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DESIGNING IN THE OPEN INNOVATION FRAMEWORK

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THESIS ABSTRACT

Over the past two decades, a combination of changes in technological, political, and cultural arenas have affected the way in which companies, organizations, groups and individuals innovate. Firms seek for different, more "open" and new ways of thinking about innovation, mostly to complements traditional innovation logics.

This dissertation, based on three distinct and jet interconnected papers, explores innovation as a complex challenge for profit and nonprofit organizations, and focuses critically on two promising and widely adopted models for problem solving to manage such innovation process: Crowdsourcing and Design Thinking.

This work intends to provide theoretical contributions and empirical evidences on what are the role(s) and the mechanisms of Crowdsourcing and Design Thinking when facing open innovation challenges in organizations. Investigating and comparing these two models allow to better understand the dynamics and the mechanisms underlying their results.

The first article investigates crowdsourcing contests. Drawing on matching theory, it suggests that a contest is a two-sided matching process between firms and the crowd, where the way a task is formulated is essential to engage the best idea providers. The second empirical work of this thesis investigate crowdsourcing too, but in nonprofit context. It addresses the issue of how to use crowdsourcing to lead social innovation. By analyzing a crowdsourced co-created platform, this research provides empirical evidences about how a crowd could evolve into a community which will be able to engage in social innovation. The third article focus on Design Thinking. It investigates the process towards solutions in Design Thinking to better understand the challenges and the costs on the use of this model, in particular when newly adopted. It analyzes and isolates the elements, in particular struggles and triggers, which accompany participants, as they work through conflicting demands facing the innovation process.

Keywords: crowdsourcing, Design Thinking, innovation, problem solving

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"In today's world, we have difficulty formulating grand, comforting ideas. We hear a cacophony of voices and opinions, see rage and frustration, and observe a lot of ad hoc policy and tentative management. There is a lot of fumbling around without a guiding concept. ... A great deal of tinkering and muddling goes on within politics, educational institutions, the business community, retailers, the self-employed. ... If nobody knows the answer, then we choose what seems to be "best": good practices, effective interventions, evidence-based policy. We formulate a politics of risk management and crisis management. ... We let ourselves be guided by effectiveness and efficiency, preferably demonstrated by performance indicators, guided by supervision and control" (Boutellier, 2013)

INTRODUCTION

Over the past two decades, a combination of changes in technological, political, and cultural arenas have significantly affected the way in which companies, organizations, groups and individuals innovate.

Products, technologies, firms and markets evolve interactively changing the nature of organizational boundaries and the way firms innovate (Boudreau & Lakhani, 2013; Felin & Zenger, 2014; Lakhani & Panetta, 2007). Firms seek for different, more "open" and new ways of thinking about innovation, mostly to complements traditional innovation logics (Lakhani, Lifshitz - Assaf, & Tushman, 2012). Openness could refer

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to seek for a different *locus* of innovation, as searching for valuable knowledge outside firms' boundaries. Firms are also looking for new way of being inspired to find different *sources* to foster innovation (i.e. from design companies and design processes). More in general, *the overall nature of the firm itself* can be challenge, by dealing with external-to-the firm and often non-hierarchical user communities (West & Lakhani, 2008; West, Salter, Vanhaverbeke, & Chesbrough, 2014).

Scholars, with increased attention (Bogers et al., 2017; Randhawa, Wilden, & Hohberger, 2016; West, Salter, Vanhaverbeke, & Chesbrough, 2014), provided evidences on the benefits of open innovation in its various forms - such as crowdsourcing, crowdfunding, peer and community production - and how to use inflows of knowledge to accelerate internal innovation and outflows of knowledge to expand the markets for external use of innovation (Chesbrough, West, & Vanhaverbeke, 2006).

As the founder of Sun Microsystem, Bill Joy, stated, in any given sphere of activity a lot of the pertinent knowledge could reside outside the boundaries of any one organization, and the central challenge for firms which would like to engage in this dynamic model of innovation is to find ways to access that knowledge. For example, one study, conducted by Franke and Shah (2003), found that more than one-third of members of 'extreme' sport clubs had developed or modified sport products for their own use, while another study, by Morrison and others (Morrison, Roberts, & Midgley, 2004). They leveraged on the lead user concept - sophisticated users who are the most likely to innovate to satisfy their own needs (von Hippel, 1986) - and found that more than a quarter of library employees modified computerized library information systems. This very interesting phenomena is challenging the conventional model of innovation (von Hippel, 2005) and is inspiring a more dynamic approach, where knowledge is

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distributed and firms have to be involved with different types of actors (Chesbrough, 2012).

To date, research highlights the role of users in online communities (Dahlander, Frederiksen, & Rullani, 2008; McLure Wasko & Faraj, 2000; West & Lakhani, 2008) and have examined the governance, coordination and architecture of communities, primarily focusing on open-source software as an empirical context (Besten & Dalle, 2008; Langlois & Garzarelli, 2008; West & O'mahony, 2008). Open source software (OSS) projects, and in particular the successful development of the Linux operating system, provided an alternative model for organizing for innovation (Dahlander et al., 2008). OSS communities are examples of the appearance of distributed innovation systems characterized by decentralized problem solving, self-selected participation, self-organizing coordination and collaboration, "free" revealing of knowledge, and organizational models that blend community with commercial success (Saebi & Foss, 2015). Organization, innovation and strategy literatures have struggled to theoretically integrate many of these crowd-related phenomena coherently into their body of work. Indeed, while the literatures in these areas are growing rapidly (Ghezzi, Gabelloni, Martini, & Natalicchio, 2017), the underlying theoretical and practical mechanisms deserves further attention.

This dissertation embracing the open innovation framework, focuses on innovation as a process by which existing knowledge and inputs are creatively and efficiently recombined to create new and valuable outputs (Felin & Zenger, 2014). More specifically, my broader interest is in how this recombinative process of innovation is organized when organizations are facing environments characterized by continual change (Barry & Rerup, 2006). In such contexts, as Garud, Jain, and Tuertscher (2008) explained, system boundaries are often unclear and user preferences are both

heterogeneous and evolving. Organizations are under pressure to maintain or grow market share, however, they do not know how to approach problems when there is no clear and stable boundary between the entity to exploit and the context to explore. Therefore problems are ill-defined, preferences are fluid and solutions tend to emerge in action (Garud, Jain, and Tuertscher 2008)

Accordingly, my dissertation explores innovation as a complex challenge for profit and nonprofit organizations, and focuses on two promising and widely adopted models for problem solving to manage such innovation process: *Crowdsourcing* and *Design Thinking*.

Crowdsourcing and Design Thinking precisely connect at the process where many users with diverse knowledge intervene. However, they are models that tend to be replicated by firms "blindly"(Carlgren, Rauth, & Elmquist, 2016; Felin, Lakhani, & Tushman, 2017), without considering how they need to be enacted and what are the peculiar idiosyncratic elements of each of them. Therefore, they deserve a special attention to better evaluate their peculiarities when implemented.

Theoretical Background

Crowdsourcing

The first model my dissertation studies is Crowdsourcing. The original definition of the concept goes back to Howe (2006). Lately, after a comprehensive literature review, Estellés-Arolas, Navarro-Giner, & González-Ladrón-De-Guevara (2015) prepared a single unified definition: *"Crowdsourcing is a type of participative online activity in which a nonprofit organization, or company proposes to a group of individuals of*

varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task, generally for a price" (Estellés-Arolas et al., 2015: 198). Depending on the level and type of innovation requested from the group of individual (or crowd), crowdsourcing can be seen either as an open practice and support tool or as a new way to outsource a simple task. Following these differences Boudreau and Lakhani (2013) proposed a taxonomy of four forms of crowdsourcing: 1) contest - idea competitions, hosted by a platform, to facilitate easy ideas generation on a task defined by a firm, generally for a cash prize (i.e Innocentive);

2) collaborative communities – based on platform, collaborative communities aim to join their effort to achieve a common goal (i.e. OSS communities, like Linux);

3) complementors –platforms built by companies, which aim to give access to the outsiders to their core product in order to let them develop a wide range of solutions based on it and create a competitive advantage (i.e. iTunes by Apple);

4) labor markets – based on third-party platforms, labor markets match buyers and sellers of services and employ conventional contracting for services rendered (i.e. Mechanical Turk by Amazon).

Following the broader research question, which aims to investigate innovation when problems are ill-defined and its mechanisms, the dissertation focuses just on two of them: contests and collaborative communities. Complementors and labor market were excluded, because not in line with my intent. Indeed, complementor platforms are often privately own and there is no visibility on the internal mechanisms; labor markets are outsourcing just very precise and well-define tasks, not attempting to innovate.

Instead, *Contests* are the most used form of crowd-engagements by firms (Boudreau & Lakhani, 2013). Bodureau and Lakhani, 2013 argues that contests are most effective when the problem is complex or novel or has no established best-practice approaches

and they are useful for solving design problems, in which creativity and subjectivity influence the evaluation of solutions. Also *Collaborative communities* are a well-known example because of the success of Linux or Wikipedia. But whereas contests are competitive and contributions are individuals, communities are organized to assemble the outputs of multiple contributors and aggregate them into a coherent and value-creating whole. Social-movement are also part of this crowd practice, where ideology and purpose link work and economic activity, which can lead to unexpected innovative results.

Previous research on crowdsourcing focuses primarily on highlighting the benefits for organizations to support innovation strategies (Boudreau & Lakhani, 2013; Tidball, Mulder, & Stappers, 2011). In particulars, studies explore the nature and the social structure of communities (O'Mahony & Lakhani, 2011) to better understand what are the motivations for the crowd to participate and what are the role of incentives as antecedents of motivation (Frey, Lüthje, & Haag, 2011; Füller, 2006, 2010; Leimeister, Huber, Bretschneider, & Krcmar, 2009; Roberts, Hann, & Slaughter, 2006)

Instead, research is still limited on the challenges of using crowd practices (Lakhani & Thusman, 2012). In particular, when it implies cost and problems which might results from misattribution or misapplication of such a process. Indeed, there is the need to better delineate *when* openness and of *what* type, makes sense (Felin & Zenger, 2014; von Hippel & von Krogh, 2015). Research still lack to identify *when* (and when not) certain forms or governance structures make sense, and *what* an organization should be open to and *why* (Felin et al., 2017). Little research has been done on what are *the mechanisms* for designing, organizing, motivating and how they work to harness such external open innovation collaborations (Bogers et al., 2017).

Indeed, very few empirical studies had attempted to analyze how to build the relationship between a firm and a completely independent, autonomous and competitive (in case of contests) group of individuals (O'Mahony & Lakhani, 2011). Therefore, one of the main gap that still remains unaddressed is to define the structure and the formulation of innovation problems to be broadcasted to the pool of solvers (Afuah & Tucci, 2012; Felin et al., 2017). Moreover, innovation problems need to be relevant for the seekers but also have to be affordable, challenging and of interest to the solvers, to ensure that solutions are submitted (Sieg, Wallin, & von Krogh, 2010). Paper 1 addresses this gap following the research question: *How are the tasks formulated in design crowdsourcing contests to stimulate designers to make a contribution that is creative and simultaneously compatible with a firm's aim?*

Alongside with the formulation of the innovation problem, another interesting gap emerges when we consider that the majority of the studies examine profit business cases and competitive form (mostly contests). However, the crowdsourcing model holds enormous promise for non-profit and collaborative innovation but very limited discussion on it (Brabham, 2011). Crowdsourcing in profit context focuses mainly on new product development to achieve competitive advantage and adds value in term of possible higher revenue. By contrast, innovation in nonprofit context could focuses social innovation and societal benefits by leveraging collaboration between individuals. Consequently, the relation between the crowd and the innovation could take a different form when the ultimate goal is knowledge collaboration and social innovation. Therefore, a more fine-grained discussion is needed to better understand the dynamics and mechanisms on how open processes could support which type of innovation in which context.

Paper 2 addresses this gap, and explores the idea of involving a crowd, with an interdisciplinary and diverse knowledge, for public benefit and social innovation. Paper 2 investigates the follow research question: *How could crowdsourcing support social innovation initiatives?*

Design Thinking (DT)

The dissertation studies also a second model of problem solving to foster innovation: Design Thinking.

The word "design" in management literature has been recognized as a central issue since the seminal work of Simon (1969). Simon, in *The Sciences of the Articial* (1969) identifies design as a rational set of procedures, a logical search for satisfactory criteria that fulfill a specific goal (Huppatz 2015) that respond both to well-defined and ill-defined problems (Simon 1973). This logic of optimization promised greater predictability and profit, which is why it became very popular in management literature (Kimbell, 2011)

Since then, management scholars identified design as a strategic *source* of innovation and competitive success in a very wide perspective (Dumas & Mintzberg, 1989; Hargadon & Sutton, 1997a; Verganti, 2003)using two main approaches. On one side, design is meant as a driver of strategic value and innovation performance through the model of *design driven innovation* (Landoni et al., 2016; Verganti, 2003, 2006, 2008, 2011). On the other side, coming back to the idea of design as a logical process - which is possible to control toward an effective solution (Simon 1969) - a recent characterization of design as a managerial discourse emerges from the practice of consultancy, like IDEO (Hargadon & Sutton, 1997a).

Johansson-Sköldberg et al. (2013) suggested to consider the latest as a separate stream of research, which is not concerned anymore with the tradition of studying designers and the "way they think", but with the definition of an approach, design-inspired, to be used repetitively in organizations to foster innovation. Brown (2008) IDEO's CEO, detailed the steps of this process (2008) and labeled the concept as 'Design Thinking', which is *"a human centered and collaborative approach to problem solving, using a design mindset to solve complex problems."*. Scholars and practitioners are promoting Design Thinking as a fundamentally team-based exploratory process where organizations are enabled to cope with complex problems and to transform them in opportunities (Brown, 2008; Liedtka, 2015)However, despite the growing interest towards the concept of design and its influence on innovation strategies, the analysis of design as a dimension of value in the management literature is still ambiguous, while its impact on innovation theory is uncritical and often undefined (Carlgren, Rauth, & Elmquist, 2016; Johansson-Sköldberg, Ulla Woodilla, Jill Çetinkaya, 2013). Furthermore, little research has been conducted on the challenges that such a process could rise when adopted by organizations. Dealing with problem solving for innovation can rise tensions and conflicting demands (Lewis, 2000; Pettigrew et al., 2000). Indeed, shortcomings of design thinking approaches in firms are often witnessed (Carlgren, Elmquist, & Rauth, 2014)Implementation of design thinking in companies is sometimes poor and raises multiple challenges, such as collaboration issues and time for learning and practicing, often leading to abandoning the design thinking approach without realizing its potential benefits (Jahnke, 2009; Yoo, Boland, & Lyytinen, 2006). Therefore, there is the need to look closer at the process, especially when implemented by novice teams working for the first time with this method. Little is known about how individuals and teams could adopt and learn effectively how to use Design Thinking. A

further difficulty with many past studies is that they collect data of team dynamics at a project level and then relate these to performance measures (Beckman & Barry, 2007; Sutton & Hargadon, 1996), but they do not look at how team behaviors may change over the duration of a project and there is no inner perspective of the individuals to trace the process. Such prior research suggests that following projects longitudinally, over the duration of an innovation project, is important to understand potential differences across phases. These are the motivations for empirical study 3, which addresses the following research question: *how do individuals and groups engage in a Design Thinking innovation process and how do they work through its inherent tensions?*

Purpose of the thesis

My dissertation focuses critically on two promising and widely adopted models for problem solving to manage innovation process: *Crowdsourcing* and *Design Thinking*. I selected these two approaches because both of them are suggested, by both practitioners and researchers, as effective models for problem solving, that promise to provide inflows of knowledge to accelerate internal innovation. Crowdsourcing and Design Thinking seem to answer the need of organizations to seek for different, more "open" and new ways of thinking. In fact, crowdsourcing represents a way to change the *locus of innovation*, by involving the crowd and Design Thinking represents a possibility to find a *source* of innovation, e.g. the "design way".

Investigating and comparing these two models allows to my dissertation to better understand the dynamics and the mechanisms underlying crowdsourcing and Design Thinking results.

Moreover, crowdsourcing is a model where the problem needs to be well-defined before being outsourced, however the process through which people participate is widely

unknown and not analyzed. On the contrary, Design Thinking is a model particularly well structured and normalized, but the problems address by this process are ill-defined.

Tab 1: models characteristics comparison

	Problem	Process
Crowdsourcing	Well- defined	Not known
Design Thinking	Ill-defined	Known

These differences make the comparative approach more interesting for management research. Indeed, even if sometimes used unteachably by firms, these models are meant to deal with two opposite problem structures – well-defined and ill-defined problem - and they encompass two opposite process structures.

Therefore, my dissertation studies and compares these two models, with three independent but complementary papers. The thesis aims to shade some light on the theoretical and practical mechanisms and on the roles played by these two models, especially when facing open innovation challenges in different contexts.

Hence, the research question guiding this dissertation is:

What are the role(s) and the mechanisms of Crowdsourcing and Design Thinking when facing open innovation challenges in organizations?

In order to fill these gaps, each of the three paper focuses on one model. Each of them aims to advance the understanding of a specific mechanism for solving an innovation problem by following its process in an empirical investigation. Studying the processes, instead of the outcomes, is the peculiarity of these investigations. Indeed, the research questions and the contributions aim to deal with how things change and develop over a

certain amount of time, offering a reflection on the mechanisms that are enacted over time, during the actuation of the processes.

All three papers aim to contribute theoretically and practically on a broader open innovation framework in order to increase the knowledge and the effectiveness of these models and also the benefits for individuals and firms taking part in these initiatives.

Structure of the thesis

The dissertation is structured on three essays, which aim to investigate the overall questions: *what are the role(s) and the mechanisms of Crowdsourcing and Design Thinking when facing open innovation challenges in organizations?*

Therefore, the 3 independent but complementary essays are part of a larger research project to explore two of the models suggested for ill-defined problem solving in innovation, and it frames a comparison between them in order to better study the role(s) and mechanisms of these models and to better identify how do they approach complex challenges. In order to do that, the dissertation can be schematized as following:

Figure 1: Scheme unifying research project

1: Exploring Task Formulation in Crowdsourcing Design Contests

2: Crowdsourcing to co-design meaningful social change

3: Struggles and Triggers during a Design Thinking journey

4: Design Thinking: how to shape problem solving without a-priori problem formulation
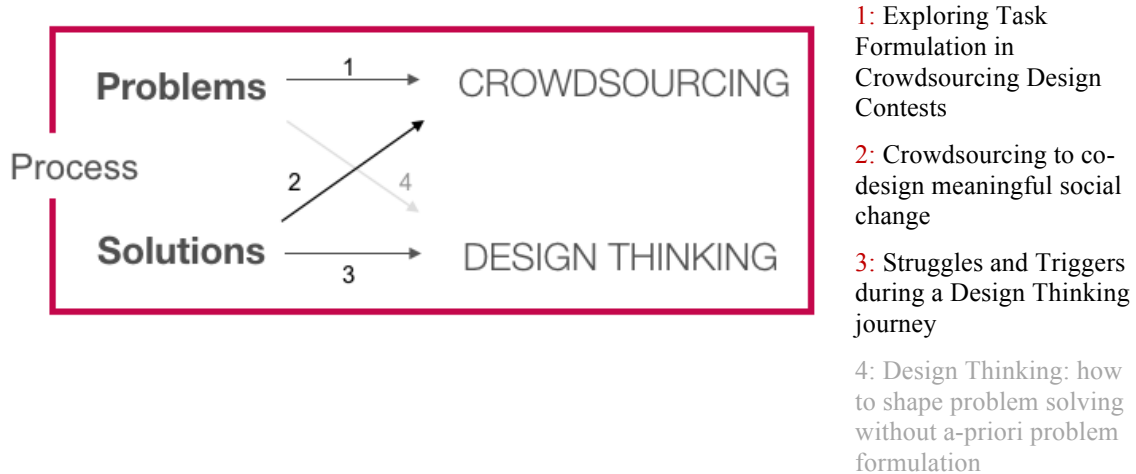
Figure 1 shows a simplified model of the overall framework of the research project which comprise the 3 essays included in this dissertation.

The first paper investigates the formulation on an outsourced problem in a crowdsourcing design contest; the second paper instead poses its emphasis on the solution, a platform to support social innovation, and investigates how crowdsourcing could support that. The third one investigates the process towards solutions in Design Thinking to better understand the challenges on the use of this model. To conclude, the overall research project would benefit from a forthcoming fourth paper (not included in this dissertation and with data collection still ongoing) where the problem formulation would be the starting point to better explore the micro-foundation of Design Thinking.

The following sections summarize all four papers with reference to the model in Figure 1. The main papers in this dissertation are papers 1, 2 and 3.

The first paper, entitled "Exploring Task Formulation in Crowdsourcing Design Contests",

explores online crowdsourcing design contests as a new locus of innovation. In this study we investigate one firm's core activities, product design, a complex and creative task for new product development which is outsourced in design crowdsourcing contests. Firms need to understand how to exploit the full potential of crowdsourcing and to understand which are the mechanisms to engage the right solution providers, in particular when they are an independent, autonomous and competitive global crowd. Therefore, the study looks at design crowdsourcing contest and it argues that besides prizes and other type of incentives, the way a task is formulated matters in designers' choice of the contests in which to invest. Moreover, we suggest that the requirements of both parties need to be satisfied to maximize the pay-off from each firm-designer match. Coherently, we draw on matching theory (Haas, Criscuolo, & George, 2014; Mitsuhashi & Greve, 2009) and argue that the formulation of design contests activates a two-sided matching process, in which the description of the task (brief) clarifies what the company is looking for, when posting the contest. We introduce the idea that firm searches for solutions that are both *compatible* and *complementary* to its goals and knowledge. *Compatible* means that a project submitted by a designer should fit firm's requirements, to allow it to absorb the new idea and bring it to the market. While *complementary* means that a designer should ideate something that the firm is not able to achieve with its internal resources. Therefore, we analyse the narratives of 13 crowdsourcing design contests launched by 12 firms and we identified 4 different narrative dimensions which frame the possibility for solvers to generate ideas, which are compatible and complementary at the same time. We contribute to innovation and

crowdsourcing literature in different ways. First, the study provides, for the first time to our knowledge, an in-depth analysis of how to structure the innovation problem, the design task, to be broadcast to the pool of solvers. Indeed, we identify four framing dimensions: technology, user experience, corporate identity, and creativity, that have the function to draw the exploratory space by which a firm could point designers to the different aspects of the problem to be solved. Moreover, with this study, we provide a detailed analysis of the different formulation patterns of the four narrative dimensions along the two coordinates of compatibility and complementarity. Second, we also collected a large and fine-grained data set on contests results to show which task formulation pattern leads to better performance. Therefore, our study contributes to crowdsourcing literature by providing original and exploratory evidence concerning the role of task formulation in the matching process among firms and designers. Findings suggest that both coordinates of a brief are necessary for a performing matching process, while companies tend to rely most on the compatibility one.

The second paper entitled "Crowdsourcing to co-design meaningful social change", also approaches crowdsourcing and it explores online communities dynamics and crowdsourced knowledge development of an online platform to sustain social innovation. The study follows the development of a social innovation initiative called "School Open Source" (SOS) in Bari, Italy.

Old Town Bari is the center of Bari City and the main city of Apulia region, in the southeast of Italy, neglected for years to its own community due to the high criminality level. This study follows a social innovation to leverage education using crowdsourcing knowledge, launched by a young group of local people. The essay, after embedding the concept of crowdsourcing in the context of open collaboration aims to understand the

mechanisms and dynamics to create effective and stimulating partnerships with online communities, in particular to foster knowledge collaboration and achieve societal goals. Therefore, the study is based on an action research of a 12 days' workshop for the development of the initiative. The workshop aimed to create "the School Open Source" with the help of the crowd, which was engaged on promoting and co-creating the social initiative. Furthermore, I collected and analyzed the online discussions, paths and topics from the days of the workshop to the opening of the School. Four major findings are presented. The study reveals how crowdsourcing acted as an opportunity to build a new community which is revitalizing the local social environment. I also found that design processes played a major role on the community creation and instructed new governance models. Additionally, digital communications built a network, which is able to generate and regenerate the local socio-economical fabric and connect it with the rest of the world. The study contributes to indicate a first step towards a proposal for a model of the emergent properties of collaboration in social innovation, which combines online crowd engagement with offline activities and where design processes nurture the sense of belonging between community and territory.

The third paper entitled, "Struggles and Triggers during a Design Thinking journey" explores Design Thinking when newly adopted. The purpose of this paper is to analyze and isolate the elements, in particular struggles and triggers, which accompany participants, with no prior knowledge on the approach, as they work through conflicting demands facing the innovation process. The study draws on scholarly and practitioners' literature on Design Thinking and encounter the assumptions on the potential benefits of using Design Thinking (DT) to develop innovations and foster creativity. Indeed,

innovation and creativity processes are widely characterized by continues competing demands (Lewis, 2000; Pettigrew et al., 2000), which generate tensions, therefore we expected also challenges rising when facing them. Therefore, while shedding more light on the struggles and triggers of Design Thinking adoption, this paper set the ground for a wider reflection on how to train people on coping with and working through conflicting demands.

The paper investigates qualitatively the journey throughout the construction of a design thinking mindset in people without any prior experience with such method. We explore the process of introduction of new teaching practices inspired by design thinking in a class of students attending a Master program on Innovation and Marketing at Calfskin University, from the eyes of the participants. The originality of the paper lies in the fact that it reports and analyses the particular point of view of each student, often including their feelings and cognitions, during the overall process. This particular angle allows us to identify and describe three main struggles and triggers (destabilizing, non-deciding, abstracting) for newly adopters in every step of the DT process. The study thus contributes to a better understanding of Design Thinking by acknowledging its challenges and the cost of it, in order to be able to apply it as an organizational resource when facing competing demands.

OVERVIEW OF THE RESEARCH PROJECT

Paper	Title	Authors	Model & mechanism(s)	Method	Conferences & awards	Status
1	Exploring Task Formulation in Crowdsourcing Design Contests	Nunzia Coco Anna Comacchio	Crowdsourcing/ Problem structure	13 case studies qualitative coding	Presented at: (accepted at EURAM16); IPDMC16; EGOS16, AOM16, OUI16	To be submitted: *Journal of Product Innovation Management*
2	Crowdsourcing to co-design meaningful social change	Nunzia Coco	Crowdsourcing/ Social innovation	Action research qualitative coding and topic modelling on Facebook data	Presented at: WOIC16; AOM 17 shortlisted for best student paper award at WOIC; presented as seminar at ETH	Revise and resubmit: *R&D Management Journal*
3	Struggles and Triggers during a Design Thinking journey	Nunzia Coco Monica Calcagno Maria Lusiani	Design Thinking/ Innovation tensions & conflicting demands	Qualitative inductive research	Presented at: EGOS16;	Published as Ca'Foscari Department's working paper with the title: "Towards design thinking as a management practice: A learning experiment in teaching innovation" To be submitted: *Creativity and Innovation Management Journal*
4	Design Thinking: how to shape problem solving without a-priori problem formulation (tbd)	Nunzia Coco Anja Niedworok (ETH Zurich)	Design Thinking/ Problem Structures	Laboratory study and qualitative coding on observations	Presented at: Preliminary study presented at EGOS 17	ongoing data collection

References

Afuah, A., & Tucci, C. L. 2012. Crowdsourcing as a solution to distant search. *Academy of Management Review*. https://doi.org/10.5465/amr.2010.0146.

BAER, M., DIRKS, K. T., & NICKERSON, J. 2013. MICROFOUNDATIONS OF STRATEGIC PROBLEM FORMULATION. *STATEGIC MANAGMENT JOUNRAL*, 34: 197–214.

Barley, S. R. 1990. The Alignment of Technology and Structure through Roles and Networks. *Administrative Science Quarterly*. https://doi.org/10.2307/2393551.

Barry, D., & Rerup, C. 2006. Going mobile: Aesthetic design considerations from Calder and the constructivists. *Organization Science*. https://doi.org/10.1287/orsc.1050.0165.

Battilana, J., Sengul, M., Pache, A. C., & Model, J. 2015. Harnessing productive tensions in hybrid organizations: The case of work integration social enterprises. *Academy of Management Journal*. https://doi.org/10.5465/amj.2013.0903.

Beckman, S., & Barry, M. 2007. Innovation as a learning process: Embedding design thinking. *California Management Review*. https://doi.org/10.2307/41166415.

Bennett, W. L., & Segerberg, A. 2012. The logic of connective action: Digital media and the personalization of contentious politics. *Information Communication and Society*. https://doi.org/10.1080/1369118X.2012.670661.

Besten, M. Den, & Dalle, J. M. 2008. Keep it simple: A companion for simple wikipedia? *Industry and Innovation*. https://doi.org/10.1080/13662710801970126.

Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., et al. 2017. The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, 24(1): 8–40.

Boler, M., & Zembylas, M. 2003. Discomforting truths: The emotional terrain of understanding difference. *Pedagogies of Difference: Rethinking Education for Social Change*. https://doi.org/10.4324/9780203465547.

Boudreau, K. J., Lacetera, N., & Lakhani, K. R. 2011. Incentives and Problem Uncertainty in Innovation Contests: An Empirical Analysis. *Management Science*. https://doi.org/10.1287/mnsc.1110.1322.

Boudreau, K. J., & Lakhani, K. R. 2013. Using the Crowd as an Innovation Partner. *Harvard Business Review*, (April): 3–11.

Brabham, D. 2011. Crowdsourcing: A Model for Leveraging Online Communities. *The Routledge Handbook of Participatory Cultures - CROWDSOURCING*, 1–22.

Brown, T. 2008. Design Thinking in Harvard Business Review | ideo.com. *Harvard Business Review*.

Brown, T. 2009. Change by Design. *HarperCollins Publisher*. New York, NY: HarperCollins Publishers.

Brusoni, S., Prencipe, A., & Pavitt, K. 2001. Knowledge Specialization, Organizational Coupling, and the Boundaries of the Firm: Why Do Firms Know More Than They Make? *Administrative Science Quarterly*. https://doi.org/10.2307/3094825.

Buchanan, R. 1992. Wicked Problems in Design Thinking. *Wicked Problems in Design Thinking*. https://doi.org/10.1162/DESI_a_00157.

Carlgren, L., Elmquist, M., & Rauth, I. 2014. Design thinking: Exploring values and effects from an innovation capability perspective. *Design Journal*. https://doi.org/10.2752/175630614X13982745783000.

Carlgren, L., Rauth, I., & Elmquist, M. 2016. Framing Design Thinking: The Concept in Idea and Enactment. *Creativity and Innovation Management*.

https://doi.org/10.1111/caim.12153.

Chesbrough, H. 2012. Open Innovation: Where We've Been and Where We're Going. *Research-Technology Management*, 55(4): 20–27.

Chesbrough, H. W., West, J., & Vanhaverbeke, W. 2006. Open Innovation : A New Paradigm for Understanding Industrial Innovation. *Open Innovation*. https://doi.org/citeulike-article-id:5207447.

Clegg, S. R., da Cunha, J. V., & e Cunha, M. P. 2002. Management Paradoxes: A Relational View. *Human Relations*. https://doi.org/10.1177/0018726702555001.

Dahlander, L., Frederiksen, L., & Rullani, F. 2008. Online Communities and Open Innovation. *Industry and Innovation*, 15(2): 115–123.

Dewey, J. 1938. *Experience and education*. New York, NY: Touchstone Rockefeller Center.
http://www.tandfonline.com/doi/abs/10.1080/00131728609335764%5Cnhttp://ruby.fgcu.edu/courses/ndemers/colloquium/ExperiencEducationDewey.pdf.

Dorst, K. 2011. The core of "design thinking" and its application. *Design Studies*, 32(6): 521–532.

Dorst, K., & Cross, N. 2001. Creativity in the design process: Co-evolution of problem-solution. *Design Studies*. https://doi.org/10.1016/S0142-694X(01)00009-6.

Dumas, A., & Mintzberg, H. 1989. Managing Design-Designing Management. *Design Management Journal*. https://doi.org/10.1111/j.1948-7169.2007.tb00076.x.

Estellés-Arolas, E., Navarro-Giner, R., & González-Ladrón-De-Guevara, F. 2015. Crowdsourcing fundamentals: Definition and typology. *Advances in Crowdsourcing*: 33–48.

Feldman, J., & Boult, J. 2005. Third-Generation Design Consultancies: Designing Culture for Innovation. *Design Management Review*. https://doi.org/10.1111/j.1948-7169.2005.tb00006.x.

Felin, T., Lakhani, K. R., & Tushman, M. L. 2017. Firms, crowds, and innovation. *Strategic Organization*, 15(2): 119–140.

Felin, T., & Zenger, T. R. 2014. Closed or open innovation? Problem solving and the governance choice. *Research Policy*, 43(5): 914–925.

Franke, N., & Shah, S. 2003. How communities support innovative activities: An exploration of assistance and sharing among end-users. *Research Policy*. https://doi.org/10.1016/S0048-7333(02)00006-9.

Frey, K., Lüthje, C., & Haag, S. 2011. Whom should firms attract to open innovation platforms? The role of knowledge diversity and motivation. *Long Range Planning*. https://doi.org/10.1016/j.lrp.2011.09.006.

Füller, J. 2006. Why consumers engage in virtual new product developments initiated by producers. *Advances in Consumer Research*. https://doi.org/43008804.

Füller, J. 2010. Refining Virtual Co-Creation from a Consumer Perspective. *California Management Review*. https://doi.org/10.1525/cmr.2010.52.2.98.

Gaim, M., & Wåhlin, N. 2016. In search of a creative space: A conceptual framework of synthesizing paradoxical tensions. *Scandinavian Journal of Management*, 32(1): 33–44.

Garud, R., Gehman, J., & Kumaraswamy, A. 2011. Complexity Arrangements for Sustained Innovation: Lessons from 3M Corporation. *Organization Studies*. https://doi.org/10.1177/0170840611410810.

Garud, R., Jain, S., & Tuertscher, P. 2009. Incomplete by design and designing for incompleteness. *Lecture Notes in Business Information Processing*. https://doi.org/10.1007/978-3-540-92966-6_7.

Ghezzi, A., Gabelloni, D., Martini, A., & Natalicchio, A. 2017. Crowdsourcing: A

Review and Suggestions for Future Research. *International Journal of Management Reviews*, 0: 1–21.

Glaser, B., & Strauss, A. 1967. The Discovery of Grounded Theory: Strategies for Qualitative Research. *The Discovery of Grounded Theory Strategies for qualitative research*.

Haas, M. R., Criscuolo, P., & George, G. 2014. Which problems to solve ? Attention allocation and online knowledge sharing in organizations. *Academy of Management Journal*, 58(3): Published online ahead of print.

Hargadon, A., & Sutton, R. I. 1997a. Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly*, 42(4): 716.

Hargadon, A., & Sutton, R. I. 1997b. Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly*. https://doi.org/10.2307/2393655.

Jahnke, M. 2009. Design Thinking As Enabler of Innovation in Engineering Organizations. *8th European Academy Of Design Conference*.

Jeppesen, L. B., & Lakhani, K. R. 2010. Marginality and Problem-Solving Effectiveness in Broadcast Search. *Organization Science*, 21(5): 1016–1033.

Johansson-Sköldberg, Ulla/ Woodilla, Jill/ Çetinkaya, M. 2013. Design Thinking : Past , Present and Possible Futures. *Design Thinking: Past, Present and Possible Futures*. https://doi.org/10.1111/caim.12023.

Kelley, T., & Kelley, D. 2013. Creative confidence: Unleashing the creative potential within us all. *The Business Source*. https://doi.org/10.1080/08963568.2014.883249.

Kimbell, L. 2011. Rethinking Design Thinking: Part 1. *Design and Culture*, 3(3): 285–306.

King, N., Anderson, N., & West, M. A. 1991. Organizational innovation in the UK: A case study of perceptions and processes. *Work & Stress*. https://doi.org/10.1080/02678379108257031.

Lakhani, K. R., Lifshitz - Assaf, H., & Tushman, M. 2012. Open Innovation and Organizational Boundaries: The Impact of Task Decomposition and Knowledge Distribution on the Locus of Innovation. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1980118.

Lakhani, K. R., & Panetta, J. A. 2007. The Principles of Distributed Innovation. *Innovations: Technology, Governance, Globalization*, 2(3): 97–112.

Landoni, P., Dell'Era, C., Ferraloro, G., Peradotto, M., Karlsson, H., et al. 2016. Design Contribution to the Competitive Performance of SMEs: The Role of Design Innovation Capabilities. *Creativity and Innovation Management*. https://doi.org/10.1111/caim.12165.

Langley, A. 1999. Strategies for Theorizing from Process Data. *Academy of Management Review*, 24(4): 691–710.

Langlois, R. N., & Garzarelli, G. 2008. Of hackers and hairdressers: Modularity and the organizational economics of open-source collaboration. *Industry and Innovation*. https://doi.org/10.1080/13662710801954559.

Latour, B., & Woolgar, S. 2013. Laboratory life: The construction of scientific facts. *Laboratory Life: The Construction of Scientific Facts*. https://doi.org/10.1017/CBO9781107415324.004.

Lauritzen, G. D. 2017. The Role of Innovation Intermediaries in Firm-Innovation Community Collaboration: Navigating the Membership Paradox. *Journal of Product Innovation Management*. https://doi.org/10.1111/jpim.12363.

Laursen, K., & Salter, A. 2006. Open for innovation: the role of openness in explaining

innovation performance among U.K. manufacturing firms. *Strategic Management Journal*. https://doi.org/10.1002/smj.507.

Leimeister, J. M., Huber, M., Bretschneider, U., & Krcmar, H. 2009. Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition. *Journal of Management Information Systems*, 26(1): 197–224.

Lewis, M. W. 2000. Exploring paradox: Toward a more comprehensive guide. *Academy of Management Review*, 25(4): 760–776.

Lewis, M. W., Ann Welsh, M., Dehler, G. E., & Green, S. G. 2002. Product development tensions: Exploring contrasting styles of project management. *Academy of Management Journal*. https://doi.org/10.2307/3069380.

Lewis, M. W., & Smith, W. K. 2014. Paradox as a Metatheoretical Perspective. *The Journal of Applied Behavioral Science*. https://doi.org/10.1177/0021886314522322.

Liedtka, J. 2015. Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction. *Journal of Product Innovation Management*. https://doi.org/10.1111/jpim.12163.

March, J. 1991. Exploration and Exploitation in Organizational Learning. *Organizational Science*.

Martin, R. 2007. Opposable Mind: How Successful Leaders Win Through Integrative Thinking. *Harvard Business School Press Books*.

Martin, R. 2009. The Design of Business: Why Design Thinking is the Next Competitive Advantage. *Harvard Business Press*.

McLure Wasko, M., & Faraj, S. 2000. "It is what one does": Why people participate and help others in electronic communities of practice. *Journal of Strategic Information Systems*, 9(2–3): 155–173.

Miron-spektor, E., Erez, M., & Naveh, E. 2011. THE EFFECT OF CONFORMIST AND ATTENTIVE-TO-DETAIL MEMBERS ON TEAM INNOVATION : RECONCILING THE INNOVATION PARADOX. *Academy of Management Journal*, 54(4): 740–760.

Mitsuhashi, H., & Greve, H. 2009. A matching theory of alliance formation and organizational success: Complementarity and compatibility. *Academy of Management Journal*. https://doi.org/10.5465/AMJ.2009.44634482.

Morrison, P. D., Roberts, J. H., & Midgley, D. F. 2004. The nature of lead users and measurement of leading edge status. *Research Policy*. https://doi.org/10.1016/j.respol.2003.09.007.

Paton, B., & Dorst, K. 2011. Briefing and reframing: A situated practice. *Design Studies*, 32(6): 573–587.

Pettigrew, A. M., Fenton, E. M., Fischer, R. M., Mohrman, S. A. A., Mohrman Jr., A. M. M., et al. 2000. The emergence and development of internal networks and their impact on knowledge flows: the case of Rabobank Group. *The Innovating Organization*. https://doi.org/10.1108/01437730210414535.

Porter, M. E., & Heppelmann, J. E. 2015. How smart, connected products are transforming companies. *Harvard Business Review*. https://doi.org/10.1017/CBO9781107415324.004.

Randhawa, K., Wilden, R., & Hohberger, J. 2016. A Bibliometric Review of Open Innovation: Setting a Research Agenda. *Journal of Product Innovation Management*, 33(6): 750–772.

Roberts, J. A., Hann, I.-H., & Slaughter, S. A. 2006. Understanding the Motivations, Participation, and Performance of Open Source Software Developers: A Longitudinal Study of the Apache Projects. *Management Science*.

https://doi.org/10.1287/mnsc.1060.0554.

Saebi, T., & Foss, N. J. 2015. Business models for open innovation: Matching heterogeneous open innovation strategies with business model dimensions. *European Management Journal*. https://doi.org/10.1016/j.emj.2014.11.002.

Sieg, J. H., Wallin, M. W., & von Krogh, G. 2010. Managerial challenges in open innovation: A study of innovation intermediation in the chemical industry. *R and D Management*, 40(3): 281–291.

Smith, W. K. 2014. Dynamic Decision Making : A Model of Senior Leaders Managing Strategic Paradoxes. *Academy of Management Journal*, 57: 1592–1623.

Smith, W. K., Lewis, M. W., & Tushman, M. L. 2016. "Both/and" leadership. *Harvard Business Review*.

Stevens, J., & Moultrie, J. 2011. Aligning strategy and design perspectives: A framework of design's strategic contributions. *Design Journal*. https://doi.org/10.2752/175630611X13091688930525.

Sutton, R. I., & Hargadon, A. 1996. Brainstorming Groups in Context: Effectiveness in a Product Design Firm. *Administrative Science Quarterly*. https://doi.org/10.2307/2393872.

Tidball, B., Mulder, I., & Stappers, P. 2011. Online Design Contests: a Network of Inspiration for Designers. *Proceedings of IASDR 2011, the 4th World Conference on Design REsearch*. http://studiolab.ide.tudelft.nl/studiolab/tidball/files/2011/10/IASDR-Paper-Design-Contest-Tidball-Final.pdf.

Tucci, C. L., Chesbrough, H., Piller, F., & West, J. 2016. When do firms undertake open, collaborative activities? Introduction to the special section on open innovation and open business models. *Industrial and Corporate Change*. https://doi.org/10.1093/icc/dtw002.

van Dijk, S., Berends, H., Jelinek, M., Romme, A. G. L., & Weggeman, M. 2011. Micro-Institutional Affordances and Strategies of Radical Innovation. *Organization Studies*. https://doi.org/10.1177/0170840611421253.

Van Maanen, J., Sørensen, J. B., & Mitchell, T. R. 2007. The interplay between theory and method. *Academy of Management Review*, 32(4): 1145–1154.

Verganti, R. 2003. Design as brokering of languages: Innovation strategies in Italian firms. *Design Management Journal*. https://doi.org/10.1111/j.1948-7169.2003.tb00050.x.

Verganti, R. 2006. Innovating through design. *Harvard Business Review*.

Verganti, R. 2008. Design, meanings and radical innovation: A research agenda. *Journal of Product Innovation Management*. https://doi.org/10.1111/j.1540-5885.2008.00313.x.

Verganti, R. 2009. Design-driven innovation: changing the rules of competition by radicaly innovating what things mean. *Igarss 2014*. https://doi.org/10.1007/s13398-014-0173-7.2.

Verganti, R. 2011. Designing breakthrough products. *Harvard Business Review*.

von Hippel, E. 1986. Lead Users: A Source of Novel Product Concepts. *Management Science*. https://doi.org/10.1287/mnsc.32.7.791.

von Hippel, E. 2005. *Democratizing Innvation*.

von Hippel, E., & von Krogh, G. 2015. Identifying Viable "Need–Solution Pairs": Problem Solving Without Problem Formulation. *Organization Science*. https://doi.org/10.1287/orsc.2015.1023.

Ward, A., Runcie, E., & Morris, L. 2009. Embedding innovation: design thinking for small enterprises. *Journal of Business Strategy*.

https://doi.org/10.1108/02756660910942490.

West, J., & Lakhani, K. R. 2008. Getting Clear About Communities in Open Innovation. *Industry and Innovation*, 15(2): 223–231.

West, J., & O'mahony, S. 2008. The role of participation architecture in growing sponsored open source communities. *Industry and Innovation*. https://doi.org/10.1080/13662710801970142.

West, J., Salter, A., Vanhaverbeke, W., & Chesbrough, H. 2014. Open innovation: The next decade. *Research Policy*, 43(5): 805–811.

Yoo, Y., Boland, R. J., & Lyytinen, K. 2006. From Organization Design to Organization Designing. *Organization Science*. https://doi.org/10.1287/orsc.1050.0168.

1. EXPLORING TASK FORMULATION IN CROWDSOURCING DESIGN CONTESTS

Abstract

There is increasing interest in crowdsourcing as a source of innovation, however, research on how firms engage the best idea providers is still limited. Drawing on matching theory, we suggest that a contest is a two-sided matching process between firms and the crowd. Thus, besides prizes and other type of incentives, the way a task is formulated (brief) helps a firm to find out the contributor with a solution both compatible and complementary to its knowledge and gives her the hints to choose the contest she can successfully invest in. With a multiple case study of 13 design contests launched by 12 firms through an Italian crowdsourcing platform, we provided, for the first time to our knowledge, an in-depth analysis of the structure and narrative of each contest's brief. We identified four framing dimensions: technology, user experience, corporate identity, and creativity, by which firms point designers' creative effort to address the multidimensionality of the problem to be solved. We, then, analyze how the four narrative dimensions are combined in formulations that might emphasize either compatibility or complementarity or both of them. We finally collected fine-grained data on the contests results and showed which formulation leads to a better performance. Findings suggest that briefs with a balanced formulation based on compatibility and complementarity might lead to a better performing match, while companies seem more prone to leverage on compatibility. Our study contributes to crowdsourcing literature by providing original and exploratory evidence concerning task formulation and its role in the matching process among firms and designers.

Keywords: crowdsourcing contest; task; design brief; problem formulation; open innovation; framing; matching theory

Introduction

In many industries, "open innovation" strategies (Chesbrough, 2003) has been powered by crowdsourcing (Boudreau and Lakhani, 2013): ideation efforts are outsourced to large communities of individuals with widely diverse knowledge, skills, experience, and perspectives (Howe, 2006). In order to exploit the full potential of crowdsourcing, organizations need to understand which mechanisms are effective in engaging the right solution providers, particularly when they outsource a core activity, such as the complex and creative task of new product development. Traditional mechanisms used to motivate employees might need to be rethought when external designers are to be engaged on a case-by-case basis by crowdsourcing.

Recently, research on crowdsourcing showed that intrinsic factors related to the task itself such as enjoyment (Lakhani and Wolf, 2005) and meaningfulness (Chandler and Kapelner, 2013) have a better effect on motivation than extrinsic ones (prizes or career opportunities). However, while evidence suggests that routine tasks, framed in a meaningful way, exert a positive impact on motivation, less is known on how a task could be framed and communicated to motivate a designer, already used to deal with rich and creative ones, such as idea generation and product development. Moreover, when a firm formulates a task for external designers, it should also consider how far it wants to spur their creative exploration for a novel idea that indeed has to be successfully absorbed internally (Cohen and Levinthal 1990; Zhara and George 2002). To address these gaps, we look at design crowdsourcing contests and we argue that, besides prizes and other type of incentives, the way a task is formulated (brief) matters in designers' choice of the contest to invest in. Moreover, we suggest that in crowdsourcing the choice is made on a project-by-project basis by both parties, and they want to maximize the pay-off of their matching.

Coherently, we draw on matching theory (Haas, Criscuolo, and George, 2015; Mitsuhashi and Greve, 2009) and argue that design contests activate a two-sided matching process, in which the formulation of the task (brief) clarifies what the company is looking for, when posting the contest. The brief narrates the task features that might be attractive for designers, eventually persuading them to invest their effort and resources. Furthermore, in design crowdsourcing a firm formulate the task in searches for solutions that are both *compatible* and *complementary* to its goals and knowledge. *Compatible* means that a project submitted by a designer should fit firm's requirements, to allow it to absorb the new idea and bring it to the market. While *complementary* means that a designer should ideate something that the firm is not able to achieve with its internal resources.

Thus, our research question is: how is the task formulated in design crowdsourcing contests to stimulate designers to make a contribution that is creative and simultaneously compatible with a firm's aim?

We developed a qualitative in-depth analysis of a group of 13 contests launched by 12 companies through a successful Italian design crowdsourcing platform, which has a community of 70,000 designers registered and more than 3,000 active contributors. We analyzed the narrative of each brief to discern its inherent features. We identified four framing dimensions: technology, user experience, corporate identity, and creativity and their relation to the two matching criteria of compatibility and complementarity. We related them to the performance of the contests to identify which formulation might better affect contests performance.

We contribute to extant literature in different ways. First, on crowdsourcing literature, we shed light on the role of task formulation in contests, as a key element of contests structure and dynamics, neglected by previous research, and we provide empirical

evidence on how the narrative can be differently used by firms. Grounding our findings on matching theory we suggest a theoretical argument to comprehend the role of task framing in the relation between firms and designers. Second, we provide original and explorative evidence of the dimensions of the narrative used to frame the task and their relation to the two matching criteria of compatibility and complementarity. Third, by fine-grained data of contests' performances, we provide first explorative insights on how framing a task by combining the different dimensions along the two matching criteria could better impact on the matching process between the crowd and the firm. Our theoretical and empirical contributions have several managerial implications. This study provides managers with insights on an intangible and powerful tool, so far underestimated, by which they can leverage the interest of designers in order to improve the benefit of crowdsourcing. By carefully formulating the narrative dimensions of the task, managers can engage the best matching designer. Moreover, our study provides implication for crowdsourcing platforms managers that could guide firms during the creation of a crowdsourcing contest and the formulation of the task.

In the next section, we review the literature on crowdsourcing design contests and task formulation. We then present the research method and findings, before discussing the theoretical contributions and managerial implications.

Theoretical Background

Matching Ideas Seekers and Providers in Design Crowdsourcing

Contests are increasingly used to tapping a large number of knowledge sources beyond organizational boundaries (Chesbrough, Vanhaverbeke, and West, 2006; Boudreau and Lakhani, 2013). Through crowdsourcing a firm identifies a specific problem, offers a cash prize, and broadcasts an invitation to submit solutions to a global community of

idea providers by the means of a web platform (Zheng, Li, and Hou, 2011; Mortara, Ford, and Jaeger, 2013). Idea providers act as free agents, unaffiliated with the contest sponsor, and may be able to generate very creative ideas (Majchrzak and Malhotra, 2013).

Although crowdsourcing is a promising way of improving a firm's innovation capability (Boudreau and Lakhani, 2013), organizations must understand the mechanisms by which a partnership with external idea providers can be optimally leveraged to maximize the benefits of this form of open innovation (Lakhani and Tushman, 2012). Furthermore, organizations often struggle to make use of distant knowledge as it is difficult to combine their current knowledge with external newly elicited one (Kotha, George, and Srikanth, 2013), and this risk could be higher when there is a poor fit between crowd submissions and a firm's requirements.

Research on crowdsourcing in the last decade has analyzed how organizations can successfully engage contributors. For instance, a study on consumers involved in virtual product development showed that intrinsic interest in the innovation activity and curiosity tends to breed more substantial postings (Frey, Lüthje, and Haag, 2011; Füller, 2006; Füller, 2010; Leimeister et al. 2009; Roberts, Hann, and Slaughter, 2006); Chandler and Kapelner (2013), found a positive relationship between workers' efforts and the "meaningfulness" of a task of labeling medical images outsourced by Amazon's Mechanical Turk (MTurk). Notwithstanding these findings there are still gaps in the literature.

First, prior research has primarily looked at open source communities (O'Mahony and Lakhani, 2011), however crowdsourcing contests rely on a very different type of community, formed by geographically dispersed and autonomous individuals, who are

physically and cognitively independent and compete each other for monetary awards and interesting tasks.

Second, research has drawn on theoretical motivation models such as self-determination theory (Deci and Ryan, 1985) or goal setting (Locke et al. 1968), which were mainly developed to understand employer–employee relationships, and might not fully capture the essence of a relationship between a firm and external, independent, and competitive designers. Firms do not hire solution providers, rather they engage them on a project-by-project basis. Contributors look at the contests open in one given moment and they decide in which one they want to invest their time, effort, and expertise to get the better payoff from their efforts. Accordingly, in each contest the requirements of the firm's and the interests of the providers need to be matched.

Moreover, while evidence suggests that when a routine task (such as image labeling) is framed as more meaningful, workers increase their efforts, less is known on how to frame tasks already inherently rich, creative and autonomous, such as idea generation and product development, in order to engage external designers.

Fourth, when a firm formulates a task to search for a best solution, it should consider that the exploration for distant ideas must not be too remote from a firm's goal and knowledge to be able to absorb it (Cohen and Levinthal 1990; Nooteboom et al., 2007).

To address these gaps, we suggest that the way a task is formulated (brief) matters in design crowdsourcing. We draw on the matching theory (Mitsuhashi and Greve, 2009), that has recently been used to investigate similar problems of matching among potential partners (Mitsuhashi and Greve, 2009) in the context of : companies looking for prospective alliance partners (Soda and Furlotti, 2014), new ventures (Vissa, 2011), and online communities (Haas, Criscuolo, and George, 2015).

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Mitsuhashi and Greve (2009) claim that the fundamental tenet of matching theory is that it addresses the two parties' preferences by using data "on the characteristics or resources that each side values in the other" (Logan, 1996:117). For a match to occur, the parties need to find a mutual fit. Mitsuhashi and Greve (2009) suggest that matching criteria can be assessed based on the concepts of complementarity and compatibility: *complementarity* gives a match quality through differences, while *compatibility* gives a match quality through similarities.

We suggest that in crowdsourcing design contests, the way in which the task is framed gives the firms and the crowd observable matching criteria to select each other. It clarifies what the company is looking for and sheds light on task features that might engage a designer. Indeed, designers, need to find in the task formulation those matching criteria that will persuade them that they are the best idea provider for the firm and consequently they could gain the most from investing their time and resources on that specific contest. Moreover, the task formulation is even more relevant in design crowdsourcing, being frequently the only communication link between a firm and a designer.

So far, little empirical attention has been devoted to task formulation, namely how the narrative is crafted as a text to attract creative designers while clarifying the firm's requirements (Baer, Dirks and Nickerson, 2013; Foss, Frederiksen and Rullani, 2015; von Hippel and von Krogh, 2015).

Thus, our research question is as follows: how is the task formulated in design crowdsourcing contests to stimulate designers to make a contribution that is creative and simultaneously compatible with a firm's aim?

The Challenge of Task Framing in Design Crowdsourcing

When an innovative task is allocated to designers, the instructions are formulated as a brief, a written starting point and a dialogical tool that activates a creative reasoning pattern (Paton and Dorst, 2011) closely associated with abduction (Dorst, 2011; Roberts, Hann, and Slaughter, 2006). Deliberate and efficient abductive strategies involve the development or adoption of a "frame" for the creation of a novel standpoint from which a problematic situation can be tackled (Dorst, 2006). Therefore, a design *brief* on the one hand describes a firm's "desiderata", based on its own expert knowledge, concerning the nature of the problem space (Nelson and Stolterman, 2003) to engage designers effectively and to frame their creative potential. Designers, on the other hand, have their own professional knowledge, including schemata, guiding principles, recognition, and gambits, which will influence the way in which they attempt to reframe the situation (Lawson and Dorst, 2009).

Design brief narratives in crowdsourcing contests are the elements that allow this exchange between firms and designers and the activation of a framing processes in designer's community. However, the rich dialog that usually exists among firms and designers in internal new product development projects is absent in crowdsourcing contests. The "conversation" is one way, from a firm to the community of designers, through the platform. Furthermore, as we previously remarked, communities of designers are formed by decentralized, geographically dispersed, autonomous individuals. While potentially a source of innovation, this cultural and cognitive distance between the firm and the designers poses a challenge. To face it, the firm must create an easily understandable task that inspires the designers to invest their time and creativity, all within the firm's remit.

More concisely, firms face the challenge of how to frame the outsourced creative task in a way that captures the designers' interest and establishes the need to work to meet the firm's aims. Drawing on matching theory, we suggest that in the search for the best match among a firm and providers, task framing is informed by the firm's need to activate submissions that are *complementary* with its extant projects/products, meaning that new creative ideas should be significantly different from those that could be developed in house. At same time, a submission should be *compatible* with the aims and the knowledge of the firm, allowing the organization to absorb and implement the new idea, by producing and commercializing it.

Research Method

Consistent with the exploratory aim of the research, we adopted a qualitative research approach (Glaser and Strauss, 1967), carried out through an in-depth analysis of 13 contests sourced by 12 firms through a successful crowdsourcing design platform, Desall.com. Desall Spa is an Italian start-up born in 2012 and operating in the industrial design crowdsourcing. It runs a platform dedicated to the conception and participatory development of new products. The platform outsources tasks involving idea generation, product design, and interior development that are more complex than creative tasks mostly outsourced by other platforms, such as designing logos or T-shirts.

According to data we collected from Desall platform (2015), Desall.com has a large online community of 70,000 registered participants. The community is young (80% < 37 years old) and covers various professional categories, predominantly professional designers (33%) and students from design, art, and architecture universities (25%). Thus, we consider the community to be composed of design professionals (83%) with different levels of expertise (3.6% senior designers and 4.5% design lovers). The

majority of members are male (62% vs. 38% female). A large number of them are from Italy, but the community includes several other nationalities, e.g., from Singapore, Lebanon, France, and Spain.

As regards members' participation, Desall designers differ in terms of their involvement level in each submission: while some merely signed up, others submitted multiple design projects and were deeply involved in the voting activity for each contest. More than 3,000 designers of the community are active contributors (at least 1 submission per year). In 2014, we traced more than 13,500 submissions for a total number of 46 briefs, lunched since the Desall inception (2012), on average more than 200 submissions per brief.

Industrial clients of the platform are mainly Italian firms, among which there are large companies well known worldwide for the aesthetic and artistic quality of their products, such as Alessi, Illy, Luxottica, Breil, Replay, and Barilla.

The contests posted on the platform allocate complex tasks, mainly related to new product development projects. Frequently the capability to use 2D and 3D CAD programs is explicitly required by the brief, for instance the development of a prototype or a mock-up is one of the activities of the task. In addition, the platform classifies each contest into one of four *categories*: product innovation, interior design, new packaging design, or brand identity. Each category requires some specific qualified skills and expertise background.

Looking at the contest process, it consists of five steps: brief editing, contest activation on the platform, the uploading of ideas, community evaluation of projects, and the final selection of the winner(s) by the client. On the Desall.com crowdsourcing platform individuals within the community do not have the opportunity to interact and discuss

the projects, however they are allowed to ask for some specific clarifications, through the platform.

Data Collection

Table 1 shows the multiple sources of data collected (Yin 1994) with the analytical use for each source.

1)   Design briefs text: we took into consideration 50 contests out of the 54 (154 pages), executed between 2012 and 2015 (4 were based on a nondisclosure agreement with the firms). Then, for the in-depth analysis, and coherently with Eisenhardt's (1989) recommendation for a theoretical sampling approach (Corbin and Strauss, 1996), we selected a group of 13 contests launched by 12 firms, using four parameters (tab 1).

2)   Interviews and meetings: three interviews were conducted face to face with the CEOs of Desall.com, each lasting about two hours, and four meetings of at least one hour and half were organized with the Desall.com team by one of the two authors (12 hours).

3)   Questionnaires on contests performances. During the interviews and through the questionnaire, we identified and validated with interviewees a set of key indicators of contest performance and we then collected the performance measures of each contest analysed.

4)   Quantitative data from the Desall.com *website* on each contest, including visuals, titles, web categories, number of entries, timing, price per phase, and community data and votes.

5)   Quantitative data from the Desall.com *website* on the community of designers, including age, professional profile, participation to contests.

TAB 1 & 2

Data Analysis

The data analysis was organized in five steps. In the first step, we analyzed how task information was structured in each brief by comparing the 50 contests. Second, we analyzed, with a bottom up approach, the narrative used to orchestrate the selected brief contents (Table2). Following prior research (Corley and Gioia, 2004), we used sentences or paragraphs as coding units. We labeled each textual expression with either in vivo codes, that is, the language used in the text, or with simple descriptive phrases. Multiple specific textual expressions were then grouped into first-order codes. Two researchers conducted this open-coding process independently and generated the first-order codes, resolving occasional differences through discussion. We established links among first-order codes (Locke, 2001) in the next round of axial coding. Both researchers evaluated similarities in first-order codes and suggested theoretical labels in relation to the evidence contained in the interviews. To illustrate, we grouped the first-order codes under a more general second-order code, which was associated with four dimensions: *technical requirements, user experience, corporate identity, and creativity*. We then tested this second-order code against all available data using the constant comparison method (Glaser and Strauss, 1967).

Third, following a top-down approach base on literature, we examined the qualitative dimensions and the ways in which they were combined per brief. In line with matching theory, we identified the two criteria of *compatibility* and *complementarity*. A narrative is *compatible*, when it engages designer to follow the firm's specific features and

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requirements, a narrative is *complementarity*, when it engages designers to move far from the firm's knowledge in exploring new opportunities, delving into their creativity or their knowledge of users' emergent needs. We then analysed and coded each narrative dimension to categorized it into one the two matching criteria.

A following step was the *analysis of the brief's formulation by dimensions*. We identified the weight of each dimension in the narrative, counting the total number of the textual expressions-narrative components codified in each brief and identified the number of components belonging to each dimensions. This allowed to develop a measure of the weight of each dimension: the percentage of each dimensions in any brief/contest (expressions-components attributed to one dimension on the overall number of expressions codified in a brief), as reported in table 5 and visually showed in the radar chart of Fig.2.

Finally, we examined the relation between the briefs' formulation and the contest performance according to the following performance indicators:

Number of submissions/number of unique page views of the briefs as a measure of the *attractiveness* of the brief/contest.

Number of ideas submitted selected by Desall.com (the service to firms includes the first selection of ideas) as the shortlist of the best ideas to be submitted to the firm/number of submissions as a measure of *the quality* of the submissions;

Firms' satisfaction per contest. We asked the CEOs of Desall to rate firms' satisfaction with the contest from 1 to 7 (complete satisfaction);

Progression from submission to production. We asked the CEOs of Desall.com to rate (from 1 to 7, with 7 = certainty) the *likelihood* that the firm would take the idea of the contest winner to *production*.

Two measures of exploration were added. A Boolean variable to express if the firm received idea that were *unexpected* and remarkably interesting (1= yes/ 0= no) and if the firms wanted to *pursue a relationship* with the winner designers (1= yes/0 = no).

Results and Discussion

Our qualitative analysis offers new insights into how briefs are structured and how their narratives embedded several elements, which allow a framing process by designers toward ideation and lead them to choose contests.

The Brief Structure

The 13 briefs share a common structure consisting of the following sections: *Summary*; *Description; What we need and Guidelines; Timeline; Eligibility and submission; Awards; Appendix* (Tab 3). The common architecture (set of sections) is decided by Desall to help designers quickly and easily read through the brief. The brief structure organizes the different type of information provided by the firm and facilitates the interaction between firms and designers, allowing the designers to effectively retrieve the insights they need about a task and to quickly decide whether or not to start a project.

TAB 3

The Dimensions of Brief Narrative

Beyond the structure, the brief narrative plays a key role in communicating the firm's expectations and in engaging the designers in the framing process (Schon, 2008). The narrative components are delivered by the brief in the different sections of the structure described above. While each section is mainly focused on a specific kind of information, it might embody a richer content. For instance, the section *What we need*

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and Guidelines is mainly characterized by technical information, however some sentences of this section might engage designers in a creative endeavor or point to specific customer needs. Coherently, we analyzed the text of the brief considering that each section might deliver a rich set of meanings and we coded each sentence or phrase due to the content communicated. We identified the following main narrative components:

1. The *technical details* are components specifying the size, measure, form, style, materials, colors, and industrial processes (e.g.. "clean lines","metallic materials")

2. The *functions and user experience* are components specifying functions, customer age, customer lifestyles, and desired behaviors (e.g. "to help babies and kids develop their sense of movement and their physical skills")

3. The *firm's features* are components specifying the firm characteristics, such as age, or personality or specific cultural values related to firm personality narratives, such as "50 years of artisanal experience," or "we are a young firm, ready to innovate…"

4. As *firm's personality*, we coded the firm's mission and its relations with the territory (e.g."It has being recognized as one of the "Italian Design Factories")

5. The *emotional triggers* are identified as different triggers that draw on emotions and feelings such as the phrase "It's time to let your heart speak," which clearly define a required emotional attitude.

6. The *cognitive triggers* are ways of picturing possible scenarios for the project, they help to envision a usage environment such as "towards unexplored horizons full of possibilities" or "imagine the technological hood of the future." We identified sensorial triggers pointing to radical breakthrough.

This rich and articulated narrative acts as trigger for designers' creativity, at same time it provides the guidance towards firms' requirements. We coded these components until we reach theoretical saturation and from the six elements identified, we finally coded four dimensions (Fig 1)

1. The first dimension, *technical requirements*, it embodies the first type of element, *technical details,* and relates to design criteria, such as size, set by the firm for designers to conform to minimum requirements when conceiving the new product. By this dimension, the firm leverages the technical and specialized expertise of the designers.

2. The second dimension, *user experience*, includes the element *functions and user experience*, and engages a designer in crafting a product or service that should fulfill certain functions, triggering a desired user experience. By this dimension, the firm aims to tap into customer knowledge of the designers, on their capacity to observe human needs and ability to imagine new ways to satisfy users' unmet needs.

3. The third dimension, *corporate identity*, includes *firm's features* and *personality*, and concerns the firm's aim to explore new ways of managing its own brand or building on its identity, asking the designers to leverage their capacity to reinterpret the firm's history or to identify with its organizational culture or values, and conceive a product that could transmit them to the customer in a new way.

4. The fourth dimension, *creativity*, leverage on *emotional* and *cognitive triggers, and* spurs designers to delve on their own creativity and imagination to find new ideas for new use scenarios.

FIG 1

A brief might be framed placing a different emphasis on each one of the four dimensions, or relying on just one or two of them. We detected the emphasis placed on each dimension by analyzing the frequency by which a dimension is used in a brief (Tab. 5). Data show that firms used the four dimensions differently to formulate the task. For instance, while Fim-Lam primarily leveraged technical requirements, Made formulated the task highlighting mainly the corporate identity dimension, and Barilla championed creativity.

More in detail, as regards to the *average frequency* of each dimension across briefs. The *technical requirements* dimension is present in all the briefs except one, which directs the attention completely on the creativity dimension (Barilla) with an average frequency across briefs of 31%. *Creativity* is the second more represented across briefs, and its average frequency is 33 %. *Corporate Identity* is not very diffused, with an average of 21% and U*ser Experience* is used in just two briefs (Chicco 1 and Chicco 2) with a value around 45%, on average the frequency across briefs is 15% and 3 briefs do not include it at all.

We deepened this preliminary analysis on diffusion and average weight across briefs, identifying which are the dimensions at least relevant, if not *dominant* in a brief, to detect on which one most of the emphasis is placed by firms when formulating the brief. A dimension is identified as *dominant* when the brief narrative is based on it for more than 50% of its components. A dimension is *relevant* when the brief narrative is based on it for more than the 25% of the text and to a maximum of 49%. Thus a dimension is "at least" relevant when its frequency is more than 25%.

Two dimensions are relevant in formulating the brief: *Technical requirements*, at least relevant (frequency more than 25%) in 7 out of 13 briefs (dominant in 3) and *Creativity,* at least relevant in 10 out of 13 briefs (dominant in 2 cases). *Corporate Identity*, never dominant, is relevant in 5 out of 13 briefs. *User Experience*, never dominant, is relevant just in 2 narratives.

As far as the combination of the four dimension in each brief is concerned, we also found that 8 out of 13 brief, do not present any dominant dimension, but a combination of relevant ones, moreover the 3 briefs with *Technical requirements* as *dominant* dimension, do not combine it with any other relevant one. Instead the 2 briefs with *Creativity* as dominant dimension, combine it with another one, namely they anchor designers' exploration to *Corporate identity* (2 briefs out of 2).

The role of the matching criteria of compatibility and complementarity in brief formulation

We put further our analysis on brief formulation, investigating the way firms leveraged on the two criteria of compatibility and complementarity, *Compatibility* criterion highlights similarities and alignment to the firm, while *complementarity* point to differences and exploration far from the firm knowledge. Therefore, we codified as compatible the formulations where firms tend to inform on technical and corporate details related to their portfolio choice and specific implementation requirements, therefore we coded as part of the *compatibility criterion* the two dimensions of *technical requirements* and *corporate identity* dimensions. While, *user experience and creativity* have been coded as dimensions pointing to *complementarity*, as they spur the search for something different from the extant portfolio of products and customers of a firm.

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By considering the frequency of the four dimensions, we calculated the total frequency of *compatibility* (technical requirements + corporate identity) and *complementarity* (user experience + creativity). We preliminarily analysed which dimension firms mostly used to express each criterion in brief formulation: compatibility was expressed mostly by using the dimension of *technical requirements* over *corporate identity, complementarity* was based on the dimension of *creativity* over *user experience*. We then investigated whether there was a balance in the way briefs were framed along the two criteria. We defined as *unbalanced framing,* briefs where the percentage of one matching criterion double (or more) the percentage of the other; *balanced* those briefs in which the percentage of the two matching criteria differ of maximum 25%. Following this definition, we found that 6 briefs' formulations were *unbalanced* and 7 *balanced.*

TAB 6

Contests' performance

We analyzed what characterizes the most effective framing in the matching process between firms and designers. We related brief formulation features and contest performance, by 5 indicators described in details in the data collection section:

1. *attractiveness*: number of submissions/number of unique page views;

2. *quality of the submissions*: number of best idea/number of submissions;

3. *firms' satisfaction* : from 1 to 7 complete satisfaction);

4. *likelihood of production*: from 1 to 7 certainty.

5. *Surprise - novelty* of ideas and *willingness to collaborate* with the winner (1= yes/0 = no).

The indicators of *firms' satisfaction* and *likelihood of production* measure the contest performance from a firm point of view; while *higher attractiveness of the briefs and higher quality of ideas submitted*, take into consideration the crowd point of view. The two additional performance indicators, *surprise* the firm and *contact with the designers* to foster future collaborations, emphasize the explorative nature of design contests.

First, we ranked the contests (from 1= poorest performer to 13 = better performer); per each performance measures *(attractiveness, quality, firms 'satisfaction, likelihood of production);* we identified which contests performed better and we considered the booleans (*Surprise and Willing to collaborate)* as additional points (maximum of 2 points). Then, we finalized a list of contests best performer by add-in all the scores. The list had a maximum possible value of (13 points x 3 performance measures) + 2 (additional points) = 41 points, and the minimum (1x3)+ 0= 4 points. This ranking system positioned Made with 38 points at the top of our list. Selle Royal was the poorest performer with 14 points.

We then grouped the briefs in four performance levels: best, good , average and poor, based to average performance (25) and standard deviation (5,95). We identified *best contests* those that differ from the average performance 1,5 times the standard deviation, thus those with a score above 33,9, and *poor* ones are those below 16. We identified *good* contests as those above the average and below the best, as well as the contests with an *average* performance, their score ranging between 24 and 16. Findings show that the only contest which score as a best was Made; 6 briefs scored as good; 5 briefs scored as average and 1 as poor.

We then, analyzed the brief formulation characteristics in relations with the contest performance.

Brief formulations with a dominant dimension, Technology (3 over 13) or Creativity (2 over 13) performed as good just in 1 over 3 (technology) and 1 over 2 (creativity) briefs; however, the brief which performed as poor has also Technology as dominant dimensions and no relevant ones. Therefore, seemed that the dominance is not a leading factor to a good performance. Instead when dimensions like technology and creativity are used as relevant they seemed to direct to better performances (technology 3 over 4 cases; creativity 5 over 6 cases; Corporate Identity 4 over 5 cases).

These findings suggested, as matching theory advocated, that pointing just on one dimensions do not ensure best performances, instead multidimensionality and the use of relevant instead of dominant narrative could direct to better results. Then, we further investigated how much the combination of the matching criteria could lead to successful performances.

Previously we identified 6 unbalanced briefs and 7 balanced ones. *Unbalanced* briefs scored as good just in 1 over 6 cases, instead *balanced* briefs in 6 out of 7 cases (1 best and 5 good). Therefore, balanced briefs seem promising formulations, as they provide a consistent guideline (compatibility) *and* encourage creative thinking and exploration of novel opportunities (complementarity).

Made's brief, the best performer, is an example of that and we analysed it in depth. *The compatibility* criterion (58,33%) is nicely balanced by the complementarity criterion (41,67%). As the dimensions are concerned, Made leverages on the *corporate identity* dimension (67%), to express *compatibility*, contrary to the majority of the briefs; a combination of creativity (25%) and user experience (16,7%) is used to point designers attention to *complementarity*. It seems that this brief formulation provides a consistent message that allows designers to both adhere to firm's interests and to break free of constraints. Leveraging on *corporate identity* allows designers to explore having an

anchor in the specific identity of the organization, without being constrained by too strict technical requirements.

In summary, findings suggest that the briefs that balance compatibility and complementarity are the most promising. However, the dimensions and their combinations within each criterion are very important characteristics for the success of a contest. The use of one dominant dimension do not lead to better performance, instead multidimensionality seemed to be more effective. In the compatibility criterion, we saw that corporate identity dimension, seems to represent a good way of balancing and anchoring the creative potential, and on the complementarity criterion, the user dimension, seemed to be not explored enough in the narratives, however we assume that potentially this dimension could relate better then creativity with the exploratory purpose of a contest without misleading the designers.

Theoretical Implications

With our research, we contribute in different ways to the literature on crowdsourcing and open innovation and we also extend the matching theory with original empirical evidence. First, our paper advances knowledge of how firms leverage on online communities through task formulation to enable an effective distributed design process (Jeppesen and Lakhani, 2010; Lakhani and Tushman, 2012). Looking at the designers' engagement as a matching process (Mitsuhashi and Greve, 2009) our study complements those conducted on online communities and on contests for software development or routine tasks (Haas, Criscuolo, and George, 2015), providing evidence concerning the role of task formulation - brief in design crowdsourcing- which has thus far scarcely been investigated. We showed that firms and designers need to find the best partners on a reciprocal basis, with a more dynamic approach (Lauritzen, 2017).

Specifically, firms by task formulation find solution providers that submit ideas compatible with and complementary to their own products.

Brief formulation and matching criteria in design crowdsourcing

Our findings on how task are formulated in design crowdsourcing, first, suggest that structuring the brief narrative is not enough to engage them, but it might help designers to quickly and easily read through the brief.

As soon as designers' attention is captured, the role of brief narrative becomes fundamental. We found that design briefs are framed by using different dimensions that help to configure the exploration space for designers and to make it specifically attractive to engage the right ones. Dimensions of the exploratory space point to different aspects of the problem to be solved, challenging the designers to exploit differently their own expertise and creativity. Our findings clarify that there is no just "one best way" of combining dimensions in brief formulation, but rather there are multiple possibilities of doing so, as the nuances requested from an idea-seeking firm are multiple. While findings show that firms use dimensions differently to frame the space of exploration for new ideas, however just two of the four dimensions they can leverage on, are the relevant ones: technical requirements and creativity. Corporate identity is used just as an anchor for creativity, with the aim to relate the exploration of designers to the core values and traditions of the firms. Firms do not use very much the fourth dimension, not delving on the designers' capacity to explore the user experience. In summary, firms seem to think that brief narrative which lead to solutions that are closer to their original knowledge will be more beneficial, however this choice is not always the more valuable one in a matching perspective.

Brief formulation it is at same time a mean to activate designers' creativity and to engage them in a matching process. The exploratory spaces motivate the solvers by freeing up their exploration, but at the same time they constrain creativity to align the exploration of new ideas coherently with the firm's request. Multiple dimensions mold a rich ideation perimeter compatible and complementary to a firm's needs. Our cases show that just half of the briefs are formulated balancing both criteria and indeed having a balanced approach could lead to better performances. In other words, the matching process seemed to be more effective when the crowd engage with a consistent message which allow to respond to both compatibility & complementarity signals.

Our findings build on and extend the concepts of complementarity (the quality of a match determined though differences) and compatibility (the quality of a match determined through similarities) (Mitsuhashi and Greve, 2009), and add to matching theory the granularity of four different narrative dimensions which shade light on how a problem can be formulated to address the quality of the matching process.

Managerial Implication

This study implies that brief formulation represents an important step to avoid potential negative impact in innovation-related community collaboration.

This study provides managers with insights on how to leverage the interest of designers in order to improve the benefit of crowdsourcing. Our findings suggested to approach designers' community as investors. Investors need to be involved and stimulate to raise interest in the project. Therefore, incentives are not enough; the narrative should inspire them to take action and direct effort toward shared goals.

Therefore design brief narrative has to be shaped and formulated carefully in order, on one hand, to mirror firms' expectations and on the other, to stimulate and trigger the

designer's attention. Our study provide manager with a fine-grained set of dimensions with which they can frame a task to be outsourced. We also point to the relationship between dimensions and matching criteria.

Our findings advise managers on how important is to formulate problems that could oscillate between opposite criteria in order to avoid, on one side, community frustration and, on the other, the risks of achieving undesirable outcomes. A narrative conscious usage will allow managers to frame contents that are coherent with the "right amount" of exploration in order to match results with firm expectations and objectives.

The results offer useful hints for how it is possible to describe a specific perimeter, an exploration space, where designers could explore new ideas and opportunities *and* be guided at the same time.

Implications for platform managers

Crowdsourcing platforms are resourceful intermediary, which offers an Internet base service where firms can host their challenge. The formulation of the challenge is often delegate by firms to the platform.

The findings attempt to provide useful advice for how an innovation intermediary can help managers to not underestimate the value of jointly shape the narrative. Platforms managers have the chance to guide and assist firms during the brief formulation by giving an overview on the possible dimensions and consequently providing questions that firms need to consider before engaging in a crowdsourcing contest. This joint effort could lead to build in firms a more open culture, without being too worry about controlling the innovation process.

The results highlight another important role for intermediaries as solution seeker. Firms often, even if they seek for novelty (Kotha, George, and Srikanth, 2013), have

difficulties to see it and they tent to establish a path dependent behavior on their choices. Platforms instead have the potential to break the path dependency by supporting a more inform decision-making process and to open up to contradiction which might lead to encourage to embrace real novelty.

Limitations and suggestions for Future Research

This study is limited to the publicly available data on the Desall.com website. A more refined understanding of community activities (e.g., votes and submission per each contest) and firms' perceptions (e.g., idea selection criteria, how many ideas were taken up in R&D) might lead to other hypotheses, and thus a deeper understanding of the role of the narrative in framing the solvers. The limitations of this study offer opportunities for further research. First, this article triangulated data for performance through the platform, thus other interviews to the firms should be examined to better understood the firms initial intentions on using the crowdsourcing platform and to better understand if they finally developed the product.

Second, although Desall.com represents an active crowdsourcing platform for developing innovative product ideas, making it possible to isolate briefs as the only communication tool, the generalizability of the specific results from this study may be limited. Future research might attempt to confirm our findings in other similar settings. Third, another interesting line of research could be the development of a set of experimental briefs to determine to a greater extent the balance between the criteria and the role of the four dimensions, and how changes dimensions relevance and combination and in criteria balance could affect the crowd's output quality and quantity.

References

Baer, M., Dirks, K. T., & Nickerson, J. A. (2013). Microfoundations of strategic problem formulation. *Strategic Management Journal*, *34*(2), 197–214

Bart, C. and A. Pujari. 2007. The performance impact of content and process in product innovation charters. *Journal of Product Innovation Management* **24(1): 3–19.**

Bayus, B. L. 2013. Crowdsourcing new product ideas over time: An analysis of the Dell IdeaStorm community. *Management Science* **59(1): 226–244**.

Boudreau, K. J., E. C. Guinan, K. R. Lakhani, and C. Riedl. 2016. Looking Across and Looking Beyond the Knowledge Frontier: Intellectual Distance, Novelty, and Resource Allocation in Science. *Management Science* **62 (10): 2765–83**.

Boudreau, K. J, N. Lacetera and K R. Lakhani. 2011. Incentives and Problem Uncertainty in Innovation Contests: An Empirical Analysis. *Management Science* **57(5):843-863**

Boudreau, K. J. and K. R. Lakhani. 2013. Using the crowd as an innovation partner. *Harvard Business Review* **91(4): 60–69.**

Brabham, D. C. 2008. Crowdsourcing as a model for problem solving: An introduction and cases. *Convergence: The International Journal of Research into New Media Technologies* **14(1): 75–90.**

Brabham, D. C. 2013. *Crowdsourcing*. NY: MIT Press.

Calantone, R. J., N Harmancioglu and C. Droge. 2010. Inconclusive innovation "returns": A meta-analysis of research on innovation in new product development. *Journal of Product Innovation Management* **27(7): 1065–1081.**

Chandler, D. and A. Kapelner. 2013. Breaking monotony with meaning: Motivation in crowdsourcing markets. *Journal of Economic Behavior and Organization* **90: 123–133**.

Chesbrough, H. W. 2003. *Open innovation*. Cambridge: Harvard Business Press.

Chesbrough, H., W. Vanhaverbeke and J. West. 2006. *Open innovation: Researching a new paradigm*. Cambridge: Oxford University Press

Cohen, W. and D. Levinthal. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly* **35(1): 128 –135**.

Corbin, J. and A. Strauss. 1990. Grounded theory research: Procedures, canons and evaluative Criteria. *Zeitschrift für Soziologie* **19(6)**.

Corbin, J. and Strauss, A. 1996. Analytic Ordering for Theoretical Purposes. *Qualitative Inquiry*, **2(2):139-150**.

Corley, K. G. and D. A. Gioia. 2004. Identity ambiguity and change in the wake of a corporate spin-off. *Administrative Science Quarterly* **49(2): 173–208.**

Dahlander, L. and D. M. Gann. 2010. How open is innovation? *Research Policy* **39(6): 699–709.**

Dawson, R. and S. Bynghall. 2012. *Getting results from crowds*. xx

Deci, E. and R. Ryan. 1985. The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality* **19(2): 109–134.**

Dorst, K. 2006. Design problems and design paradoxes. *Design Issues* **22(3): 4–17.**

Dorst, K. 2011. The core of "design thinking" and its application. *Design Studies* **32:**

521–532.

Eisenhardt, K. M. 1989. Building theories from case study research. *Academy of Management Review* **14(4): 532–550.**

Eisenhardt, K. M. and M. E. Graebner. 2007. Theory building from cases: Opportunities and challenges. *Academy of Management* **50(1): 25–32.**

Enkel, E., J. Perez Freije and O. Gassmann. 2005. Minimizing market risks through customer integration in new product development: Learning from bad practice. *Creativity and Innovation Management* **14(4): 425–437.**

Fiol, C. M. 1989. A semiotic analysis of corporate language: Organizational boundaries and joint venturing. *Administrative Science Quarterly* **34(2): 277**.

Frey, K., C. Lüthje and S. Haag. 2011. Whom should firms attract to open innovation platforms? The role of knowledge diversity and motivation. *Long Range Planning* **44(5–6): 397–420.**

Foss, N. J., Frederiksen, L., and Rullani, F. 2015. Problem-formulation and problem-solving in self-organized communities: How modes of communication shape project behaviors in the free open source software community. *Strategic Management Journal* **37(13):2589-2610**

Füller, J. 2006. Why consumers engage in virtual new product developments initiated by producers. *Advances in Consumer Research* **33: 639–646.**

Füller, J. 2010. Refining virtual co-creation from a consumer perspective. *California Management Review* **52(2): 98–122.**

Glaser, B. and Strauss, A. 1967. *The discovery of grounded theory*. 1st ed. Chicago: Aldine Pub. Co.

Haas, M. R., P. Criscuolo and G. George. 2015. Which problems to solve? Online knowledge sharing and attention allocation in organizations. *Academy of Management Journal* **58(3): 680–711.**

Hatchuel, A., Le Masson, P. and Weil, B. 2002. From knowledge management to design-oriented organisations**. *International Social Science Journal,* 54(171):25-37.**

Hippel, E. von, & Krogh, G. von. 2015. CROSSROADS—Identifying Viable "Need–Solution Pairs": Problem Solving Without Problem Formulation. *Organization Science***, *27*(1), 207– 221**

Howe, J. 2006. The rise of crowdsourcing. *Wired Magazine* **14(6): 1–4**.

Howells, J. 2006. Intermediation and the role of intermediaries in innovation. *Research Policy* **35(5): 715–728.**

Jeppesen, L. B. and K. R. Lakhani. 2010. Marginality and problem-solving effectiveness in broadcast search. *Organization Science* **21(5): 1016–1033**.

Kalogerakis, K., C. Lüthje and C. Herstatt. 2010. Developing innovations based on analogies: Experience from design and engineering consultants. *Journal of Product Innovation Management* **27: 418–436.**

Kotha, R., G. George and K. Srikanth. 2013. Bridging the mutual knowledge gap: Coordination and the commercialization of university science. *Academy of Management Journal* **56(2): 498–524.**

Kristensson, P., P. R. Magnusson and J. Matthing. 2002. Users as a hidden resource for creativity: Findings from an experimental study on user involvement. *Creativity and Innovation Management* **11(1): 55–61**.

Lakhani, K. and M. Tushman. 2012. Open innovation and organizational boundaries: The impact of task decomposition and knowledge distribution on the locus of innovation. Harvard Business School Working Paper 12-057.

Lakhani, K. R. and R. G. Wolf. 2005. Why hackers do what they do: Understanding

motivation and effort in free/open source software projects. **In *Perspectives on free and open source software***, ed. J. Feller, B. Fitzgerald, S. A. Hissan and K. R. Lakhani, 3–22. Cambridge, MA: The MIT Press.

Lauritzen, G. 2017. The Role of Innovation Intermediaries in Firm-Innovation Community Collaboration: Navigating the Membership Paradox. *Journal of Product Innovation Management* **(00):00-00**

Lawson, B. and K. Dorst. 2009. ***Design expertise***. Oxford: Architectural Press.

Leimeister, J. M., M. Huber, U. Bretschneider and H. Krcmar. 2009. Leveraging crowdsourcing: Activation-supporting components for IT-based ideas competition. ***Journal of Management Information System* 26(1): 197–224.**

Locke, E. and Bryan, J.1968. Goal-Setting as a Determinant of the Effect of Knowledge of Score on Performance. ***The American Journal of Psychology* 81(3): 398**

Logan, J. A. 1996. Opportunity and choice in socially structured labor markets. ***American Journal of Sociology*, 102(1):114–160**.

Majchrzak, A. and A. Malhotra. 2013. Towards an information systems perspective and research agenda on crowdsourcing for innovation. ***The Journal of Strategic Information Systems* 22(4): 257–268.**

Mitsuhashi, H., and H. R. Greve. 2009. A matching theory of alliance formation and organizational success: Complementarity and compatibility. ***Academy of Management Journal* xx.**

Mortara, L., S. J. Ford and M. Jaeger. 2013. Idea competitions under scrutiny: Acquisition, intelligence or public relations mechanism? ***Technological Forecasting and Social Change* 80(8): 1563–1578.**

Nelson, H. G. and E. Stolterman. 2003**. *The design way*.** Cambridge: MIT Press.

Nelson R. R. 1959. The simple economics of basic scientific research. ***Journal of Political Economy* 67(3): 297–306.**

Nelson R. R and N. Rosenberg. 1993. Technical innovations and national systems. In ***National innovation systems: A comparative analysis***, ed. R. R. Nelson, xx–xx. New York: Oxford University Press.

Nooteboom, B., W. Van Haverbeke, G. Duysters, V. Gilsing and A. van den Oord. 2007. Optimal cognitive distance and absorptive capacity. ***Research Policy* 36(7): 1016–1034.**

O'Mahony, S. and Lakhani, K. R. 2011. Organizations in the shadow of communities. In ***Communities and organizations***, ed. C. Marquis, M. Lounsbury and R. Greenwood, Research in the sociology of organizations, Vol. 33, 3–35. Bingley, UK: Emerald Group Publishing Limited.

Paton, B. and K. Dorst. 2011. Briefing and reframing: A situated practice. *Design Studies*. 32(6): 573–587.

Preece, J., Nonnecke, B. and Andrews, D. 2004. The Top 5 Reasons for Lurking: Improving Community Experiences for Everyone. ***Computers in Human Behavior*. 20: 201–23.**

Poetz, M. K. and M. Schreier. (2012). The value of crowdsourcing: Can users really compete with professionals in generating new product ideas? ***Journal of Product Innovation Management* 29(2): 245–256.**

Roberts, J. A., I.-H. Hann and S. A. Slaughter. 2006. Understanding the motivations, participation, and performance of open source software developers: A longitudinal study of the Apache Projects**. *Management Science* 52(7): 984–999**.

Schenk, E. and C. Guittard. 2011. Towards a characterization of crowdsourcing practices. ***Journal of Innovation Economics* 7(1): 93–107.**

Schmookler J. 1966. ***Invention and economic growth.*** Cambridge, MA: Harvard University Press.

Schon, D. A. 2008. ***The reflective practitioner***. xx: Basic Books.

Siggelkow, N. 2002. Evolution toward fit. ***Administrative Science Quarterly*** **47(1): 125–159.**

Soda, G. and M. Furlotti. 2014. Bringing tasks back in an organizational theory of resource complementarity and partner selection. ***Journal of Management*** **20(10): 1–28.**

Surowiecki, J. 2004. ***The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies, and nations.*** New York: Doubleday.

Vissa, B. 2011. A matching theory of entrepreneurs' tie formation intentions and initiation of economic exchange**. *Academy of Management Journal* 54(1): 137– 158.**

Walsh V. 1996. Design, innovation and the boundaries of the firm. *Research Policy* 25(4): 509–529.

Yin, R. K. 1994. ***Case study research: Design and methods*** (2nd ed.). Newbury Park, CA: Sage.

Zheng, H., Li D. and W. Hou. 2011. Task design, motivation, and participation in crowdsourcing contests**. *International Journal of Electronic Commerce* 15(4): 57–88.**

Table 1. Data collection

Data Source	Data Type	Analytical Use
Design briefs	Design briefs text (54), executed between 2012 and 2015 (we took into consideration 50 contests out of the 54 (154 pages),4 were based on a nondisclosure agreement with the firms).	Comparison between briefs structures
	13 selected narratives (56 pages) - Criteria of selection: • From 2014 to 2015 • Closed contests to enable better identification of the performance of each contest • Task formulation for new idea generation • Diverse sampling to fulfill different categories (type of product, firm size and sector, task requirements and performance-successful and less successful) - to provide a rich description (Siggelkow, 2002) - to strengthen our theory building (Eisenhardt and Graebner, 2007; Yin, 1994) - to enhance the external validity of the study.	In depth qualitative narrative analysis: first and second order code ((Corley and Gioia, 2004)
	Additional data for the 13 contests selected: • the numbers of reviews per contest • length (number of words)	Detection of difference in originating the task formulation
Interviews	Semi-structured interviews (3) - face to face with the CEOs of Desall.com, each lasting about two hours - 6 hours (audio)	Gaining familiarity with the process of each contest framing, collecting qualitative information about each contest and the client firms' aims.
	Meetings with the Desall.com team (4) by one of the two authors - (notes)	Meetings were organized to verify with the Desall team data, interpretations and themes emerging from the authors' coding, by an iterative process
Questionnaires on contests performance	Contests performances questionnaires given to Desall CEO and 2 Desall team members on firm performance perception	Collecting a set of key performance measures for each contest, richer than the standard performance measure collected by prior literature, which consists in single information on the number of contributions.
On line data	• visuals • titles • web categories • number of entries/submission • timing • price per phase and typology of incentive (awards; royalties) • community votes	Triangulation of contest information about selections criteria confirmation and performances assigned by the platform

Table 2. Design contest descriptio

	Contest name	Phase typology	Year	Time frame (months)	Incentive typology	Prize	Royalties	Brand Perception	Contest Difficulty	Brief length (word)	No. Phase Contribution
Barilla	Game for Breakfast	New idea	2015	3	Monetary	3000	0	2	3	462	488
Chicco 2	Ride on baby	New idea	2014	4	Monetary	2000	0	8	8	1847	186
Chicco 3	Re-evolutionary	New idea	2015	3	Monetary	2000	0	8	8	1247	103
Elica	Elica Air Design Award	New idea	2015	2	Monetary	3000	0	6	4	619	314
Fim Lam	Velocity	Product design	2015	4	Monetary	4000	0	1	10	1312	95
Giallo Zafferano	Smart cooking	New idea	2015	4	Monetary	1500	0	7	6	635	119
Illy	Illy City Mug	New idea	2014	1	Not monetary	0	6	9	2	481	2021
Keyline	Iconic Flip Key	Product design	2014	3	Monetary	4000	0	4	7	916	192
Luxottica	Full Metal Frame	Product design	2014	3	Monetary	5000	0	7	7	702	271
Mabele	Off the wall	Product design	2014	3	Mix	1000	1	5	4	629	900
Made	Emerging Talent Award	Product design	2015	3	Not monetary	0	1	8	3	530	1070
Selle Royal	Selle Royal Saddle Selector	New idea	2014	1	Monetary	1500	0	6	8	937	62
Sigma	Wire storming	New idea	2014	3	Monetary	3000	0	1	7	543	149

Table 3. Brief Structure

Section Title	What	Why	Description
Summary section: project overview and background.	This section clearly and concisely articulates the scope of the project, the business needs and objectives, the desired outcomes, and ownership of the project.	This first section serves as an executive summary of the project. Our interviews confirmed "This section is essential in online design contests, because people will not read an entire design brief if the summary is not catchy."	This section provides all the important information and in some cases, aims to leverage the intrinsic motivations for participating in the contest. It emphasizes, where possible, the opportunity to learn ("international workshop") and to be part of the recognition of a specific brand ("Alessi collection"; "Illy exclusive mugs line"). This immediate leveraging seems to be recurrent in design brief summaries and it could be worthy of further investigation to determine the value of this element in decision making.
Description section: a broad mix of company portfolio and target audience.	This section describes the company (or enterprise) and its activities as completely as possible. The description presents the firm's brand and describes its reputation.	The description section indicates the ways in which the project outsourced should be integrated or not with the rest of the company portfolio of products and/or services.	Description includes information about target audience where a description of the people that the design solutions need to address is provided. Some examples include: "business owners," "high spending power," "executives," and "you!" Information about nationality, culture, and age differences in behaviors are present in very few briefs. For the majority, the target audience description is very simple and quite general.
What We Need and Guidelines section: project Scope and Business Objectives/Design Strategy.	This section includes the guideline of the outsourced project and a brief paragraph on company's needs.	This part of the design brief provides critical details of the road map to success	This section comprise two elements: a brief statement of what is required, mostly described as a very specific task ("a decoration for …," "kit of several components," "a new concept for …," "a graphical proposal for …," etc.); and the specific guidelines concerning the "correct realization," listing the characteristics the project needs to take into consideration, generally including style, shape, colors, materials, technologies and functions, size, extra specific information, delivery format, etc.
Inflexible Elements: timeline, legal agreements and awards description	This section includes the timeline/deadline, legal agreements, and the awards; they require no interpretation and are related to fixed events.	Additional information related to the contest details,The timeline concerns the deadline for the contest. The awards section presents the possible prizes in each contest.	This section may also include some metrics for measuring the quality of the projects. We noticed in the briefs that this element, called generally "selection criteria," is stated in a very generic manner: originality, innovation, feasibility, presentation, and consistency with the brief.
Optional Elements:appendix	This section comprises an appendix, which is an optional downloadable extra folder attached to the written document	Documents provided by the company for the designer in order to have a more complete understanding of the task outsourced.	It generally contains documents that are considered helpful for the designer, such as research data, specific material features, maps, photographs, or other visual materials.
Visual section: brand image associated	Two interesting structural elements associated with each brief: a 2x2 visual and a title for each brief launched in the platform. These two elements, together with the category associated with each brief, are proposed by Desall to the firm.	Usually, the platform proposes the brand image as a means of strengthening the connection with the specific firm and a catchy title that attracts attention. a fundamental role in creating immediate links with the crowd	Some catchy tiles example are: "Concrete in Design" for Italcementi, "Alessi in Love," "Ride on, baby!" for Chicco They establish the first direct, coherent, and coordinated relation with the firm's proposal, and the crowd benefits by receiving a prompt visual communication regarding the subject brief.

Table 4. Brief performance

Brand	View	Contributions	Attractivness	RANK	Contributors	Submission	Quality	RANK	Firm SATISFACTION	Idea DEVELOPMENT-Firms Willingness to develop the idea	Values for the firm	RANK	SURPRISE	Engagement	Additional values	RANK + additional	PERFORMANCE GROUP
	Unique view to brief	N° of contributions	% 2/1	from 13 to 1	N. Phase Contributors	Submission on shortlist	% 5/6	from 13 to 1	1–7; 1 = goal not at all reached, 7 = goal completely reached	1–7; 1 = not at all, 4 = thinking about it, 7 = certainly		from 13 to 1	Contest outcomes as positive and unexpected	Engagement of winner designer in firm activities			
Made	20432	1070	5,2	12	1070	300	**28,0**	11	7	7	**14**	13	1	1	**2**	**38**	**BEST**
Mabele	24913	900	3,6	10	900	153	**17,0**	6	7	7	**14**	13	1	1	**2**	**31**	**GOOD**
Illy	12945	2021	15,6	13	2021	21	**1,0**	1	7	7	**14**	13	0	1	**1**	**28**	**GOOD**
Luxottica	14565	271	1,9	7	271	88	**32,5**	12	5	2	**7**	8	0	0	**0**	**27**	**GOOD**
Giallo Zafferano	11777	119	1,0	3	119	41	**34,5**	13	5	4	**9**	10	0	0	**0**	**26**	**GOOD**
Elica	10136	314	3,1	9	314	74	**23,6**	8	6	2	**8**	9	0	0	**0**	**26**	**GOOD**
Sigma	6070	149	2,5	8	149	39	**26,2**	10	5	2	**7**	8	0	0	**0**	**26**	**GOOD**
Keyline	10614	192	1,8	6	192	32	**16,7**	5	6	6	**12**	12	0	1	**1**	**24**	**AVERAGE**
Barilla	12963	488	3,8	11	488	22	**4,5**	2	6	5	**11**	11	0	0	**0**	**24**	**AVERAGE**
Chicco 2	12089	186	1,5	5	186	45	**24,2**	9	5	2	**7**	8	0	0	**0**	**22**	**AVERAGE**
Chicco 3	11449	103	0,9	2	103	15	**14,6**	4	6	6	**12**	12	0	1	**1**	**19**	**AVERAGE**
Fim Lam	17078	95	0,6	1	95	22	**23,2**	7	5	4	**9**	10	0	1	**1**	**19**	**AVERAGE**
Selle Royal	4855	62	1,3	4	62	8	**12,9**	3	5	1	**6**	7	0	0	**0**	**14**	**POOR**

Table 5. Frequency of the four dimensions across contests

	TECH	CORP ID	USER	CREATIVITY
Fim Lam	62,50	2,08	20,83	14,58
Selle Royal	59,26	14,81	22,22	3,70
Mabele	56,52	17,39	8,70	17,39
Luxottica	44,44	16,67	11,11	27,78
Illy	42,11	15,79	5,26	36,84
Keyline	37,04	14,81	11,11	37,04
Sigma	31,58	26,32	0,00	42,11
Giallo Zafferano	20,00	33,33	6,67	40,00
Made	16,67	41,67	16,67	25,00
Chicco 2-ride on baby!	13,64	9,09	45,45	31,82
Chicco 3-r-evolution	11,43	8,57	48,57	31,43
Elica	7,69	38,46	0,00	53,85
Barilla	0,00	33,33	0,00	66,67

	TECH	CORP ID	USER	CREATIVITY
Made	16,67	41,67	16,67	25,00
Elica	7,69	38,46	0,00	53,85
Giallo Zafferano	20,00	33,33	6,67	40,00
Barilla	0,00	33,33	0,00	66,67
Sigma	31,58	26,32	0,00	42,11
Mabele	56,52	17,39	8,70	17,39
Luxottica	44,44	16,67	11,11	27,78
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Made	16,67	41,67	16,67	25,00
Mabele	56,52	17,39	8,70	17,39
Fim Lam	62,50	2,08	20,83	14,58
Selle Royal	59,26	14,81	22,22	3,70

Table 6. Frequency of the four dimensions on the two criteria and configuration groups

	DIMENSIONS				CRITERIA		DIFF	GROUPS	PERFOMANCE
	TECH	CORP ID	USER	CREATIVITY	COMPATIBILITY (T+CI)	COMPLEMENTARITY (U+Cr)	COMPATIBILITY- COMPLEMENTARITY		
Selle Royal	59,26	14,81	22,22	3,70	74,07	25,93	48,15	Unbalance	**POOR**
Mabele	56,52	17,39	8,70	17,39	73,91	26,09	47,83	Unbalance	GOOD
Fim Lam	62,50	2,08	20,83	14,58	64,58	35,42	29,17	Unbalance	AVERAGE
Luxottica	44,44	16,67	11,11	27,78	61,11	38,89	22,22	Balance	GOOD
Made	16,67	41,67	16,67	25,00	58,33	41,67	16,67	Balance	**BEST**
Illy	42,11	15,79	5,26	36,84	57,89	42,11	15,79	Balance	GOOD
Sigma	31,58	26,32	0,00	42,11	57,89	42,11	15,79	Balance	GOOD
Giallo Zafferano	20,00	33,33	6,67	40,00	53,33	46,67	6,67	Balance	GOOD
Keyline	37,04	14,81	11,11	37,04	51,85	48,15	3,70	Balance	AVERAGE
Elica	7,69	38,46	0,00	53,85	46,15	53,85	-7,69	Balance	GOOD
Barilla	0,00	33,33	0,00	66,67	33,33	66,67	-33,33	Unbalance	AVERAGE
chicco 2-ride on baby!	13,64	9,09	45,45	31,82	22,73	77,27	-54,55	Unbalance	AVERAGE
Chicco 3-r-evolution	11,43	8,57	48,57	31,43	20,00	80,00	-60,00	Unbalance	AVERAGE

Figure 1. Coding of narrative elements

NARRATIVE ELEMENTS

NARRATIVE ELEMENTS	FRAMING DIMENSIONS	THEORETICAL CODING

TECHNICAL DETAILS: size-measures, materials, form, style, color "Materials: steel, aluminum, plastic, blown glass, ceramic, silicon
"Product typology: small bijoux, wedding favors, accessories for the person or for home"
"designing two versions of a portable bike, basic and electric version (see below for details), that can be easily used by anyone for daily journeys ensuring, all the same, a true bike experience"

TECHNICAL REQUIREMENTS size-measures, materials, form, style "international workshops aimed at creating new design objects"

FUNCTIONS and USER EXPERIENCE: details about functions target customer, behaviors and experience of use "new solutions to the mobility needs of a raising number of people throughout the world"
"considering all the unforgettable events linked to the universal feeling of love"
"innovative bicycle for city commuters and travelers of the world to move with ease and comfort"

USER EXPERIENCE: details about functions, target customer behaviors and user experience

COMPATIBILITY

CRITERION

FIRM FEATURES (History, sector and type)
"International workshop aimed at creating new design objects"
"The historical Italian Design Factory"

FIRM PERSONALITY / IDENTITY TRAITS / PRODUCTS TRAITS
"We are aiming at breaking the design and mechanical boundaries that have so far conned the other ways multiple uses of a health and environment friendly vehicle."

CORPORATE IDENTITY: firm features (history, sector i.e. artisanal firm) and firm personality / identity traits / products traits

EMOTIONAL TRIGGERS - suggested feelings
"...to interpret the love"
"...unique and deep feeling"
"Now it's your turn to translate feelings into reality"

CREATIVITY: emotional triggers - suggested feelings
Suggested cognitive processes like analogies and metaphors, provide scenarios

COMPLEMENTARITY

CRITERION

COGNITIVE TRIGGERS - suggested cognitive processes like analogies and metaphors or provided scenarios
"It's time to let your heart speak"
"The focus is on the creation of emotional objects, overcoming the industrial and anonymous production logic"
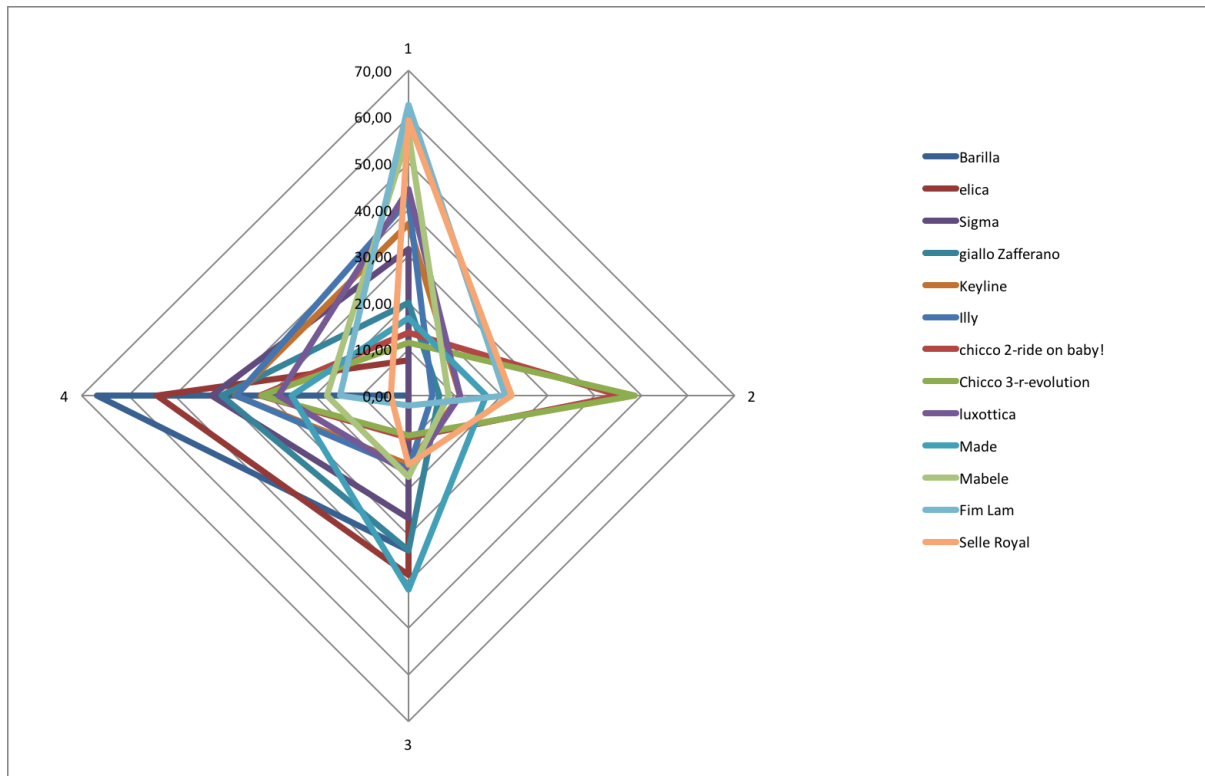
Figure 2. Visual representation of the briefs analyzed

2. CROWDSOURCING TO CO-DESIGN MEANINGFUL

SOCIAL CHANGE

Abstract

The Old Town of Bari forms the center of Bari City, the main city of the Apulia region, in the southeast of Italy. For many years, it has been a neglected area shunned by its own community due to the high level of criminality. This study follows a social innovation initiative launched by a youth-collective in Bari to leverage education using crowdsourcing knowledge. The study aims to better understand how to develop an interdisciplinary crowdsourcing platform to lead social innovation.

To address this research question, the author conducted action research through a 12-day workshop, organized by the collective, in the Old Town of Bari. The workshop aimed to create La Scuola Open Source with the help of the crowd, which was engaged in promoting and co-creating the social initiative. Furthermore, the researcher collected and analyzed the online discussions, paths, and topics in the days following the workshop until the opening of the School.

The study reveals how crowdsourcing acted as an opportunity to build a new community that revitalized the local social environment. The author also found that design processes played a major role in the community creation, instructing new governance models. Additionally, digital communications were used to build a network, which is able to generate and regenerate the local socio-economic fabric and connect it with the wider world. These results indicate a first step towards a proposal for a model of the emergent properties of collaboration in social innovation, which combines online crowd engagement with offline activities, and where design processes nurture the sense of belonging between community and territory.

Introduction

Open collaboration strategies and online communities (Jeppesen & Lakhani, 2010) have provided a way for firms to increase the flow of new ideas coming from external sources. Recently, powered by advanced internet technologies, organizations are outsourcing their ideation efforts to large communities of individuals with widely diverse knowledge, skills, experience, and perspectives, in an attempt to bring fresh ideas into their innovation process (Howe, 2006). The study examines how such open dynamics, like crowdsourcing (Howe, 2006) can achieve societal goals. The study follows the creation of La Scuola Open Source. The initiative aimed to achieve a positive social change in the Old Town of Bari, a city unfortunately known for high criminality and low education levels among the population. In the study, I follow the dynamics and the mechanisms that relate the local reality with a crowdsourced community in order to form a new "community point of view," which will allow citizens to engage in social change.

This paper addresses the following research question: *How could crowdsourcing support social innovation initiatives?*

Social innovators can glean new insights for their practice from the literature online communities and open collaboration. In addition, online communities literature can be enriched by studying the dynamics and the processes over time of people engage in social innovation initiatives.

To explore the research question, I conducted an action research procedure with the use of participative methods for data collection, analysis, and diagnosis. Furthermore, the researcher collected digital repertoires from the community to run a content analysis to follow online discussions, paths, and topics. By combining action research reports, observations, and outcomes from the crowd and digital repertoire clusters, the study highlights the success of the

initiative as a value-based change process based on two activities (the role of design processes and the role of communication) and one challenge (the governance model) in which participants used the created shared values, built during the workshop, to drive the social initiative.

Findings, therefore, examine, as first, how crowdsourcing could represent the first steps to create a supportive community, which will connect an isolated local node with a much larger and connected global crowd. Secondly, I highlight the use of design processes in order to create a sense of community belonging. Third, I find a very interesting role for communication channels in order to connect and combine online and offline activities and it serve to align the crowdsource community with the local one. Fourth finding concerns the emergence of potential new governance models through a "learning by doing" approach and it examine how to engaged people in the social challenge.

The study aims to contribute to the online communities literature on an empirical level by sketching an open social innovation model that combines the knowledge created by an online crowd with offline activities and where design processes and communication play a major role in nurturing the sense of belonging between the community and the territory.

Theoretical Background

Over the past twenty years Internet is changing the scope, boundaries, and dynamics of social and economic interactions. It supports human communication unconstrained by distance in time and space. It provides platforms and virtual spaces for individuals and groups that can organized themselves in communities with minimal cost. Online communities (OCs) are open collectives of dispersed individuals with members who are not necessarily known or identifiable and who share common interests (Sproull, Dutton, & Kiesler, 2007). In particular, knowledge collaboration - the sharing, transferring, accumulation, transformation and co-

creation of knowledge - is identified as the critical element of the sustainability of OCs. Individuals main activity as part of an OC is to share and combine their knowledge in ways that benefit them personally, while contributing to the community's greater worth (Hippel & Krogh, 2003; Jeppesen & Frederiksen, 2006; McLure Wasko & Faraj, 2000).

Previous literature on online communities focused on investigating the motivational factors for individuals to participate (e.g. Lakhani & Von Hippel, 2003), share their knowledge(e.g. Faraj & Johnson, 2011) and on structural mechanisms (e.g. Butler, 2001) to help sustaining these communities. However, the research focused mostly on individual actions and contributions without taking in account the interactive dynamics of the community in particular over time. Faraj, Jarvenpaa, & Majchrzak (2011) emphasize the importance, instead, to study online community dynamics and processes in order to expand our knowledge on OCs and to better understand more how the multiple contributions of various people unfold over time. Consequently, OCs offer the possibilities of exploring new mechanisms and dynamics for understanding the more general phenomenon of organizational knowledge collaboration. Scholars have call for research on online knowledge collaboration (Hippel & Krogh, 2003; Jeppesen & Frederiksen, 2006) and in particular how it happens (Faraj et al., 2011). This study investigates an OC, which was crowdsourced by a call for social innovation.

"Crowdsourcing is a type of participative online activity in which a nonprofit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task, generally for a price" (Estellés-Arolas, Navarro-Giner, & González-Ladrón-De-Guevara, 2015: 198)). It has provided organizations with new ways of engaging with an online, distributed, collective intelligence, which serves specific organizational goals (Brabham, 2013; Kristensson & Magnusson, 2010) and enable user engagement (von Hippel, 2005). Crowdsourcing is a promising way of improving innovation capabilities and resources, but it is still not clear how to stimulate

engagement over time with online communities (Afuah & Tucci, 2012; Bogers et al., 2017; Boudreau & Lakhani, 2013), in particular when they aim to achieve societal goals (Chesbrough & Di Minin, 2014). Social innovation literature provides limited discussion regarding the value of online communities over prolonged periods and how crowdsourcing can be leveraged and support social initiatives.

Social innovations are innovative solutions to problems in society that mobilize ideas, capabilities, resources, and social arrangements required for sustainable social transformation (Alvord, Brown, & Letts, 2004). Across the world during the past decade, there has been an increasing interest in social innovation as a way to achieve sustainable economic development (Dawson & Daniel, 2010) and call for a more responsive role of governments to address long-standing social problems (Mulgan, Tucker, Ali, & Sanders, 2007). In particular, the social innovation literature (Ramírez, 1999) promotes and encourages the involvement of end users or beneficiaries in the innovation process. User involvement refers to users developing or actively contributing to implement social innovation; in other words, co-creating value for a social initiative. Therefore, in order to co-create, there is a need to include different types of activities, actors, beneficiaries, tools, themes, objectives, rules, frameworks, as well as new challenges and strategies (Bortagaray & Ordonez-Matamoros, 2012).

In this paper, I investigate crowdsourcing in its open collaboration form (Levine & Prietula, 2014), where the final outcomes are the results of the collaborative effort and knowledge of all crowd members. I studied the crowdsourced online community interactive dynamics in particular over time the dynamics and processes which aim to support a social innovation initiative. Consequently, the research question is *how could crowdsourcing support social innovation initiatives?*

Research Method

Research Setting: La Scuola Open Source project

A youth-collective (13 members) based in Bari entered a national competition on social innovation in 2015 sponsored by "Che Fare" – an Italian social innovation incubator – with an idea aiming for a cultural renascence of the Old Town of Bari: La Scuola Open Source. The idea was to build a space, physical and virtual, where "education will be open and accessible to be a lever for social change, which will allow Bari to become a better place to live." It was necessary to bring in new and open education where both standard institutions and governmental projects were not able to penetrate. This was particularly relevant in areas, like Bari Old Town, of prolonged cultural stasis due to scarce individual, entrepreneurial, and governmental investments.

The city of Bari is the main city in Apulia, an Italian region of approximately four million inhabitants. For many years, the original city center, known as "Bari Vecchia," has been at the center of organized crime in Italy. In particular, youth criminality has increased considerably in the last decade. A culture of illegality is widespread and so diffused that sometimes young criminals do not even know that their activities are illegal.

This ambitious idea of La Scuola Open Source encompasses four issues: education, research, co-living, and spin-off. The initiative aims for: a physical space to allow people to meet and exchange knowledge; an education program to nurture new professional skills to create new job opportunities; a study of the research and academic environment to feed the educational requirements. The project addresses the local need for new international knowledge, in order to foster future opportunities for the population.

"Che Fare" competition (https://bando.che-fare.com/il-bando/) received 700 projects and activated a public online voting mechanism on its platform to shortlist 40 projects. The project

entered in the shortlist, and after subsequent evaluation, it ended up being one of the three projects funded by "Che Fare."

As soon as the approval was announced, in December 2015, the youth-collective activated their extensive network to crowdsource participants and teachers to activate the workshop, with the aim to co-design the identity, the tools, and the processes of La Scuola Open Source. The youth-collective went on a tour of Italian universities (Bocconi, Firenze Isia, Urbino Isia, Milano Poli) and FabLab (density design studio, FabLab Torino) to present, explain, receive feedback, and recruit resources. At the same time, they enhanced their virtual identity, mainly through Facebook, by posting the whole initiative, video, thoughts, and developments, and by receiving encouraging endorsements from intellectuals and well-known international, public figures.

In June 2015, for one month, the youth-collective opened an online invitation distributed by Facebook (https://www.facebook.com/scuolaopensource/), the Che Fare website (https://www.che-fare.com) and La Scuola Open Source web page (http://lascuolaopensource.xyz) to participate in the workshop. The only requirements were to submit a CV and a willingness to make the idea of La Scuola Open Source a reality. The youth-collective received more than 200 applications and selected 64 of them.

The selection criteria as expressed by the youth-collective were "coherence, expertize and motivation" and as a plus, they checked for specific criteria per each workshop (X: graphic design skills, Y: making/developing attitude and Z: service design expertize).

In July 2016 (18th-30th), selected participants, instructors, and tutors flew to the Old Town of Bari to work together at the triple co-design workshop X,Y,Z for 12 full days, for free.

The workshop connected 13 internationally renowned instructors and 14 tutors (mostly with an expert design background) and 64 participants. Participants' ages ranged from 22 to 72, with an average around 30, with different skills (makers, community creators, computer-experts) and diverse backgrounds (from business students, artists, communication and product

designers, entrepreneurs, to engineers and computer science researchers). 22 participants out of 64 (34%) came from Apulia region (8 from the city of Bari and 5 from the Bari province) and 5 of them were international participants (Brazil, Germany and UK) (see Table 1).

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Participants split according to interest into three sub-themes: identity (X), tools (Y), and processes (Z). Each of the sub-themes was coordinated by one/two instructor/s per week, 4/5 tutors and one member of the youth-collective. All of the outputs from the workshop represent the inputs for La Scuola Open Source, that presented its first offer to the general public in November 2016. Table 2 lists the most significant activities launched by the youth-collective for the development of La Scuola Open Source

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Case Selection

In this paper, I report the findings from an in-depth interpretive study of one initiative, the creation of La Scuola Open Source. A 12-day workshop (X,Y,Z) in Bari, where three different groups of crowdsourced people co-designed the identity (X), the tools (Y), and the processes (Z) for La Scuola Open Source. The intent was to co-design (Franke & Piller, 2004; Thomke & Von Hippel, 2002; von Hippel & Katz, 2002) the school; therefore, selected participants were also meant to be potential end user. In fact, they were and they still are using and developing the initiatives of the school.

The study was selected because it allows me a unique and continuous access to the youth-collective's activities and to the participants. Indeed, the youth-collective involved me to lead one of the three sub-themes (Z). Therefore, I conducted an action research procedure, within the Z sub-theme, with the use of participative methods for data collection, analysis, and diagnosis. Hult and Lennung (1980) defined action research as an approach that "simultaneously assists in practical problem-solving and expands scientific knowledge" (p. 242). Therefore, my main role during the workshop was to facilitate and enhance the competencies of the group actors, engaged in a process of mutual learning. Participants involved in the workshop were informed of being part of an action research. They accepted with the aim to actively change their social world collectively, by thinking about their world differently, acting differently, and relating to one another differently. Therefore, the workshop was performed collaboratively, and the author shared the responsibility for its outcome (see Table 3) with the participants (full description on X, Y, Z activities in **Appendix 1**).

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This methodology seemed appropriate to allow the study of interconnections, interdependencies, and the dynamics of a total functioning system rather than isolated factors. A deliberate attempt was made not to divorce phenomena from the environment that gave them meaning. This approach was suitable to assess how people with different backgrounds work together and how different approaches lead to better outcomes.

The youth-collective also granted me full availability for interviews, and when necessary facilitated my access to online data, such as analytics for La Scuola Open Source website and Facebook profiles.

This allowed me to conduct a very detailed, micro-level analysis of the workshop, especially the one I was leading (Z), and of the external online activities ongoing during the workshop and after it.

Data Collection

The data were collected in two steps. The first data collection covers the 12-day workshop from July 18th to 30th, 2016. The second covers all the digital activities performed from July to November 2016, to the day of the official opening of La Scuola Open Source in Bari.

During the workshop, I collected direct data as a participant and as an instructor for one of the workshops (Z). I began by analyzing my field notes and transcriptions of participants' actions and reflections.

Second, I interviewed, with open-ended conversations, 43 people including participants, teachers, and tutors who collaborated at the X, Y, Z workshop. Notes were transcribed daily during the 12 days of Z and the conversations were used to triangulate the information.

During the workshop, I followed an action research protocol with the participants (Hult & Lennung, 1980; Kemmis, McTaggart, & Nixon, 2014) in three stages (planning, acting, and reflecting). Sub-theme Z, the workshop I was leading, was composed of 23 participants, divided into 8 groups of 3-4 people each. The action research protocol we followed was iterative, but comprised three main phases: first *planning* a change; second *acting and observing* the process and consequences of the change; third *reflecting* on these processes and consequences; and then *re-planning, acting and observing, reflecting*; and so on... Therefore, each group was invited to actively and proactively identify, firstly, the focus of their actions, where and for whom they would like to enact a change; then I asked them to interrogate their practices (with the help of others around them), and to perform and observe an action to fulfill their objective. For example, many groups (6 out of 8) decided to conduct interviews with representative groups, which was what they needed to grow and sustain positive change, and took up suggestions from the environment (full protocol description for each group in **Table 3A**).

To follow the process, the action researcher, myself, produced reports on the system, during the 12-day workshop. As suggested by the protocol, I also took part in the implementation of the results from the project, by continually interacting, disseminating findings to the other groups and sub-themes (X and Y), and with the youth-collective to encourage bi-directional feedback and enable reflection to stimulate positive change and improvement in a participatory environment.

At the end of the workshop, I also gathered descriptive data about the participants and founders and all outputs from the workshops: three general reports for each sub-theme (X,Y, Z) and 8 specific outcomes from sub-theme Z. The specific outcomes are presentations, pictures, and prototypes developed during the Z lab.

The second step of data collection concerned the digital repertoires: the X,Y,Z Facebook page (with 501 posts) and La Scuola Open Source website with reports (10), shared documents (12), and feedback forms (2) from the community were continuously tracked. In order to map the different points of view, the author also monitored each participant's personal blog and press coverage.

Finally, to correctly triangulate the information and in order to improve the validity of the findings (Eisenhardt, 1989), I conducted a series of post-workshop interviews of members of the youth-collective and of one "Che Fare" member, to better understand how they were processing the outcomes from the workshop to realize the School.

Data Analysis

In order to comprehend La Scuola Open Source's initiative and its development, I have organized the data following a chronological approach and I have used an interpretive approach (Orlikowski & Baroudi, 1991) to analyze them and create a report of how the youth-collective has dealt with crowdsourcing. Thus, for the two periods considered, the workshop and after the workshop until the opening of the school, I prepared brief descriptions of the youth-collective's activities, the crowd involved, and the results obtained (e.g. profiles of the members, participants at the workshops, and new Facebook members over time).

Data analysis focused on two central considerations. The first was the description and characterization of X,Y,Z workshop, activities, and mechanisms involved for engaging the crowd. The second was concerned with the values and the actions enacted to make the project real and give the general public access to La Scuola Open Source.

The first data analysis was conducted during the X,Y,Z workshop, where the author reported, real time, actions and feedbacks in a cyclical process aiming at an increased understanding of a given social situation, the creation of La Scuola Open Source. Then, the initial interpretation and analysis of these data were undertaken in a collaboration of myself and two youth-collective members through continuous interactions, to obtain a reliable interpretation.

Then, a second phase of analysis started at the end of the X,Y,Z workshop (August 2016). First, I wrote descriptive stories (Langley, 1999) to be shared with the youth-collective and with the community that participated in the workshop (reported in Appendix 1 and currently online at http://www.lascuolaopensource.xyz/XYZ-Report/). Second, I iterated their feedbacks on the interpretations of the data and I started to rely on theory to bring clarification to emergent themes and constructs (Glaser & Strauss, 1967).

The first round of coding developed an initial understanding of the observations and field notes. From the first phase of the analysis, some concepts emerged as relevant from our codes, such as "group," "community," "participation," "process," "service," "new," "open," "design," "network," and "value." We realized that these terms were intended to have connotations as the way participants started to perceive themselves in relation to the La Scuola Open Source initiative. This led me to decide to dig deeper and take a closer look at the values embedded in the initiative and claimed by the participants. In order to do so, during the second phase of the analysis, I analyzed the contents of the reports, the blog posts, the Google shared documents, and the articles written by the participants and the youth-collective. All these materials were posted online on the La Scuola Open Source website (http://lascuolaopensource.xyz/) and were distributed with open access.

In particular, two Facebook channels (one closed group – SOS Community https://www.facebook.com/groups/559013517570769/ and an open page – https://www.facebook.com/scuolaopensource/) were very active from the end of the workshop to the opening of the school (and still are).

The second round of coding was mainly based on the online conversations within the network of people created during the workshop, which led me to second order themes of "values" as manifested (with text) by the youth-collective and the community.

In order to better match the identification of the second order themes, I additionally ran a quantitative content analysis (Krippendorff, 2004) on the 501 Facebook posts on the two channels, with the help of content analysis software (http://www.iramuteq.org). Word frequency, concurrency, and semantic analysis (Krippendorf, 2004) were tested to compare and better investigate common themes, values, and semantic relations between the Facebook channels, the other digital contents, and the actions and events observed previously. The goal of the content analysis was to identify, summarize, and represent the specific patterns and

mechanisms that led to enacting the process of realizing the school. The software presented

its results in three main clusters (Fig. 1) with a robust reliability (77.99% units, following

Cronbach's Alpha), which were interpreted, compared, and triangulated with the second order

themes to better validate them.

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As soon as I discovered that the use of the values was central in linking the participants with

the social initiative, I started to question how the X,Y,Z workshop and the crowdsourcing

invitation were able to drive them. A closer analysis of the overall data enabled me to identify

three aggregated dimensions (Corley & Gioia, 2004): two activities (the role of design

processes and the role of communication) and one challenge (the governance model) that

seemed to characterize how the crowdsourced community interacted and leveraged La Scuola

Open Source initiative (see Figure 2).

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Through the action research and the analysis of the contents distributed on the digital network,

I had the opportunity to show how the crowdsourced community enacted the creation of the La

Scuola Open Source initiative, and therefore how this social initiative was brought to life in

November.

Finally, at the end of the data analysis, I presented and discussed the study results with the

members of the youth-collective, who are still very involved in the research project.

Findings

Crowdsourcing as an opportunity to build a new community

The founders initially, by engaging in the university tour (November 2015), relied just on small collaborative teams of design experts (who become instructors and tutors during the X, Y, Z workshop). However, as soon as they launched the invitation (June 2016), the constructions of, and responses to, the crowdsourcing possibility were very revealing. The youth-collective, instead of just using crowdsourcing as an "alternative innovation system" relying on untrained people (Howe, 2006), saw an opportunity to invite and consequently create a new community of creative and highly motivated individuals to generate new knowledge on social challenges, and actively experiment with, adapt, and implement new practices. This opportunity translated into the 12-day workshop, where 60 people with different backgrounds and experiences were totally immersed in a multidisciplinary approach based on cooperation and skill exchange. Some participants during the interview reported this experience as *"This (workshop) experience will end as a new beginning," "We found together new forms of collaborations, to write together a new story," "It was amazing the way we interacted and we created new relations among us and within the territory,"* and *"La Scuola Open Source is not just filling a gap, but lighting a fire."* As soon as the workshop ended, the first step toward a new community was completed. The 64 participants, the 13 instructors, and the 14 tutors felt unified by the workshop experience and ready to continue to collaborate, even remotely, to leverage the opening of La Scuola Open Source initiative. This success can be described as a value-based change process based on two activities (the role of design processes and the role of communication) and one challenge (the governance model) in which participants used the created shared values, built during the workshop, to drive the social initiative.

Community creation: a role for design processes

As we know from the literature (Lakhani, Jeppesen, Lohse, Panetta, & Research, 2006; Lakhani & Panetta, 2007), the strength of crowdsourcing is to engage a diverse and diffuse crowd with different knowledge and backgrounds. However, this creates a multiplicity of points of view, with different values, which are destructive if there is no convergence towards a specific goal. Participants from the sub-themes X, Y and Z ran their activities in different ways. Group X decided, with a group manifesto, to vote for every step and every decision, while group Z was structured into 8 groups, each responsible for its deliveries but which led toward a "design for service" method. Design for service is described by Kimbell (2011) "as one specific way of approaching service design, combining an exploratory, constructivist approach to design, proposing and creating new kinds of value relation within a socio-material configuration involving diverse actors including people, technologies and artifacts" (Kimbell, 2011).

Group X encountered a clash during the delivery phase, where the multiplicity was unable to converge on a joint point of view. In contrast, group Z were able to deliver 8 different outcomes around a very complex matter: the future processes and services of the school. Therefore, the study highlights the important role of the design processes followed, which gave structure and tools to the workflow without limiting their creative autonomy.

From this experience, two emergent mechanisms were identified. First, design practices forced participants to translate ideas into tangible outcomes, and to share and visualize them. Participants used storyboards and customer journeys to represent the relational and temporal nature of the processes in visual form, which was a way to deeply understand and engage all group members around a shared perspective.

Second, design practices, in particular the interviews within an ethnographical approach, created opportunities for all members in each group to take part in the enquiry and invested resources in creating material artifacts, as prototypes, and situations, as experience-prototype,

that will enable the processes of La Scuola Open Source. An example of experience-prototype was an extemporary event organized by one of the Z groups: the open evening. The group identified that the population of Bari did not know much about the La Scuola Open Source initiative. Therefore, in less than two days, the group designed an open public evening where people could be introduced to the "future" offers of La Scuola Open Source for the first time. An important part of their work was the construction of artifacts, such as promotional gadgets (La Scuola Open Source bags), demos (3d printer demo objects), and customer journeys (to initiate a conversation about open points with the citizens), and to make La Scuola Open Source services visible and comprehensible. These tools and mechanisms suggested design as a constructive process, to overcome singularity and involve crowdsourced members in creating a new "community point of view," which could lead to the success of the social initiative by including other stakeholders, such as citizens and social contexts. These mechanisms created a sense of belonging and helped the youth-collective with decision-making in subsequent steps; one of them said, *"the results of this workshop are in front of you. We will be able to open (La Scuola Open Source) in November, thanks to its community."*

The role of communication as an organizing principle

The second value-based activity was identifying the role played by the communication channels. The analysis suggested that the youth-collective and the community exhibited a strong commitment toward knowledge generation within the communication channels.

During the overall observations, I identified three attitudes toward the digital repertoire, where values were exposed and shaped: an initial attitude where IT was fundamental to engage the community; a second, during the workshop, where technology was almost distracting people from their goals; and a third after the workshop, where it became a way to reflect on what was done previously.

At the beginning, IT and communication channels (mostly the website and Facebook channels) were used to disseminate the youth-collective's values toward the social initiative by diffusing the invitation, a summary, and a draft plan on how they were thinking about La Scuola Open Source. This initiative reached out to more than 200 people, being the number of applications received for the X, Y, Z workshop.

Later on, especially during the workshop, I observed that the use of web-based channels was fading into the background and was seen more as a complement to the activities. Web platforms, during the development of the workshop, were working as repositories for process steps and ideas. Instead face-to-face conversations and physical enactment of the concepts were the tools used to take the concept to the next step. The idea of "making" and to prototype ideas through physicality complemented the possibility in a short time to combine different skills and distant knowledge. Participants used physical artifacts, like drawings, storyboards, prototypes, and visual maps, to support their conversations with the youth-collective and the citizens. As mentioned, one of the Z groups took this conversation further and organized an "open night" to prototype how La Scuola Open Source could be perceived by the territory. Many Bari Old Town citizens were there and we note surprising success in communicating complex ideas with simple artifacts to the public. During these conversations, citizens were expressing their own willingness and life experiences. The exchange between citizens and participants led us to see an interesting possibility to involve the local community and in the role of communication as an organization principle to better fit the local demand.

When the workshop was over, the role of communication with the use of IT channels increased again, and they became a way to reflect and share the values of what was achieved during the workshop. Therefore, the online communication increased again and in a couple of months the Facebook closed group had grown to up to 400 active members, while the open group grew in less than one month to 2k followers.

A new governance model challenge

The crowdsourcing model for social innovation immediately encountered some challenges in governance. By whom, where, and when should the decisions be taken? Before, during, or after the X,Y,Z workshop? By the crowdsourced communities or the founders?

In an open innovation context, system boundaries are mostly unclear and actor preferences are both heterogeneous and evolving; consequently, the goals and the purpose are likely to remain continually moving targets (Rindova & Kotha, 2001). This dynamic challenged the community during the X,Y,Z workshop and at the same time works as a generative principle.

The initiative adapted to this challenge by proposing a non-centralized entity, where the decisions could be shaped by the crowdsourcing community and by each single constituent workshop. Each sub-theme produced crucial components (the identity, the tools, and the processes), and the founders and the instructors had the mission to link and share the knowledge among these groups, with the mutual understanding that every approach is provisional and perfectible, not definitive.

The idea of the workshop did not aim to produce an exhaustive, fully replicable characterization of the service La Scuola Open Source will provide. It was a "learning by doing" mechanism with the intent to experiment and indicate the feasible goals and set of means for obtaining them. Thus, the early characterization of means and ends provided not just a starting point but also a basis for organizing the exchange of experiences among collaborators. The exchange, in turn, results in learning that allows adjustment after the workshop. The community is still very much engaged in finding new possible governance forms. After the workshop ended, this was one of the most debated topics by the Facebook community, as confirmed by the content analysis (Fig. 2).

Discussion and Implications

Our results contribute to the understanding on open collaboration for social innovation. This study investigates the question *how could crowdsourcing support social innovation initiatives?* The case of La Scuola Open Source provided two important answers to this question, which mark the contribution of the paper.

First, the research found that the crowdsourcing invitation and the X, Y, Z workshop were able to support and drive the social initiative, leveraging on two activities (the role of design processes and the role of communication) and one challenge (the governance model), as a value-based change process in the creation of La Scuola Open Source.

The study draws on online communities and knowledge collaboration literature (Faraj et al., 2011) by empirically examining a social innovation initiative for Bari Old Town: the creation of La Scuola Open Source. The author illustrates the story of the X,Y, Z workshop and the online and offline dynamics through which La Scuola Open Source becomes a reality. These dynamics expanded the empirical knowledge on social innovation initiatives and on online communities.

The complex relationship between the multiplicity of actors involved (workshop participants, the youth-collective, citizens) was salient in the initiative studied. Crowdsourcing was the first step in building a diverse community, led by the goal of pursuing actions for social change, in Bari Old Town. However, our study identified a strong complementarity between online and offline actions. The X,Y,Z workshops fostered the relationship between the actors to create a new "community point of view," which continued the conversation, later, online to promote innovation on a local dimension.

A constructive, *in situ*, exchange between different kinds of actors helped to identify and define problems and challenges in ways that captured their complexity and developed new, viable strategies for dealing with this complexity. Collaborative interaction facilitated trust-based

circulation and cross-fertilization of new and creative ideas, and ensured a broad assessment of the potential risks and benefits of new and bold solutions and the selection of the most promising ones. The "design for service" method, used in particular in the Z workshop, allowed participants to structure their conversations, to better understand and align the ideation phase, and to engage with the needs and the skills of the territory, where they want to have an impact for social change.

Finally, the implementation of the new solutions will be facilitated by resource exchange, coordination, and the formation of joint ownership (Sørensen & Torfing, 2016) as I have seen from the ongoing communication though the Facebook channel.

Second, in addition to conceptualizing this strategic use of crowdsourcing, the study delivered some insights for the emergent debate on enhancing collaboration in social innovation.

The key argument in favor of enhancing collaborative innovation in social initiatives is that multi-actor collaboration, when facilitated, ensures that knowledge collaboration dynamically converge and diverge toward a common goal, direction, criterion which will enable the social innovation to occur. Over time, ideas compete, combine, fork and reemerge, morphing into new ideas with new possibilities and draw a common ground that allow a disperse crowd of people to feel themselves as part of a real community. With this study, I also contribute with empirical evidence on the need to complement the online engagement with offline reinforcement in order to create new forms of partnership and ownership, and to enhance social innovation through cross-disciplinary collaboration.

At the same time, the small scale of the project and the high interconnection with a new and globally distributed community allows the initiatives, on one side, to be highly rooted in the local place, and on the other to embrace the global flows of ideas, information, and people, which together generate a new sense of place. As such, places are no longer isolated entities, but rather nodes in both short and long-distance networks, where the short networks generate

and regenerate the local socio-economic fabric and the long ones connect a particular community to the rest of the world. This study by capturing the initial condition of the ideas, how this idea evolved within the community in response to local challenges and how these changes generate additional connections and trajectories to other people and to other contexts, is a first step toward a proposal for a model of the emergent properties of collaboration in social innovation.

Limitations and Future Research

The implications need to be considered in the light of the study's limitations. First, the purpose of the study was to follow the process that was able to sustain the opening of La Scuola Open Source (in November 2016), and to understand what were the mechanisms that were able to do this. However, I think the study could open a new avenue for further research. Indeed, the initiative is still ongoing, therefore further longitudinal studies could identify the social impact (Elkington, 1997, Harris and Goodwin, 2001) of such an initiative in the territory of Bari Old Town. Over a longer period of time, by investigating the actions, the courses, and the participation from the territory, it might be possible to measure the impact of this initiative for the social environment.

Additionally, the research emphasizes the importance of value-based communication, especially when analyzing the involvement of online communities. Future research could elaborate more on the role of values in struggles over governance models. It would be interesting to explore how these values change over time, and how the youth-collective will be able to address the community's suggestions and positions.

Future research might also explore how digital interactions will support the local impact, and how this model could spread and be replicated in other contexts and territories.

References

Afuah, A., & Tucci, C. L. 2012. Crowdsourcing as a solution to distant search. *Academy of Management Review*. https://doi.org/10.5465/amr.2010.0146.

Alvord, S. H., Brown, L. D., & Letts, C. W. 2004. Social Enterpreneurship and Social Transformation - An Exploratory Study. *The Journal of Applied Behavioral Science*, 40(3): 260–282.

Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., et al. 2017. The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, 24(1): 8–40.

Bortagaray, I., & Ordonez-Matamoros, G. 2012. Introduction to the Special Issue of the Review of Policy Research: Innovation, Innovation Policy, and Social Inclusion in Developing Countries. *Review of Policy Research*, 29(6): 669–671.

Boudreau, K. J., & Lakhani, K. R. 2013. Using the Crowd as an Innovation Partner. *Harvard Business Review*, (April): 3–11.

Brabham, D. C. 2013. Crowdsourcing. *MIT Press*. https://www.timeshighereducation.co.uk/books/crowdsourcing-by-daren-c-brabham/2005865.article%5Cnhttp://www.jstor.org/stable/j.ctt5hhk3m.

Butler, B. S. 2001. Membership Size, Communication Activity, and Sustainability: A Resource-Based Model of Online Social Structures. *Information Systems Research*, 12(4): 346–362.

Chesbrough, H., & Di Minin，Alberto. 2014. Open Social Innovation. *New Frontiers in Open Innovation*, 16(January 2015): 301–315.

Corley, K. G., & Gioia, D. a. 2004. Identity Ambiguity and Change in the Wake of a Corporate Spin-off. *Administrative Science Quarterly*, 49(2): 173–208.

Dawson, P., & Daniel, L. 2010. Understanding social innovation: a provisional framework. *International Journal of Technology Management*, 51(1): 9.

Eisenhardt, K. M. 1989. Building Theories from Case Study Research. *Academy of Management Review*, 14(4): 532–550.

Elkington, J. 1997. Cannibals with forks. *Cannibals with Forks: The Triple Bottom Line of 21st centuryThe Triple Bottom Line of 21st Century*, (April): 1–16.

Estellés-Arolas, E., Navarro-Giner, R., & González-Ladrón-De-Guevara, F. 2015. Crowdsourcing fundamentals: Definition and typology. *Advances in Crowdsourcing*: 33–48.

Faraj, S., Jarvenpaa, S. L., & Majchrzak, A. 2011. Knowledge Collaboration in Online Communities. *Organization Science*, 22(5): 1224–1239.

Faraj, S., & Johnson, S. L. 2011. Network Exchange Patterns in Online Communities. *Organization Science*, 22(6): 1464–1480.

Franke, N., & Piller, F. 2004. Value creation by toolkits for user innovation and design: The case of the watch market. *Journal of Product Innovation Management*.

Glaser, B., & Strauss, A. 1967. The Discovery of Grounded Theory: Strategies for Qualitative Research. *The Discovery of Grounded Theory Strategies for qualitative research*.

Hippel, E. Von, & Krogh, G. Von. 2003. Open Source Software and the "Private-Collective" Model: Innovation Issues for Organization Science. *Organization Science*, 14(2): 209–223.

Howe, J. 2006. The Rise of Crowdsourcing by Jeff Howe | Byliner. *Wired Magazine*. https://www.byliner.com/jeff-howe/stories/the-rise-of-crowdsourcing.

Hult, M., & Lennung, S. 1980. TOWARDS A DEFINITION OF ACTION RESEARCH: A NOTE AND BIBLIOGRAPHY. *Journal of Management Studies*, 17(2): 241–250.

Jeppesen, L. B., & Frederiksen, L. 2006. Why Do Users Contribute to Firm-Hosted User Communities? The Case of Computer-Controlled Music Instruments. *Organization Science*, 17(1): 45–63.

Jeppesen, L. B., & Lakhani, K. R. 2010. Marginality and Problem-Solving Effectiveness in Broadcast Search. *Organization Science*, 21(5): 1016–1033.

Kemmis, S., McTaggart, R., & Nixon, R. 2014. The action research planner. *The Action Research Planner: Doing Critical Participatory Action Research*, (Carr 2006): 154.

Kimbell, L. 2011. Designing for service as one way of designing services. *International Journal of Design*, 5(2): 41–52.

Krippendorff, K. 2004. Content Analysis: An Introduction to Its Methodology. *Education*, vol. 79. https://doi.org/10.2307/2288384.

Kristensson, P., & Magnusson, P. R. 2010. Tuning Users' Innovativeness During Ideation. *Creativity and Innovation Management*, 19(2): 147–159.

Lakhani, K. R., Jeppesen, L. B., Lohse, P. a., Panetta, J. a., & Research, H. B. S. D. 2006. *The Value of Openness in Scientific Problem Solving*. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.85.9537&rep=rep1&type=pdf.

Lakhani, K. R., & Panetta, J. A. 2007. The Principles of Distributed Innovation. *Innovations: Technology, Governance, Globalization*, 2(3): 97–112.

Lakhani, K. R., & Von Hippel, E. 2003. How open source software works: "free" user-to-user assistance. *Research Policy*, 32(6): 923–943.

Langley, A. 1999. Strategies for theorizing from process data. *Academy of Management Review*. https://doi.org/10.2307/259349.

Levine, S. S., & Prietula, M. J. 2014. Open Collaboration for Innovation: Principles and Performance. *Organization Science*, 25(5): 1414–1433.

McLure Wasko, M., & Faraj, S. 2000. "It is what one does": Why people participate and help others in electronic communities of practice. *Journal of Strategic Information Systems*, 9(2–3): 155–173.

Mulgan, G., Tucker, S., Ali, R., & Sanders, B. 2007. Social Innovation: What it Is, Why it Matters and How it Can Be Accelerated. *Oxford Saïd Business School*. https://doi.org/citeulike-article-id:5204389.

Orlikowski, W. J., & Baroudi, J. J. 1991. Studying information technology in organizations: Research approaches and assumptions. *Information Systems Research*, 2(1): 1–28.

Ramírez, R. 1999. Value co-production: Intellectual origins and implications for practice and research. *Strategic Management Journal*, 20(1): 49–65.

Rindova, V. P., & Kotha, S. 2001. Continuous " Morphing ": Competing through Dynamic Capabilities , Form , and Function Author (s): Violina P . Rindova and Suresh Kotha Source : The Academy of Management Journal , Vol . 44 , No . 6 (Dec ., 2001), pp . 1263-1280 Published by : Academy. *Academy of Management Journal*, 44(6): 1263–1280.

Sørensen, E., & Torfing, J. 2016. Enhancing Public Innovation through Collaboration, Leadership and New Public Governance. *New Frontiers in Social Innovation Research*: 145–169.

Sproull, L., Dutton, W., & Kiesler, S. 2007. Introduction to the Special Issue: Online Communities. *Organization Studies*, 28(3): 277–281.

Thomke, S., & Von Hippel, E. 2002. Customers as innovators: A new way to create value. *Harvard Business Review*.

von Hippel, E. 2005. *Democratizing Innvation*.

von Hippel, E., & Katz, R. 2002. Shifting Innovation to Users via Toolkits. *Management Science*, 48(7): 821–833.

Table 1
X, Y, Z Workshop participant's details

Role	Group	City	Province	Region	Country	Background	Job or passion
Participant 1	X	Jelsi	Campobasso	Molise	Italy	Graphic design and visual communication	Typography, silkscreen and world music
Participant 2	X	Catania	Catania	Sicilia	Italy	Graphic, web, relational - design.	Graphic designer
Participant 3	X	Barletta	Barletta-Andria-Trani	Puglia	Italy	Graphic design	Graphic design, wine, football
Participant 4	X	Catania	Catania	Sicilia	Italy	Graphic Design and Visual Communication	Interaction design
Participant 5	X	Rovereto	Trento	Trentino-Alto Adige	Italy	Visual Communication	Designer and researcher
Participant 6	X	Milano	Milano	Lombardia	Italy	Visual and multimedia communication	Interaction designer / project manager
Participant 7	X	Roma	Roma	Lazio	Italy	Graphic Design	Graphic Design, Experience Design
Participant 8	X	Bologna	Bologna	Emilia-Romagna	Italy	Graphic Design and Visual Communication / Eco-social design	Inventing new ways and methods for communicating culture and knowledge
Participant 9	X	Cisternino	Brindisi	Puglia	Italy	Communication Design	Graphic designer and illustrator
Participant 10	X	Reggio Emilia	Reggio Emilia	Emilia-Romagna	Italy	Graphic Design	Editorial graphic, philosophy
Participant 11	X	Foggia	Foggia	Puglia	Italy	Industrial design	Illustration, graphic design, painting, video making
Participant 12	X	Cesena	Forlì-Cesena	Emilia-Romagna	Italy	Graphic design	Freelance graphic designer
Participant 13	X	Trieste	Trieste	Friuli-Venezia Giulia	Italy	Digital Marketing	Digital Marketing consultant
Participant 14	X	Faenza	Ravenna	Emilia-Romagna	Italy	Visual design	Visual designer
Participant 15	X	Stuttgart	Stuttgart	Baden-Württemberg	Germany	Communication design	experimenting, sharing, crossing, communicating
Participant 16	X	San Ferdinando di Puglia	Barletta-Andria-Trani	Puglia	Italy	Marketing and business communication	Entrepreneurship
Participant 17	X	Matera	Matera	Basilicata	Italy	Communication, Social Media e Journalism	Writing, Digital Journalism, Transmedia Storytelling
Participant 18	X	Lecce	Lecce	Puglia	Italy	Architecture	Graphic and web design, data journalism, illustration, urban planning, landscape.
Participant 19	X	Bari	Bari	Puglia	Italy	Philosophy, Communication	sociology, communications strategy
Participant 20	X	Firenze	Firenze	Toscana	Italy	Graphic Design	Graphic Designer
Participant 21	X	Milano	Milano	Lombardia	Italy	Communication design	Brand & Digital specialist
Participant 22	X	Bietigheim-Bissingen	Ludwigsburg	Baden-Württemberg	Germany	Communication Design	Design
Participant 23	X	Monza	Monza-Brianza	Lombardia	Italy	Communication design	Web design
Participant 24	Y	Bari	Bari	Puglia	Italy	International Relations	Broad field of Information Communication Technologies
Participant 25	Y	Bari	Bari	Puglia	Italy	Industrial Design	Modeling programs and rapid prototyping. My passion is digital crafts!
Participant 26	Y	Caserta	Caserta	Campania	Italy	creative coding / music	this question is a torture to me, there are too many possible answers

Participant 27	Y	Salerno	Salerno	Puglia	Italy	Industrial Design	Designer / Developer
Participant 28	Y	Treviso	Treviso	Veneto	Italy	design	I research how reality is not what it seems
Participant 29	Y	Rimini	Rimini	Emilia-Romagna	Italy	Communication Design	Cooking, photography and yoga
Participant 30	Y	Bologna	Bologna	Emilia-Romagna	Italy	Graphic Design	Interaction Design
Participant 31	Y	Torino	Torino	Piemonte	Italy	OpenData Visualization	Complex Systems Researcher
Participant 32	Y	Venezia	Venezia	Veneto	Italy	Arte	Making
Participant 33	Y	Napoli	Napoli	Campania	Italy	Visual arts/graphic design	Visual artist, VJ, freelance graphic designer, video maker, independent curator
Participant 34	Y	Messina	Messina	Sicilia	Italy	Informatics	Web developer
Participant 35	Y	Bari	Bari	Puglia	Italy	Electronic Engineer	electronic
Participant 36	Y	Monopoli	Bari	Puglia	Italy	Product and Typography	Mechanical, sailing, Photography
Participant 37	Y	Bitonto	Bari	Puglia	Italy	Product Design / Research	Design/Craft/Photography/Cooking and Cinema
Participant 38	Y	Sannicandro di Bari	Bari	Puglia	Italy	Economics and Business Management	Accounting and IT
Participant 39	Y	Manchester	Manchester	Greater Manchester	UK	Materials Science and Engineering	I love science, design and sustainability.
Participant 40	Y	Napoli	Napoli	Campania	Italy	Architecture / Innovative Energy Solution	3D printing / Electromagnetism and energy systems /
Participant 41	Y	Milano	Milano	Lombardia	Italy	Economic/Informatics	Developer
Participant 42	Z	Foggia	Foggia	Puglia	Italy	Social Innovation	Social Food Entrepreneur
Participant 43	Z	Conversano	Bari	Puglia	Italy	Product Service System Design	Designer
Participant 44	Z	Milano	Milano	Lombardia	Italy	Product Service System Design	Design and think
Participant 45	Z	Prato	Prato	Toscana	Italy	Innovation Management	Design Thinking - Craftsmanship - Collaborative Economies
Participant 46	Z	Bari	Bari	Puglia	Italy	Service Design	Service Design, Human Centered Design, Design Thinking
Participant 47	Z	Bari	Bari	Puglia	Italy	Literature and History	Head School
Participant 48	Z	Arenzano	Genova	Liguria	Italy	Business Administration	Corporate Finance, Ferrari and Formula 1 and digital environment.
Participant 49	Z	Trani	Barletta-Andria-Trani	Puglia	Italy	Management of Arts, festivals and Culture	Cultural Manager
Participant 50	Z	Roma	Roma	Lazio	Italy	Systemic Design	System and Product Designer
Participant 51	Z	Matera	Matera	Basilicata	Italy	Economics and Management	Student. Interests: PA, Public Policy and Development
Participant 52	Z	Lecce	Lecce	Puglia	Italy	Communication Strategy and Eco-Management	Communication design for Sustainability
Participant 53	Z	Roma	Roma	Lazio	Italy	Systemic design - Social innovation	Designer for social urban planning
Participant 54	Z	Bari	Bari	Puglia	Italy	Political Economy and Social Sciences; Gender Studies	Using Art as a tool for community development
Participant 55	Z	Manchester	Manchester	Greater Manchester	UK	Business and Economics	Human behavior, culture and education
Participant 56	Z	Noci	Bari	Puglia	Italy	Politics	Politics, Political Philosophy
Participant 57	Z	Trieste	Trieste	Friuli-Venezia Giulia	Italy	Architecture	Architect + urban strategist & reporter
Participant 58	Z	Bologna	Bologna	Emilia-Romagna	Italy	Human Resources and Organization Management	HR Sales Consultant
Participant 59	Z	Milano	Milano	Lombardia	Italy	graphic design/art direction/curating art/photography	PHOTOGRAPHER / CURATOR ART / performer

Participant 60	Z	Torino	Torino	Piemonte	Italy	Service Design	Service Design
Participant 61	Z	Bologna	Bologna	Emilia-Romagna	Italy	Business and economics	Social business and quality in education
Participant 62	Z	Rio de Janeiro	Rio de Janeiro	Rio de Janeiro	Brazil	Designer, artist and social entrepreneur	Social Entrepreneur
Participant 63	Z	Bari	Bari	Puglia	Italy	Architecture e urbanistic	Architect, urban planner
Participant 64	Z	Roma	Roma	Lazio	Italy	Industrial design	product designer / systemic design

Table 2

Timeline of La Scuola Open Source development

September 2015	Video call – first phase of the "Che Fare" competition
November 2015	University tours
December 2015	Winner of the "Che Fare" competition
June 2016 (03/06/16 to 05/07)	Open online invitation to the X, Y, Z workshop – 60 vacancies
21/06/16	Received 86 applications
02/07/16	Received more than 120 applications
05/07/16	Received 199 applications and the invitation closed
July 2016	Selection of participants
July 2016 (18th – 30th)	X,Y,Z Workshop
November 22nd, 2016	Opening of the school

Table 2
X, Y, Z Outcomes

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Group	Topic	Outputs	Approaches
X	identity	Creation of FREAK GROTESK font based on HK GROTESK. Design of letterheads: business cards, business paper, flags, poster templates, signals, merchandising. Manufacture of a hundred branded shoppers, with the institutional identity printed through serigraphy.	Group manifesto
Y	Tools	Setup a Linux server with ownCloud and GitLab for sharing documents and source code. Created a Slack bot for making surveys and collecting information from the participants. Built an IOT network hub with a Raspberry Pi board and a device, based on Moteino and connected wirelessly to the IOT hub, which was used by participants for expressing a vote on the success of the initiative. Designed a management software, based on micro services architecture, and an app.	3 thematic groups
Z	Processes	8 blueprints, 8 scenarios, 1 experience prototype	8 thematic groups

Table 3A

Action research protocol of the development – lab Z for each group (12 days)

	Planning & saying (focus)	*Acting & observing (main actions)*	*Reflecting and relating (implementations)*
Group 1	SOS and the stakeholders	Interviews with stakeholders and other organizations	Report "SOS X Firms"
Group 2	New educational models	Interviews with possible future users	System of pricing to have access to education
Group 3	Community and territory	Organization of an Open Evening	Guideline to involve the territory
Group 4	Governance	Interviews with participants of X, Y, Z and the youth-collective	New governance rules; ideation of voting system
Group 5	SOS and its knowledge sustainability	Interviews with participants of X, Y, Z and the youth-collective	Storyboards of interaction between SOS and the universities or research centers
Group 6	Online relations	Co-creation sessions with X, Y	SOS website map
Group 7	Participation among the community	Interviews with participants of X, Y, Z and the youth-collective	Channels and accessibility analysis of the platform
Group 8	Relation with the educational offers	Interviews with teachers and professors	Education model advertising proposal

Table 4

Data Collection

Data Source	Type of Data	Use in the Analysis
Direct observations and facilitation during action research (12 days)	Field notes with transcription of participants' actions and reflections – descriptive stories	Characterization of the dynamics of the workshop Characterization of the strategies adopted to provide new meaning to the initiative Identification of the themes that represent the community
Interviews	First round during X,Y, Z workshop (43 open-ended conversations)	Characterization of the perception of the change to be made by the activities
	Second round – end of the workshop (7)	Analysis of the interactions and alignment between collective intentions and community intentions Triangulate workshop data
Facebook posts (from 18/07/16 to 22/11/2016)		Cluster analysis of themes and values discussed
SOS page (6k followers) Community (closed groups) (+600 members)	441 posts 60 posts	Identification of discourses and values relating the community-representation and La Scuola Open Source initiatives
Digital action repertoires	Shared documents on the website – reports from the X, Y, Z groups	Development of an historical and chronological account of La Scuola Open Source initiatives and activities
	Digital feedback form from participants	Characterization of the perception of the participants at the workshops
	Participants' blogs and articles	Characterization of the perception and self-representation of the participants with the initiative

Figure 1
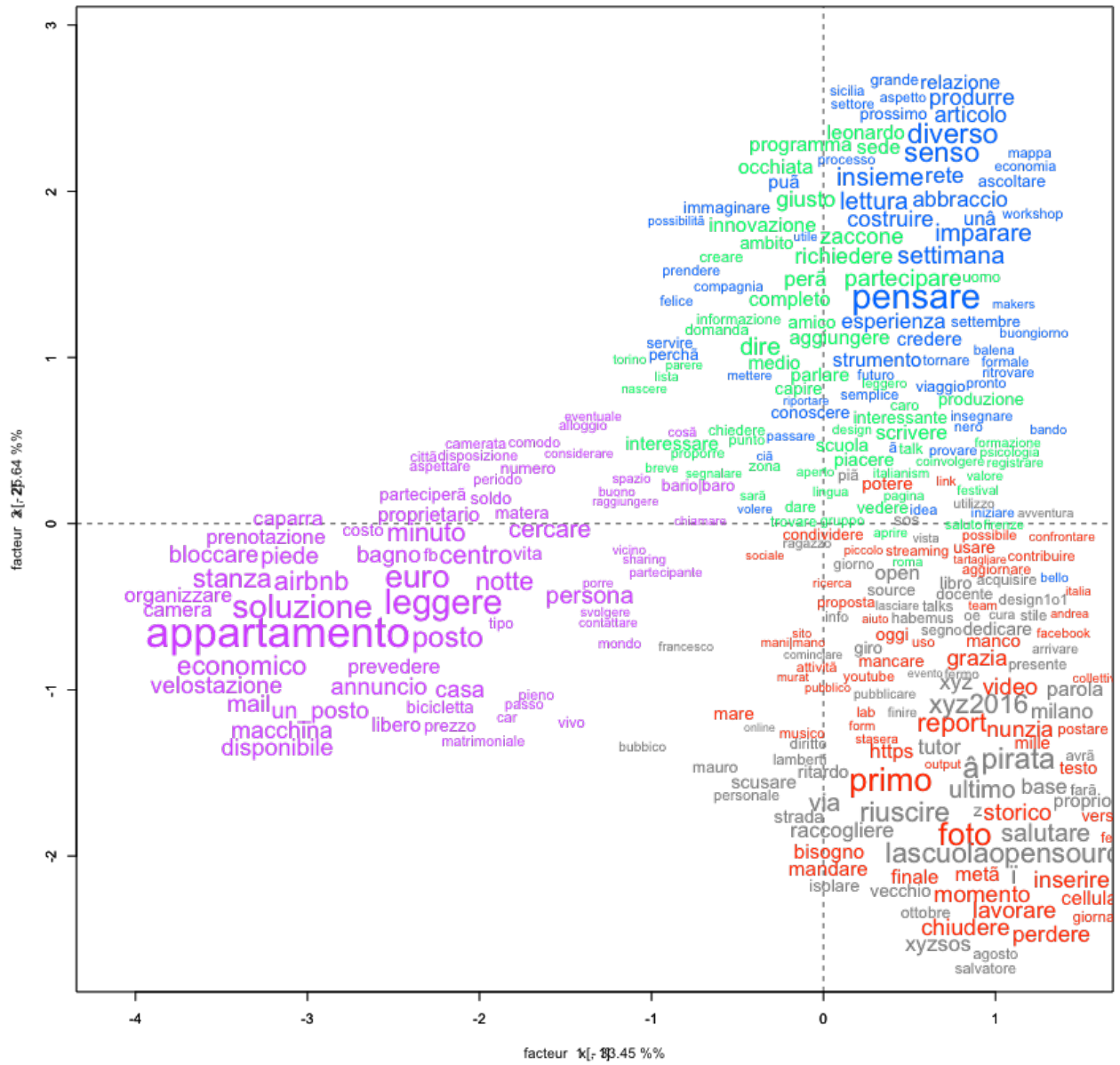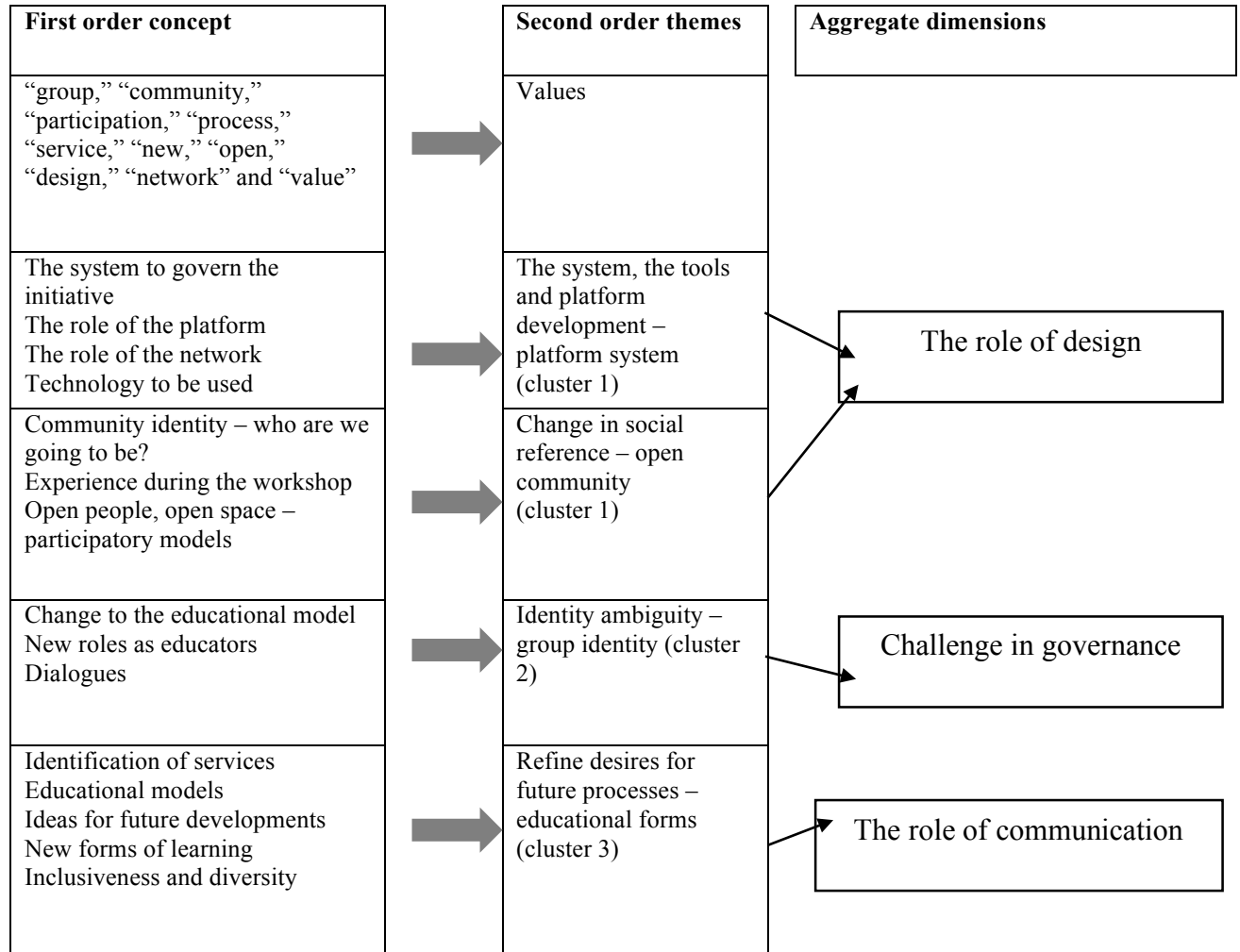
Facebook posts – 3 main clusters

Figure 2
Analytical Coding Process

First order concept	Second order themes	Aggregate dimensions
"group," "community," "participation," "process," "service," "new," "open," "design," "network" and "value"	Values	
The system to govern the initiative The role of the platform The role of the network Technology to be used	The system, the tools and platform development – platform system (cluster 1)	The role of design
Community identity – who are we going to be? Experience during the workshop Open people, open space – participatory models	Change in social reference – open community (cluster 1)	
Change to the educational model New roles as educators Dialogues	Identity ambiguity – group identity (cluster 2)	Challenge in governance
Identification of services Educational models Ideas for future developments New forms of learning Inclusiveness and diversity	Refine desires for future processes – educational forms (cluster 3)	The role of communication

Appendix 1_ Reports Activities Workshop by Group (X, Y, Z)

SOURCE: http://www.lascuolaopensource.xyz/XYZ-Report/index-eng.php

GROUP X - IDENTITY

The first step of the X lab was analyzing and studying the pre-existing material produced by SOS, particularly project abstract, business model and statute. We then moved to identify a series of keywords representing in different ways one of more characterizing aspects of the SOS project. Such words were then gathered according to some meaning associations, and some design concepts were identified across those clusters: Multiverse, Anti-fragility, Open Work and Freak (o anche Chimera). From then, we started an iconographic research aimed to synthesize the minimal element of the identity system. Once the system was identified - composed by the four words "la / scuola / open / source "always set at the corners of any space, was conceived through a performance "the open source manifesto". Through this experience, held during the Open Day, we could test the behaviors of a large group of people, even just those passing by Ferrarese Square, who were asked to fill the "empty space" with some spots, to be painted with analogical tools as pens, markers, poster paint and so on. Starting from that moment, the X participants split in three groups: identity system, website and publishing. Whilst the publishing team started developing the needed tools, methods and technologies needed for publishing, the web team started designing the content architecture and the platform's user experience, and the third group began to define the basic alphabet of the identity system elements, first working on a three "fluo" colors-based chromatic palette, then on an open source typographic font, HK GROTESK, chosen after a vivid discussion, under the condition of modifying some of its elements. Editing the font had a double goal: fixing the letters needing some sort of intervention, and inserting some "different" elements that could make the font more coherent with SOS' values and vision. Some punk and some constructivist elements were therefore added, leading to the birth of the FREAK GROTESK. Starting from this (glyph proportions, contrast ration, curves morphology), a grid for the subsequent pictogram set was designed, and some first items were designed for this new iconographic system. Finally, an algorithm was defined to elaborate the "stains" that will be part of the identity system. Thanks to such algorithm, we could design and develop a processing software that manages such stains and their genesis with some parameters. We could therefore design a three-level system:

(1) An institutional one, where the identity is represented by the sole four words disposed at the corners of the space;

(2) A promotional one, which also uses the stain - in its infinite possible setups - as an identity element;

(3) An open, non regulated one.

Starting from this three-way separation, while the publishing and web teams were finalizing the digital and communication tools design, both in terms of processes and form, the third group designed all of the letterheads: business cards, business paper, flags, poster templates, signals, merchandising. The workshop ended with a second performance: manufacturing a hundred branded shoppers, with the institutional identity printed through serigraphy, letting visitors fill the rest of the space with any design they preferred, to test the open and non-regulated format.

This last performance was useful to both explore the new identity system's possibilities and to pass from our old identity system, based on concept of piracy, to the new one, leveraging on the four identified keywords: freak, anti-fragility, multiverse and open work.

GROUP Y - TOOLS

During the first days each teacher, tutor and participant introduced himself to others, both as an individual and as a professional. All resulting information has been translated into keywords that – outlined – gave birth to a list of interests, passions and all the skills at the table.

Since the third day, the group started to study the needs of each lab and to understand which tools to adopt to facilitate its development.

Cardboard dividers were designed to improve the acoustics of Spazio Murat, the place here most of the job has been carried out. Also, a small digital fabrication and fast prototyping lab was set up. Teachers, tutors and participants fulfilled a server based on the open source operating system Linux, essentials for implementation of most of the shared services and for the database collection.

A fundamental step was to ask the participants themselves what they were enjoying and what they didn't like. They came out with several useful and important considerations, including the need for a concrete DOING; many of them poked around in the other groups and came back more cohesives to Y, some moved to Z with the Cooperative Market, others went back and forth to and from X and Z in order to report Y progresses.

Once all labs were equipped with the necessary tools to deal with the most operational phase of the lab and after they understood X and Z directions, participants splitted into subgroups according to their individual skills and willingness. Two macrogroups were formed: Internet of Things (IOT) and microservices.

In the IOT group it was immediately studied a map of the interactions that will exist between the School and its stakeholders, to envision and define all the possible implementable technologies. It was decided to design and build prototypes of the key elements of an IOT network, vital to manage and benefit from services, to interconnect things and people and to collect and release data.

In terms of internal communication and information exchange, it was decided to use Slack, an open-source, multiplatform tool, with a browser version and an app for all mobile devices. We chose it because it turned out to be very easy to install and use, also for unexperienced users.

Both OwnCloud documents and a repository for GitLab code sharing were defined and installed on server and platform.

After fews discussions on the analytical tools, it was felt the need to develop some practical tools useful to extract information from the various social network used. In particular, they started to work on a Slack bot able to make surveys and to collect information without encroaching too much on the lives of participants.

In the group formed to discuss OPEN DATA the key topics that most guided our conversations and decisions have been: Data keeping, Data ownership, Sharing tools, Analysis tools, Privacy and type of data to be collected.

One of the points was the accuracy of data collection, another of what kind of data they were talking about, yet of the rightness of collecting personal data or to oblige people to share their personal data in order to join the School. Obviously, a dilemma or – better – the evolution of a problem merged.

Using the programmable electronic board Raspberry Pi they build the IOT network hub able to manage data generated by sensors, actuators and people as well. Besides it being the interaction knot between them, the hub is at the same time a bridge for the server created during the first days.

The Server is in turn connected to a database and can be accessed by users of the services through the internet.

This group also developed a Moteino based device – hub of the IOT network – which sends data wirelessly. During the Open Day it has been useful to make visitors express their vote on the success of the event. It is designed to be installed in every room of the School and can be implemented with any kind of sensor.

Again, thanks to Moteino and RF-ID technology, an access management and monitoring tool for all of the School's users was developed and connected with IOT, the database, the app and the whole management software itself.

The Microservices team worked around designing a management software, developing a mobile app prototype and an ideas market. Together with X lab, the website functionalities were as well defined.

Starting from identifying the basic needs of each stakeholder and the available technologies, a modular, "microservices"-based system was defined. Each microservice is focused around providing and managing a specific information.

Access to microservices is made possible by a mobile app and a modular-interface management system, where each module allows to access one or more services. For example, the courses list is provided by a microservice, whereas knowing who is attending what course is possible thanks to a module connecting the information provided by two microservices: people and courses.

After having defined the software's potential attributes, such data was analysed to reach precise and

unambiguous meanings, so to defuse potential conceptual conflicts. Different use cases were then simulated through a role play. We split in groups of students, teachers and administrator, defined each one's needs and translated them into functions, re-ordered in clusters.

The cooperative market team immediately reached a liquid form and, with time developed relationships with both Y participants - with regards to developing the ideas market - related section of the management software - and with Z people, with regards to governance issues. We had, in parallel, a theoretical part on cooperation and free work on defining the determining elements of what we had in mind as a cooperative market. Before thinking about an alternative currency system, we asked ourselves what kind of dynamics would regulate the market and what kind of conflict-resolution frameworks could be utilized whenever the first contrasts would arise.

After raising everyone's awareness on the governance issue, the workshop indeed moved from Y to Z to work around the "governance process" topic together with the rest of participants and tutors/teachers. The final output is an ideas market based on Open Space Technology and a dynamic, modular and anti-fragile governance, based on a strong respect of diversities.

In short, two status are imagined: the role status (teacher, staff, etc.) and the participant status, which can easily be swapped and are anyways dynamic. The output of any sort of voting process should be used in a proportional way: the cost of investing in minorities is in fact representing an investment. The method refers to the eight principles isolated from the Nobel Prize recipient Elinor Ostrom for no centralized governance.

GROUP Z - PROCESSES

Initially, participants were split into subgroups to read, analyze and discuss the project abstract, the business plan and the SOS Company Statute. The discussion was aimed to synthesize a set of keywords. At the end of the day each subgroup presented the results of their work in plenary session. The keywords clustering led to the identification of some macro-themes: community, open source, leadership, school, processes, locality, innovation, economy. After this phase participants have been working to distil groups of keywords describing SOS, through the use of three different methods: dialogue, clustering and division into groups. The groups of words served for the elaboration of six different propositions or statements, that could represent the principles underlying La Scuola Open Source. During this phase, some conflict-triggering questions emerged: for example, the term "process" has been seen as too vague, or the "Open Source" expression, it has been observed, is presented as a concept strongly associated with technology. Hence a series of questions: "How does the experience borrowed from X, XY and XYZ applies to the whole School?"; "What are the ethical implications of the School?"; "What are the sources of income of the School?"; "What if someone wants to reproduce SOS in another city?".

At the end of the third day, participants reshuffled the initial teams into four new working groups:
Z1: they carried the work on the statements testing them on people – both inside and outside the School – with the aim of creating proto-personas;
Z2: they analyzed the systems and processes that emerged during the first few days, proceeding with the abstraction of models;
Z3: they were involved in the part related to the relations within the subgroups and labs (X, Y, Z), through actions aimed at solving integration problems;
Z4: they worked to mediate between all the groups, so that the information could be effective and efficient, working so that all participants were enrolled in the communication channels to ensure that the tools were accessible.

This division was also suggested by the need to increase cooperation and interconnection among the three XYZ tables, which led part of Z subgroups to consider the entire XYZ experience like a meta-model of the School. It was about one third of the lab when a part of the Z2 group met with a group of the Y lab to talk and discuss how the processes of SOS, once identified and mapped, could become "containers" of data. The first part of the meeting was focused on an overview on data, their use in today's society and the usefulness of making displayable and accessible the results of data processing.

The second part of the meeting was focused to monitor and structure two macro-processes: Governance and Education. In the middle of the labs one of the Z tutors (supported by a certified facilitator) led a "Lego serious play" session which involved 28 participants (on a total of 60 from the three labs) to help them formalize in an alternative way many ideas that emerged during the first week and to bring back the groups on a common ground. The "serious play" was held in two parts: (a) reflecting on some technical learning mode (play a model, follow instructions, experimenting, improvising) and the construction process of the La Scuola Open Source (use of analogies to represent one or more processes of the school individually, introducing in turn their work; working in teams to synthesize together the shared processes). Simultaneously another Z subgroup was involved in mapping the knowledge flows that connect the school the with all the internally and externally involved players. The reported output was extremely useful to have a complete conceptual map of how knowledge is transmitted in the school, as a point of reflection on the organizational models and to represent the processes and dynamics of SOS.

At the end of the first week it was noted that working in a shared mode without all team members knowing each other could represents a critical issue. For this reason there have been cases of frustration that could be envisioned as "frictions" against those modalities that many had never used before. At the beginning of the second week, as expected, two new teachers joined the lab. They proposed a very defined structure that helped to give some objective references to those who needed it. A precise working schedule was defined, allowing for deeper focus and longer resting times. The teachers also proposed to change the group structure, identifying new working themes and new connections. If in the previous week participants worked hard to deconstruct preconceived notions of what a school is and should be – starting from the analysis of lexical terms usually used to represent educational and training activities, from the beginning of the second week they started a building operation. For this to happen, first we had to face the challenge that not all Z participants had gotten to know each-other deeply, yet: therefore, we had all groups presenting their work to the rest of the participants; more-over, some afternoon time was dedicated to a session of synthetic self-presentations (basing on the Pecha Kucha format), so that everyone could get more acquainted with the others and tell their own interests, the skills that they intended to share and the reasons that had led them to participate to the co-design of the School.

As a result, the subgroups were reorganized into six new working groups and participants recombined into mixed groups for knowledge, skills and interests. The issues identified during the morning of Monday were in turn divided into four new macro-areas: teaching/research; measurement/evaluation; community/access; governance. Starting Tuesday, the groups started working on the processes concepts for La Scuola Open Source. The new groups identified, discussed and decided the macro-issues they wanted to work on for the rest of the week; later – after breaking down each issue - they discussed on what they would like to focus in particular, to try to get to a concrete results by the end of the workshop. To help them in this process of reconstruction, realization and co-design, tutors and teachers proposed to approach the problem from a service design point of view. The reflection shifted from the analysis of the processes to a detailed and concrete design of the SOS as a service delivery, moving the focus on the experience of the user that will benefit from it. By following this path they reached some actual prototypes that allowed them to identify possible problems and open points of the SOS structure.

For the design of the School as a service, a Service Blueprint approach was used. In order to develop such blueprint, the groups went through three phases: storyboard, role-playing, customer journey definition. During phase one, teams dealt with a storyboard, trying to define the service delivery experience by telling a story. In phase two, going deeper into service design, groups challenged themselves with a role-playing session. Each of the groups "staged" the concept they were working on. This allowed an entertaining sharing moment with all the other teams, which contributed with constructive feedback that allowed further adjustments on the concept. The last phase was about service alignment and fine-tuning through different approaches. Starting from their storyboards and the collected feedback, each team re-discussed, analyzed and re-designed their concepts, detailing them in a blueprint or a prototype (as, for example, an Open Night organized on Thursday to assess

the interaction with the community), moving from concept to action. This last phase allowed each group to get ready for their final presentation, spotting open points and complexities. The final presentations were in fact used with the precise intent of exposing the critical points that emerged during the two weeks to all the other participants. Each group, during the presentation, not only presented their target service via blueprint or prototype, but even set up specific questions to address, fueling a continuous effort of reflection to keep on improving the proposed services. Throughout Z, the teacher's and tutor's role was that of following and facilitating the whole design process, whilst still leaving full decision making and creative autonomy to the teams. Teachers in particular had the job of reconnecting all of the concepts into a system reflecting the Open Source School's macro-themes. Viewing the school as an ecosystem allowed us to highlight and discuss, in the second week, the different points of view on processes, identify the less developed areas and spot the elements requiring a greater effort. Participants responded to every stimula, coming out with eight different processes that are well aligned with the values and topics identified during week 1.

All in all, the Z groups had a very complex challenge ahead. They had to face a challenging design task, that of designing processes, managing a high level of complexity and uncertainty. The Z groups designed services, not physical but systemic objects, targeting both local and global perspectives. They imagined services that could be completely innovative but still well connected and integrated with the community and its social context. They focused on designing the new experiences the School could offer and produce. They designed many of them, according to their diverse competencies and passions. They interacted with their possible stakeholders and with various communication channels, designing an Open Source School in a perfect dialogic relationship with its territory and its initial intentions.

What was made by the Z groups is a proposal of a service model and a structure for the School that allow a complete openness both towards the external (companies, universities) and towards itself (in the school / teachers / students and in the teaching-related proposals), without forgetting about control topics (governance) and evaluation issues (sustainability). Z's work provided a detailed and caring map of topics representing the School's "ideal", a map that we wish could direct us and inspire us on the next strategic decisions and the project's scalability.

3. STRUGGLES AND TRIGGERS IN A DESIGN THINKING JOURNEY

Abstract

Scholarly and practitioners' literature have both described the potential benefits of using Design Thinking (DT) to develop innovations and foster creativity. Arguably, innovation and creativity processes are widely characterized by continues competing demands, which generate tensions. Therefore, the purpose of this paper is to analyze an innovation process informed by DT when newly adopted, and isolate the elements (struggles and triggers) which accompany participants as they work through conflicting demands. Following a qualitative inductive research design, the study reports the experience of the introduction of new teaching practices inspired by design thinking in a class of students without any previous design training, from a Master program on Innovation and Marketing in an Italian University. The originality of the paper lies in the fact that it reports and analyses the particular point of view of each student, often including their feelings and cognitions, during the overall process. This particular angle allows us to identify and describe three main struggles and triggers (destabilizing, non-deciding, abstracting) for newly adopters in every step of the DT process. The study thus contributes to a better understanding of DT by acknowledging its challenges and the cost of it, in order to be able to apply it as an organizational resource when facing competing demands.

Keywords: design thinking, innovation, tensions, management education, competing demands, ethnography

Introduction

Organizations are often required to meet contradictory but interrelated objectives. Competing demands are pervasive characteristics of organizational life (Lewis, 2000; Pettigrew et al., 2000). Most organizations contain interrelated elements that seem consistent in isolation but incompatible or contradictory in conjunction (Lewis, 2000). For example, managers must devote resources to exploring new opportunities while exploiting existing opportunities (Smith, 2014), taking care not to cannibalize their current sources of revenue (typical exploration/exploitation tension (March, 1991)). Service providers must offer a quality service to their customers, while also taking care to save resources or meet productivity targets (typical effectiveness/efficiency tension). Workers undergoing a change at the management level must adapt to new working practices while also preserving older ones (typical routine/innovation paradox). While equally important, such goals often involve conflicting strategies and use of resources, and so are difficult to implement simultaneously (Smith, Lewis, & Tushman, 2016). Managing the tensions resulting from competing demands is becoming necessary for effective organizational performance or even innovation to occur, or creativity to spur. However, when organizations are facing these competing demands, they often tend to choose one or the other or compromise between them, without intermediate possibilities (Dewey, 1938: 17).

Organization studies searched for new sources of inspiration to deal with innovation tensions toward a more synthesized approach by studying design companies, like IDEO (Hargadon & Sutton, 1997a)

In particular, Design Thinking (DT) is considered in management literature as an integrative and relevant approach for organizations, one that has to deal with the challenge of engaging in innovation tensions. However, DT has been also criticized for being loose, too much practitioner oriented and confused in its conceptualization (Johansson-Sköldberg, Woodilla,Çetinkaya, 2013). Therefore, shortcomings of design thinking approaches in firms

are often witnessed (Carlgren, Elmquist, & Rauth, 2014). Implementation of design thinking in companies is sometimes poor and raises multiple challenges, such as collaboration issues and time for learning and practicing, often leading to abandoning the design thinking approach without realizing its potential benefits (Jahnke, 2009; Yoo, Boland, & Lyytinen, 2006). Being able to embrace a design approach within an innovative mindset and in a collaborative interdisciplinary setting, therefore, has gained a great relevance for companies.

This paper aims at elaborating how DT as a management concept (Johansson-Sköldberg, Woodilla, Çetinkaya, 2013), can help organizations and their members to deal with innovation tensions and foster creativity. Exploring how individuals and groups engage in a DT innovation process and how they work through its inherent tensions, we shed light on the struggles and triggers of DT adoption, and set the ground for a wider reflection on how to train people on coping with and working through conflicting demands.

In particular, we investigate the journey throughout the construction of a DT mindset in people without any prior experience with such method, by analyzing the uses, effects, and challenges of design thinking in a management educational context where this practice was, for the first time, adopted.

The originality of the paper lies in the fact that it reports and analyses the particular viewpoint of the students, often including their feelings and cognitions, during their journey through a DT class, part of the Master program on Innovation and Marketing at Ca'Foscari Univeristy of Venice.

The paper is structured as follows: the first section positions our research in the field of organization studies, reviewing perspectives on design and its dimensions of value in the management literature. Then, after presenting our findings in a management education setting, we debate regarding the struggles encountered by individuals during the journey and how it

could be possible to overcome them in order to answer to the complexities of today's business world.

In conclusion, this analysis will allow us to discuss how DT can be used as an organizational resource (Kimbell, 2011) to facilitate the raising of skills which will enable people to face competing demands (Brown, 2009)and innovation to occur.

Theoretical Background

Innovation as dealing with tensions

In contemporary organizations competing demands (Lewis, 2000; Pettigrew et al., 2000) are inevitable and ubiquitous features that exist beyond management control (Clegg, da Cunha, & e Cunha, 2002). Competing demands consist of issues that require simultaneous attention and that are often seen in contrasting in terms. They include, for example, the need to have an organization that is stable and simultaneously able to change (Mitzberg, 1987), able to explore and exploit (March, 1991) prepared to be efficient and at the same time flexible, that pursues the maximization of profits and following a social mission (Battilana, Sengul, Pache, & Model, 2015). Today, given the global and dynamic environment, competing demands are intensifying (Lewis & Smith, 2014) and are becoming pervasive in contemporary innovation (van Dijk, Berends, Jelinek, Romme, & Weggeman, 2011), where open innovation, new business models, platforms and ecosystems (Chesbrough, West, & Vanhaverbeke, 2006; Laursen & Salter, 2006; Tucci, Chesbrough, Piller, & West, 2016; von Hippel, 2005), are challenging the organizational boundaries and the competing strategic demands.

Organization studies refer to innovation as characterized by tensions (Lewis, Ann Welsh, Dehler, & Green, 2002), paradoxes (Miron-spektor, Erez, & Naveh, 2011), contradictions (King, Anderson, & West, 1991) and dilemmas (Smith, 2014). Tensions are described at all levels of analysis and with regard to antecedents, processes and consequences of innovations,

and can therefore be considered to be pervasive within organizations attempting to innovate. The understanding and the managing of these tensions resulting from competing demands is becoming necessary for effective innovation to occur (Garud, Gehman, & Kumaraswamy, 2011) and the possibility to train individuals and groups to learn how to deal with these tensions could be a competitive advantage for firms.

Research highlights various approaches for managing these tensions: 1) accepting; 2) accommodating; 3) differentiating/integrating (Smith, 2014); 4) synthesizing (Gaim & Wåhlin, 2016). However, scholars in this field stress the fact that, to be able to manage tensions, it is necessary in the first place to reframe them in order to bring to the surface the elements that prevent people to solve the conflict. For example, instead of framing tensions as "either/or" dilemmas, paralyzed individual and groups into vicious cycles where just one choice between alternatives can be made (Lewis, 2000), reframing them as "both/and" involves taking on new ways of seeing and understanding things (Smith et al., 2016). This involves finding a new perspective that eliminates the disparity and duality between competing demands, and goes beyond compromise and reconciliation, to synthetize them and to fuel creative potential into an innovation process.

However, to meet these demands and to develop the appropriate capabilities and skills to operate in contemporary companies, new learning approaches are required. While research offers approaches to manage tensions deriving from competing demands, we still know little about how individuals and groups could be trained to address these tensions especially if rising during an innovation process. As the UK Design Council (2010: 13) states: "A supply of differently skilled people drives innovation". Companies are increasingly valuing creativity, flexibility and adaptability, skills that can be deployed within teams and the entire organization (UK Design Council, 2010). Scholars and practitioners are promoting Design Thinking as a way to expose and train people beyond their own disciplines and as a team-based exploratory

process, which enable organizations to cope with complex and "wicked" problems (Brown, 2008; Liedtka, 2015). Therefore, design is increasingly being viewed as a vital and important strategic business resource for innovation (Dell'Era, Marchesi, & Verganti, 2010).

Therefore, this study seeks to expand and build upon our understanding of the nature and management of tensions in innovation by exploring in depth what problems and obstacles individuals and groups face when introduced to Design Thinking, as new learning approach, for the first time and how they can work through its inherent tensions.

Design thinking: design as management discourse

Innovation theory searched for new sources of inspiration for managing tensions by studying design activities, tools, processes and companies, like IDEO (Hargadon & Sutton, 1997). The search boosted a design interest in the management innovation discourse (Feldman & Boult, 2005; Stevens & Moultrie, 2011; Ward, Runcie, & Morris, 2009), and challenged the rational models of traditional theories re-conceptualizing strategic management as a design activity focused on innovation (Hatchuel et al. 2010). The word "design" in management literature has been recognized as a central issue since the seminal work of Simon (1969). Recently, design practice has been identified as a focal point in the process of innovation, both if considered as a means of giving radically new meanings to our artifacts (Verganti, 2008) or as a new approach to deeply re-think the process of innovation (Liedtka, 2015). Moreover, design has been so far identified as a strategic source for business resources and competitive success in a very wide perspective (Dumas & Mintzberg, 1989; Hargadon & Sutton, 1997b; Verganti, 2003). However, the analysis of design as a dimension of value in the management literature is still ambiguous, while its impact, despite few attempts (McNabola, 2013), on innovation is still undefined. Moreover, the term design and design thinking are misused to refer to different studies and approaches toward design activities and their link to innovation. To disambiguate,

two main approaches can be identified: the first refers to the study of the practices and the cognitive attitudes of working designers (e.g.Kruger & Cross, 2006) and the second approach, more recent, referred to the application of a human-centered open-ended problem solving practice able to face and navigate wicked problems (Buchanan, 1992) of today's organizations (Dorst, 2011), Design Thinking.

The first approach identifies the design practice as a driver of strategic value and innovation performance through the model of design driven innovation (Landoni et al., 2016; Verganti, 2003, 2006, 2009, 2011). Here design produces innovation boosting the process of meaning construction, and overcoming the duality of market and technology as unique sources of innovation. Designers, building on their unique set of information, bring a unique way of looking at problems and they are able to find solutions, which are extremely valuable for innovation in organization.

The second approach instead looks at design as a "logical process", which is possible to control toward an effective solution (Simon 1969). The promise of control over a creative process, in an optimized, predictable and rigorous way, is close to the contemporary business context of "innovation" and it emerges from the practice of consultancy. As argued by Johansson-Sköldberg et al. (2013) this debate constitutes a separate major stream of research, which is not concerned anymore with the tradition of studying designers, but to define an approach, design-inspired, to be used and teach repetitively in organizations to foster innovation. Brown (2008), IDEO's CEO, detailed the steps of this process (2008) and labeled the concept as 'Design Thinking'. Design Thinking is conceptualized as a specific way for non-designer to evaluate and use design method (Johansson-Sköldberg, Woodilla, and Çetinkaya 2013). Additionally, he provided stories to help everyone use IDEO's method, particularly business people (Brown & Wyatt, 2007). Brown argues, through following this non-linear, human-centered, iterative design process in three steps, which he calls *inspiration, ideation, and implementation*, it can

convert problems into innovation opportunities and tackles wicked problems (Buchanan, 1992) of today's organizations (Dorst, 2011).

Stressing the relevance of wicked problem solving for business and management, Dunne and Martin (2006; Martin 2009) argue that Design Thinking offers something of value to managers, which can complement established analytical techniques. Martin (2009) sees Design Thinking as combining abductive, as well as inductive and deductive, reasoning and argues that managers are ill-served by contemporary management education which neglects the former. Drawing attention to the different ways that managers and designers judge reliable and valid, Martin (2009) propagated design thinking as a way of finding creative alternatives when organizations deal with competing demands. Thus, companies and universities are increasingly investing in programs, courses and workshops to embed Design Thinking throughout their curriculum as a way to introduce non-designers to the benefit of design practices (Beckman & Barry, 2007; Dunne & Martin, 2006; Meinel & Leifer, 2011). Students or employees experience multidisciplinary teamwork that exposes them to skills and knowledge beyond their own disciplines, with the aim to integrate creativity thinking in their daily routines. Indeed, the first two institutions to develop a Design Thinking program were the d.School at Stanford University and the Rotman School of Management (Canada). They developed and diffused normative models of DT centered on frameworks that feature a set of tools, and which emphasize a human-centered approach to innovation as well as inter-disciplinary teams (Stanford d.school, 2010; Seidel & Fixson, 2013; Fraser, 2012). These models describe to a varying degree three stages of a process (data gathering, idea generation and testing), a common set of tools (Liedtka, 2015) and prescribed ways of thinking (e.g., Stanford d. school, 2010; Fraser, 2012, p. 20). However, despite many studies related the how to teach Design Thinking (Kimbell, 2009; Melles, 2010; Melles, Howard, & Thompson-Whitesidec, 2012; Wrigley & Straker, 2017), Wong (2009) stated, "Design Thinking brings creative techniques

to business […] but no one can agree on how to teach its methods". Then what is taught in DT and how it is taught – let alone its impact back into the innovation process – is still understudied.

The two approaches described above, design driven and Design Thinking, seem to be distant in both their origin and their aims. On one side the *design driven model* (Verganti 2006) tries to refund the theory of innovation as an intellectual approach to problem framing and problem solving that acknowledged the social aspects of design work (Kimbell 2012), focusing on professional designers, on the other side the *Design Thinking approach* (Brown, 2009; Carlgren, Rauth, & Elmquist, 2016) focuses on a learning of practices, which can be control, learn by everyone and repeated by organization, extended in many different field and promoted on multidisciplinary teams outside the traditionally trained designers. The first stream of research is then theoretically grounded on the idea that a new kind of innovation is generated through the adoption of design as a language used by the entrepreneur and the trained designer to reshape the meaning and the values of a product or a service. The second stream of research is empirically based on a number of practices developed in field, where non-designers enact "a set of core principle though a number of mind-set, practices and techniques" (Carlgren et al., 2014) to help organizations deal with innovation tensions such as exploration and exploitation (Martin, 2007).

In organizations, indeed, the activities, skills and knowledge required for successful innovation are strewn across multiple parties, and when they have to be integrated and their respective needs have to be taken into account, the overall process increases complexity manifold and competing demands raised. Bridging these tensions and creating adequate organizational responses require a new way of thinking and working, which introduces design as a promising driver of value, in both approaches, strategical value and logical-repeatable process.

However, the role of design within innovation studies is still underestimated and still viewed just as a technical activity or as a sub-function in the firm (Tether, 2005). Therefore, notwithstanding a growing interest to manage tensions and changes in innovation(Martin, 2007), the business world does not seem very well equipped to embrace a design, system–oriented, way of thinking (Porter & Heppelmann, 2015), which could represent instead a possible strategic answer. Our argument is that organizational members can draw on and be informed by the approaches and the mindset of design thinking when dealing with innovation tensions. However, in order to adopt such a strategical answer, this study highlights and documents the challenges and the costs on teach it for individuals and groups, in order to better understand how to realize its potential benefits in being able to manage innovation tensions.

Research Method

Positioned in the research streams on tensions and on design thinking, this paper focuses on the challenges of enacting a DT thinking approach, embracing the point of view of participants. It addresses the following question: *how do individuals and groups engage in a DT innovation process and how do they work through its inherent tensions?* In particular, it explores what happens when a design thinking approach is introduced in a class of a school of management, by reconstructing the process from the eyes of the participants. This peculiar angle provides in-depth insights on the challenges in terms of change of mindset that introducing a design thinking approach entailed.

Consistently with such explorative nature, the study follows a qualitative inductive research design, i.e. the most useful when there is a need to develop a rich understanding of specific phenomena (Langley, 1999)No a priori theory therefore guides our analysis, and context and social action became themselves object of analysis and potential explanatory factors of the phenomena under study. On the contrary, the theorizing process emerged gradually and

systematically from the observation of facts and interpretations (Glaser & Strauss, 1967) and within a continuous sensemaking process through activities of analysis, coding and interpretation of the data as they were collected (Czarniawska, 2014).

The setting is a Design and Innovation Management (D&IM) module within the launched Master program in Innovation and Marketing at Ca' Foscari University of Venice. The module combined theoretical lectures with hands-on group work to experiment the design thinking approach in practice, as it will be explained below. The study encompasses both students' and instructors' points of view and partly relies on participant observation (Barley, 1990) and auto-ethnographic material (Agar, 1986; Boler & Zembylas, 2003; Van Maanen, Sørensen, & Mitchell, 2007)

The first author has a professional background in design and is currently a doctoral candidate in Management. Her role in the field was one of teaching assistant in the D&IM module, with tasks related to practical training and tutoring of participants in the development of design thinking skills. The second author is Professor of innovation management and was the instructor of the D&IM module in the field. These two researchers took fieldnotes and kept a research diary to note their observations and reflections along the course. The third author was involved as a management researcher in subsequent rounds of data collection (formal and informal interviews with students) and analysis. This role design allowed to counterbalance the potential bias of the participant researchers' view, while retaining the richness and depth of the insights deriving from the participant observation and auto-ethnographic techniques.

Description of the setting

The D&IM module was an intensive 30-hour course of five weeks, aimed at lecturing students on the theoretical principles of innovation, with a focus on design thinking as a means to develop capacities to tackle wicked problems (Buchanan, 1992) and competing demands. The

class was composed by 43 first-year graduate management students, around 25 years old, with a background of undergraduate studies in business administration.

The module was structured as follows: each week two lectures of theoretical background (conducted by the second author) were followed by one-day laboratory activities with a designer (the first author). Both the lectures and the lab activities revolved around the three formal stages of the classical process of design thinking innovation: *inspiration*, *ideation* and *action* (Brown, 2008; Martin, 2009).

At the beginning of the module, within the laboratory activities a challenge was launched: students were asked to develop an idea for how citizens and visitors could live, coexist, and thrive in the highly touristic city of Venice, where the university is based. As a starting point, the instructors offered four stereotyped points of view: students, commuters, tourists, and inhabitants. Each one represented a classical and competing vision of the city in terms of services required, desires and critiques. The main challenge was to overcome the stereotypes and to learn how to cope with competing demands like for example a city which bases its business model just on the touristic inflows and a city which demands to stay lively to allow people residency, working and studying.

Students formed nine teams of four to five people and were invited to choose a target stereotype and work on the suggested design challenge for the selected target. The design thinking approach was intended as a means to abandon stereotypes and start acknowledging the problem "for real". Interdependencies and complementarities, i.e. people deepest needs, required to be understood, highlighted and re-thought with a new approach of "both/and" decision making, which allows to lead to a virtuous cycle response. In other terms, the instructors induced students to understand a complex system with organizational tensions, like the city of Venice, and to apply a human-centered approach in order to design responses that would address competing demands with a sustainable and long term perspective.

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The instructors observed and mentored the groups along the processes of inspiration, ideation and action (Brown, 2008; Martin, 2009) the process was following the normalized d.School approach in order to have the possibility to observe without interfering much on assignments to better identify struggles and triggers along the innovation journey.

Students produced three corresponding partial stage deliveries (1st assignment: user-research, 2nd assignment: concept development, 3rd assignment: scenario building) and they concluded their group project with a final presentation (and a prototype) to receive feedback on their ideas from a panel of professors and professionals. Such approach was therefore quite disruptive compared to the traditional, formalized business administration learning environment students were familiar with.

Data Collection

Capturing the introduction of a design thinking approach in action requires close observation of everyday activities and a deep engagement in the field, observing and interacting with the students in action. It also requires finding means to access participants' cognitions and emotions as the process unfolds. This led us to rely on a number of data sources, which were collected intensively over four months during the module, from September to December 2015 with few follow-ups until May 2016, after the module:

instructors' field-notes and diaries from direct participant observation: the two first authors observed the course activities and wrote their own notes throughout the five weeks. This allowed us to keep track of our own views of students' actions, reactions and interactions as they progressively engaged with the practice and produced deliveries while the project unfolded.

*Students' individual process book*s: to obtain granularity on the learning process details, we encouraged students to keep a personal diary, called process book, along the duration of the

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course. No format for the process book was provided: participants autonomously chose length, size and style; teachers suggested to have it hand written, as a disposal note taker, but also digital formats were accepted. Students thus crafted 41 heterogeneous process books that were collected by the researchers at the end of the module. This allowed us not only to track the unfolding of ideas and project developments, but also the particular point of view of each student (often including their feelings and cognitions) in the process.

Groups' partial and final deliveries: these artefacts can be seen as temporary reifications of the groups' collective and emerging ideas; in combination with the individual process books these allowed us to make sense of the students' progressive experience. All in all, we collected 35 group deliveries, one for each of the three main stages of the process (inspiration, ideation, action).

Focus group at the end of the module, in the form of a feedback session (November 2015): in order to have comparable feedbacks and to structure the discussion, researchers provided students with a reflection-template in the form of a timeline, where each participant could sketch his/her own experience, thus reflecting over the ups and downs of the learning journey. On top of the focus group discussion, we therefore also collected 25 templates (provided by instructors) with participant' feedbacks.

Formal and informal interviews with the students during, right after (November 2015) and well after the course (May 2016): interviews were conducted to access students' current views about the process that they were living (November interviews) and retrospective sensemaking about it once some distance was put in between (interview round in May 2016). Interviews alone are not the most important source of insight in this study, yet they were useful to better anchor and better substantiate our emerging interpretations about the change and the challenges that the course entailed, for example in terms of assumptions held by the students, team dynamics, their evolving interpretations and generation of ideas.

All in all, we believe that engaging in the collection of these rich data allowed us to get close to the students' experience, both individually and collectively.

Data analysis

Iterating among in-depth analysis of field-notes, transcriptions of interviews, and documentary materials, in particular the process books, supplemented with students' timelines and group deliveries, we reconstructed the experience of each group and of each individual student along the three design thinking steps in developing the final group project over the five weeks. The analytical process was highly iterative, involving several rounds of coding and connection to the innovation and design thinking literature.

Stage I: developing the descriptions of the learning journey

A first round of exploratory open coding, by cross-referencing the instructors' observations, the informal student's interviews in class and the group deliveries, revealed several on-going struggles of participants. Students attempted to fit a design thinking approach – that is typically inductive, creative, collective and addressing ill-defined problems – with their traditional management problem solving attitude – that is rather deductive, analytical, individualistic and addressing well-defined problems in search for the best solution (either/or approach). This led us to take in deeper consideration each individual process book, in order to better understand how students perceived this new learning experience, and focusing on struggles.

Stage II: identifying individuals and groups struggles and possible triggers

Students' process books were coded in two rounds. From the first round, some characteristics emerged around the format (use of colors, photos, size); around time (sequentially in the information deployment, data, presence of quotes from lectures); around the process steps (contextual observations, notes on interviews, quotes form interviews); around personal attitude (answer anticipation, personal reflections, back and forward research of information,

analytical graph and drawing and sketching). Comparing and organizing these characteristics, we proceeded with a second round of coding of the process books. In this round we developed categories regarding students' cognitive approach (for example: deductive versus inductive and analytical versus creative), and regarding the struggles that emerged in every stage of the process (namely, struggling with destabilization, struggling with abstraction, struggling with 'non-deciding').

Stage III: Identifying long term behaviors

To reinforce the analyses, other two informal processes of observation and evaluation took place. Authors analyzed and compared longitudinally the behavior of the same class of students during their attendance of the subsequent module on Cultural Planning and Creative Industries (CPCP module) and they also run a set of interviews at the end of the school semester to compare previous rashly impressions with more conscious reflections after six months from the course. This analysis helped to better picture the correlation and the persistence of innovation skills developed in order to deal with competing demands during this journey in another context over time.

We will organize our findings as follows. First, we will report our findings in a processual manner, using the three main stages of the design thinking process – *inspiration*, *ideation* and *action* (Brown, 2008) – as a bracketing device. For each stage we will provide a short description of what it is about in relation to design thinking, the tasks that were given by the instructors and field evidence of how students coped with it. Second, drawing on these, we will derive some general findings on the outcomes and on the triggers that enabled or disabled the whole process.

Findings

Struggles in an innovation journey

In analyzing what participants faced during an innovation journey, three main struggles emerged, reflecting some typical conflicting demands students happened to work through in each phase of the process – namely: struggles with the destabilization that a DT purposely introduces (versus a demand for stability and control over the process); struggles with the abstraction activity to favor potential prolific ideas that DT requires (versus a demand for answering to specific events and facts); struggles with non-deciding, that is the DT requirement of inducing an innovative idea from an ambiguity of clues (versus a demand for rapidly solving a given problem). We will illustrate our findings in the following sections.

TABLE 1

Inspiration… or searching for solutions?

The inspiration stage in design thinking consists of understanding the problem, doing field research, and organizing information synthetically. This includes one of the core principles of design thinking: engaging with real people – particularly the users of the innovation project. In principle, such grounded understanding should lead to new perspectives that, in turn, may spawn novel solutions.

In relation to the challenge that instructors launched to D&IM students (to design an intervention that would address the specific needs and experiences of certain "users" of the city of Venice), once the groups chose their main "target" (recall: tourists, commuters, students, inhabitants), the instructors invited the groups to engage with the *inspiration* practice. This implied that students understand the people for whom they were designing. In order to design

for them, the instructors asked students to build empathy and approach the issue without assumptions (Instructor 02 Diary, 29/09/15). Students were invited to make contact with the real *users* (not to be labelled "target" anymore – first change of language), observe them in their daily life, interview them and synthesize group findings to discover meaningful *needs* and *insights* (other new words). At the end of the inspiration phase (2 weeks) each group was expected to have run at least three different observations of places and people in Venice and have conducted at least three different interviews with their users.

To introduce this completely new task, the instructors designed a preparatory 30 minutes activity (Instructor 01 and 02 Diary, 02/10/15). During one lecture, the students were split in two teams and asked to rethink their university workspace as an environment to support collaboration. The instructors asked to half of the class to use a traditional analytical approach to problem solving: this team stayed in the classroom to formalize, analyse, and address the problem. Instead, the other half of the class was invited to use an intuitive approach to problem solving, going into the world (outside of the classroom, into the campus) to address the problem by observing. Then, after 30 minutes they re-gathered and shared what they had encountered. This small experience was meant to sensitize the students about how to proceed in the inspiration phase for their group work on Venice.

During this inspiration phase evidence of destabilization, of a somewhat passive attitude and, at the same time, of a decision attitude emerged. We will illustrate these in the form of the following three struggles.

Struggling with destabilization:

Students were destabilized. For example, even in the 30 minutes preparatory activity, when instructor 02 invited the students to leave the classroom for observing the campus spaces, students suspiciously asked: *"Now?? Out??"* (Instructor 02 Diary, Sept 25th). Immediately

after they reacted by expecting higher constraints, and there was a demand to re-establish a clear and stable environment: *"What do we have to observe exactly? How should we report it?"* (Instructor 02 Diary, Sept 25th). Similar requests about frames and guidelines were raised as the groups started their own fieldwork for inspiration. One student motivated their destabilization in one of the retrospective interviews: *"this design, from our point of view, had little to do with marketing. We were there to study marketing!"* (Int. retrospective Jack, 27/05/2016).

Students' process books are punctuated with comments about discomfort or confusion about what to do in the inspiration phase. For example, a student reported: *"we learn how to interview a person without judging! It is so difficult"*. This same student, after running an observation in Venice, noted in her process book: *"long way home, I couldn't find the way back! Too many tourists. We missed time and…the bus!!!"* (PB F.S, 07/10/15) – which reflects, in our view, a feeling of loss of reference points or comfort on multiple dimensions (getting lost in the task, in the city, in time, in transportation). Another student well expressed this destabilization in his own process book, while valuing it at the same time: *"big cultural shock as previous academic experiences seldom encourage you to take action. Maybe a small step for others but a big leap for me"* (PB M.F., November).

Struggling with abstraction:

Also, in the inspiration phase, students overall demonstrated a quite passive attitude in terms of ability to go beyond the immediate surface of things. They would not challenge what the problem was. For example, no one of the nine groups was really challenging the target stereotypes we gave them, even though they were expected to get rid of stereotypes and explore "real people" in the field. All of the nine groups uncritically declared to work for "tourists"

(Group 6 and 7) or "inhabitants" (Group 4 and 8) or "students" (Group 2,3 and 5) or "commuting workers" (Group 1 and 9).

The challenge was broad on purpose and it required students to explore and understand before having the problem solved. However, in the process books students' observations tend to remain on very specific and precise micro issues reported by specific interviewees *("Venice is far more crowded now than a few years ago"* interviews from 2nd delivery - group 7; *"How to find a small vaporetto station?"* – observation from 1st assignments – group 6) or presupposed stereotypes *("we kind of expected to explore how tourists with a specific budget go around Venice"*- 1st assignment - group 7; *"our assumption about(workers) being not motivated(to visit Venice) was correct. So, being not motivated, workers don't find the time to walk around Venice* – 1st assignment - group1)* without the effort of abstracting and exploring a possible domain of the problem. Students claim great difficulty in observing reality with a magnifying lens and then abstracting a meaning from this observation, and they remained attached to the ground: *"ideas emerged from our own experience as students"* (Int.P.A., October – member of a group working for the student "target"):

"we don't know the problem enough and we are not really interested in it (directly). […] The group is not really interested in this topic and prefers to focus on problems it knows better" (PB: P.F., October)

This lack of a proactive effort and the fact that students tended to remain attached to the ground, to previous assumptions, or to what is known, made us label this a somewhat passive attitude in inspiration.

Struggling with 'non-deciding':

Related to this, also a strong decision attitude toward a problem solving, instead of a more explorative one, emerged from our data. As a general tendency, in the inspiration phase

virtually all students proceeded by listing what they assumed as options and processed them in search of the best one. This practice is very evident in the following passage, where a student reported in her process book: *"I divided all my questions into 5 macro areas"*. Then she added the following note to herself*: "choose the right one!"* (PB Z.L., October). Similarly, some students already launched a definitive idea at the beginning of their process book, i.e. at the very beginning of the inspiration phase. For example, a student of a group working on the tourist type of users divided tourists into ten categories and scribbled: *"for each category insert a 24 hours guide about what to do in Venice (path to follow where to eat breakfast and so on…)"* (PB P.F., 22/09/2015, note: page one, first entry in the process book), that is directly jumping to a pre-conceived solution.

Another student listed some questions in his process book about workers in Venice (his group's type of user) and wrote the following sentence, in capital letters: "*HOW TO CHANGE THEIR MIND"* (PB P.J., 6/10/15), again reflecting the tendency to immediately jump to a solution for the target, implicitly assuming the observer's superiority, by the way, rather than a deep immersion in the observed. Few students themselves critically recognized this strong decision attitude, as a student noted to herself at the beginning of the process (6th day): *"STOP SEARCHING A SOLUTION RIGHT NOW!"* (PB S.S., October), written in red, capital letters. *"We were really focused on the objectives"* explained a student in one of the retrospective interviews *"then we noticed that we were going the wrong way"* (Int. retrospective P.J., 27/05/2016).

Overall, the emergence of these struggles when engaging with the inspiration practice suggests that there is a strong dominance of the analytical and deductive approach of more traditional business school learning (looking for stability, processing a given set of alternatives, finding *the* solution), as opposed to the more creative and inductive approach that should inform design thinking inspiration.

Ideation… or the stereotype of the genius invention?

The ideation stage in design thinking consists of brainstorming on the evidence gathered in the inspiration stage, progressively specifying the challenge, and crafting a potential idea.

At the beginning of this stage the instructors asked each group to identify peculiar and meaningful insights from the inspiration phase and to run three brainstorming sessions to generate solution concepts, using the guiding question *"how might we?"* to respond to the emerging insights from the field.

To facilitate this process, the instructors took the class to visit a Venetian cultural institution, Querini Stampalia, a renowned library and historical museum. During the visit students had the possibility to observe and run interviews with the people they met and, back to the groups, to brainstorm about the main challenges emerging from the insights and about how they could be addressed. After this class exercise, they were invited to do the same in their groups for their project on Venice.

Struggling with destabilization:

Students were asked to reflect on the insights but as reported on a retrospective interview:

"it was a very new process. We needed more structure, more explanations, a clear direction. This is the way I am, but I need to know precisely, where I am, what I need to do and what is the objective and then I can work with a challenge" (Int, retrospective, P.A. 27/05/16).

Groups felt destabilized and unable to recollect the information from the previous steps in the ideation phases. Instructors then provided students with a template to constructs the "how might we" questions: who/need/what. Groups, suddenly, accelerated the following brainstorming sessions in a painful rush and without a proper certainty of the path to follow. One of the students reported: *"This process is continuously destabilizing me"* (Int, P.A., October 2015).

<u>Struggling with abstraction:</u>

In the ideation phase the students synthetized their observations and tried to enucleate users' insights on their experience of Venice.

The students engaged with this task in an effortful way and many process books report this phase very clearly: notes from the interviews or (very rarely) fieldnotes from observation of tourists' behaviour or commuters' behaviour, for example, are transcribed in the process books. Next to them, several students reported a table with the main insights. However, in many of the cases these insights are a repetition of what was stated in the interviews. The following two exaples are illustrative in this sense:

Example from group 1: "when I'm inside the train I think about what I need to do the day after or I surf the Web"- translated in: "How can we improve workers' stay in the trains?" (PB S.S., 13/10/15)

Example from group 7: "Venice can be a very expensive city but it has a very old tradition about food and can offer a great gastronomic opportunity, avoiding touristic places- interv.tourist"- translated in: "How might we warn tourists and incoming foreign workers about Venice's prices?" (PB A.B, 18/10/15)

In other cases the link between the insight and the interview/data was not clear at all. For example, one student whose group was working on the "target" of inhabitants reported a generic observation about the crowdedness of the streets of Venice because of tourists' flows (BP S. R.). Then, in the ideation process, he asked himself *how might we create private calli* [Venetian pedestrian streets] *for inhabitants?"* thus giving a precise answer to the observed crowded places, as perceived by the student, instead of trying to identify how this observation, cross-referred with what he listened during the interviews, would lead to some more interesting insights. The same student, during the brainstorming session with his group, promoted this

possible solution moving onto identifying specific ways of realizing it (Obs./Instructor 02 diary, October.). Also, none of them went back to interviews and observations at the end of the project, while they tended to interpret the data soon after their collection.

In other words, despite the effort students put in this stage, the impression is left, once again, that the groups were not able to make sense and frame the data collected in the previous phase in more abstract terms. They were not able to see what they achieved in terms of new knowledge from the interviews or observations. Students seemed to lack abstract conceptualization and reflective observation skills that are preferred requirements in the ideation phase as well (Backman and Barry 2007).

Struggling with 'non-deciding':

The decision attitude noted above was even stronger during the ideation stage, whose purpose would be to move away from the original perception of the problem towards a new focus gained from the data collected in the inspiration phase. As we saw, an important passage of the ideation phase was the brainstorming sessions. The students engaged in this process and the effort that some of the groups put is clear. For example, a student reported in two passages in her process book about their brainstorming meeting:

"we discuss about the interviews and we try to analyse them. We translated every interview and tried to highlight the insights and the useful quotes" […] "We met again and we wrote down in many many post-its our main ideas and understanding from the interviews." (PB T.B., October)

However, this process was meant to inspire the students, instead, once again, most of the groups were stuck on a solution they heard during the interviews or on their initial ideas. Some groups fell in love with their initial idea and used the inspiration phase to support and justify their

initial thoughts, even against evidences suggesting a set of possible different solutions, without recognizing the need to prove the feasibility of their idea.

The following quote is exemplary in this sense: *"just because it's complex, doesn't mean it's impossible! IT'S NOT IMPOSSIBLE!"* (PB V.A., October – written in capital letters, stressed, at the centre of the page).

On the other extreme, some students demonstrated the opposite attitude toward ideation: *"DON'T INVENT. If something doesn't exist yet, it means is not working"* (PB T.B., October). Here the attitude toward invention seemed to acquire a negative value; in this case reality was seen as an anchor against the possibility to create something different. In other words, students seemed to swing between the heroic view of the genius inventor (recall *"It's not impossible"*) and the conservative view of the administrator (recall: *"don't invent")* – both far from the view of ideation that underlies design thinking innovation.

Overall, in the ideation phase too students struggled on multiple dimensions: they were perhaps better coping with the lack of predefined frameworks and solutions (less strong destabilization struggle), and efforts of collective ideation are there, but the tendency to look for solutions close to the preconceived problem (abstraction struggle) and the tendency to stick strongly to a deduced decision (decision struggle) are still there.

Action… or inaction?

Finally, in design thinking the implementation phase is the execution of the solution, with the recognition that implementation leads to new projects or the next iteration of the current one. This involves prototyping. Prototyping is a very active phase, where a team should stop (just) discussing, and start building. Prototypes are a potential "solution so far" that is given some form and materiality, so that the designers can engage with users in a different way, in order to

continue the understanding of a taken direction. Reaching an agreement on a specific concrete implementation is a great way to bring clarity.

During *Action* we asked groups to rapidly develop and build their solution concepts and to be able to test their prototypes with potential users and pitch the idea to the class.

As a final delivery, we proposed to students a scenario-based prototyping approach to visualize and communicate the intended solution. We asked them to build a scenario that answered the question "how will your idea work?". A scenario is a story that illustrates a product or service concept: how people would use it; the context; and the action or goals involved in the activity. The scenario is typically a hypothetical view of an overall concept that is used to facilitate discussion and common understanding around the idea.

To promote this idea of "making it real", we made students experiment an "egg drop challenge". Egg drop is a classic team building activity, where teams of 3-5 take given materials and build something to protect a raw egg. The eggs that survive a 3 meters drop successfully complete the challenge. In a very limited time – 15 minutes, this activity allows teams to build creative thinking and implement it straight away. This was meant to let them understand what prototyping is and inspire them for how their final delivery (prototype of their idea for Venice) could be given shape and communicated. Then we asked to prepare their final presentation, with one scenario in order to receive multiple feedbacks.

Struggling with destabilization:

The egg activity was embraced with great fun and hilarity. However, they felt the egg activity as aside of the ideation process; this was hinted at by the fact that no one of the process book reports a world about this specific moment. Students made videos and laughed about the fun activity, but it seems that they did not truly understood the potential of this game. However, when it comes to their challenge for Venice, three groups tried to build a physical prototype of

theirs ideas (a map – group 2 , cardboard app screens – group 5, a set of cubes – group 7) to better clarify and communicate the solution. The day of the presentation, initially, all groups were sitting in the class normally. Instructor 02 entered the room and said *"I expected to see something different here!"* (Instructor 01 Diary, 23 October), implying that for the presentation of the prototypes more physical arrangements were made. Only then the groups started taking out their prototypes and moved in the classroom space. In other words, they had been creative, but tended to fall back in the normal formats of presentation. For example, the majority of the groups intended to present their idea using a power point. As soon as we encouraged them to surprise us, drawings, posters and prototypes appeared. The struggle with destabilization of the traditional class formats was therefore weakened by the end of this process, as they were engaging more actively with creativity (e.g. in presentations), yet the tendency to go back to stability emerges too here (see the fact of sitting normally in the class and the fact of timidly hiding the prototypes at first, the day of the final presentation).

Struggling with abstraction:

All groups delivered just one final solution. Scenarios were rough; the majority did not craft a proper settings for their solution or an activity sequences which would be able to expose how their imagine people to use it. Each group delivered a scenario, however they did not explore the potential of the tool. They seemed to trouble to use their imagination on something that does not exist yet and it could only be imagined. Furthermore, during the presentation no iterative process was mentioned. The final presentation was enacted to show off their ideas, instead of used to receive feedback and reactions from users. Although instructors had encouraged groups to take notes, no one of the individuals reported any on the process book.

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During their presentation, they presented each idea as a final concept, which needs to be sold. In order to explain the value of the idea, groups preferred to apply an analytical framework, analysing the problem in theory and not supporting their ideas through a process of visualization based on empirical experimentation. Therefore, once again, teams did not report any of the observations or quotes from the inspiration phase. Their analytical propensity (Boland and Collopy, 2007) seemed to contain somehow their possibility to try something out physically.

Triggers of innovation

We reported evidence on how the process was lived in the eyes and in the words of the participants, highlighting the struggles that it entailed in each stage. But what did this all lead to? We will report here our description of what the groups reached (a brief description of the solutions that they came up with) and, especially, what was created and what remained after the process (according to the retrospective interviews and our own follow-up observations in the following courses of the degree) – namely: variety and innovativeness in their deliverables, a shift towards a more collaborative approach, a shift towards a more open mindset,

Next we will focus our attention on the elements of space and materiality as two main elements that triggered the achievement of the innovation challenge, despite the struggles that came with it.

The outcomes of the innovation journey: what was created

The first, immediate outcome of the process consisted in the deliverables that the groups came up with. Indeed, despite the struggles illustrated above, at the end of the five weeks students presented a surprising variety and a certain degree of innovativeness in their deliveries (Table 2).

TABLE 2

Another outcome was that, although students were initially incline to undervalue the collective intelligence in favour of a more individualistic approach, along the process they increased the time spent collaborating face to face in an intense and continuous interaction, using a set of practical tools to facilitate not only a one-way communication but a two-way conversation (Hooper Greenhill 1998; 2000; 2005):

"It was fantastic to work in groups. We were mixed and randomized. This was a stimulus for the student's integration. I worked with new people, which allows us to create new dynamics as colleagues and as friends too" (Int. Rerospective P.J. 27/05/16)

Our evidence also suggests that the process led students to embrace a more open mindset in their approach to problems. Indeed, students were in the overall process reporting a low level of confidence and high uncomforting attitude in each phase of the innovation process, nonetheless:

"What design thinking gives you is another way of thinking and reasoning. It gives you the possibility to not take for granted the things around what you think you know"

"DT opens your mind, it makes you reasoning…it also breaks your mind but then it helps you to rebuild it" Now whenever I am facing a problem, I am starting to think about what I know and what it is real about what I think to know" (Int. retrospective P.A. 27/05/16).

Moreover, during the following course entitled Cultural Planning and Creative Processes, they were asked to investigate business models in creative industries, and the majority of them spontaneously used the design method learned in the Innovation and Design Management

module with new autonomous confidence. As reported during one of the retrospective interviews:

"We went to conduct an interview during the CPCP module, and we knew how to deal with it. We let them speak and add information about the issue we were investigating. At the same time we also observed who was in the same space, who entered..." (Int. retrospective P.A. 27/05/16).

The instructor of the following course reported to a surprising dimension of creativity and playfulness that the class showed during their presentations and case analyses. She also noticed a good improvement on the depth of the observations requested and the ability of diving in reality to analyze it. As she said, *" the outcomes were positively unexpected, groups were able to distance their thoughts from ready-made cases provided by the literature and were able to substantiate their own analysis by meaningful observations and interesting interviews to support them"* (Int. CPCP instructor)

Two triggers of innovation: what enables managing innovation tensions

During their innovation journey, students faced notable struggles in working through conflicting demands and yet they eventually reached somewhat successful outcomes as just discussed. Our reflection shifts on the triggering elements that may enable or disable a successful innovation.

Space as a trigger:

While running the laboratory we acknowledged that the space hosting the course was not adequate for such a collaborative activity. The environment – fixed desks, chairs and not disposable walls - devoted to host the courses had two main weaknesses. First of all, there was no distinction between undergraduate and post-graduate facilities, thus presuming that the

teaching methods are almost the same. Secondly, physical spaces devoted to teaching activities or simply to host them in their working days, are designed to promote competitive and individual dynamics instead of collaborative ones, that is highly inconsistent with the requirements for knowledge based-activities (Becker 2007).

Students slowly reacted to the environment by seating on the desks instead on chairs in order to have the possibility to form circles for discussion.

Materiality as a trigger:

Students also built a canvas of sheets to be able to discuss and trace with post-its their steps and digital presentations per each step, in order to overcome the absence of a physical space for memory.

From these observations, it appears that materiality (Carlile et al.2013) played two main roles during the laboratory activities. First, students used objects, like post-it, canvas and digital report-file to transform their acquired knowledge in order to visualize, communicate and synthesize their thoughts, what they heard and felt during the inspiration phase, to the instructors and to the group. Those objects became a form of *actionable* knowledge for the team to proceed on the next project step. Second, materiality allowed the groups to feel more in control of the slippery process they were trying to undertake. All the groups approached the innovation challenge as a decision making process and suddenly realized that they were in the need of a more stable environment to be able to go further.

The physical dimensions of spaces and materials emerges as a need for individuals and groups to identify and trace the interdependencies between elements, steps and phases of the process. The high level of dynamism in the innovation-intensive environment mined the stability and predictability of the process, therefore, materiality and spaces worked as triggers which allow

individuals and groups to deal with the tensions by facilitating, with tangible visibility, the reframing of the challenge, the integration of perspective between the groups and the acceptance and embracement of divergent point of views to explore different responses.

Discussion and Conclusion

In this paper we began with the aim of achieving an increase understanding on how to train people to deal with tensions deriving from conflicting demands, especially the one rising on an innovation journey. In today's fluid and post-industrial economy, management education should train to deal with the complexity of organized collective action and with a variety of organizing forms and contexts (Durand & Dameron 2011) and the tensions in innovation processes.

We specifically situated design thinking in organization studies and used it as a conceptual bridge to show how we can use it to deal with tensions in innovation processes, by at the same time exacerbating tensions (struggling with destabilization, abstraction, non-decision) and providing elements to work through them (space and materiality as triggering innovative outcomes). We did so based on an observation of an innovation process that took place in a school of management, where design was used to change the learning processes through which a group of students interpret complex and ill-defined contexts. During the D&IM course, we observed and followed step by step the deployment of this process, combining instructors' direct observation with students' own notes and views as expressed in their process books and interviews. We identified a set of struggles and the triggers rising from each step of the journey in order to better highlight the costs of engaging in such a process to emphasize the necessary acknowledgments to pursue a chance of real change.

We have indicated how dealing with competing demands and the tensions derived is crucial to innovation (Garud et al 2013). We argue that design thinking can facilitate a virtuous repose

when organizations and their members are confronted with such tension. However, in order to be able to frame responses, this analysis let emerge the existence of at least three intertwined tensions which raised when a design thinking approach encounters a different terrain:

a continuous tension between stability (the need for constraints, frameworks, guidelines) and instability (the openness of a design thinking process), as the students were struggling with destabilization in each stage of the process;

a continuous tension between concreteness (the lived experience of 'users') and abstractedness (their underlying deep needs), that the students experimented as they struggled to abstract and go beyond the surface of things;

a continuous tension between searching the solution (the decision attitude) and crafting the solution (the design attitude), that students experimented in each phase as they were struggling not to decide immediately, while instead launching definitive ideas from the beginning of the process.

The study reveals how encountering these tensions encourage individuals to engage and represent creative alternatives. They start to "create" new points of view and responses instead of being trapped on "choosing" one options over the other.

In the light of all this, the study concludes that design thinking lab practice activates an alternative framework that leads the participants to potentially more informed decisions, but it also has some costs. Introducing design thinking activities slowed down the process and made individuals less comfortable on what they were delivering during the learning process. However, students learned slowly to be proactive problem solvers, who can work on complex problems with a more flexible and exploratory approach (Kelley & Kelley, 2013)In order to do it they started to learn how to interact and embrace uncertainty and failure, which was the major counterweight to their analytic dominant approach during the learning process.

Management literature tends to embrace passively the design thinking method as positive inside of organization. In a more cautious vein, this work highlights how hard it is to make it effective when the subjects of the experiment are novice to the method and are already trained with emphasis just on analytical tools despite an attention to grow synthetic skills.

By observing a management learning environment, the paper confirmed that design thinking could be of powerful use as an organizational resource (Kimbell, 2011) to facilitate the metaskill of being able to face competing models (Brown, 2009). However, the study confirms also that DT is not just a set of methods that can be applied in isolation (Johansson-Sköldberg et al. 2013, Liedtka, 2015) and it cannot be seen as a default response to all tensions emanating from competing demands. Indeed, the study emphasizes the rising of additional tensions emerging from the process itself and the participants' struggles to be able to overcome these. Therefore, the role of professional designers as facilitators and interpreters of the process (Lawson & Dorst, 2013) is strongly emerging in order to integrate, converge and support the efforts of individuals and make the process potentially beneficial for dealing with innovation tensions. Additionally, the role of materiality and adequate spaces as triggers of the dynamism of the process and to cope with the struggles, is accentuated and has to be taken in consideration before engaging in such a process.

To conclude, this paper empirically contributes to highlight costs and benefits of the relationship between design thinking and innovation tensions, in order to prevent shortcoming on the implementation.

References

Agar M.H. 1986. *Speaking of Ethnography*. Beverly Hills, CA: Sage

Barley, S. R. 1990. The Alignment of Technology and Structure through Roles and Networks. *Administrative Science Quarterly*. https://doi.org/10.2307/2393551.

Battilana, J., Sengul, M., Pache, A. C., & Model, J. 2015. Harnessing productive tensions in hybrid organizations: The case of work integration social enterprises. *Academy of Management Journal*. https://doi.org/10.5465/amj.2013.0903.

Beckman, S. L., & Barry, M. 2007. Innovation as a Learning Process: Embedding Design Thinking. *California Management Review*, 50(1): 25–56.

Boler, M., & Zembylas, M. 2003. Discomforting truths: The emotional terrain of understanding difference. *Pedagogies of Difference: Rethinking Education for Social Change*. https://doi.org/10.4324/9780203465547.

Brown, T. 2008. Design Thinking in Harvard Business Review | ideo.com. *Harvard Business Review*.

Brown, T. 2009. Change by Design. *HarperCollins Publisher*. New York, NY: HarperCollins Publishers.

Buchanan, R. 1992. Wicked Problems in Design Thinking. *Wicked Problems in Design Thinking*. https://doi.org/10.1162/DESI_a_00157.

Carlgren, L., Elmquist, M., & Rauth, I. 2014. Design thinking: Exploring values and effects from an innovation capability perspective. *Design Journal*. https://doi.org/10.2752/175630614X13982745783000.

Carlgren, L., Rauth, I., & Elmquist, M. 2016. Framing Design Thinking: The Concept in Idea and Enactment. *Creativity and Innovation Management*. https://doi.org/10.1111/caim.12153.

Chesbrough, H. W., West, J., & Vanhaverbeke, W. 2006. Open Innovation : A New Paradigm for Understanding Industrial Innovation. *Open Innovation*. https://doi.org/citeulike-article-id:5207447.

Clegg, S. R., da Cunha, J. V., & e Cunha, M. P. 2002. Management Paradoxes: A Relational View. *Human Relations*. https://doi.org/10.1177/0018726702555001.

Dell'Era, C., Marchesi, A., & Verganti, R. 2010. Mastering Technologies in Design-Driven Innovation. *Research Technology Management*, 53(2): 12–23.

Dewey, J. 1938. *Experience and education*. New York, NY: Touchstone Rockefeller Center. http://www.tandfonline.com/doi/abs/10.1080/00131728609335764%5Cnhttp://ruby.fgcu.edu/courses/ndemers/colloquium/ExperiencEducationDewey.pdf.

Dorst, K. 2011. The core of "design thinking" and its application. *Design Studies*, 32(6): 521–532.

Dumas, A., & Mintzberg, H. 1989. Managing Design-Designing Management. *Design Management Journal*. https://doi.org/10.1111/j.1948-7169.2007.tb00076.x.

Dunne, D., & Martin, R. 2006. Design thinking and how it will change management education: An interview and discussion. *Academy of Management Learning and Education*.

Feldman, J., & Boult, J. 2005. Third-Generation Design Consultancies: Designing Culture for Innovation. *Design Management Review*. https://doi.org/10.1111/j.1948-7169.2005.tb00006.x.

Gaim, M., & Wåhlin, N. 2016. In search of a creative space: A conceptual framework of synthesizing paradoxical tensions. *Scandinavian Journal of Management*, 32(1): 33–44.

Garud, R., Gehman, J., & Kumaraswamy, A. 2011. Complexity Arrangements for Sustained Innovation: Lessons from 3M Corporation. *Organization Studies*. https://doi.org/10.1177/0170840611410810.

Glaser, B., & Strauss, A. 1967. The Discovery of Grounded Theory: Strategies for Qualitative Research. *The Discovery of Grounded Theory Strategies for qualitative research*.

Hargadon, A., & Sutton, R. I. 1997a. Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly*, 42(4): 716.

Hargadon, A., & Sutton, R. I. 1997b. Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly*. https://doi.org/10.2307/2393655.

Jahnke, M. 2009. Design Thinking As Enabler of Innovation in Engineering Organizations. *8th European Academy Of Design Conference*.

Johansson-Sköldberg, Ulla/ Woodilla, Jill/ Çetinkaya, M. 2013. Design Thinking : Past , Present and

Possible Futures. ***Design Thinking: Past, Present and Possible Futures***. https://doi.org/10.1111/caim.12023.

Kelley, T., & Kelley, D. 2013. Creative confidence: Unleashing the creative potential within us all. ***The Business Source***. https://doi.org/10.1080/08963568.2014.883249.

Kimbell, L. 2009. Design practices in design thinking. ***Design***, May(July): 1–24.

Kimbell, L. 2011. Rethinking Design Thinking: Part 1. ***Design and Culture***, 3(3): 285–306.

King, N., Anderson, N., & West, M. A. 1991. Organizational innovation in the UK: A case study of perceptions and processes. ***Work & Stress***. https://doi.org/10.1080/02678379108257031.

Kruger, C., & Cross, N. 2006. Solution driven versus problem driven design: strategies and outcomes. ***Design Studies***, 27(5): 527–548.

Landoni, P., Dell'Era, C., Ferraloro, G., Peradotto, M., Karlsson, H., et al. 2016. Design Contribution to the Competitive Performance of SMEs: The Role of Design Innovation Capabilities. ***Creativity and Innovation Management***. https://doi.org/10.1111/caim.12165.

Langley, A. 1999. Strategies for Theorizing from Process Data. ***Academy of Management Review***, 24(4): 691–710.

Laursen, K., & Salter, A. 2006. Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. ***Strategic Management Journal***. https://doi.org/10.1002/smj.507.

Lewis, M. W. 2000. Exploring paradox: Toward a more comprehensive guide. ***Academy of Management Review***, 25(4): 760–776.

Lewis, M. W., Ann Welsh, M., Dehler, G. E., & Green, S. G. 2002. Product development tensions: Exploring contrasting styles of project management. ***Academy of Management Journal***. https://doi.org/10.2307/3069380.

Lewis, M. W., & Smith, W. K. 2014. Paradox as a Metatheoretical Perspective. ***The Journal of Applied Behavioral Science***. https://doi.org/10.1177/0021886314522322.

Liedtka, J. 2015. Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction. ***Journal of Product Innovation Management***. https://doi.org/10.1111/jpim.12163.

March, J. 1991. Exploration and Exploitation in Organizational Learning. ***Organizational Science***.

Martin, R. 2007. Opposable Mind: How Successful Leaders Win Through Integrative Thinking. ***Harvard Business School Press Books***.

Martin, R. 2009. The Design of Business: Why Design Thinking is the Next Competitive Advantage. ***Harvard Business Press***.

McNabola, A. 2013. The UK Design Council: Putting a Value on Design. ***Design Management Review***, 24(4): 22–23.

Meinel, C., & Leifer, L. 2011. Design Thinking Research. ***Design Thinking: Understand, Improve, Apply***. https://doi.org/10.1016/B978-0-12-387667-6.00013-0.

Melles, G. 2010. Curriculum Design thinking: A New Name for old ways of Thinking and Practice? ***Proceedings of the 8th Design Thinking Research Symposium***, (March): 299–308.

Melles, G., Howard, Z., & Thompson-Whitesidec, S. 2012. Teaching design thinking: Expanding horizons in design education. ***Procedia - Social and Behavioral Sciences***, 31: 162–166.

Miron-spektor, E., Erez, M., & Naveh, E. 2011. THE EFFECT OF CONFORMIST AND ATTENTIVE-TO-DETAIL MEMBERS ON TEAM INNOVATION : RECONCILING THE INNOVATION PARADOX. ***Academy of Management Journal***, 54(4): 740–760.

Pettigrew, A. M., Fenton, E. M., Fischer, R. M., Mohrman, S. A. A., Mohrman Jr., A. M. M., et al. 2000. The emergence and development of internal networks and their impact on knowledge flows: the case of Rabobank Group. ***The Innovating Organization***. https://doi.org/10.1108/01437730210414535.

Porter, M. E., & Heppelmann, J. E. 2015. How smart, connected products are transforming companies. ***Harvard Business Review***. https://doi.org/10.1017/CBO9781107415324.004.

Smith, W. K. 2014. Dynamic Decision Making : A Model of Senior Leaders Managing Strategic Paradoxes. ***Academy of Management Journal***, 57: 1592–1623.

Smith, W. K., Lewis, M. W., & Tushman, M. L. 2016. "Both/and" leadership. ***Harvard Business Review***.

Stevens, J., & Moultrie, J. 2011. Aligning strategy and design perspectives: A framework of design's

strategic contributions. ***Design Journal***. https://doi.org/10.2752/175630611X13091688930525.

Tucci, C. L., Chesbrough, H., Piller, F., & West, J. 2016. When do firms undertake open, collaborative activities? Introduction to the special section on open innovation and open business models. ***Industrial and Corporate Change***. https://doi.org/10.1093/icc/dtw002.

UK Design Council. 2010. Multi-disciplinary design education in the UK. ***Design Council***.

van Dijk, S., Berends, H., Jelinek, M., Romme, A. G. L., & Weggeman, M. 2011. Micro-Institutional Affordances and Strategies of Radical Innovation. ***Organization Studies***. https://doi.org/10.1177/0170840611421253.

Van Maanen, J., Sørensen, J. B., & Mitchell, T. R. 2007. The interplay between theory and method. ***Academy of Management Review***, 32(4): 1145–1154.

Verganti, R. 2003. Design as brokering of languages: Innovation strategies in Italian firms. ***Design Management Journal***. https://doi.org/10.1111/j.1948-7169.2003.tb00050.x.

Verganti, R. 2006. Innovating through design. ***Harvard Business Review***.

Verganti, R. 2008. Design, meanings and radical innovation: A research agenda. ***Journal of Product Innovation Management***. https://doi.org/10.1111/j.1540-5885.2008.00313.x.

Verganti, R. 2009. Design-driven innovation: changing the rules of competition by radicaly innovating what things mean. ***Igarss 2014***. https://doi.org/10.1007/s13398-014-0173-7.2.

Verganti, R. 2011. Designing breakthrough products. ***Harvard Business Review***.

von Hippel, E. 2005. ***Democratizing Innvation***.

Ward, A., Runcie, E., & Morris, L. 2009. Embedding innovation: design thinking for small enterprises. ***Journal of Business Strategy***. https://doi.org/10.1108/02756660910942490.

Wrigley, C., & Straker, K. 2017. Design Thinking pedagogy: the Educational Design Ladder. ***Innovations in Education and Teaching International***, 54(4): 374–385.

Yoo, Y., Boland, R. J., & Lyytinen, K. 2006. From Organization Design to Organization Designing. ***Organization Science***. https://doi.org/10.1287/orsc.1050.0168.

Table 1: Struggles with DT

DT Struggle	Description
Destabilizing	Conflict between demand for control and demand for disruption
Abstracting	Conflict between demand for dealing with grounded facts and demand for embracing potentials of new ideas
Non-deciding	Conflict between demand for deductively solving a problem and demand for inductively generating an idea

Table 2: Final outcomes

Group N°	Users	Concept title	Type of prototype
Group 1	workers	Lunch vaporetto: A 30-minute-Food-Experience for workers while enjoying Venice on a Boat.	None
Group 2	students	Whe nice: A digital Map built by students for students.	Prototype: map
Group 3	students	Trust week: Try your life in Venice before choosing it	None
Group 4	inhabitants	Become venetian.com: a website to persuade people that living in Venice has many advantages and to get rid of all the typical stereotypes that usually make foreigners to not consider it as a possible solution.	None
Group 5	students	StudInVe: Create an app to facilitate all the aspects related to the students world in Venice.	Prototype: cardboard screens
Group 6	tourists	Cluerist: an app in which tourists should resolve enigmas with the help of clues to be allowed to go further in our paths going to the events we want to promote.	Cardboard
Group 7	tourists	unwrap: choose your experience	Prototype: website
Group 8	inhabitants	Boat sharing: Easier and faster way for Venetian inhabitants to move	None
Group 9	workers	#VenEasy: A place with a joyful, smart and modern atmosphere where having a break or to have a delicious fast meal.	Prototype: sketched rendering of a café and simulated café table on a classroom desk

CONTRIBUTIONS AND DISCUSSION

Theoretical Contributions

The dissertation aims to make three important theoretical contributions.

Firstly**,** it answers a very timely theoretical call for a better understanding of innovation approaches able to deal with environments which are characterized by continual change, that are unstable and where boundaries are often unclear and user preference cannot be pre-set (Garud, Jain, & Tuertscher, 2009) Indeed, the advent of new information technologies, the continuous growth of online technologies, the open contents and the willingness of people to participate is very significant and potential for innovation. Online technologies seem to function as "organizing agents" (Bennett & Segerberg, 2012: 752), which enhance the connectivity among people. However, research does not classify or distinguish between any collective formation on the web (i.e. crowd or community or network) and it does not reflect on the role of the technological infrastructure which enable such formations as mechanism. The dissertation, in order to address these gaps, contributes with an original comparison of two distinct models for problem solving, Crowdsourcing and Design Thinking, which to the best of our knowledge were never been compared. By comparing them, it contributes to an initial reflection on the implications on different governance model, among different contexts and the mechanisms, like technological infrastructures, adopted to embrace external knowledge and greater openness in innovation.

Second, each paper contributes to uncover the role of a specific model and its related mechanisms as drivers of innovation processes. In particular, the first paper's findings highlight the importance and the role of task formulation in crowdsourcing. It advances knowledge of

how firms foster relationships between organizations and online communities through task formulation to enable an effective distributed design process (Jeppesen & Lakhani, 2010; Lakhani et al., 2012). The paper also complements others studies conducted on online communities and on contests for software development or routine tasks, providing evidence concerning the role of task formulation, which has thus far scarcely been investigated by looking at the designers' engagement as a matching process (Haas et al., 2014; Mitsuhashi & Greve, 2009). We showed that firms and designers need to find the best partners on a reciprocal basis, with a more dynamic approach (Lauritzen, 2017). Specifically, firms by task formulation find solution providers that submit ideas compatible with and complementary to their own products.

Furthermore, the second paper answered to the call to explore the potential of crowdsourcing for nonprofit and non-competitive contexts (Brabham, 2011). The research extends knowledge on the mechanisms, which influenced crowdsourcing in public sector and on the role, digital technologies, plays for open innovation in a nonprofit context. Specifically, we showed how crowdsourcing works as first step of building a diverse community to pursue actions for social change. It also identified a strong complementary between offline actions (in situ) and consecutive online (platform). *In situ* activities, like the "design for service" workshop helped the participants to identify and define problems and challenges, then the platform helped them to actively participate, share opinions and build values around them. Collaborative interaction facilitates trust-based circulation and cross-fertilization of new and creative ideas. This study adds empirical evidence on the need to complement the online engagement with offline reinforcement in order to create new forms of partnership and ownership, and to enhance social innovation through cross-disciplinary collaboration. It also contributes to define to a closer look into a process to evolve a initially disperse crowd of individuals into a community with a sense of belongings.

With the third paper, the dissertation tackles an important and timely gap for scholars and practitioners, by defining the challenges of implementing Design Thinking. Indeed, the study contributes to a better understanding of the process by following an original approach to analyze each inner perspective of the participants. Therefore, while shedding more light on the struggles and triggers of Design Thinking adoption, this paper set the ground for a wider reflection on how to train people on coping with and working through conflicting demands. The overall research project comprises also a forthcoming paper, to expand on the finding of the third paper. The outline of this future research aims to better explores the micro-foundation of Design Thinking and its cognitive relations with individual and groups. In order to address this issue, we run several preliminary observations (June, 2017) during a Design Thinking class and we are currently collecting new data (from September to December 2017), through experimental research on the cognitive approaches developed by individuals while addressing ill-defined problems. In the preliminary observations we adopt the "problem practice" as a unit of analysis as a useful basis to better understand how the DT process evolves and outcomes would emerge. The forthcoming paper will investigate what are the cognitive mechanisms used to overcome challenges expressed in the third study. From preliminary results we discovered that two main phases (problem formulation and user research) are strictly related with the changing on cognitive attitude. However, we are collecting more data to better define when cognitive changes are effecting individual and/or groups behaviors and with which effects.

Third, the overall dissertation, by comparing these two different models, Crowdsourcing and Design Thinking, contributes to start a reflection on definition and governance implications when considering innovations as open to knowledge flows from various external and interdisciplinary teams, crowds and communities. Research tend to address complex

innovation within the logical approach of decomposed problems into smaller tasks (Simon 1979; Boudreau, Lacetera, & Lakhani, 2011; Felin, Lakhani, & Tushman, 2017). However, when problems are ill-defined decomposing the problem into more manageable sub-problems is not an easy task. Indeed, firms run the risk to lose relevant knowledge and to not be able to reconcile solutions when trying to absorb them. Literature (Baer, Dirks, & Nickerson, 2013) often when considering problem-solving perspective takes problems and their associated solution landscapes as given and assumes that the formulation of problems is logically prior to their resolution. Instead, the dissertation, by comparing different usages and contexts of these two problem-solving models, aims to consider also different ways toward effective solutions. Paper 1 poses the idea of *framing*, which enhance the possibility to draw *exploratory spaces* towards effective solutions. This idea is also explored in paper 3 and we found that *framing* is also one of the main challenges for non-designers. Even if challenging, as mentioned in paper 3, it serves as a trigger for the creation of many diverse ideas, encourage the creation of diverse spaces of exploration and allow the possibility to harness generative properties. This, if purposefully manage with platforms, as suggested in paper 1 and 2 and with Design Thinking tools, in paper 3, could facilitate access to disperse and diverse knowledge, encourage constant thinking and free riding.

The dissertation analyzes different governance structures, observes the adjustments to collect and use external knowledge and the struggles when organizations and individuals try to be simultaneously flexible and stable. In particular, in the first study we have analyzed a process facilitate by a platform, where narratives aim to leverage the intelligence of a distributed, autonomous and competitive crowd. The study points out the importance of managing the narratives of the problem outsourced. Firms demonstrated issues on recognizing important and diverse distant knowledge, therefore the platform acquires the role of coordinator and prompts firms on how to match with the interest of the crowd. In the second paper we have observed

how the platform takes a different role form the previous studies. Here, it is not just a coordination mechanism to enable the matching process but it works more as a system integrator (Brusoni, Prencipe, & Pavitt, 2001) where a combination of technical and social rules become able to manage diverse and interdisciplinary groups of people in a dynamic (offline and online) network. Moreover, the third study follows a process which promises to have control over ambiguity, conflicting demands, complexity and uncertainty. Indeed, Design Thinking could be used as a creativity governance mechanism which allows the emergence over time of different problems spaces, however, in these studies we highlighted how this promise needs to be compromised with considering some costs.

Therefore, the dissertation contributes to theoretically inputting the possibility of establishing mechanisms of incompleteness (Garud et al., 2009) which will allow for more generative solutions, instead of the risky decomposition of a problem.

The dissertation also highlights that organizations, in order to benefit from these approaches, need to be able to embrace a "conceptual shift". They need to face this approach toward innovation by embracing participation in its developments as deliberately inclusive, by accepting the blurring of the boundaries between users and producers and by accommodating for loosening control over the process and its results. Therefore, new business models and new governance systems need to rise, systems which are able to provide some stability and enable continuous changes at the same time, to inform but not to determine. To enable such governance, paper 2 and 3 proposed that the trace of a process (such as Facebook conversations and materiality in paper 3), could be a key element and it could serve as the locus of coordination as well as point of departure in a perpetual status of change. Moreover, social rules of engagements, like transparency and symmetry of information with a diverse and

disperse crowd could become more and more important to involve and let the crowd be generative.

Managerial Contributions

The findings also have important implication for practitioners. Paper 1 suggested how to leverage the interest of designers in order to improve the benefit of crowdsourcing in contests. Our findings suggested to approach designers as investors. Investors need to be involved and stimulated to raise interest in the project. Therefore, incentives are not enough; the narrative should inspire them to take action and direct effort toward shared goals. We provide managers with a fine grained set of dimensions with which they can frame a task to be outsourced and we allow also a refection about which criteria to leverage on in order to avoid, on one side, community frustration and, on the other, the risks of achieving undesirable outcomes. A narrative conscious usage will allow managers to frame contents that are coherent with the "right amount" of exploration in order to match results with firm expectations and objectives. Moreover, with paper 1 we provide some implication for platform managers. Indeed, we recognize how important the platform is in this process and we suggest to take the chance to assist and guide firms during the brief formulation to create a more open culture in firms, without being too worry about controlling the innovation process and instead embrace real novelty.

Paper 2, instead, gives the chance to managers to see the crowd in a completely different manner form the classical crowdsourcing studies. It gives suggestions on how to lead people toward social actions.

Paper 3 confirmed that design thinking could be of powerful use as an organizational resource (Kimbell, 2011) to facilitate the metaskill of being able to face competing models (Brown, 2009). However, the study confirms also that DT is not just a set of methods that can be applied

in isolation (Johansson-Sköldberg, Ulla Woodilla and Jill Çetinkaya, 2013; Liedtka, 2015) and it cannot be seen as a default response to all tensions emanating from competing demands. Instead, it has its costs that should be considered. Therefore, it is important for managers to acknowledge the need to involve professional designers as facilitators and interpreters of the process (Dorst & Cross, 2001; Paton & Dorst, 2011). Moreover, it suggests the need to shape a better relationship between design and management, to breach toward new skills which are essential to be understood and embraced by managers to boost innovation.

The paper concluded by addressing triggers that need to be adopted, such as materiality and adequate spaces, in order to allow a successful dynamic of the process.

CONCLUSIONS

The dissertation explored two models of problem solving for innovation to sketch out the elements of how this recombinative process is organized when organizations are facing environments characterized by continual changes because of unclear boundaries and heterogeneous and evolving user's preferences (Garud et al., 2011). Garud, Jain, & Tuertscher (2009) argue that "in continually changing environments, adopting innovation approaches that attempt to fix boundaries, goals and purpose is potentially counterproductive. While such approaches may produce a system that is optimal at a point in time, given continual change the system is likely to rapidly become obsolete over time (pag.367)". Therefore, comparing Crowdsourcing and Design Thinking can help to advance research in innovation literature, by investigating the dynamics and the mechanisms underlying these models. It contributes significantly both theoretically and practically by increasing the knowledge and the

effectiveness of this approaches and also highlighting the benefits and the challenges for individuals and firms 2taking part in these initiatives.

Finally, I hope the dissertation can also highlight the relevance of design for strategic management purposes both in profit and nonprofit contexts. Avoiding the "tool perspective", these empirical studies aim to give a stance of design as capable mean of knowledge production (Latour & Woolgar, 2013), able to achieve organizational changes, if used wisely.

References

Afuah, A., & Tucci, C. L. 2012. Crowdsourcing as a solution to distant search. *Academy of Management Review*. https://doi.org/10.5465/amr.2010.0146.

BAER, M., DIRKS, K. T., & NICKERSON, J. 2013. MICROFOUNDATIONS OF STRATEGIC PROBLEM FORMULATION. *STATEGIC MANAGMENT JOUNRAL*, 34: 197–214.

Barley, S. R. 1990. The Alignment of Technology and Structure through Roles and Networks. *Administrative Science Quarterly*. https://doi.org/10.2307/2393551.

Barry, D., & Rerup, C. 2006. Going mobile: Aesthetic design considerations from Calder and the constructivists. *Organization Science*. https://doi.org/10.1287/orsc.1050.0165.

Battilana, J., Sengul, M., Pache, A. C., & Model, J. 2015. Harnessing productive tensions in hybrid organizations: The case of work integration social enterprises. *Academy of Management Journal*. https://doi.org/10.5465/amj.2013.0903.

Beckman, S., & Barry, M. 2007. Innovation as a learning process: Embedding design thinking. *California Management Review*. https://doi.org/10.2307/41166415.

Bennett, W. L., & Segerberg, A. 2012. The logic of connective action: Digital media and the personalization of contentious politics. *Information Communication and Society*. https://doi.org/10.1080/1369118X.2012.670661.

Besten, M. Den, & Dalle, J. M. 2008. Keep it simple: A companion for simple wikipedia? *Industry and Innovation*. https://doi.org/10.1080/13662710801970126.

Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., et al. 2017. The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, 24(1): 8–40.

Boler, M., & Zembylas, M. 2003. Discomforting truths: The emotional terrain of understanding difference. *Pedagogies of Difference: Rethinking Education for Social Change*. https://doi.org/10.4324/9780203465547.

Boudreau, K. J., Lacetera, N., & Lakhani, K. R. 2011. Incentives and Problem Uncertainty in Innovation Contests: An Empirical Analysis. *Management Science*. https://doi.org/10.1287/mnsc.1110.1322.

Boudreau, K. J., & Lakhani, K. R. 2013. Using the Crowd as an Innovation Partner. *Harvard Business Review*, (April): 3–11.

Brabham, D. 2011. Crowdsourcing: A Model for Leveraging Online Communities. *The Routledge Handbook of Participatory Cultures - CROWDSOURCING*, 1–22.

Brown, T. 2008. Design Thinking in Harvard Business Review | ideo.com. *Harvard Business Review*.

Brown, T. 2009. Change by Design. ***HarperCollins Publisher***. New York, NY: HarperCollins Publishers.

Brusoni, S., Prencipe, A., & Pavitt, K. 2001. Knowledge Specialization, Organizational Coupling, and the Boundaries of the Firm: Why Do Firms Know More Than They Make? ***Administrative Science Quarterly***. https://doi.org/10.2307/3094825.

Buchanan, R. 1992. Wicked Problems in Design Thinking. ***Wicked Problems in Design Thinking***. https://doi.org/10.1162/DESI_a_00157.

Carlgren, L., Elmquist, M., & Rauth, I. 2014. Design thinking: Exploring values and effects from an innovation capability perspective. ***Design Journal***. https://doi.org/10.2752/175630614X13982745783000.

Carlgren, L., Rauth, I., & Elmquist, M. 2016. Framing Design Thinking: The Concept in Idea and Enactment. ***Creativity and Innovation Management***. https://doi.org/10.1111/caim.12153.

Chesbrough, H. 2012. Open Innovation: Where We've Been and Where We're Going. ***Research-Technology Management***, 55(4): 20–27.

Chesbrough, H. W., West, J., & Vanhaverbeke, W. 2006. Open Innovation : A New Paradigm for Understanding Industrial Innovation. ***Open Innovation***. https://doi.org/citeulike-article-id:5207447.

Clegg, S. R., da Cunha, J. V., & e Cunha, M. P. 2002. Management Paradoxes: A Relational View. ***Human Relations***. https://doi.org/10.1177/0018726702555001.

Dahlander, L., Frederiksen, L., & Rullani, F. 2008. Online Communities and Open Innovation. ***Industry and Innovation***, 15(2): 115–123.

Dewey, J. 1938. ***Experience and education***. New York, NY: Touchstone Rockefeller Center. http://www.tandfonline.com/doi/abs/10.1080/00131728609335764%5Cnhttp://ruby.fgcu.edu/courses/ndemers/colloquium/ExperiencEducationDewey.pdf.

Dorst, K. 2011. The core of "design thinking" and its application. ***Design Studies***, 32(6): 521–532.

Dorst, K., & Cross, N. 2001. Creativity in the design process: Co-evolution of problem-solution. ***Design Studies***. https://doi.org/10.1016/S0142-694X(01)00009-6.

Dumas, A., & Mintzberg, H. 1989. Managing Design-Designing Management. ***Design Management Journal***. https://doi.org/10.1111/j.1948-7169.2007.tb00076.x.

Estellés-Arolas, E., Navarro-Giner, R., & González-Ladrón-De-Guevara, F. 2015. Crowdsourcing fundamentals: Definition and typology. ***Advances in Crowdsourcing***: 33–48.

Feldman, J., & Boult, J. 2005. Third-Generation Design Consultancies: Designing Culture for Innovation. ***Design Management Review***. https://doi.org/10.1111/j.1948-7169.2005.tb00006.x.

Felin, T., Lakhani, K. R., & Tushman, M. L. 2017. Firms, crowds, and innovation. ***Strategic Organization***, 15(2): 119–140.

Felin, T., & Zenger, T. R. 2014. Closed or open innovation? Problem solving and the governance choice. ***Research Policy***, 43(5): 914–925.

Franke, N., & Shah, S. 2003. How communities support innovative activities: An exploration of assistance and sharing among end-users. ***Research Policy***. https://doi.org/10.1016/S0048-7333(02)00006-9.

Frey, K., Lüthje, C., & Haag, S. 2011. Whom should firms attract to open innovation platforms? The role of knowledge diversity and motivation. ***Long Range Planning***. https://doi.org/10.1016/j.lrp.2011.09.006.

Füller, J. 2006. Why consumers engage in virtual new product developments initiated by producers. ***Advances in Consumer Research***. https://doi.org/43008804.

Füller, J. 2010. Refining Virtual Co-Creation from a Consumer Perspective. ***California***

Management Review. https://doi.org/10.1525/cmr.2010.52.2.98.

Gaim, M., & Wåhlin, N. 2016. In search of a creative space: A conceptual framework of synthesizing paradoxical tensions. *Scandinavian Journal of Management*, 32(1): 33–44.

Garud, R., Gehman, J., & Kumaraswamy, A. 2011. Complexity Arrangements for Sustained Innovation: Lessons from 3M Corporation. *Organization Studies*. https://doi.org/10.1177/0170840611410810.

Garud, R., Jain, S., & Tuertscher, P. 2009. Incomplete by design and designing for incompleteness. *Lecture Notes in Business Information Processing*. https://doi.org/10.1007/978-3-540-92966-6_7.

Ghezzi, A., Gabelloni, D., Martini, A., & Natalicchio, A. 2017. Crowdsourcing: A Review and Suggestions for Future Research. *International Journal of Management Reviews*, 0: 1–21.

Glaser, B., & Strauss, A. 1967. The Discovery of Grounded Theory: Strategies for Qualitative Research. *The Discovery of Grounded Theory Strategies for qualitative research*.

Haas, M. R., Criscuolo, P., & George, G. 2014. Which problems to solve ? Attention allocation and online knowledge sharing in organizations. *Academy of Management Journal*, 58(3): Published online ahead of print.

Hargadon, A., & Sutton, R. I. 1997a. Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly*, 42(4): 716.

Hargadon, A., & Sutton, R. I. 1997b. Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly*. https://doi.org/10.2307/2393655.

Jahnke, M. 2009. Design Thinking As Enabler of Innovation in Engineering Organizations. *8th European Academy Of Design Conference*.

Jeppesen, L. B., & Lakhani, K. R. 2010. Marginality and Problem-Solving Effectiveness in Broadcast Search. *Organization Science*, 21(5): 1016–1033.

Johansson-Sköldberg, Ulla/ Woodilla, Jill/ Çetinkaya, M. 2013. Design Thinking : Past , Present and Possible Futures. *Design Thinking: Past, Present and Possible Futures*. https://doi.org/10.1111/caim.12023.

Kelley, T., & Kelley, D. 2013. Creative confidence: Unleashing the creative potential within us all. *The Business Source*. https://doi.org/10.1080/08963568.2014.883249.

Kimbell, L. 2011. Rethinking Design Thinking: Part 1. *Design and Culture*, 3(3): 285–306.

King, N., Anderson, N., & West, M. A. 1991. Organizational innovation in the UK: A case study of perceptions and processes. *Work & Stress*. https://doi.org/10.1080/02678379108257031.

Lakhani, K. R., Lifshitz - Assaf, H., & Tushman, M. 2012. Open Innovation and Organizational Boundaries: The Impact of Task Decomposition and Knowledge Distribution on the Locus of Innovation. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1980118.

Lakhani, K. R., & Panetta, J. A. 2007. The Principles of Distributed Innovation. *Innovations: Technology, Governance, Globalization*, 2(3): 97–112.

Landoni, P., Dell'Era, C., Ferraloro, G., Peradotto, M., Karlsson, H., et al. 2016. Design Contribution to the Competitive Performance of SMEs: The Role of Design Innovation Capabilities. *Creativity and Innovation Management*. https://doi.org/10.1111/caim.12165.

Langley, A. 1999. Strategies for Theorizing from Process Data. *Academy of Management Review*, 24(4): 691–710.

Langlois, R. N., & Garzarelli, G. 2008. Of hackers and hairdressers: Modularity and the organizational economics of open-source collaboration. *Industry and Innovation*. https://doi.org/10.1080/13662710801954559.

Latour, B., & Woolgar, S. 2013. Laboratory life: The construction of scientific facts. *Laboratory Life: The Construction of Scientific Facts*. https://doi.org/10.1017/CBO9781107415324.004.

Lauritzen, G. D. 2017. The Role of Innovation Intermediaries in Firm-Innovation Community Collaboration: Navigating the Membership Paradox. *Journal of Product Innovation Management*. https://doi.org/10.1111/jpim.12363.

Laursen, K., & Salter, A. 2006. Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*. https://doi.org/10.1002/smj.507.

Leimeister, J. M., Huber, M., Bretschneider, U., & Krcmar, H. 2009. Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition. *Journal of Management Information Systems*, 26(1): 197–224.

Lewis, M. W. 2000. Exploring paradox: Toward a more comprehensive guide. *Academy of Management Review*, 25(4): 760–776.

Lewis, M. W., Ann Welsh, M., Dehler, G. E., & Green, S. G. 2002. Product development tensions: Exploring contrasting styles of project management. *Academy of Management Journal*. https://doi.org/10.2307/3069380.

Lewis, M. W., & Smith, W. K. 2014. Paradox as a Metatheoretical Perspective. *The Journal of Applied Behavioral Science*. https://doi.org/10.1177/0021886314522322.

Liedtka, J. 2015. Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction. *Journal of Product Innovation Management*. https://doi.org/10.1111/jpim.12163.

March, J. 1991. Exploration and Exploitation in Organizational Learning. *Organizational Science*.

Martin, R. 2007. Opposable Mind: How Successful Leaders Win Through Integrative Thinking. *Harvard Business School Press Books*.

Martin, R. 2009. The Design of Business: Why Design Thinking is the Next Competitive Advantage. *Harvard Business Press*.

McLure Wasko, M., & Faraj, S. 2000. "It is what one does": Why people participate and help others in electronic communities of practice. *Journal of Strategic Information Systems*, 9(2–3): 155–173.

Miron-spektor, E., Erez, M., & Naveh, E. 2011. THE EFFECT OF CONFORMIST AND ATTENTIVE-TO-DETAIL MEMBERS ON TEAM INNOVATION : RECONCILING THE INNOVATION PARADOX. *Academy of Management Journal*, 54(4): 740–760.

Mitsuhashi, H., & Greve, H. 2009. A matching theory of alliance formation and organizational success: Complementarity and compatibility. *Academy of Management Journal*. https://doi.org/10.5465/AMJ.2009.44634482.

Morrison, P. D., Roberts, J. H., & Midgley, D. F. 2004. The nature of lead users and measurement of leading edge status. *Research Policy*. https://doi.org/10.1016/j.respol.2003.09.007.

Paton, B., & Dorst, K. 2011. Briefing and reframing: A situated practice. *Design Studies*, 32(6): 573–587.

Pettigrew, A. M., Fenton, E. M., Fischer, R. M., Mohrman, S. A. A., Mohrman Jr., A. M. M., et al. 2000. The emergence and development of internal networks and their impact on knowledge flows: the case of Rabobank Group. *The Innovating Organization*. https://doi.org/10.1108/01437730210414535.

Porter, M. E., & Heppelmann, J. E. 2015. How smart, connected products are transforming companies. *Harvard Business Review*. https://doi.org/10.1017/CBO9781107415324.004.

Randhawa, K., Wilden, R., & Hohberger, J. 2016. A Bibliometric Review of Open Innovation: Setting a Research Agenda. *Journal of Product Innovation Management*,

33(6): 750–772.

Roberts, J. A., Hann, I.-H., & Slaughter, S. A. 2006. Understanding the Motivations, Participation, and Performance of Open Source Software Developers: A Longitudinal Study of the Apache Projects. *Management Science*. https://doi.org/10.1287/mnsc.1060.0554.

Saebi, T., & Foss, N. J. 2015. Business models for open innovation: Matching heterogeneous open innovation strategies with business model dimensions. *European Management Journal*. https://doi.org/10.1016/j.emj.2014.11.002.

Sieg, J. H., Wallin, M. W., & von Krogh, G. 2010. Managerial challenges in open innovation: A study of innovation intermediation in the chemical industry. *R and D Management*, 40(3): 281–291.

Smith, W. K. 2014. Dynamic Decision Making : A Model of Senior Leaders Managing Strategic Paradoxes. *Academy of Management Journal*, 57: 1592–1623.

Smith, W. K., Lewis, M. W., & Tushman, M. L. 2016. "Both/and" leadership. *Harvard Business Review*.

Stevens, J., & Moultrie, J. 2011. Aligning strategy and design perspectives: A framework of design's strategic contributions. *Design Journal*. https://doi.org/10.2752/175630611X13091688930525.

Sutton, R. I., & Hargadon, A. 1996. Brainstorming Groups in Context: Effectiveness in a Product Design Firm. *Administrative Science Quarterly*. https://doi.org/10.2307/2393872.

Tidball, B., Mulder, I., & Stappers, P. 2011. Online Design Contests: a Network of Inspiration for Designers. *Proceedings of IASDR 2011, the 4th World Conference on Design REsearch*. http://studiolab.ide.tudelft.nl/studiolab/tidball/files/2011/10/IASDR-Paper-Design-Contest-Tidball-Final.pdf.

Tucci, C. L., Chesbrough, H., Piller, F., & West, J. 2016. When do firms undertake open, collaborative activities? Introduction to the special section on open innovation and open business models. *Industrial and Corporate Change*. https://doi.org/10.1093/icc/dtw002.

van Dijk, S., Berends, H., Jelinek, M., Romme, A. G. L., & Weggeman, M. 2011. Micro-Institutional Affordances and Strategies of Radical Innovation. *Organization Studies*. https://doi.org/10.1177/0170840611421253.

Van Maanen, J., Sørensen, J. B., & Mitchell, T. R. 2007. The interplay between theory and method. *Academy of Management Review*, 32(4): 1145–1154.

Verganti, R. 2003. Design as brokering of languages: Innovation strategies in Italian firms. *Design Management Journal*. https://doi.org/10.1111/j.1948-7169.2003.tb00050.x.

Verganti, R. 2006. Innovating through design. *Harvard Business Review*.

Verganti, R. 2008. Design, meanings and radical innovation: A research agenda. *Journal of Product Innovation Management*. https://doi.org/10.1111/j.1540-5885.2008.00313.x.

Verganti, R. 2009. Design-driven innovation: changing the rules of competition by radically innovating what things mean. *Igarss 2014*. https://doi.org/10.1007/s13398-014-0173-7.2.

Verganti, R. 2011. Designing breakthrough products. *Harvard Business Review*.

von Hippel, E. 1986. Lead Users: A Source of Novel Product Concepts. *Management Science*. https://doi.org/10.1287/mnsc.32.7.791.

von Hippel, E. 2005. *Democratizing Innvation*.

von Hippel, E., & von Krogh, G. 2015. Identifying Viable "Need–Solution Pairs": Problem Solving Without Problem Formulation. *Organization Science*. https://doi.org/10.1287/orsc.2015.1023.

Ward, A., Runcie, E., & Morris, L. 2009. Embedding innovation: design thinking for small enterprises. *Journal of Business Strategy*. https://doi.org/10.1108/02756660910942490.

West, J., & Lakhani, K. R. 2008. Getting Clear About Communities in Open Innovation.

Industry and Innovation, 15(2): 223–231.

West, J., & O'mahony, S. 2008. The role of participation architecture in growing sponsored open source communities. *Industry and Innovation*. https://doi.org/10.1080/13662710801970142.

West, J., Salter, A., Vanhaverbeke, W., & Chesbrough, H. 2014. Open innovation: The next decade. *Research Policy*, 43(5): 805–811.

Yoo, Y., Boland, R. J., & Lyytinen, K. 2006. From Organization Design to Organization Designing. *Organization Science*. https://doi.org/10.1287/orsc.1050.0168.