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Managing Co-creation Design: A Strategic Approach to Innovation

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Co-creation offers firms and their network of actors significant opportunities for innovation, as each actor offers access to new resources through a process of resource integration. However, despite the significant advantages that co-creation can offer, there is surprisingly little research providing a strategic approach for identifying the most advantageous co-creation opportunities, especially when many possible options are available. Recently, scholars have called for research that develops tools and processes related to co-creation. This study addresses these priorities, making two contributions. First, in contrast to previous work considering co-creation more generally, or focusing on one specific form only, e.g. co-production, this paper offers a detailed and granular approach to co-creation design. A co-creation design framework is developed, which incorporates multiple design dimensions and categories that can reveal new co-creation opportunities. Second, the research extends the application of a design approach, specifically within the context of co-creative activities. The authors use field-based research with senior executives to develop a framework that includes key co-creation design elements. A morphological approach is used to explore how a lead firm can identify attractive co-creation opportunities. An innovation solution in one organization provides an illustration of how the co-creation design framework can be applied.

Introduction

Co-creation offers significant potential for managers wishing to improve their innovation capabilities. From an organization's perspective, co-creation can enhance its innovation processes (Nambisan, 2002) and is the key to unlocking new sources of competitive advantage (Prahalad and Ramaswamy, 2004). Lee, Olson and Trimi (2012) undertake a broad coverage of co-creation and co-innovation, highlighting the importance of engagement, co-creation and creating compelling experiences in value creation. From a customer's perspective, interaction with a firm allows co-creation of their consumption experiences (O'Cass and Ngo, 2011), enhancing customers' brand experiences (Nysveen, Pedersen and Skard, 2012) and strengthening valued relationships (Payne and Holt, 2001).

Co-creation benefits include: enhanced engagement of employees (Hatch and Schultz, 2010); better supply chain integration (Jüttner, Christopher and Godsell, 2010); improved shareholder commitment (Madden, Fehle and Fournier, 2006); and knowledge sharing with competitors (Kohlbacher, 2007), which occurs especially in 'co-opetitive' contexts, providing major benefits, but also creating risks (Ilvonen and Vuori, 2013). Scholars agree that co-creation research is important, especially in investigating how co-creation offers new opportunities for enterprises (e.g. McColl-Kennedy *et al.*, 2009; Prahalad and Ramaswamy, 2004).

Despite growing interest in co-creation, scholars call for more work in this important area of

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research. A recent article in *BJM* suggested that the literature ignores studies that 'enable' or 'build in' aspects of co-creation to the service delivery process (Osborne and Strokosch, 2013), advocating a 'design' imperative (Pacenti and Sangiorgi, 2010). Barczak (2012) highlights the need for research on 'What tools and processes enable effective cocreation' (p. 356), encouraging work on practices for collaborating with partners. Similarly, the Marketing Science Institute (MSI) (2014, p. 11) highlights the need to identify 'What is the value of alternative sources of insight generation to drive innovation' in co-creation and 'How can design be infused in product and service development?' Scholars recognize the substantial advantages that co-creation can offer, yet there is little research that addresses 'How firms can purposefully identify co-creation opportunities'. Recent work considers the co-creation process (Hoyer *et al.*, 2010; Payne, Storbacka and Frow, 2008; Prahalad and Ramaswamy, 2004), but this work does not offer a detailed exploration of the specific dimensions and categories that are important in co-creation design.

In this paper, we adopt the definition of co-creation advanced by Perks, Gruber and Edvardsson (2012): 'Co-creation involves the joint creation of value by the firm and its network of various entities (such as customers, suppliers and distributors) termed here actors. Innovations are thus the outcomes of behaviors and interactions between individuals and organizations' (p. 935). These authors note that innovation is a valuable potential outcome of the interactions and encounters with actors involved in co-creation. However, other valuable outcomes, such as enhanced customer insights through knowledge sharing (e.g. Schreier, Fuchs and Dahl, 2012), are also possible.

Co-creation design is a purposive process that can be viewed as being distinct from other related concepts, including: the outcome of routine joint value creation (Vargo and Lusch, 2004, 2008); open innovation (Chesbrough, 2003); crowdsourcing that focuses on sharing innovative ideas (Howe, 2009); and prosumption that focuses on the production of the core product (Tapscott and Williams, 2008). We view co-creation as a particular form of open innovation, concurring with Barczak (2012) and Van Stiphout (2010), who list co-creation as a category within open innovation.

This paper examines co-creation from a design perspective. Recent discussion of design thinking argues for bringing together designers' principles, approaches, methods and tools to assist in problem-solving (Brown, 2008). This human-centred approach relies upon learning through experimentation and is particularly suited to the design of innovations (Liedtka, 2014). This paper develops a strategic framework for co-creation design, exploring how a design approach can assist a firm with identifying new co-creation opportunities. In common with recent work on co-creation (Payne, Storbacka and Frow, 2008; Perks, Gruber and Edvardsson, 2012), the perspective of the lead firm within a network is adopted.

This research makes two important theoretical contributions: first, it provides a detailed, granular perspective of co-creation; and, second, it adopts a design approach to assist in identifying new co-creation opportunities. These contributions address significant deficiencies in current knowledge: specifically, how can a firm integrate specific resources of selected actors with its own resources, and design new co-creation initiatives? Resource integration involves a process of ongoing combination of resources by actors (resource integrators) in co-creating value (Kleinaltenkamp *et al.*, 2012; Vargo and Lusch, 2011). The managerial contribution of this paper is a response to Prahalad's (2004) call for new building blocks for co-creation.

This research develops a structured framework that enables managers to identify and evaluate co-creation opportunities. Previous frameworks addressing co-creation (Jaakkola and Hakanen, 2013; Saarijärvi, Kannan and Kuusela, 2013), innovation (Lichtenthaler, 2011) and new product development (NPD) (Alam, 2002; Brockhoff, 2003) provide some guidance in terms of dimensions that may be important. However, they do not offer a detailed co-creation framework to identify key dimensions and categories that can assist firms design new opportunities for innovation.

This paper is organized as follows. First, we review relevant the extant literature on co-creation and design. Second, we describe the research method, which involves field-based research with groups of senior executives from eight large enterprises. Third, we explain the development of the framework, identifying important dimensions of co-creation and specific categories within these dimensions. Fourth, we illustrate how one of the firms participating in this research developed an

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innovative new solution using the co-creation design framework. Finally, we discuss the contribution of this research, consider managerial implications, explain the limitations of the study, and suggest further research opportunities.

Review of relevant literature

Within the substantial research on co-creation, scholars have recently reviewed the literature (Galvagno and Dalli, 2014; Ranjan and Read, 2014). In this section, we do not repeat these extant reviews, but address the literature that relates specifically to this study. We first consider the literature relating to innovation and user involvement and then discuss the two primary dimensions of co-creation identified by Ranjan and Read (2014): co-production; and other aspects of co-creation relating to value-in-use. We review these dimensions with an emphasis on recent developments, including identifying the gaps in the literature motivating this research. In a later section, which presents the co-creation design framework, we consider further literature that specifically relates to the co-creation design dimensions in the framework.

Overall innovation and user involvement in new products and services

Early studies relevant to the concept of co-creation focused on user involvement in major process innovation (e.g. Freeman, 1968). Bogers, Afuah and Bastian (2010) provide a detailed literature on users as innovators, while Greer and Lei (2012) review a broader range of interdisciplinary literature that addresses collaborative innovation. These reviews identify von Hippel (1976) and his colleagues as major contributors who examine the role of users as innovators and NPD (e.g. Herstatt and von Hippel, 1992; von Hippel, Thomke and Sonnack, 1999). Customers engage in a range of NPD activities including product design, testing and support (e.g. Nambisan and Baron, 2009). Related concepts, including open innovation (Chesbrough, 2003) and crowdsourcing (Howe, 2009), form part of this literature. However, as noted above, following Barczak (2012) and Van Stiphout (2010), we view co-creation as a particular form of open innovation.

Co-production

The first of the two major co-creation dimensions identified by Ranjan and Read is co-production, which involves customer participation and engagement of the customer base.

Customer participation. Early work proposed that the consumer would become a 'producer' (McLuhan and Nevitt, 1972), later termed a 'prosumer' (Tofler, 1980). During the 1990s, interest grew in the concept of customer as co-producer (e.g. Grönroos, 1990; Pine, 1999; Wikström, 1996). Ramirez (1999) explores the intellectual origins of coproduction. Co-production involves customers taking an active role in producing goods and services, e.g. customers assembling furniture they purchase from IKEA, and using photography shop equipment to enhance their photographs (Bendapudi and Leone, 2003). Subsequently, others have explored consumer participation in coproduction (e.g. Etgar, 2008; Humphreys and Grayson, 2008; Troye and Supphellen, 2012). Co-production is generally viewed as a component of co-creation with the term referring to customer participation in the development of the core offering (Vargo, 2008).

Engaging the customer base and new customer value. Scholars including Prahalad and Ramaswamy (2000) and O'Hern and Rindfliesch (2010) emphasize the evolution of customers from 'passive audiences' to 'active players'. With this evolution, the role of customer-to-customer and customer-to-enterprise interactions has become increasingly important in generating new co-created customer value. The rise of social media has further augmented the role of customer and brand communities (e.g. Cova, Kozinets and Shankar, 2007; Schau, Muniz and Arnould, 2009; Schouten and McAlexander, 1995), with customers and firms collaborating in personalized co-created value.

Co-creation relating to value-in-use

The second co-creation dimension involves collaborative value-in-use activities that enhance customer lifetime value (Payne and Frow, 2005). Co-creation has attracted substantial recent interest, with scholars adopting many different perspectives. Among this considerable body of

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research, we now consider a number of key areas relevant to this current work.

Co-creation actors involved. Recently, scholars have called for extending the focus of co-creation to include a wider range of stakeholders, or 'actors' (e.g. Spohrer *et al*., 2008). Other scholars (Driessen and Hillebrand, 2013; Wind and Mahajan, 1997) also highlight the importance of integrating multiple actors extending the range of co-creation opportunities (Gummesson and Mele, 2010). These considerations regarding multiple actors, together with various identifiable forms of co-creation noted above, increase the scope of potential value chain activities and efficiencies.

Value chain efficiency. Regarding co-creation activities that can improve value chain efficiency, co-production has possibly attracted the greatest research interest. However, Vargo and Lusch (2006) raise the issue of co-creating all marketing mix elements, and Sheth and Uslay (2007), pointing to the complexity of co-creation options, briefly speculate on a further set of co-creation activities, including co-conception, co-design, co-production, co-promotion, co-pricing, co-distribution, co-consumption, co-maintenance, co-disposal and co-outsourcing; however, they do not explore these activities further.

Network economies and service systems. Ramaswamy and Gouillart (2010) point out that a core principle of co-creation is engaging people in creating valuable experiences together, while enhancing network economies. Work by Vargo and Lusch (2004) inspired much greater attention on service systems, networks and service ecosystems (e.g. Cantù, Corsaro and Snehota, 2012; Cova and Salle, 2008; Edvardsson, Tronvoll and Gruber, 2011; Gummesson, 2008; Jaakkola and Hakanen, 2013; Romero and Molina; 2011; Spohrer *et al*., 2008). This work contributes to the service system perspective and discussions of co-creation as a dynamic process contributing to the well-being of an ecosystem. A key feature of network economies is that value resides in the network of company relationships, rather than in its internal assets (Kelly, 1998).

New business models. Co-creation changes the locus of value creation from inside the company to collaborative interactions that lie beyond the firm boundaries. This perspective requires new business models, identifying the practices that assist a firm in coordinating those interactions that lead to an increase in resource density across multiple actors (Nenonen and Storbacka, 2010; Storbacka *et al*., 2012). Co-creation can lead to new distinctive business models defined as 'the design or architecture of the value creation, delivery and capture mechanisms' (Teece, 2010, p. 191). Business model design themes and principles (Zott and Amit, 2010) set out ways by which resources are configured and capabilities utilized. Although helpful in identifying the coordinating role of business models, previous discussions do not sufficiently address business models for purposeful co-creation design.

Design approaches and research questions

A design approach has contributed to a number of areas, including product development (Luchs and Swan, 2011), customer environments (Nambisan and Baron, 2009) and servicescapes (Lee, 2011). One key perspective involves design as a problem-solving activity (Buchanan, 1992) addressing 'wicked problems' that do not have a single solution and require a creative contextualization to shape a solution. However, scholars are largely silent regarding the provision of a design approach that incorporates a full spectrum of co-creation activities. Detailed understanding of the nature of co-creation activity and improvements in firms' abilities to design offerings can identify new opportunities for co-creation.

As Grönroos and Ravald (2011) and Perks, Gruber and Edvardsson (2012) note, the topic of co-creation within the context of innovation needs more research, as the current level of abstraction is too remote from theoretical insights and practical application. Unlike previous studies of co-creation in NPD that focus on consumers (Hoyer *et al*., 2010), or on micro-level processes (Perks, Gruber and Edvardsson, 2012), this study examines co-creation design from the perspective of the lead firm by considering multiple actors and macro-level design. Building on these observations, our research questions are: (1) What are the key components of co-creation; and (2) How do these components fit together to form a design framework for identifying co-creation opportunities? In the section that follows, we explain the

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research method, which involves selection of companies and participants within them, that are used in our field-based research aimed at addressing these research questions.

Research method

Firm sample selection

This study uses a purposive sample of companies (Miles and Huberman, 1994), which involves selecting information-rich firms manifesting the phenomenon of interest (Patton, 2002). Following Eisenhardt's (1989) recommendation of examining four to ten examples as a basis for generalization and given the resources required for managing a substantial number of executives from different companies over the relatively long duration of the planned project, the researchers sought participation from six to ten companies for this research. The criteria for identifying suitable companies to participate in this research included: (a) current or proposed engagement in co-creation design; (b) a mix of innovative firms operating in the business-to-business (B2B) and the business-to consumer (B2C) sectors, or both; and (c) coverage of a range of industries.

The researchers developed an initial list of 53 companies that met these criteria, using relevant literature, lists of companies noted for their innovation and relevant companies where the research team had contacts. The researchers recognized that the companies identified may differ in their definition of co-creation, or use alternative words to explain this concept. Therefore, before approaching the companies, the researchers developed a briefing document that broadly explained the topic of co-creation and the planned research process. Care was taken not to introduce bias into the research, with the briefing document discussing the concept and potential outcomes in general terms and not providing a detailed conceptualization of co-creation. Eight companies, representing a broad range of industry sectors, agreed to participate in the research. Table 1 provides details of the companies participating, including details of their industry diversity, sales turnover, geographic scope and type of customer relationships.

Participant involvement

Lynham (2000) recommends that executives who expect to use a theory should play a crucial role in defining the content of the underlying theoretical model; a position supported by Reibstein, Day and Wind (2009). Over several months the researchers discussed participation in the study with each company. The majority of these discussions involved personal meetings, while a limited number were conducted by telephone. With the assistance of the primary company contact, four criteria were used to select participants: senior managers with at least five years' relevant experience, e.g. managed an innovation project; involved in co-creation or expressed a strong personal interest in co-creation; identified as a 'reflective practitioner' (Gummesson, 2008; Schön, 1983) by the primary contact in the firm; and a willingness to participate in the research. The selected participants were all senior executive vice-presidents or their direct reports, with between 10 and 35 years of industry experience. These managers included executives responsible for business development, strategy, R&D or external partnerships. A total of 29 senior executives were involved in intensive research workshops, with between three and four representatives from each of the eight firms.

Table 1. Profile of companies participating in research process

Firm	Industry	Sales (US$)	Geographical scope	Customer relationships
A	Media	$100 m–$1 bn	Europe	B2C and B2B
B	Finance	$100 m–$1 bn	Europe (one country)	B2C and B2B
C	Fast-moving consumer goods	over $1bn	Europe and Russia	B2B2C
D	ICT services	over $1bn	Global	B2B
E	User interface design	under $100 m	Europe and North America	B2B
F	Telecom devices	over $1bn	Global	B2B2C
G	Software	$100 m–$1 bn	Global	B2B
H	High-tech instruments	$100 m–$1 bn	Global	B2B

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Research approach

The study engaged these senior executives in the development of the co-creation design framework using an abductive research approach. An abductive approach is highly suited to design research (Martin, 2009), where the objective is related to innovation (Leavy, 2010). It is used both by scholars (e.g. Aarikka-Stenroos and Jaakkola, 2012; Cova and Salle, 2008) and by acknowledged co-creation leaders (e.g. Lafley and Charan, 2008). Abductive research is characterized by a non-linear, iterative process of systematic combinations and inference that matches theory with reality (Dubois and Gadde, 2002). The aim of abductive research is to combine data-gathering with analysis, comparing the evolving co-creation framework with existing literature-based theory, and using evidence and experiences from a number of interventions. Abductive inquiry is particularly appropriate when pursuing theory development, i.e. refining existing theories rather than inventing entirely new ones (van Echtel *et al*., 2008). The research process, undertaken over nine months, permitted a reflective process between workshops that is characteristic of abductive research.

The structure used to develop a co-creation design framework is a morphological method (Ritchey, 2006, 2012). Morphological analysis (MA) represents a method of investigating relationships contained in multidimensional, usually non-quantifiable, problems. The MA method entails identifying and defining the most important dimensions pertinent to a situation or problem. Each dimension is then categorized into a range of possible and relevant categories. Together, these dimensions and their categories make up a morphological field. Selecting suitable categories from each relevant dimension creates a viable 'morphotype', or a 'morphological field' configuration, which is a specific solution to the issue under study. In the context of developing a co-creation design framework, MA facilitates linking central dimensions and categories related to co-creation and forming patterns of discrete co-creation opportunities, which can then be tested for their feasibility and utility.

Despite a growing literature on co-creation, the authors could not identify any scholarly research that applies MA to co-creation design. Searches in the managerial literature found only one short practitioner article that considers MA in a co-creation context (Bartl, 2009). We conclude that the systematic appraisal of unique combinations in MA represents a particularly suitable approach for addressing problems such as co-creation design.

Research process

The research process included a series of facilitated workshops designed to engage the senior executive participants in a focused exploration of co-creation and its key components. Interviews and a facilitated workshop process were chosen, rather than the conventional Delphi method. This approach was used because we wished to facilitate immediate feedback, assist 'the efficient flow of information' and we did not want to restrict the ability of participants to interact with each other (Linstone and Turoff, 2002). The approach avoided limitations associated with the Delphi method (Linstone and Turoff, 2002). The research process consisted of three phases, shown in Figure 1. Each intervention phase was interactive and iterative (e.g. Coughlan and Coghlan, 2002) and employed the abductive approach outlined above. Each phase included a research workshop with the managers, who contributed to the process of developing, refining and/or amending the framework for co-creation design. The first two phases were concerned with framework development, while the third phase was concerned with finalizing the co-creation design framework and its application within the firms.

Phase 1: Research planning and exploration of co-creation dimensions

The aim of this phase, and the following phases, was to identify and refine the key dimensions and the categories within them that constitute a morphological field for co-creation design. At the start of the phase, the researchers developed some broad parameters of a framework for co-creation design based on an extensive literature review, which combined insights from the innovation, NPD, design, and strategy literatures. The researchers then conducted 85–130-minutes interviews with 26 executives from the firms. The discussion guide addressed: exploration of current understanding of 'co-creation'; a description of current and potential co-creation activities; and a consideration of conceptual tools. These interviews were analysed to enrich the output

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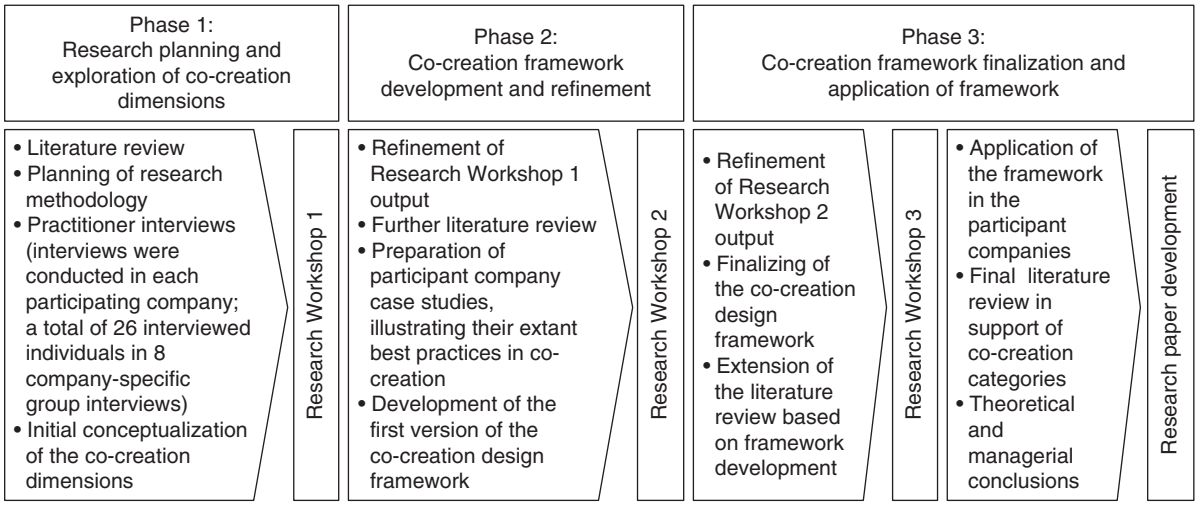

Figure 1. Research process

of the literature review and followed the approach suggested by Spiggle (1994). This analytical process, which continued across the three phases of the research, included: categorizing (labelling the data into emergent categories); abstracting (combining emergent categories into higher-order categories); comparison (identifying similarities and differences in the emergent categories); dimensionalizing (identifying the properties of each category); integrating (combining the categories into a framework); refutation (eliminating redundant categories, based on agreed criteria); and iterating (moving iteratively between the various analytical stages).

The output of this analysis was used in the first research workshop, which focused on identifying co-creation dimensions relevant to the firms' existing and potential co-creation activities. Following a detailed briefing session regarding workshop aims, the participant groups considered their firms' co-creation practices using a structured process, reporting their discussions under several categories, including: a description of their existing co-creation practices; ideas for new co-creation initiatives; and their views on key co-creation dimensions. The synthesis of this material formed a crucial input into the next phase.

Phase 2: Co-creation framework development and refinement

An analysis of the output of the first research workshop confirmed that the firms were frequently using some forms of co-creation (e.g. co-design and co-production) with customers and suppliers. Much less frequently, the firms considered other forms of co-creation and with a broader range of actors. However, when asked to consider further forms of co-creation, the managers identified new opportunities. Similarly, managers reported that they had often not considered co-creation motives, or an appropriate platform for co-creation. Based on this analysis, a first version of a co-creation design framework was developed and refined further during the second research workshop. This first version incorporated key elements including: co-creation motives, co-creation forms, engaging actors and engagement platforms. However, the categories within each of these dimensions remained underdeveloped, and the level of engagement and duration of engagement dimensions were not considered.

During the second workshop, the dimensions were further developed, resulting in an initial version of the co-creation design framework. From the original set of ten dimensions, the participants identified six dimensions as being the most relevant to their current and potential co-creation activities. (The excluded dimensions are discussed in Appendix 1.) The managers were asked to consider the most applicable co-creation dimensions and their categories: first in their company groups, and then these outputs were summarized for the entire group of workshop participants. Where the dimensions and categories overlapped, the researchers asked the managers to identify an illustration of each, based on their own

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experience. Using this process, the researchers ensured that the dimensions and categories within the final framework were distinct and relevant. The groups recorded the output of their discussions and compared their refined list with all participants. The result of this collaborative and iterative process was a further version of the design framework. Data that had previously been coded using the four excluded dimensions was re-coded using the six dimensions.

The final six dimensions that were identified, each of which have substantial support from the extant literature (detailed in the following section), are: co-creation motive; co-creation form; engaging actor; engagement platform; level of engagement; and duration of engagement.

Phase 3: Co-creation framework finalization and application

In the framework finalization and application phase, the researchers synthesized the output from the second workshop. During the third research workshop, the researchers and managers reviewed and reached agreement on a final version of the framework. This process involved the display of the co-creation design framework, and managers describing the relevance of categories, their dimensions and their concurrence on the framework's appropriateness. Participants were then briefed on applying the co-creation design framework to address a specific complex business challenge where co-creation could provide an innovative solution in the context of their own firms. Later, we describe the application of the framework within one participating company.

The interactive research workshops, meetings and interviews, together with the literature review, allowed iterative refinement of the co-creation dimensions and the categories within them. The process was guided by: (1) compatibility with the purpose of the research, i.e. assisting a lead firm to identify and design promising co-creation opportunities; (2) compatibility with the guidelines of MA, i.e. including only 'the most important dimensions of the problem complex to be investigated' (Ritchey, 2006, p. 796), as assessed by the reflective practitioners; and (3) selecting only those dimensions and categories within them that are applicable for the majority of industries and business contexts relevant to both the managers' businesses and industry more generally.

The co-creation design framework

Table 2 shows the final co-creation design framework that was developed from the research process. The framework is represented as a morphological field for co-creation design. Each of the six co-creation design dimensions contains specific categories identified according to the criteria outlined above. In order to follow the guidelines of MA, the researchers guided the managers to strive for distinct, as opposed to continuous, categories. Distinctiveness was addressed from the focal firm viewpoint: e.g. all categories under the dimension 'co-creation motive' can be perceived as possible strategic motivations for co-creation. However, it should be noted that the MA approach enables multiple categories to exist concurrently. For example, within the dimension 'co-creation motive' in Table 2, the categories of decreasing cost and enabling self-service may both occur simultaneously.

As a co-creation design tool, the lead firm can use the proposed framework to identify viable co-creation alternatives, by forming different morphotypes and choosing suitable categories from relevant co-creation dimensions. We now explain the dimensions and the categories within them in more detail, drawing on relevant supporting literature.

Motives for co-creation

A starting point for the designing firm, which will drive other design aspects, is the organizational motive(s) for engaging in co-creation activities. Despite some studies that explore the motives for co-creation from the perspective of the customer (e.g. Fuller, 2010), detailed investigations from the perspective of the lead firm appear to be lacking in the literature. Some studies point to specific individual motives; however, research neglects to offer a holistic categorization of different types of motives from this perspective. From the literature review, workshops with executives, and interviews and meetings within the firms participating in the research, we identified the following nine motives for co-creation.

(1) *Access to resources*: This motive is discussed in the context of networks (e.g. Fryberg and Jüriado, 2009) and resource integration (e.g. Vargo and Lusch, 2008). Outsourcing studies

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Table 2. Co-creation design framework

	Dimensions					
	Co-creation motive	**Co-creation form**	**Engaging actor**	**Engagement platform**	**Level of engagement**	**Duration of engagement**
Categories	Access to resources	Co-conception of ideas	Focal firm	Digital application	Cognitive	One-off
	Enhance customer experience	Co-design	Customer	Tool or product	Emotional	Recurring
	Create customer commitment	Co-production	Supplier	Physical resources, spaces/events	Behavioural	Continuous
	Enable self-service	Co-promotion	Partner	Joint processes		
	Create more competitive offerings	Co-pricing	Competitor	Personnel groups		
	Decrease cost	Co-distribution	Influencer			
	Faster time to market	Co-consumption				
	Emergent strategy	Co-maintenance				
	Build brand awareness	Co-outsourcing				
		Co-disposal				
		Co-experience				
		Co-meaning creation				

also suggests the motive is important in co-creation (e.g. Holcomb and Hitt, 2007).

(2) *Enhance customer experience*: This motive is proposed in relation to differentiation strategies (Pine and Gilmore, 1999) and customization (Berger *et al*., 2005).

(3) *Create customer commitment.* The study identified research investigating customer commitment as a motive (e.g. Gentile, Spiller and Noci, 2007; Ogawa and Piller, 2006).

(4) *Enable self-service*: This motive is discussed in relation to its impact on customer experience (Weijters *et al*., 2007), especially in the context of self-service technologies (Parasuraman and Colby, 2000).

(5) *Create more competitive offerings*: Some research suggests that customer involvement enhances co-design and co-conception (Carbonell, Rodriguez-Escudero and Pujari, 2009), resulting in more competitive products. Scholars highlight how collaboration within a network impacts favourably on competitive success (Snow *et al*., 2011).

(6) *Decrease cost*: The desire to reduce costs can lead to actor collaboration, especially in co-production of the core product (Bendapudi and Leone, 2003). This motive may sometimes result in self-service solutions.

(7) *Faster time to market*: Some co-creation, including open innovation ideas, can lead to

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speedier development and therefore a reduced time to create and launch new products. This motive is discussed in terms of developing capabilities (De Luca and Atuahene-Gima, 2007).

(8) *Emergent strategy*: This motive is apparent in the effectuation literature (e.g. Read *et al.*, 2009). When faced with an uncertain operating environment, some firms opt for non-predictive, evolving strategies, in which co-creation with other actors occurs.

(9) *Build brand awareness*: Co-promotion can result in creating and shaping brands, e.g. in brand communities (Schau, Muniz and Arnould, 2009). Strategic alliances between network partners can form 'hybrid marketing systems' that also promote brands (Wind, 2006).

Co-creation forms

Building on Sheth and Uslay (2007) and Vargo and Lusch (2006), Frow and Payne (2013) identify 12 specific forms of co-creation. They argue for the benefit of an approach that considers co-creation at a more granular level, but these latter authors do not address the other dimensions of co-creation

We use these forms in the co-creation design framework, which include: (1) co-conception of ideas (e.g. crowd-sourced solutions at InnoCentive); (2) co-design (e.g. customization of Dell Computers); (3) co-production (e.g. DIY clinics at Home Depot); (4) co-promotion (e.g. Harley Davidson brand community); (5) co-pricing (e.g. pay-what-you-want restaurants); (6) co-distribution (e.g. Unilever's use of 'last mile' local women distributors in India); (7) co-consumption (e.g. Wet Seal's online users); (8) co-maintenance (e.g. Tesco customer engagement for trolley recovery); (9) co-outsourcing (e.g. Apple's co-outsourcing of 'apps'); (10) co-disposal (e.g. technology companies' recycling initiatives); (11) co-experience (e.g. adventure holidays); and (12) co-meaning creation (e.g. on-line gamers' shared meanings within a virtual world). Although this list encompasses a substantive set of potential co-creation forms, Frow and Payne (2013) acknowledge that, in the future, new forms of co-creation may emerge; these authors also point out that one form of co-creation may exist alongside others.

Engaging actor

Based on our conceptualization of co-creation, all forms of co-creation require two or more actors. The lead actor focuses on a co-creation solution, involving specific forms of co-creation and relevant actors. We draw on the relationship marketing literature to identify five relevant actor groupings, combining two models (Payne, Ballantyne and Christopher, 2005; Ross and Robertson, 2007), reflecting the need for comprehensive and flexible approaches to categorizing actors (e.g. Malhotra and Agarwal, 2002). The five broad actor categories in the framework, which can then be further sub-divided, include (1) customers (upstream actors), (2) suppliers (downstream actors), (3) partners (collaborators for any types of exchange), (4) competitors (actors with a similar offering), and (5) influencers (indirect collaborators such as media, government and regulatory bodies).

Engagement platform

Effective co-creation typically requires an engagement platform (Ramaswamy and Gouillart, 2010) that enable actors to share their resources and adapt their processes to each other. In some instances, the co-creation platforms are part of the lead firm's offering itself. Examples include Adidas' and Nike's engagement platforms for co-designing athletic shoes. In contemporary research, the term 'platform' is most commonly used to denote broad systems enabling innovation (e.g. Zahra and Nambisan, 2011), or technical platforms such as Apple's iOS or the Android platform. In this study, engagement platform is considered as a resource for enabling efficient and effective co-creation. Usually, an engagement platform is intentionally brought to the co-creation context by the lead actor. We identify five types of engagement platforms: (1) digital applications, such as websites that extend the reach and speed of interactions with multiple and diverse actors (Sawhney Verona and Prandelli, 2005); (2) tools or products used on a recurring or continuous basis as a device to connect actors (e.g. software companies providing software developer toolkits); (3) physical resources, where collaborators come together occasionally for mutual benefit, to share and enhance their knowledge (e.g. retail formats such as Apple stores); (4) joint

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processes involving multiple actors (e.g. P&G's 'connect+develop' innovation initiative); and (5) dedicated personnel groups, such as call centre teams.

Level of engagement

An actor's level of engagement is context dependent (Brodie *et al*., 2011) and is embedded in the social, cultural and political context (Vibert and Shields, 2003). The intensity of a specific interaction lies on a continuum of cognitive, emotional and/or behavioural engagement, which may range from 'non-engaged' through to 'highly engaged' consumers (Patterson, Yu and de Ruyter, 2006). The three categories for level of engagement identified in the present research follow Macey and Schneider (2008): (1) cognitive engagement, when the actor cognitively acknowledges and provides his/her resources to the lead actor and/or its offering; (2) emotional engagement, when the actor is committed and willing to invest and expend discretionary effort in engaging with the lead actor and/or its offering; and, (3) behavioural engagement, when, given a specific frame of reference, the actor changes his/her behaviour, because of the lead actor and/or its offering.

Duration of engagement

Co-creation varies in terms of duration (Fuller, 2010) including the duration of both an interaction and the collaborative relationship. Actors participating in co-creation over an extended time will have more at stake in maintaining their relationship than those with limited participation (Wasko and Faraj, 2000). Three categories of duration are identified: (1) one-off interactions; (2) recurring interactions; and (3) continuous interactions. Selecting an appropriate category of duration for designing the co-creation initiative is important in terms of issues such as selection of an appropriate channel and the allocation of resources. One-off interactions may typically occur in a single channel, whereas continuous interactions may benefit from multiple channels that support continued interaction.

Assessment of co-creation options

This research focuses on how the lead firm can identify and design new co-creation opportunities. Successful co-creation requires recognition of the critical importance of configuring appropriate co-creation platforms, offering a key opportunity to achieve 'difficult to imitate' competitive advantage. For example, Apple's online app store (a 'digital' engagement platform) provides over 750,000 'apps', and its software development kit (a 'tools' platform) makes it easy for developers to create new apps (Ramaswamy and Ozcan, 2014). Apple has not only built digital and tool engagement platforms that are difficult to imitate, it has also created a highly differentiated retail store (a 'physical resource' platform) involving design that facilitates customer engagement with products and the renowned 'Genius Bar'.

Successful co-creation design also requires the lead firm and the co-creating actors to define the 'architecture of participation' (O'Reilly, 2003), including systems, mechanisms and processes assisting co-creative interactions. A morphological method assists in identifying the architecture of available co-creation options, which can then be evaluated, resulting in a configuration of elements that potentially fit and reinforce each other. An important task in MA is to reduce the field by analysing and selecting viable morphotypes for investigation via experienced managers completing a cross-consistency assessment (Ritchey, 2012).

Two issues affect our ability to report on framework use. First, the substantial amount of work involved in co-creation design and execution meant most of the companies have not yet progressed fully with implementation. Second, although the companies involved in the research were willing to participate in framework development, those that had advanced their own co-creation initiatives were, with one exception, unwilling to share what they considered proprietary and confidential information.

Application of the co-creation design framework: an example

Many conceptual frameworks do not show how executives might use them (Payne and Frow, 2014). Responding to this concern, we now illustrate how one company participating in the research, Vaisala Corporation, applied the co-creation design framework to their business. The purpose of providing this illustration is to

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Founded in 1936, the Vaisala Corporation is a global company headquartered in Helsinki, Finland. The company is a highly innovative global market leader in the areas of environmental and industrial measurement. It provides observation and measurement products and services for customers in meteorology, weather-dependent businesses and controlled environments in 140 countries. Vaisala is listed on the NASDAQ OMX Helsinki Stock Exchange and, in 2013, generated sales of US$375 million. The company has a long history of creating industry-transforming innovations from a technological superiority point of view and driving pioneer advancements in the market. Specific innovations include: radioactivity monitoring at the crippled Fukushima nuclear power plant in Japan; automatic weather sensing stations at the Machu Picchu World Heritage Site in Peru; containing wind risk on the highly exposed trains of Canadian Railways; and a tsunami warning system in Chile.

Vaisala's Road Solutions Business Unit serves road authorities globally with complete weather observation, traffic counting on highways, and other advisory services. These products and services support operational decision-making, optimizing traffic management and road maintenance operational efficiency and ensuring safety. Road safety is essential for logistics, especially in extreme winter conditions; for example, in the US, one of Vaisala's most important markets, there is an annual average of over 1,500,000 vehicle crashes and 7130 fatalities due to adverse weather. Vaisala used the co-creation design framework in their Road Solutions Business Unit, bringing together several key actors to develop an innovative solution to address problematic and dangerous road conditions.

Figure 2. Vaisala Corporation: company background

demonstrate how this framework provided Vaisala with a design approach for solving a complex issue, through combining multiple dimensions and categories to create a new innovation. Details of Vaisala's company background are shown in Figure 2.

Vaisala used the co-creation design framework to develop a new decision-support system solution, tailored to assist the road maintenance and traffic control of their customers, especially during adverse weather conditions. The company concluded that the solution required a decision-support system enhanced with a number of additional innovative features, including weather sensors, mobile measurement, as well as additional innovations relating to maintenance, control, meteorology, consultation and visualization. In order to conceptualize and plan for such a complex solution, Vaisala required a new approach to assist in identifying an optimal design for its co-creation initiative. The application of the co-creation design framework outlined above provided the company with a structured approach for developing an innovative new solution to real-time preventative road maintenance. Following contemporary representations of MA (e.g. Trias de Bes and Kotler, 2011), Table 3 illustrates Vaisala's use of the co-creation design framework to create a new solution for real-time preventative road maintenance. Drawing on the 'morphotype' represented by the highlighted parts of this table, we now explain how Vaisala applied the framework.

Vaisala's co-creation motives

The main motives for Vaisala to engage in co-creation were to: access the resources of its partners; create more competitive offerings; and attain a faster time to market. Vaisala has over 75 years' experience in innovating and producing measurement equipment and related services. However, the concept of a real-time preventative road maintenance solution required Vaisala to integrate entirely novel components into its offering, such as data-hosting, tailored user interfaces and meteorological services. Vaisala needed partners to engage in co-creation in order to acquire these offering components, as the development of such services and products was far too time-consuming, challenging and costly for the company to undertake in-house. Successful co-coordination of these providers and their offerings, into an integrated decision-support system, would result in generating considerable benefit for customers and create a highly sophisticated offering without any direct competitors.

Co-creation forms and engaging actors

While Vaisala has extremely close customer relationships and a deep understanding of their requirements; the company needed new co-creation partners to design an innovative real-time preventative road maintenance solution. The company identified the following six main actors, representing key suppliers and partners, to engage

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Table 3. Vaisala co-creation solution – real-time preventative road maintenance

	Dimensions					
	Co-creation motive	**Co-creation form**	**Engaging actor**	**Engagement platform**	**Level of engagement**	**Duration of engagement**
Categories	**Access to resources**	Co-conception of ideas	**Focal firm**	**Digital application**	**Cognitive**	**One-off**
	Enhance customer experience	**Co-design**	Customer	**Tool or product**	Emotional	Recurring
	Create customer commitment	**Co-production**	**Supplier**	Physical resources, spaces/events	**Behavioural**	**Continuous**
	Enable self-service	Co-promotion	**Partner**	**Joint processes**		
	Create more competitive offerings	Co-pricing	Competitor	Personnel groups		
	Decrease cost	Co-distribution	Influencer			
	Faster time to market	Co-consumption				
	Emergent strategy	**Co-maintenance**				
	Build brand awareness	Co-outsourcing				
		Co-disposal				
		Co-experience				
		Co-meaning creation				

with in co-creation: (1) a developer of mobile measurement equipment; (2) a producer of mobile measurement equipment; (3) a provider of a platform for mobile measurements (i.e. the national postal authority's fleet of trucks to which mobile measurement equipment can be fitted); (4) data-hosting service providers; (5) providers of meteorological services; and (6) a designer of a decision-support system user interface. Vaisala engaged with these actors in identifying a number of specific forms of co-creation. The solution involved co-design with the developers of the mobile measurement equipment and the designers of the user interface. The collaborative activities of Vaisala, the producers of the mobile measurement equipment, providers of the mobile measurement platform, data-hosting providers and the meteorological service providers represent examples of co-production. Further, the providers of the mobile measurement platform engage as co-maintenance partners.

Vaisala's engagement platforms

Vaisala used three categories of engagement platforms to create and deliver their real-time preventative road maintenance solutions, shown in Table 3. A joint process for R&D facilitated co-creation with the co-design partners (i.e. developers of mobile measurement systems and

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designers of the user interface). Similarly, the joint process for production and logistics planning facilitated co-creation with the producer of the mobile measurement equipment. Further, the physical product (the mobile measurement equipment installed on trucks and other vehicles) permits co-creation with the mobile measurement platform provider. The digital application platform, which enables storing and transferring the data used in customer-specific decision-support systems, served to facilitate co-creation with the remaining co-production partners (i.e. the data-hosting and meteorological service providers).

Level of engagement and duration of engagement

All partners involved in the real-time preventative road maintenance were both cognitively and behaviourally involved with Vaisala in co-designing a solution. The design of the co-creation with the 'co-design partners' (i.e. developers of mobile measurement systems and designers of the user interface) is a one-off co-creation engagement, which ends when the mobile measurement system or the user interface is ready for production. In contrast, co-creation with other partners (i.e. the co-production and co-maintenance partners) is continuous.

Strategic benefits

The application of the co-creation design framework in the context of the emerging real-time preventative road maintenance venture provided four distinct strategic benefits for Vaisala. First, the co-creation design framework helped to facilitate the 'make-or-buy' decisions regarding the various resources needed in real-time preventative road maintenance: which resources Vaisala already possessed; which could be built in-house sufficiently rapidly; and which resources should be acquired via partners. Second, the framework supported Vaisala in clarifying the roles and responsibilities between itself and its partners in the various forms of co-creation activity. Third, a more granular appreciation of the different partnerships and their characteristics aided Vaisala in understanding that it cannot apply the same relationship-management and revenue-sharing model to all partnerships involved with the real-time preventative road maintenance solution. Consequently, the framework provided a starting point for creating distinct models for engagement with each partner. Finally, the framework was an effective tool in communicating the features of the new business venture internally within Vaisala.

Discussion

The aim of this paper is to develop a co-creation design framework to assist firms in identifying new opportunities for co-creation. To achieve this aim, a field-based research process was used to identify key dimensions and categories within the framework. We undertook 'practice-relevant' research (Antonacopoulu, 2010; Reibstein, Day and Wind, 2009) aimed at generating 'actionable knowledge of direct practical value in the context being studied' (Greene and Hall, 2010, p. 138). The research was operationalized by engaging senior executives from eight companies in a design-led process. An illustration reveals how a lead firm applied this design framework to clarify strategic design choices and identify a beneficial co-creation solution. As co-creation is fundamental to the success of a company, its network and its entire service system, this co-creation design framework provides a strategically important new approach for managers to identify, organize and communicate innovative opportunities.

Our work revealed several important insights. First, the interviews with the firm managers found that, despite widespread managerial interest in co-creation and its potential benefits, such firms typically do not have a structured process for identifying co-creation opportunities. Managers mentioned varied situations that can initiate co-creation solutions: for example, involvement with one or more interested actors, or through opportunistic events (e.g. Perks, 2004), but this process was often *ad hoc*. Second, most firms have not thought about specific forms of co-creation beyond co-design and co-production. They tend to consider co-creation in terms of generating ideas for new products and services, often citing examples of activities with customers rather than considering a much broader range of stakeholders and multiple forms of co-creation. Third, in our discussions, managers typically listed one or two examples of current firm practices. However, when using the co-creation design framework, they identified many potential opportunities for co-creation in a relatively short time. They

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especially highlighted how the categories and dimensions within the design framework provide an important enabling structure to assist in the discovery of innovation opportunities.

Research contribution

Much of the literature on co-creation is at a general level and offers little guidance for in-depth exploration of opportunities for co-creation. This paper provides further understanding on how co-creation can improve resource integration. Further, this research contributes to the co-creation literature by developing a detailed framework to help firms design and manage co-creation, addressing a research gap identified by Barczak (2012) and Cottam and Leadbeater (2004). Our work follows the interaction research tradition of Gummesson (2002), who points to the value of conducting research with executives who 'play a crucial role' in examining concepts, resulting in research generation (p. 345). This research makes two specific research contributions.

First, we provide a granular view of the resource integration activity involved in co-creation. Most previous work has focused on general aspects of co-creation, and a comprehensive approach to identifying co-creation dimensions and categories within them is lacking. The co-creation design framework overcomes some of the limitations of previous approaches that provide a generalized view of the co-creation process (e.g. Prahalad and Ramaswamy, 2004; Payne, Storbacka and Frow, 2008). We offer a holistic approach, incorporating design dimensions and categories that can reveal insightful co-creation opportunities. We also address a limitation of previous frameworks within the product innovation literature (e.g. Chesbrough, 2006; Elofson and Robinson, 2007) that address only one aspect of co-creation, e.g. new co-design, without considering multiple dimensions and categories. We especially highlight the role of engagement platforms and the importance of considering different forms of co-creation. Our research identifies five categories of engagement platforms on which various network actors can participate in resource integration activities. Further, the twelve co-creation forms, when considered in conjunction with other dimensions in the framework, provide new insights into specific means of engaging in co-creation.

Second, this research contributes to the emerging literature on using a design approach within the context of innovation management. Much of the discussion on design has focused on 'lower order' topics, including symbols, images and objects (Buchanan, 2001). Brown (2008) points out that 'thinking like a designer can transform the way you develop products, services and processes' (p. 85) and assist in developing creative solutions. This view suggests a holistic process of exploring a problem and concurrently formulating a solution, instead of following sequential steps (Wylant, 2010).

We contend that applying a design approach to a more strategic 'higher order' topic, such as co-creation design, is important in management. Although a more strategic approach is identified as a highly important dimension in NPD (e.g. Kahn *et al.*, 2012), our research appears to be the first academic work that applies a 'higher order' design approach to co-creation. The design framework creates an analytical approach to help managers evaluate and choose co-creation options that offer innovation opportunities.

Limitations and further research

In this research, we adopt a discovery-oriented approach (e.g. Bendapudi and Leone, 2002), as this study appears to be the first academic work using a morphological method for co-creation design. Inevitably, the study has limitations. One limitation relates to examining co-creation from the perspective of the lead firm. However, this approach does not imply a one-way process. All the firms engaged in the study agreed on the importance of creating multi-way dialogue and engagement with a wide range of actors or stakeholders. For example, the solution developed at Vaisala Corporation involved engagement with many key actors.

A further limitation relates to the context in which the enterprises involved in the study operate. The process of co-creation is highly dependent on a number of key factors that involve: the environment (including economic, regulatory political, social and cultural issues); industry type (manufacturing versus service sectors); industry maturity (mature vs knowledge-intensive young industries); extent of industry intermediation; and organization size. These

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aspects need to be considered in future research. Other limitations also suggest interesting opportunities for further research.

First, additional research could extend this work, exploring co-creation dimensions and categories from the perspective of other actors, focusing on cross-industry comparisons, including B2B and B2C contexts, as well as studies of organizations in the not-for-profit sector. The different contexts and factors outlined in the previous paragraph should form the focus of future work, including a consideration of the relevance of co-creation dimensions and categories. A key advantage of MA is its flexibility; if required, MA readily permits inserting additional dimensions or categories in the morphological field.

Second, an important avenue for further investigation is longitudinal case study research. Co-creation initiatives in large organizations involve considerable complexity and can take substantial time to develop and implement. Our illustrative example describes a co-creation initiative that evolved over many months of discussion between the lead firm, suppliers and other actors. In-depth, longitudinal case studies will broaden and deepen understanding of co-creation design across different contexts.

Third, as Barczak (2012) notes, future research needs to identify the impact of co-creation on innovation and firm performance. However, to date, there is relatively little empirical work addressing co-creation from a performance perspective (for an exception, see Lilien *et al*., 2002).

Fourth, we propose work that investigates more fully the nature of engagement platforms, in the context of designing co-creation opportunities. For example, despite an understanding that engagement platforms evolve during co-creation, little is known about this process and the mechanisms and methods for coordinating the contributions of different actors.

Fifth, we acknowledge the call for studies of co-creation in the context of social innovation, especially those addressing innovation in public services (Osborne and Strokosch, 2013). Work in this context is limited and offers significant potential in terms of social outcomes.

Finally, we identify the topic of understanding specific benefits and rewards associated with different co-creation activities. This aspect of co-creation has also received limited attention in the literature.

In conclusion, this research provides a new strategic approach to co-creation design, offering enterprises increased opportunities for innovation within their network of potential collaborators. As innovation through collaboration forms an increasingly critical role in the success of an enterprise, a strategy of allowing co-creation to evolve in an unstructured manner may be risky. We suggest that carefully orchestrating the design of co-creation should improve the chances of enterprises' success in an increasingly complex and collaborative world.

Appendix 1: Potential co-creation dimensions excluded in research process

In addition to the six key dimensions included in the co-creation design framework (see Table 3), a number of other dimensions were considered during the research process, but were eventually excluded by the consensus of the managers, as these dimensions did not fulfil all the defined selection criteria. These omitted dimensions include:

1. *Driver of the co-creation* (with categories including: whether co-creation is initiated by the lead firm, customers or third parties). This potential dimension was excluded from the final co-creation design framework, as the purpose of this research focuses specifically on co-creation driven by the lead firm.
2. *Controlling co-creation* (with categories including: controlling who can participate in co-creation; controlling who can submit content for co-creation; and controlling who can make decisions). However, the controlling co-creation dimension was not used, as it is more relevant to the management of co-creation than the identification of new co-creation opportunities. Additionally, the managers wished to develop a framework applicable to both the B2B and B2C sectors, and they considered that this dimension could be more relevant in B2C contexts than in B2B.
3. *Degrees of freedom for other actors* (with categories including: actors that give comments; actors that participate in activity; self-service with the help of the lead actor's resources; outsourced activity). This dimension was not

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included as the fifth dimension in the final framework, level of engagement, was seen by the managers as a higher level concept covering the degree of freedom for other actors.

4. *Motivating co-creation* (with categories including: extrinsic self-oriented motivation, e.g. material rewards; intrinsic self-oriented motivation, e.g. interest/enjoyment in the task itself; extrinsic others-oriented motivation, e.g. recognition and status in the community in question; and intrinsic others-oriented motivation, e.g. helping others). This dimension was rejected for reasons similar to those for the 'controlling co-creation' dimension above, as it is more relevant to the management of co-creation than the identification of new co-creation opportunities.

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