A PROCESSUAL AND (POST) HUMANIST READING OF ETHNOGRAPHY, INNOVATION, AND GENDER IN ORGANIZATIONS

By

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A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

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September, 2014

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Acknowledgements

First and furthermost, I want to thank my supervisors Professor Alessia Contu, Dr Maja Korica, and Professor Hari Tsoukas for their guidance and support in completing this work. A special thank goes to Alessia. Thank you for taking me "under your wing" four years ago, and for always encouraging me to never cease being curious and critical with my work. Maja, thank you for all the time you have dedicated to my work, for your closeness in the less bright moments, for sparking interesting discussions, and for all the insights and suggestions that helped me fine-tune this piece. Thank you Hari for the invaluable feedback, the detailed and spot on observations to my work, your editorial comments always "to be taken with a pinch of salt". I also want to thank Dr Nikiforos Panourgias for the thought-provoking conversations that inspired some of the theoretical ideas developed in this piece, and for his supervision during his time at Warwick.

I also want to thank Biomedicine for Life and Techie Labs members for having me around them and allowing me to immerse myself in their work lives. Specifically in BfL, I want to thank Marina for believing in this project and opening the door of her unit; Andrea for pushing this research in BfL to happen, and the girls for making me feel one of them, for the pleasant conversations and the warm "welcome back" I receive every time I visit. I would like to thank Martin, Richard and Simon in Techie for taking me in, for allowing me to explore life in Techie. I want to thank Techie members for taking time to explain details of their work to me, for having me around in their meetings, and for not minding my eyes on their computer screens.

A special thank goes to my family, who unconditionally believed in me, in my work, in my ambitions. Papà, thank you for opening up to sometimes tedious philosophical

conversations on my work, for sustaining me all these four years of my PhD and for never having doubts on my abilities to complete this path. Mamma, thank you for showing me what strength means in hardship, for being close to me and handling multiple tensions at the same time like a real juggler. Thank you for your unreserved love and care. To my sister Laura, my brother Andrea and their children Luigi and Lucrezia: thank you for always welcoming me with the warmest affection when I come home, and for supporting me with your love and smiles, even at distance. I hope this achievement of mine can be for Luigi and Lucrezia a motivation for challenging themselves in life.

Declaration

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy.

It has been composed by myself and has not been submitted in any previous application for any degree.

The work presented (including data generated and data analysis) was carried out by the author.

Abstract

This study offers a particular reading of ethnography, innovation processes, and gender performances. By attending to processes, (gender) performances, and their effects, the thesis brings out the consequences of a specific approach - a processual, poststructuralist and posthumanist one - for gender (how performances include and exclude people), research methods (what we are responsible for in our ethnographies), and innovation (a politics of who acts in innovation processes and a politics of what innovation processes are about).

The thesis draws on empirical material collected through an ethnographic study in two research organizations, a biomedical research centre based in Italy (BfL), and the British branch of an IT multinational (Techie). Through the analysis of the material, the thesis develops three contributions. As a first contribution, I offer a stronger process-oriented reading of innovation and show how a lens founded on the intertwinement of "performativity" and "enrolment" integrates extant innovation models by adding two dynamics (*constructing* and *effecting*), and by re-looking at the role of *objects* in shaping innovation processes. As a second contribution, I empirically address the lack of research on gender and innovation in management literature, by shedding more light on *if*, *how*, and with what *consequences* gender dynamics are enacted and shape innovation processes and its people. The third contribution refers to the elaboration of a theoretical framework enabling a *politically responsible* ethnographic practice, and accounting for *differences* as a methodological premise for grasping a phenomenon.

CHAPTER I

Gender and innovation: an introduction

1. What this is about

This work is about (innovation) processes, (gender) performances, and their effects. It delves into relations constructing our ethnographic practices, and the effects of specific relations when doing fieldwork. It explores relations among people and objects that affect work processes, such as innovation. And it furthermost grasps actions and sayings emerging through individuals' relations with others, that affect the ways people construct their gendered identities as intertwined with innovation activities.

The thesis aims to show, empirically and theoretically, the overlap of processes and performativity. More precisely, it outlines the effects and consequences of performances for the people involved (researchers and innovation participants): performances creating a gender order, performances affecting the innovation process, and performances creating the phenomenon we ought to study as researchers.

In doing so, the thesis contributes to extant literature in organization studies on innovation and gender, by operating a radical re-thinking of the notions of gender, innovation as a process, and reflexivity in ethnography. Specifically, the thesis illustrates the ways gender performances include and exclude people; it addresses a politics of who acts in innovation processes and a politics of what innovation processes are about, and it delves and extends current ideas of critical engagement and reflexive practices in ethnography.

2. Why should this matter to me and to us

> "By talking and writing about gender we are already changing gender relationships, just as we change them every day in the organizations where we work. In fact, we are much more adept in "doing gender" in face-to face interactions than we are at producing knowledge about gender. We do gender while we work, while we produce our office organizational culture with its meanings of what is fair in the relationship between the sexes and what is not." (Gherardi, 1994:607)

We do gender, and we do it constantly. Gender is not located in one site or another; it is not confined in an organization, in a group of people, a country, or else (West & Zimmerman, 1987). Yet, despite being so ineffable, ungraspable and untouchable, gender is powerful (Gherardi, 1994). It is powerful as throughout human history it has been used as a tool -in specific cultural contexts- to set out patriarchal gender orders, as an instrument of oppression (Hooks, 1989). It is powerful as it has been used as a political force, as a critique to how traditional philosophy of science has inevitably and substantially sustained an androcentric perspective on the world, neglecting the existence of an "other" not embodied in the imagined "we" (Harding, 1987; Haraway, 1988).

Gender is also a public concern. It has been so in many facets of ordinary life, but furthermost in organizational life. Gender, in the form of gender equality among women and men, is at the centre of political interventions at the institutional level. The European Commission operates towards promoting gender equality in scientific research and innovation (European Commission [EC], 2013a, b), on embedding gender in science and research projects development (EC, 2009, 2013c). Key policies and research on gender imbalances in science and technology professions in Europe are developed by the EU (EC, 2012), along with strategies for gender equality as

instruments for science excellence (EC, 2013b, EC 2008). Other European organizations have worked towards the promotion of women in research and innovation (EIGE, 2013a), and elaborated a Gender Equality Index for European Member States (EIGE, 2013b, c). The positive effects of women in fields that produce innovations, such as science, technology, engineering, and mathematics disciplines have been internationally recognized (Womenable, 2012). Despite gender equality and balance among men and women has been recognized and partially gained in recent years, female scientists are still discriminated against in terms of salaries and funding opportunities, when compared to their male colleagues (Shen, 2013).

Gender is persistent in the frameworks we use to look at the world - frameworks we use to set out what it means to be a man, a woman, a male, a female - and strongly embedded into our different roles, such as the ones of researchers. As Fujimura (2006:51) argued:

> "I also find that human and molecular geneticists used their own sociohistorically located normative definitions of sex in their experimental designs and analytic frames, thereby setting the stage for reproducing their own taken-for-granted categories of sex."

That is to say that we look at reality, and even at our work matter, from an arbitrary position that embeds certain categorizations of gender. Gender is not only present in our daily work activities, but it is more deeply engrained in the lenses we use to look around us, and within ourselves. Thus, thinking that we can somehow escape gender is a phantasmagoria. And yet, gender has been overlooked and neglected for decades in innovation research within management literature. Innovation is about disruptiveness (Bower & Christensen, 1995), breakthroughs (Bessant, 2008), networks (Swan & Scarbrough, 2005), and users (Von Hippel, 2005). Innovation is not about gender. When recently innovation has become about gender (Andresson et al., 2012; Danilda &

Thorslund, 2011; Lindberg, 2007, 2010; Lindberg et al., 2012; Lorentzi, 2011), it has been so in a liminal way, with neglect of how it is practiced in ordinary life at work, in organizations, and by enforcing associations between binary gender definitions, such as the dichotomy masculine/feminine, male/female, woman/man[1]. Gender inequalities in these studies have been conceptualized in terms of disparity between women and men in science and technology areas as emerging from governmental innovation polices, lacking accounts regarding what gender mechanisms are created in daily practices in innovation-oriented jobs, and how they affect the people involved.

My interest is thus in the intersections between gender and innovation, specifically in gender dynamics that are created throughout the innovation process, and the ways these dynamics affect people involved in doing innovation. This is important not only to enrich our understanding of how gender inequalities are produced and reproduced at work, but specifically to capture *if* and *how* gender dynamics impact the social ecology of innovation and have specific consequences for different bodies, in different ways. How do people in organizations influence and are influenced by constructions of gendered identities throughout the innovation process?

More insights on gender dynamics in innovation processes are needed, insights that transcend pre-constituted conceptions of gender, such as presumptions of gender as being about men and women, femininities and masculinities, for a more comprehensive, and indeed less distorted, way of looking at gender. I do this by using a theoretical lens which fosters flexibility and enhances the dynamic nature of phenomena in the world, both in the conceptualization of what innovation processes can be accounted for, but also in the ways we think of gender in organizations.

[1] An in-depth elaboration of the a-gendered conceptualization of innovation in management literature, and the gaps of the recent developments of gender around discourses on innovation are developed in chapter IV.

For the former, a process approach on innovation clarifies the relational nature of innovation, and conceptualizes innovation not merely as an outcome deriving from the evolution of set stages, but as a process, developing throughout phases, which carry a high level of uncertainty, that can produce different results, contingent to changing relations across institutions, organizations, and people involved (Van de Ven et al., 1999). Specifically, I depart from Van de Ven's process view of innovation, which premises processuality on longitudinal temporality (how things evolve over time), toward an understanding of processuality as premised on the reiterative forming and performing of the relations among different people and objects. For the latter, an anti-essentialist, de-constructionist, relational and inclusive approach to gender, where by inclusive I mean a definition which embraces all types of gender, is necessary. A poststructuralist feminist approach has developed in gender studies, and specifically in understanding gender at work, which encapsulates all the above mentioned elements. Methodologically, this entails opening up to further reflections on gender in innovation, as a phenomenon transcending organizational boundaries, and as occurring across different "sites".

3. The "sites"

Having accounted for the motives behind this thesis, what is left is a clarification of where, empirically, this research has taken place. This thesis recounts observations of gender dynamics in innovation processes in two organizational settings. The settings explored for the scope of this thesis are R&D organizations, in two different sectors: biomedical and IT research. According to the OECD Science, Technology and Industry Scoreboard (2011), innovative sectors are measured on four innovation dimensions: the ability to deliver product and process innovations, as well as organisation and market

innovations, the aptitude to produce intellectual property rights (patenting), and the amount of innovation-related expenditures, basically how much budget is assigned for innovation activities (OECD, 2011). By combining two indexes of the Eurostat's Community Innovation Survey, related to the period 2002-2004, and 2004-2006, the sector scoring highest in innovation-intensity is Research & Development (OECD, 2011). Both settings have a strong focus on R&D, but differ on gender composition, type of sector and status (for and not for profit).

The two organizations were followed consecutively for approximately 3.5 to 4 months, involving observation of everyday activities of a specific team within the organization, with visits at the site everyday according to the working hours of the participants. Additionally, a total of 42 interviews to members of different seniority levels[2], and related documents were collected. As a condition of access, the organisations were promised anonymity and confidentiality. For this reason, a form for both observations and interviews were signed by participants in both organizations[3].

The research stay at Biomedicine for Life lasted from May 2012 to August 2012, with an informal presentation of the preliminary findings in August 2012 to the team observed and the department director. Biomedicine for Life [BfL] is a pharmaceutical not-for-profit research institute. BfL was founded in the 1960s following a donation of its founder to build a non-profit organization offering scientific advancements in various fields of medical research: biomedical engineering, cardiovascular research, environmental health, epidemiology, molecular medicine, neuroscience, oncology, and so on. BfL is based in Italy, incorporating four sites (one of which was the setting of this study) and employing overall around 900 persons. In Biomedicine for Life-Alpha,

[2] See appendix A for a full list of interviews, duration, members' roles, and sex, and appendix B and C for other material.
[3] See appendix D and E for informed consent form of interviews and observations.

the site visited, over 60 members were employed[4]. During the observation period, a team working in the tissue engineering unit of the Bioengineering Department in BfL Alpha was followed. In BfL Alpha, more than 80% of the personnel were women. This implies that women were present at different hierarchical levels in BfL, from directors of departments, head of laboratories, to junior researchers. The hierarchical structure of BfL Alpha is clearly demarked as follows: head of department, head of laboratory, head of unit, and researchers. At the time of the observation, BfL Alpha was composed by two departments and a branch of another department located in another site. The two main departments, biomedical engineering and molecular medicine, were respectively led by a man and a woman, along with one branch of the oncology department, whose head of laboratory was a woman. At the time of the observation, only three researchers were non-Italians; the common spoken language was indeed Italian. Access to BfL was negotiated in April. During this month I had to provide medical tests and vaccinations. The formal entry was on May 2nd, when I signed a document stating my awareness and consent that in BfL animals are used for clinical trials.

The IT research centre (Techie Labs UK) had a different organizational structure. Being part of a multinational company (Techie), and specifically one of the four research Labs across the world, Techie Labs UK had a simple and flexible structure: Techie Labs UK director, research managers, and researchers. Techie is an IT multinational North American company employing more than 300,000 people totally. In Techie Labs UK 40 people ranging from researchers, managers to administrative staff were employed at the time of the observation[5]. The team observed during the study was a branch of the Security and Cloud department working on "Defending the Cloud" project, with the aim of developing a demonstrator using forensic virtual machines for signalling early-

[4] Including administrative personnel.
[5] Techie Labs overall employs around 200 people.

warnings for detecting malwares. The project was developed in conjunction with Techie Labs USA, and entailed videoconference calls with the other team. In Techie Labs UK, more than 80% of the employees at the time of the observation were men, present at all hierarchical levels. My stay in Techie Labs commenced unofficially in late August 2012, and formally in September, when two confidentiality agreement forms were signed by the Techie Labs director, the University, and me. These agreements set measures on confidential information, publication and intellectual property rights. The observation ended in December 2012. At the time of the observation Techie Labs was undergoing major restructuring at the organizational level. In November 2012 a new director, overseeing all Techie Labs, was appointed. His election was welcomed by all members as a good sign of the new direction all Techie Labs were to take, and as a step towards "being again an engineering company"[6]. Techie Labs UK was led by a man, and the two research managers in the Cloud and Security Labs were also men. Researchers in Techie Labs UK were of different ethnical backgrounds. Despite the differences, all personnel spoke English in public conversations, and as a common language at work.

4. Brief overview of methods

This section comprises a short review of the methodological techniques within the gender and management literature used for capturing gender dynamics in organizations.

Poggio (2006: 229) summarizes the multiplicity of approaches to understanding gender issues in organizational contexts as follows:

[6] As mentioned by one of the employees during the coffee meeting in which the new director was announced by the Techie Labs UK director who travelled to the headquarters in the USA for the purpose.

> "Techniques like shadowing, participant observation or the narrative interview are perhaps better able than others to grasp the processual and interactive dimension of gendering in its two main aspects: saying and doing."

Gherardi & Poggio (2001) introduce the role of narratives in understanding the gender order created in organizations. Particularly, they interviewed 34 women and 34 men colleagues in different workplaces in Italy which were characterized by women's vertical and horizontal segregation. The authors offer three different types of analysis applicable to these accounts. A first analysis could be done by identifying and comparing patterns found in men's and women's interviews. Second, an analysis could be applied on norms that define specific gender behaviour in different work contexts. Third, it can be useful to compare gender cultures in different organizational contexts. Bruni (2000) and Bruni & Gherardi (2001) used shadowing as a way to grasp gender dynamics. The researcher followed a newly-hired female employee for 10 weeks, three times a week. This approach is widely used in understanding learning in practice (Gherardi & Nicolini, 2002) as well as in detecting gender issues in organizations. For example, Ericksson, Henttonen & Merilainen (2008) shadowed for one week the women-owner managers in four small-software companies. Moreover, Ahuja (2002) illustrates different methodologies as tools for approaching the study of the role of women in IT professions. The author appeals to both qualitative and quantitative methods to study processes and empirical relationships between variables. For Ahuja (2002), in-depth case studies and participant observation are valuable tools for the understanding of the organizational culture and its relationship with gender issues. In particular, they are useful in the analysis of the effect of organizational culture on women's equality in the work environment. In these lines, interviews represent a crucial device for gathering data on workers' perceptions of the organizational

environment. With regards to data presentation, Martin (2003) presents her findings on gender un-reflexive practices at work, derived from interviews and observations, in form of vignettes. Similarly, Martin (2006) utilizes stories from her fieldwork in a financial company to explore the reflexivity and non-reflexivity of practicing gender at work.

To summarize, participant observation and semi-structured interviews are widely adopted choices of research methods in the gender and management literature. Specifically, using stories or vignettes helps researchers to present doings and sayings, and at the same time to draw on the past for connecting to future performances (Czarniawska, 1998). Many other works in the field of gender studies in organizational settings could be mentioned (e.g. Czarniawska, 2006; Holmes & Meyerhoff, 1999; Kelan, 2010; Levina & Orlikowski, 2009; Martin, 2001; Powell et al, 2009; Tangaard, 2006; Watts, 2009); these are some examples of the reasons that lead my research project to adopt participant observation and semi structured interviews as methods of data collection, along with the significance of the method also in wider management literature. For example, Barley & Kunda (2001) support comparative approaches by promoting the study of various settings. Specifically, they introduce the concept of "across family design", which they define as the "comparison of broadly dissimilar lines of work drawn from different occupational families" (Barley & Kunda, 2001: 86). Barley & Kunda (2001) suggest ethnographies are a valuable tool for studying occupations, without being confined to a single occupation, which would make them "inefficient and perhaps ineffective" in the study of contemporary organizations. Another example is Barley's (1996) work, summarizing the six to twelve months participant observations in multiple sites conducted by his research team. Researchers were involved two to four days a week in observation by immerging themselves in the

field, taking extensive field notes, collecting internal documentation and socializing with the informants off site. Also, they conducted ad hoc interviews, taped and transcribed. The result of the work is an in-depth study of nine technicians' occupations in different sectors: medical, science, microcomputers, automobile, programming, customer services, library, and radiology.

In light of this, the thesis explores gender performances in two different innovative contexts, in order to familiarize with the different ways of doing gender in different work environments. The choice of two settings allows us to grasp not only gender dynamics occurring within innovation processes in a single organization, but to open up to dynamics occurring across other sites, involving men and women, and their experiences in different innovation processes. As the two organizations are either populated by majority of males (Techie) or a majority of females (BfL), this offers a good opportunity to explore how researchers experience the female (or male) dominated environment. I used interviews[7] for discovering people's sense making of what they do at work and what they perceive as being important. Observations mixed with ad hoc interviews are better suited for grasping the situated enfolding of processes in situ, in line with Barley & Kunda (2001), who suggested that such approach, versus interviews alone, can better capture work practices. In the next section I set out the research questions and contributions of this thesis.

5. Research questions and contributions

The thesis contains a radical re-thinking of gender and innovation, touching upon three different aspects which question the multiple roles humans play in three areas: in the

[7] See appendix F for the interviews design.

making of innovation; in the gendered practices in innovation making; and in the making of the phenomenon they ought to study as researchers.

The thesis is premised on the intertwinement of feminist studies and innovation research. The thesis aims to answer the following research questions:

1. *How are people and objects constructed through their relations in innovation processes? And how does their mutual shaping affect innovation?*
2. *What doings and sayings are enacted in research organizations involved in innovation? How are these sayings and doings gendered and with what consequences?*
3. *How can we be more reflexive in our ethnographic practices?*

These are respectively developed in article 1, 2 and 3. The order of the articles echoes the journey of discovery of this research. If we are to unravel gender dynamics created throughout the innovation process, and the ways these dynamics affect people involved in doing innovation, we first need to clarify what innovation is and what actors are involved in its making.

Thus, the first article examines the ways we have so far understood innovation processes, denoted by an absence of the roles of objects and, as it will be discussed in the second article, of gender. By answering the questions: "How are people and objects constructed through their relations in innovation processes? And how does their mutual shaping affect innovation?", the article offers a complementary lens to extant process innovation literature. I here work with the concept of "enrolment" (Akrich, 1992), that is the web or relations among different elements, and posthumanist performativity (Barad, 1999, 2003; 2007), to gain insights on how identities of researchers, managers,

and furthermore objects, are constructed throughout innovation, an aspect still underdeveloped in current process oriented works on innovation.

In the article, I identify two strands of process-oriented research on innovation, namely "innovation as unfolding interactions" and "innovation as dynamic entanglement". The former looks at innovation as a process evolving over time, and involving different players (Van de Ven et al., 1999). However, Hernes (2008) notes that people, outcomes, transactions, contexts are conceptualized as independently-existing entities. Following this critique, some scholars argue for a more dynamic approach, thus posing more attention on how institutional frameworks, people, and organizations mutually influence each other throughout the innovation process (Garud & Rappa, 1994; Garud et al., 2011). This strand has added to the innovation-as-unfolding-interactions perspective the role of material objects, such as technologies, in making innovation. In the article, I claim that whilst exploring the role of people, technologies, institutions, and firms in terms of entities playing a role in innovation processes has been useful for analytical purposes, two aspects have been overlooked: *i)* an analysis of the creation of elements in the innovation process, and *ii)* an account of their social-material inseparability. Attention to these two aspects is important as it can shed light on the ways innovators and objects are formed throughout innovation, and the emerging relations among entities that impact the innovation process, more in line with a stronger process perspective.

To summarise, in the first article (chapter III), I contribute to extant process innovation literature by enriching our understanding of the processual complexity of innovation, and by offering a perspective that integrates Garud et al's (2013) innovation model with two additional dynamics: constructing and effecting. These enfold through three innovation phases (invention, development, and implementation) and three key

mechanisms (recombination, transformation, and institutionalization; Garud et al., 2013). The article problematizes researchers' and practitioners' stand on the "politics of who" (Mol, 2002) is acting in innovation, thus questioning who innovation participants are (firms, multi-party networks and communities, objects?), and the "politics of what" this process is about (faits accomplis, entanglements, or else?).

The first article delves into innovation from a gender neutral (better yet, gender blind) lens, which reflects the overshadowing of gender as a crucial dimension in innovation making that pervades contemporary innovation literature. In order to address a gap in extant research on the connection between gender and innovation, the second article (chapter IV) advances our understanding of innovation processes as inherently gendered, and clarifies the gender dynamics that affect people involved in innovation making, by answering the following questions: "What doings and sayings are enacted in research organizations involved in innovation? How are these sayings and doings gendered and with what consequences?"

This article is not about gender equality and how to demise inequalities in innovation processes. It is rather a problematization of our doings and sayings in innovation that lead to marginalization of certain bodies and experiences for the men and women at work. It is only more recently that the link between gender and innovation has been empirically explored, however with a specific focus on innovation policies (e.g. Ljunggren et al., 2010; Andersson et al., 2010; Pettersson, 2007). In doing so, these works overlook the ways gender is "done" and "un-done" (Kelan, 2010) through its doings and sayings in organizations.

The second article thus complements such research by unravelling practices in innovation-oriented jobs constructing and sustaining particular gender dynamics, by exploring what practices are enacted in research organizations involved in innovation,

how they are gendered, and with what consequences. The article engages with a feminist poststructuralist lens, and specifically Butler's elaboration of gender. This framework facilitates capturing gender dynamics of participants in innovation-oriented jobs in terms of performativity and re-production of a gender order. Empirically, this lens shows us that doings and sayings of innovators create a legitimized and ideal of innovator who does not possess a body (a pregnant body), nor family relations, thus sustaining a gender order that produces a distinction between a competitive, perseverant, passionate, aggressive researcher, and a de-legitimized Other, who privileges status quo, cooperation, harmony, balancing work and family, and including gender-related aspects such as the parental experience.

The investigation of gendering practices in innovation processes hasn't left me unaffected. As a female researcher working on gender dynamics, I came to realize through my data collection, analysis and post-facto reflections on my ethnography that I was part of such phenomenon as well, and that my engagement with participants has contributed to generating a dichotomised view of gender in the field, and the re-affirmation of traditional gender relations. The third article (chapter V) illustrates such reflections in practice. The third article thus reads as a critical exercise on reflective practices in ethnography. I here commence by problematizing how our onto-epistemological lens affects the ways we understand and grasp a phenomenon: how has my position (a feminist and processual one) affected the ways I approached the field and participants?

In the article, I review current development on reflexivity in ethnography (Rhodes, 2009; Weick, 2002) as a practical tool for producing ethically responsible ethnographies, and specifically highlight the critiques to current uses of reflexivity. More specifically, centring attention on researchers as participants and knowledge

producers is not unproblematic, as Fournier & Grey (2000) note, by shifting focus from participants to researchers, reflexive accounts can fall into the trap of privileging researcher's practices rather than participants' voices. Weick (1999) calls this an exaggeration of researchers' reflectiveness, a form of narcissism. Similarly, Rhodes (2009) notes that taking researchers' reflections on their roles in the field to the extremes can justify the production of "self-promoting confessionals" (Rhodes, 2009:522). However, in the article I acknowledge the positive dimensions of reflexivity in ethnography, and critically built on those to enrich our reflexive practices.

I take the charge of narcissist tendencies as a starting point for inquiring on the ontological and epistemological cues at the basis of this problematic, and for questioning the possibilities for creating more responsible - and less self-centred - ethnographic works. As Keevers & Treleaven (2011) note, reflexivity is premised on an "ontology of separateness" (Orlikowski, 2009:10), a dualistic ontology discerning among individuals and things, and specifically in this case, researchers and researched. "Ethical limitations" (Rhodes, 2009:665) can emerge from such distinction, that legitimize tendencies which grant more voice to the researcher. In the article I illustrate that such ontological separation is problematic for two reasons. The first is that it draws a continuum with researchers at one end and researched at the other, leaving entirely to researchers the responsibly of ethically revealing themselves in their practice, without overshadowing participants. Second, by separating us and them we conceptualize researchers and participants as self-existing entities constructed in some way before their interaction. As a consequence, we assume that there is "out-there"-self-existing reality to be studied.

Such ontological separateness assumes that we are part of what we study only when we approach it, thus minimizing our responsibilities in creating the world we seek to bring

into light. I instead advocate for an ontology of inseparability, which foresees a shift from focusing either on the researched or the researcher (the "Self-Other hyphen"), to a tighter attention on the relational whole of the practices constructing the reality we seek to observe. Thus, before we begin reflecting on practices in the field, we are already absorbed in them. Moreover, in the article I suggest that we are not only implicated in what we observe and understand, but especially, in ethnography, that the phenomenon we observe, such as the gendering dynamics enacted, is also part of our/their practices and the breakdowns we are part of.

The article introduces a Baradian approach to ethnography as a useful lens for generating ethically and politically responsible ethnographies, enabling a particular escape from the narcissist trap of certain ethnographic practices. The article suggests diffraction - patterns of differences created through interactions - as a way of making researchers more responsible in ethnographic practices, and to position differences as a central methodological premise for grasping phenomena. The article contributes to a radical rethinking of reflexivity in ethnography and opens a reflection on: How do we (participants and researchers as participants) make cuts on the phenomenon? What cuts matter, and for whom? Which possibilities do they foreclose, and with what effects?

Overall, the narrative developed throughout the three articles is a journey of questioning, destabilising, and critically engaging in intersections of gender and innovation in organizational contexts. If we are to explore gender dynamics occurring within innovation processes, we need to first assess what we define as "innovation" and whether extant innovation research illuminates us on gendering. I do this in chapter III, an article that suggests extant innovation literature is concerned with innovation stakeholders, institutions, ideas, and outcomes, rather than gender dynamics. A deeper engagement with such gender blindness is developed in chapter IV. It is here that I

bring to the fore gendering in innovation processes. However, accounting for what gender dynamics emerge in innovation processes is only one part of the critical engagement with gender and innovation. The second part is the post-facto acknowledgement that gender in innovation is a phenomenon that I, as a researcher and observer in the organizations, helped shaping through my practices and engagement with participants. Thus, chapter V shows such construction in practice and offers a reflection on how I (researcher) can account for my responsibility in making gender in a reflexive manner.

6. Sign posting

Briefly, the thesis will thus progress as follows. Firstly, I outline the theoretical approaches in more detail, specifically a process-oriented and a feminist lens. In chapter II, I introduce the ontological and epistemological assumptions of this piece and their significance for innovation literature. Then I turn to gender, and specifically suggest poststructuralist and posthumanist feminism as lenses for problematizing the ecology of innovation. I then bridge poststructuralist feminism with process theorizing, and show how the two can be harmoniously intertwined in our theoretical canvas.

The thesis then turns to the three articles, which constitute the main body of this work. Chapter III is the first paper of the thesis, and is titled: "Redefining the roles of objects and people: Towards a stronger view of innovation processes". The chapter is dedicated to understanding innovation processually, and to recounting for the role of humans and nonhumans in innovation making.

Chapter IV, comprising the article "Excluding the Other: Re-producing gender dynamics throughout innovation processes", delves into innovation and gender in

organizations, and explores if, how, and with what consequences gender dynamics shape innovation processes and its people.

Chapter V is titled “From a reflexive to a diffractive ethnographic enquiry in management research: An outline for a promising methodological approach”. In this article I elaborate a framework enabling a politically responsible ethnographic practice, and for accounting for differences as a methodological premise for grasping a phenomenon.

Chapter VI concludes with some considerations on the overall contributions and limitations of this work, sketching out promising ideas for future research.

CHAPTER II

Sketching the canvas: theoretical approaches

> "Innovation is not gender-blind, but rather inherently gender-biased" (Ranga & Eztkowitz, 2010:3)

As indicated in the introduction, this study aims to explore gender dynamics in the making of innovation. Gender has been a neglected lens over the past decades in the organization and management literature on innovation (Alsos et al., 2013), and just recently its importance is emerging as a means to understand barriers to an equal participation in innovation-oriented activities and as a tool to create more gender equality (Schiebinger & Schraudner, 2011). This also implies using flexible theoretical and methodological tools. In order to do so, it must be first clarified what ontological and epistemological positions both on innovation and gender are assumed in this study. This is important as the way I look at innovation and gender is conditional to a specific understanding of reality, a processual one, which sees everything as a flux, in continuous becoming, never accomplished. This approach emerges in extant literature on innovation, but also, as I will argue in the next sessions, across gender studies. Such an approach allows for the problematization of existing views of both innovation and gender, and thus enables in a particular away an account such as this, which is oriented toward exploring phenomena as they happen in situ.

The next sections aim to clarify the lens through which innovation and gender are understood, and specifically sets out the links between the two and the importance of incorporating a gender dimension in the analysis of innovation as a process. The

chapter proceeds as follows. First, I introduce a review of the ontological and epistemological assumptions constructing this study, followed by its diffusion in innovation research. In this section I aim to clarify the key tenets of process theorizing and its usefulness in understanding innovation. Second, I tackle the missing knots within innovation-as-process literature, by suggesting that gender can be a key lens for problematizing the ecology of innovation. I then propose that a poststructuralist feminist lens has much more in common to process theorizing that what is has been claimed up to date in gender studies. By clarifying their connections, I show how process ontology and poststructuralist feminist theorizing can offer a prism, an optical element, diffracting multiple, colourful, and potentially unexpected strakes on gender mechanisms in innovation.

1. Process literature in organization and management studies

"For process philosophy, what a thing is consists in what it does." (Rescher, 2006:5)

Process thinking in organization studies has attracted an increasing number of scholars in the past decades, and their arising interest in analysing organizations as processes, rather than entities, open-ended and in continuous change. Process thinking draws from works of pre-Socratic Greek philosophers, namely, Heraclitus, as opposed to Parmenides, who viewed the world as unchangeable. As Chia (1999) notes, Parmenides' predominance in philosophical thought has led to a representationalist epistemology, one for which reality is made by discrete and identifiable entities, and where change is merely a transitional state between two steady stages. Heraclitus instead thought of the world as "natural process":

> "As Heraclitus saw it, reality is at bottom not a constellation of things at all, but one of processes: we must at all costs avoid the fallacy of substantializing nature into

> perduring things (substances) because it is not stable things but fundamental forces and the varied and fluctuating activities which they produce that make up this world of ours." (Rescher, 2006:3)

These two philosophical thoughts have developed across different disciplines, and specifically in social sciences in understanding organizational phenomena. The next sections aim to clarify the basis of process theorizing, the ontological and epistemological assumptions, as well as its diffusion to study of one particular observed phenomenon in management literature: innovation.

1.1. Ontological assumptions

> "Process philosophical thinking invites us to think about individuals, organizations and social entities in terms of ceaseless change, emergence and self-transformation. It urges us to recognize that what really exist are 'not things made but things in the making' (James, 1925, p. 263). The social world, in particular, is not 'ready-made'; rather, it is the material effect of an ongoing enactive process of 'world-making' (Goodman, 1978; Chia, 2003)." (Nayak & Chia, 2011:282)

Process thinking is based on a relational approach: things are formed through their interactions with other elements, and through these relations, all the entities connected are reproduced and transformed:

> "[…] what an actor 'is' at one instant in time is not the same as what an actor 'is' at another instant in time" (Hernes, 2008: XV)

This has several ontological implications. By ontology I here mean:

> "[…] the study of the nature of being, a concern with the basic structure of reality." (Lawson, 2003:120)

The first implication regards the definition of what "actors" means. Actors from a process perspective are not fixed entities; they are not only persons, but comprise everything that emerges in the world: laws, people, organizations, artefacts, nations, trees, technologies, ideas, numbers, and so on. Yet these beings do not live in a vacuum: what a nation is today is not what it has been in the past, and it is certainly not what will be in the future. As an example, Italy today is a country with almost 61 million residents, with somewhat stable democratic government, facing economic turbulence. But what Italy is today is the heritage of its past failing governments, of changing demographics, as well as its developing relations with other European countries. Events join over time, in a flow (Tsoukas & Chia, 2002), so that Italy configures as an evolving process, rather than being a static entity, namely a nation. What Italy is as an entity, so to speak, is how it has become as such. Process ontology entails seeing things in the world not as *faits accomplis* (Langley & Tsoukas, 2010), but as "unfolding processes" (Hernes, 2008): they are never accomplished, nor static, nor have set outcomes. Rather, what we see is in constant creation, and evolvement, so that Italy, for example, is in constant dynamic movement and flux. This means that a process perspective is based on an "ontology of becoming": everything in the world is in a process of becoming, never ending. This view rejects a "representationalist epistemology" (Chia, 1999), which accounts for the outcome, rather than the process itself. In other words, a representationalist approach would see Italy, as a country with set boarders, as the creation of succeeding historical stages, rather than a process itself. Yet, viewing phenomena as *faits accomplis* reduces their complexity and dynamic unfolding (Tsoukas & Chia, 2002); it misses out how Italy is not only a country, but a democratic state, part of a wider European network of countries, with which over time

has had different changing relations that formed its borders, its historical heritage, its Constitution.

Second, a relational approach to reality means that everything we see, and particularly, everything we come to analyse as researchers, is the emergent outcome of tangled relationships, which shape and come to create an indefinite form of a phenomenon. In other words, if we are interested in looking at innovation from a process perspective, what we see as the outcome of the innovation, merely the technological artefact (a new insulin transplant device), embeds a series of actions of people involved in the making of the device, relationships among stakeholders, among biomedical researchers, with the socio-economic context, which are never fixed, but change over time. This implies that the insulin transplant device is not just a technological object, but it contains sets of relations that made that device in that specific way, at that point in time, which make it different from what it could have been if, for example, different stakeholders were involved, if researchers tested the device on dogs, rather than rats, if national laws on animal experimentation impeded biomedical research on animals, and so forth. What we can see now, as an insulin transplant device, is just the emergent process of a series of events that, combined together in a certain way, come to configure what we see as a substance (the device) in the way we experience it. A process perspective is opposed to a "synoptic account" (Tsoukas & Chia, 2002): the insulin transplant device is not an accomplished event; rather, it is the emerging artefact of open-ended processes, underlying different trajectories. Whitehead promotes a view of reality as the concealing of events into entities that are the "atomic unit of experience" (Chia, 1999); the world emerges from combinations (the above mentioned trajectories) of entities (humans and non-humans), possibly infinite. As Hernes (2008: 50) also argued:

> "What it becomes -be it a routine, a firm or a project- is based on a coming together of many endogenous as well as exogenous events. Also, what something 'is' is but a basis for becoming something else. In other words, there is no finality, nor can there be any a priori equilibrium state towards which something will converge. This implies that nothing -no innovation, firm or institution- is a final state; rather, everything is merely a stage forming (potentially) other processes."

Entities, or actors, are never accomplished and never stay the same (Nayak & Chia, 2011): they change when entering in contact with other entities, forming a complex unity of related entities, events that take place at several points in time. Entities do not pre-exist their actions, they don't carry out actions; rather, entities are formed through actions and interactions (Bakken & Hernes, 2006). In other words, for a strong process view it makes no sense to distinguish between my office desk, and the process of its design and making, and my use of it. Entities involved in this complex unity (events) are heterogeneous: ranging from human to non-human objects[8], making the separation among the two problematic (Hernes, 2008:56):

> "The principle of heterogeneity suggests, for example, that organization cannot be seen as wholly social, and that there will always be some physical artefact or technology that mediates social interaction. It so happens that technology and artefacts provide more enduring stabilization than do social relations. But, more importantly, heterogeneity implies that the physical and the social are not seen as two worlds that influence one another from two opposite sides of a divide. On the contrary, they make each other. Just as people make technology, technology makes people."

[8] The debate around material and social has particularly sparked in the last few years in the management literature (see Carlile et al., 2013; Leonardi, 2012; Leonardi, 2013; Mutch 2013; Orlikowski, 2007; Orlikowski & Scott, 2008; Scott & Orlikowski, 2013).

This entanglement of people and technologies blurs the boarders between the two, as they reciprocally constitute each other: different actors shape their relations and through these relations they are shaped[9].

This leads to thinking of individuals as nexuses of relationships, shaped over time, rather than discrete entities interrelating with an external environment. Thinking processually means to see organizations, and even individuals, as "bundles" of relationships (Nayak & Chia, 2011). Entanglements are formed and reformed over time, and make the world we see as in continuous flux. Reiteration is one of the key tenets of a process perspective: reiteration does not suggest the repetition of sameness; actions repeated are continuous change and what is repeated at t=0 is different from what it will be repeated t=1, 2, 3, etc. Change is a constitutive part of a process view. In other words, what the insulin transplant device has come to be today, is different from what it will be in a year time, due to changes in people's participation in its making, changing partners of the project, advancements in technology, results of first implants on testers, and so on. Yet, even if we were to picture every stage of the design and making of the insulin transplant device, we would only get snapshots of the process, and never fully capture the entirety of its entanglements. Similarly, Tsoukas & Chia (2002) note that the definition of motion, as a category, even if captured in each instant of its evolvement, reduces the complexity and movement of the concept, and therefore flattens its processuality.

[9] The heterogeneity of the world, namely the blurred boarders between humans, technologies, and ideas is a key ontological feature shared by ANT (see Callon,1986) and process thinking. Hernes (2010) notes that whether process theorizing primarily developed this point as ontological position, ANT researchers instead deployed it in practice. Specifically, Callon (1986:207) sustains that actors are "interdefined", that is, "they are formed and are adjusted only during action". This resonates with a process perspective for which everything we see (e.g. the fishermen, the community of specialists, and the scallops) is shaped through their interactions.

To summarize, a process approach is developed around these key tenets: *i)* its foundation on the ontology of becoming, for which what we see is in the world is an emergent process, never accomplished; *ii)* the inseparability of materiality and sociality; *iii)* a rejection of representationalism (Chia, 1999); *iv)* an understanding of entities as processes, as the conjunction of events; and *v)* a strong commitment to the concept of reiteration in space-time.

1.2. Epistemological assumptions

Adopting a process perspective has implications on the way we -as researchers- come to know phenomena of the world, and specifically, within organizations. Whereas the ontological assumptions regarding what, from a process perspective, can be said to exist were clarified in the previous section, this part focuses on how we can acquire knowledge of what exists, or in other words, "how we know what we claim to know" (Tsoukas & Chia, 2011:9). Ontological standpoints have repercussions for what researchers focus on, and specifically, how they orient their analyses towards understanding, explaining, or predicting phenomena, and looking at the causal conditions for specific outcomes, or the processes through which certain outcomes emerge.

How do we come to capture, when using a process approach (Tsoukas & Chia, 2002), how "[…]'things' come to be constituted, reproduced, adapted, and defined through ongoing processes" (Langley, 2007:271)? Specifically, when thinking of reality as a continuous flux, process researchers face the dilemma of how to grasp this dynamic evolvement of relations, networks and materiality:

> "Process data are messy. Making sense of them is a constant challenge." (Langley, 1999:691)

Yet this challenge has been addressed by process-oriented researchers. In particular, Langley (1999) develops an extensive framework of strategies of sensemaking from process data: narrative, quantification, alternative templates, grounded theory, visual mapping, temporal bracketing, and synthetic strategy. Langley (2007) also found that processes are better captured through qualitative research methods, as they enhance the richness of the data and therefore of processes. Among these, two main epistemological positions can be found among process researchers (Langley, 2009). The first refers to the "weak" stream of process theory, the so-called "owned" process theory (MacKay & Chia, 2013) embraced by scholars such as Pettigrew (1992), Ring & Van de Ven (1994), Schroeder et al. (1986). This approach sees entities as pre-constituted (before the process) and focuses on their change over time, and the phases they undergo. Differently, a "strong" process perspective (termed "Approach III" by Van de Ven & Poole, 2005, or "unowned" process theory by MacKay & Chia, 2013), derived from the works of Whitehead, James and Bergson, sees the world as a process (ontological assumption), and looks at mechanisms producing and reproducing events (Bakken & Hernes, 2006). Process thinking rejects a substance approach, for which organizations and individuals are thought as discrete entities, and calls us to think of processes not as mere "processes *of* things" (Nayek & Chia, 2011:288). A strong process approach requires a researcher to look at phenomena as continually in motion, and at "things" as nodes of networks of relations, continually evolving and never stable. Yet, Hernes (2008) notes the difficulty of thinking of the world as a flux, rather than being made by defined objects. In other words, we tend to think of what we see, for example the insulin transplant device, as an object, as a device, made of fibres and containing isolated islets of a pancreas. If we were to think processually, in the strong acceptation, we would see this device not only as a physical object, but also as a bundle of

properties that feed into a process, that make this physical object as it is now. What a researcher should focus on is the processes that made this physical object with certain properties. This mental practice researchers are urged to make is called "entification" (Hernes, 2008). Entification overcomes the entity/process dichotomy; we construct stability in a dynamic world, to make sense of reality:

> "By and large, we are not good at thinking process, movement, flux or transformation on their own terms. Our conceptual skills favour the static, the separate and the self-contained." (Nayek and Chia, 2011:291)

It does not surprise then that many process researchers have dealt with concepts of time and people as entities (Langley & Truax, 1994; Barley, 1986; Poole, 1981), where time is linear and evolves in subsequent phases -"a transaction view of time" (Van de Ven & Poole, 2005:1389), and people are independent actors, interacting with others and with technologies, while still remaining intact (Van de Ven et al., 2008). These studies put at the centre how technologies are "constituted through the interactions of various participants" (Garud & Ahlstrom, 1997: 46), namely technological artifacts, routines, beliefs, and researchers (Garud & Rappa, 1994). A "weak" process approach tracks the evolvement of entities through states, developing over time. Differently, a "strong" process perspective sees agency as distributed, among humans and things that are "mutually constituted and hopelessly mangled" (Garud & Gehman, 2012:983). Yet, Rescher (2006:11) notes that this approach is problematic: we can never escape the need to use objects for making "any viable metaphysical position". Despite a belief of reality as processual, process researchers still reify processes, by assigning labels,

building tables and charts, and fixing all these onto a static research article (Van de Ven & Poole, 2005)[10].

To methodologically overcome static positions of researchers in capturing processes, Tsoukas & Chia (2002) suggest placing oneself in the middle of the evolving phenomenon and to start knowing it from within. This, along with Langley's (2007) indication that qualitative research better captures processes, suggests the centrality of living with the people we study, and observing them so that we can get a feeling of their emotions, and social meanings:

> "To access social meanings, observe behaviour and work closely with informants several methods of data collection are relevant, such as participant observation, indepth interviewing, the use of personal documents and discourse analyses of natural language." (Brewer, 2005: 59).

This should come along with a focus on movement, rather than a breaking down of the phenomenon into stages, and on the continuous evolvement and change of phenomena.

A process approach also helps our reflexive journey as researchers: we try to make order of what we see in organizations, trying to stabilize it by assigning labels (Hernes, 2008). Yet we cannot think of us -researchers- as static entities, interacting with our observed fields and people, yet still unbroken, integral. We are never the same throughout our empirical journeys, as things around us change us as we change them, in a reciprocal constitution. This suggests that process thinking also enhances our understanding of the performative nature of the research process. I next turn to a review of a process approach in innovation, delving in the ontological and epistemological assumptions at its premise.

[10] For more in-depth explanation of the differences between a strong and weak process approach to innovation see section 2.2.1.

1.3. Process thinking in innovation

In organization studies, process thinking pervades research on decision making, sensemaking (Weick, 1995; Weick et al., 2005), routines (Feldman, 2000), organizational change (Tsoukas & Chia, 2002; Van de Ven & Poole, 2005). Among these studies, different stakes on processuality were taken: from a deeply ingrained process perspective (Law, 2004), to a more entitative approach[11] (Langley, 1999; Van de Ven, & Poole, 2005). This replicates also in the different approaches on innovation from a process perspective[12].

1.3.1. Innovation from a process perspective

> "Organizational change and innovation are best captured by process theories." (Poole & Van de Ven, 2004:375)

Process theorizing in innovation literature emerges in Van de Ven et al. (2008, 2000) works on the innovation journey throughout 17 years of research, tracing 14 innovations. The scope of this extensive work was to examine "how and why innovations actually emerge, develop, grow or terminate over time" (Van de Ven et al., 2008: ix). As a result, they found that innovation is an uncertain process, entailing gestation periods, shocks, plans, proliferation, setbacks, criteria shifts, fluid participation of personnel, of top management, of other institutions, developing into an infrastructure for innovation and reaching a point when innovation is adopted and its journey ends. The results also helped to answer questions such as: *i)* "How and why do innovations actually develop over time from concept to implemented reality?"; *ii)* "What innovation processes lead to successful and unsuccessful outcomes?"; and *iii)*

[11] By entitative approach to reality I refer to the belief of entities pre-existing their actions, and as acting in specific time and space configurations.

[12] For reasons of conciseness, a review of the literature on innovation in organization and management literature is not part of this piece. However, a brief overview is provided in chapter IV, and widely acknowledged in extant works on innovation (see for example: Garud et al., 2013; Poole & Van de Ven, 2008; Schroeder et al., 1986; and Slappendel, 1996).

"To what extent can knowledge about managing innovation and change processes be generalized from one situation to another?" (Van de Ven & Angle, 2000:5).

Van de Ven & Rogers (1988) clarify the difference between their approach to innovation -a process model- from a variance approach, the latter focusing on individual or organizational propensity for innovation adoption, and more generally, their innovativeness. Their process approach, instead, filled the lack of research on the sequences of events that, over time, lead to innovation and organizational change. One of the requirements of a process perspective on innovation is a "clear set of concepts about the object being studied" (Van de Ven & Rogers, 1988:638). In other words, what is needed from a process researcher is a clear definition of categories, and attention to how these categories (dimensions) of an object change over time. For Van de Ven & Rogers (1988), it makes no sense to talk about innovation and organizational change without referring to the *objects* that are transformed. Whereas objects are defined *a priori*, what should not be predicted *a priori* is the outcome of such change.

Chia (1999) observes that Van de Ven's formulation of innovation rotates around changes *of* things, namely changes in the different dimensions of an entity. Yet, he questions this position, due to its privilege of substance over processes, defined a priori: change is not about "change of an object" (Chia, 1999:213), there is no object that changes, but everything is in movement.

Another key claim of process thinking in innovation has been an interest in the emergence of events throughout the innovation journey. For capturing processes of innovation, researchers need to focus on events and issues emerging in building an infrastructure for innovation (Van de Ven & Garud, 1993). This infrastructure refers to interactions among employees of an organization, various firms involved, industries,

and institutions in the public and private sectors. Their interrelation emerges through events, defined as:

> "[…] instances when changes were observed to occur in either the ideas, people involved, transactions or relationships engaged in, context, or outcomes of the innovation being examined over time." (Van de Ven et al., 2000: 39)

Through these events happening over time, across a variety of participants (users, trade associations, regulatory bodies, research and academic institutions, etc.), institutional capabilities, resource endowments, and technical economic activities are developed (Van de Ven & Garud, 1993). For example, a phase found in the development of the cochlear device (Van de Ven & Garud, 1993) was the "expansion period" following the creation of endowments and basic research knowledge appropriation by private firms. During this phase, several events occurred, such as an application submission of a pre-market approval for the cochlear device to the FDA, or the cooperation among companies to obtain financial reimbursement for the implantation into a patient of the cochlear device (whose cost was financially significant for one single firm), among others. Hernes (2008) notes that Van de Ven et al.'s (2000) events resemble Whitehead's to the extent that events are the nodes of complexities, of emergent processes, they are nexus of actual entities or, better yet, of "actual occasions" (Whitehead, 1929:113). For process thinkers in innovation (Van de Ven et al., 2000; Van de Ven & Garud, 1993) events are made of some central subjects, namely people (researchers, managers, and external stakeholders), relationships (between them), context (all those external circumstances, specifically structural conditions) and outcomes (whether the innovation was successful or not). Traceable changes in these subjects constitute an event. What is therefore needed according to this perspective is a coding of: people/groups and their roles in various activities over time; ideas of people

involved in innovation, over different points in time; all the relationships among people, whether formal or informal, and within or across the organization; and outcomes, i.e. the criteria of success of innovations (Van de Ven & Poole, 2000). Differently, for Whitehead (1929), events are the nexus of actual occasions: abstractions of actual occasions are what we define as things that exist in the world. In other words, what we name as a phone, a university, a State, a cochlear implant device, and so on, are just abstractions (labels, so to speak) that we create to make sense of the processes of the world. In other words, Van de Ven et al.'s (2000) approach can be seen as one of the process perspectives on innovation, a "weak" approach to process thinking in innovation that sees subjects as constant. Hernes (2008) suggests that to this "weak" approach can be juxtaposed a stronger process view of innovation:

> "On the contrary, it is perfectly possible that anything can change, including the central subjects, precisely because central subjects intervene in processes and are changed by their intervention. The subject changes because it is part of the process. The subject, it would be noted, is not a mere observer, nor it is the exclusive architect of the process. The subject is that which attaches meaning, takes part in the process and it is shaped by the process." (Hernes, 2008:51)

What a strong process view argues for is a less entitative approach to innovation. Following Van de Ven & Garud's (1993) example of the events in the making of cochlear device, a "strong" process view would instead emphasize how a single event, such as emergent FDA regulations, is in fact enactments of entangled forces of government, of researchers developing initial clinical trials on the cochlear device change according to the experiments run, their interactions with technologies and other subjects or materials (animals as testers, patients), their evolving participation, and changing environmental conditions in the laboratories, and so on.

1.3.2. Overcoming entitative innovation perspectives: an Actor Network Theory approach to innovation

Developing from these critiques on the still entitative character of process views on innovation, researchers informed by Actor Network Theory have developed a less entitative and more relational approach to innovation[13]. As Garud et al. (2013) note, at the time of the Minnesota Innovation Research Programme, studies on innovation were informed both by an evolutionary perspective on innovation (e.g. Dosi, 1982), but also by literature in Social Construction of Technological Systems (e.g. Bijker et al., 1987), and more generally actor-network literature (e.g. Callon, 1986; Latour, 1987). The latter focuses on the interplay of different actors in the making of innovation, and their ability to shape not only technologies but also the broader social context: what is important is to recognize the reciprocal shaping of social and material elements in the innovation process. An ANT approach views innovation as constituted by three major phases: invention, development, and implementation. Across these phases, different actors play distinct roles: firms create forums in which ideas flow, provide economic resources for ideas development, they offer the terrain for human skills development. Firms do not operate in a vacuum but in a complex industrial context, shaping communities; multi-party networks are constituted by different firms that cooperate or compete in developing innovations, so that implementation across networks takes more the form of a translation (Latour, 1987), rather than of mere adoption.

Garud et al. (2013) also find central in the three phases of the innovation process the entanglement of material and social elements: any change in the innovation process

[13] Hernes (2010) suggests that ANT approaches contribute in relation to three aspects central to process thinking: becoming of things, heterogeneous relationality, and contingency/time. He also argues that ANT is "an application of a process view to areas of technology, economics and organization, where a basic tenet is the emergent character of entities, and where ordering consists of the work of connecting entities in the making" (Hernes, 2010:163).

(changes in technologies, for example) has impact on other aspects, such as researchers' learning capabilities and their use of technologies (Geels, 2004). In other words, to understand fully innovation processes, actors including several stakeholders and their relationships must be contextualized historically, with particular attention to their roles and changing power across their relationships, but also in relation to their engagement over time with material objects. In these lines, matter involved in the innovation process needs to be understood as never stabilized, and always in movement. As an example, Garud & Munir (2008) suggest that the design of the S X-70 Polaroid was conditional to various tensions of different players, as well as societal-technological changes: inclusion of shutters, new electronics, integration of battery into film, were some of the changes in the design that Garud & Munir (2008) found to affect the production network as well. Different actors determine the choice of an innovation path over another: customers, ideas creators, and those in institutional organizations. And their roles and involvement changes throughout the innovation development:

> "To summarize, actors become interwoven into emerging technological paths that they shape in real time. In turn, the accumulating artifacts, tools, practices, rules and knowledge begin shaping actors over time (Giddens, 1979)." (Garud & Karnoe, 2003:281)

Social and material networks shape innovation; material and social mutually shape each other, they are entangled in such a way that environments are not given, nor actors are pre-defined; rather they are part of an ongoing process of construction. For example, the predominance of internal combustion engines vehicles over electrical ones (EV) in early 20th century and the emergence of EV as an appealing opportunity at the end of the same century (Garud & Gehman, 2012) was related to increasing governmental demands on lower carbon emission vehicles, a change in societal trends towards

attention to environmental friendly policies, changes in models of measurements of emissions, changes in infrastructures such as roads, gas stations, electrical docks, and so forth. Hence, what we see in the world, its road infrastructures, housing establishments, city outlooks, transport systems, reflect ever-changing frames of reference, as "actors carry and (re)produce the rules in their activities" (Geels, 2004:903). This means that frameworks on reality are contingent to the historic moment, but also its norms and pillars are re-produced, performed, and also contested, through daily actions of the people involved in innovation. In these lines, Geels (2004) uses the term of "socio-technical systems" to refer to the complex entanglement of social and technological elements: human beings inscribe a world view in artifacts, and at the same time technologies, or objects in more general terms, shape their identities, and the ways they perceive reality. On similar lines, Akrich et al. (2002a) describe the socio-technical analysis of the photovoltaic kits in Africa: the interplay among French industrialists, African researchers, government agency, users, batteries, and wires are all part of a "model of interessment" (Akrich et al., 2002a:205) capturing the links among them, which sustain an innovation's success or failure: balancing the relationship between human and non-human actors is what makes an innovation successful. From an ANT perspective, social and technical are symmetrical (Akrich et al., 2002b; Hernes, 2010):

> "[…] the form of a technical object is directly dependant upon on the identity of the actors who participate in its development and the nature of the relations which they maintain." (Akrich, 2002b:212)

As Akrich (1992) points out, part of the innovation process is the innovator's "inscribing" of a framework into technologies/objects. This is just half of the work. To this inscribing from the innovator side corresponds with a de-scribing from the user: the

meanings and views encapsulated in an object are teased out by the users, who make sense of objects in such ways that can confirm the in-scription or fail the original purpose (script) of the object. This implies symmetry between objects and social in the analysis of innovation, as there is reciprocal influence of humans over technologies, of norms over humans, and so forth:

> "But human actors are not entirely free to act as they want. Their perceptions and activities are coordinated (but not determined) by institutions and rules. […] On the other hand, actors carry and (re)produce the rules in their activities." (Geels, 2004:902-903)

As Garud and Rappa (1994) note, whereas a social constructivist perspective of innovation clearly shows how innovations are influenced by the institutional context, it does not tell much about people's beliefs on what would constitute successful innovation, and the alternative technological paths that could be followed. To a socio-material approach, Garud and Rappa (1994) propose a framework that connects social and cognitive perspectives to understand how an innovation, namely the cochlear implant, is constructed as the interconnection of artifacts, beliefs and routines of the people involved in the process. All this suggests that material, social, and cognitive elements are all entangled and influence each other in the innovation process. In the innovation process reciprocal interactions occur between beliefs and artifacts, beliefs and routines, routines and artifacts. Garud and Rappa (1994) noticed researchers' beliefs at 3M on the importance to increase safety and reduce the trauma in using a cochlear implant moved them towards developing a single-channel device shorter than the one developed by Nucleus. According to this socio-cognitive model, along with wider ANT approaches, social, material and cognitive elements are to be treated as ontologically distinct, yet interrelated, entities. Hence, despite the move towards a more

relational and stronger process perspective, recent advancements in ANT innovation literature still ontologically discern among various entities involved in the innovation process, therefore not taking a full process approach identified as highly promising above.

1.3.3. Implications of a relational approach: gender invisibility in innovation research

As mentioned in the sections above, a relational, dynamic view of innovation has developed fruitfully in the past decades. One of the key tenets of these studies has been the interconnection among actors, technologies, institutions, as well as cultural and societal arrangements, supporting the development of an innovation. Specifically, the "prevailing ideas of gender, health, and environment" (Kirsch, 2000:25, in Garud & Gehman, 2012:984) delineate whether an innovation process would be successful or not. This is consistent with wider ANT approaches to innovation, and the recognized role of societal-political-cultural frameworks in shaping innovation. As Fujimura (2006) finds molecular and human geneticists apply their frameworks of what constitutes gender, which they learned to be conceptualized in binary terms of male and female, on the identification of sex genes. Similarly, our frameworks on what constitutes innovation, its characteristics and the requirements for its creation and development are inscribed in the innovation process itself. Specifically, Fujimura (2006) notes that researchers working on *Sry* and *Dax-1* genes set binary gender and heterosexuality as the norm against which alternative forms -defined as "abnormal"- were neglected as published results. This tells us that:

> "Sex categories in particular operate within socially prescribed systems of meaning. Human and molecular geneticists use their own sociohistorically located normative

> definitions of sex to design their experiments on sex determination. As a result, new molecular genetic experiments on sex determination do not challenge the previously determined socially defined categories. Instead, they give material form to socially defined ideas. By selecting particular human bodies in the design of their sex-determination experiments, these geneticists have reproduced their own taken-for-granted categories of sex." (Fujimura, 2006:67)

Hence, it is indeed valuable to understand what innovation is framed to be, in organizations through practices and discourses, and to evaluate what ideas on gender, if any, emerge in the innovation process. This helps us to understand the embedded meanings attributed to doing innovation, and the ideas of gender attached to it, but furthermore to understand what gender identities are promoted throughout innovation processes and the consequences both for the people involved and for the innovation process itself.

Despite the increasing interest in gender at work and in innovation processes respectively, current research specifically looking at gender and innovation is still underdeveloped in management literature, as more attention has been given to women's entrepreneurship, femininities and masculinities in entrepreneurial activities, rather than a focus on gender dynamics in innovation processes. Some recent yet limited insights on gender and innovation have been offered in management literature[14] (Andersson et al., 2012; Danilda & Thorslund, 2011; Lindberg, 2007; Lindberg et al., 2012; Lorentzi, 2011; Petterson, 2007). The lack of research on gender and innovation is attributed to the absence of people, in favour of processes and organizations:

> "One of the reasons for the lack of studies taking a gender perspective to innovation, compared to for instance the increasing number of studies on entrepreneurship and

[14] See Special Issue on "International Journal of Entrepreneurship and Gender", 2013, 5(3).

> gender, is the apparent invisibility of people in innovation. While entrepreneurs are in the limelight in entrepreneurship research, the role of the innovator is under-communicated in innovation research (Brännback et al., 2012). When people are not visible in the discourse, gender easily becomes invisible. In general the literature presents innovation as taking place in processes, in corporations, as spin-offs from universities and in innovation systems, and does not give the innovator as such specific roles. However, this does not mean that gender is irrelevant to studies of innovation. The focus on results, processes and systems, and hence the lack of focus on individuals when it comes to innovation does not imply that gender is absent." (Alsos et al., 2013:215)

Furthermore, Alsos et al. (2013) note that most of the recent literature on gender and innovation gives scarce attention to organziational contexts. For this reason, the Special Issue on "International Journal of Entrepreneurship and Gender" (2013, 5[3]) aimed to address three formulations of gender in innovation literature: the gendered construction of innovation, gendering processes in innovation, and gender differences/similarities in innovation. The last refers to a body of literature keen in analysing gender differences in males and females in contributing to innovation and patenting, specifically in academia (Azagra-Caro et al., 2006; Bozeman and Gaughan, 2007; Cooper, 2012; Whittington, 2011), fostering awareness on the discriminations among women and men involvement in innovation activities. These studies found that despite the fact that women detain capabilities of being innovation-generators as much as their male colleagues, their voices are nevertheless seldom heard, and their contribution is perceived as marginal. Their invisibility is related to discourses[16] that exclude women as innovators and attribute to innovation a masculine character (Blake & Hanson, 2005;

[15] The available version of the paper was sent to me by the author and is her version.
[16] This refers to the first aspect discussed by Alsos et al. (2013): gendered construction of innovation.

Nälinder et al., 2012): gender inequalities hence stem from what is acknowledged as innovation and innovators by people involved in the process.

The second approach to gender and innovation, which sees them as entangled processes, sheds light on the ways gender and innovation mutually shape and transform each other (Alsos et al., 2013). This emerges in instances in which women "gender" products to create innovations, such as taking titatnium dioxide into cosmetics, as a raw material, and packaging the resulting cosmetic product in an appealing way for female customers (Poutanen & Kovalainen, 2013). A process perspective to gender in innovation therefore offers potentialities for including different/alternative types of innovation into the acknowldeged realm of innovation outputs (Alsos et al., 2013).

To summarize, a gender approach to innovation is a key facet in analysing innovation processes for the following reasons:

a. The inclusion of gender in innovation has proven to boost organizations' growth and enable a creative environment, when gender equality is addressed (Källhammer & Nilsson, 2012);
b. Gender equality creates more innovative organizations (Andresson et al., 2012);
c. A gender approach opens up to different ways of conceptualizing innovation, offering more inclusive definitions of what innovation is, namely not necessarily technological or scientific (Danilda & Thorslund 2011; Schiebinger, 2008);
d. An innovation expresses a particular view of the world (Andresson et al., 2012); by including a gender framework, it is therefore possible to understand what ideas regarding gender are embedded in notions of innovation, innovativeness, and innovators, and;

e. To understand which actors (types of innovators) are excluded from discourses and practices of innovation.

Despite the achievements of this body of literature in highlighting the centrality of gender in innovation processes, they encounter few shortfalls[17]. First, conceptualizations of gender are based on the opposition of male and female: in these studies gender is defined in binary terms as "women" and "femininities" (the marginalized), as opposed to "men" and "masculinities" (the dominant characters in innovation). This becomes problematic as gender is defined as oppositions among two genders, with a neglect of other forms of gender (transgenderism, queer, among others). Paradoxically, these studies, by attributing certain characteristics to the "feminine" and "masculine" re-create the very gender order they ought to dismantle. Second, whereas these studies abundantly explore discourses of innovation, they don't say much about what gender mechanisms are enacted in practice, in organizations, in the making of innovation. Most of these studies focus on policies for innovation at the regional (national) level (Andersson et al., 2010; Danilda & Thorslund 2011; Lindberg, 2007; Ljunggren et al., 2010; Pettersson, 2007), or on post-facto analysis of innovation creation performed by a female scientist (Poutanen & Kovalainen, 2013). What is therefore missing is an account of gender mechanisms in innovation processes occurring in organizational settings, to address the lack of research on gender and innovation in organizations (Alsos et al., 2013), and specifically in non-profit organizations (Petterson & Lindberg, 2013).

Building on such absences in the present literature, the next paragraphs outline the approach to gender used in this study, and the existing connections between a specific

[17] For a more in-depth review of the limits of current literature on gender and innovation see chapter V.

take on gender in organization and management literature -a poststructuralist feminist approach- and innovation as a process.

2. Gender as a conceptual lens

Feminist theories are "conceptual lenses" through which organizational phenomena can be grasped and understood (Calás & Smircich, 2006). Each theory among feminist thinking (post-structuralist, Marxist, post-colonial, liberal, radical, psychoanalytic) gives a different nuance to a phenomenon, frames problems differently, and offers different solutions. Yet, despite their nuances, feminist perspectives are always political. They are political as they aim to undermine the status quo, and foster change. Many voices exist among gender, and the choice of one voice over another is based on what that voice tells us more about the problematic we are addressing, but specifically about how gender is conceptualized.

One of the key aspects emerging in previous sections is a shared understanding, across innovation, and gender in innovation studies, of the socially, historically, politically, economically, and linguistically constructed frameworks (of gender, health, innovation, technology, and so on) embedded in innovation processes that make certain innovations success over others, and certain actors being included, over others.

For this reason, a theoretical lens on gender that captures the local and arbitrary constructions of gender is necessary. This type of approach is better represented by a poststructuralist approach to gender, which gives voice to power and knowledge relations among gendered identities, and to meanings attributed to different bodies; to not merely the ways in which gender is done, but specifically to the conditions and consequences of this doing.

The next sections aim to frame poststructuralist feminist theorizing, specifically in organization and management studies, by starting with a brief exposition of the heritage

of this approach, and the critiques in feminist theories it aims to address. Looking at the premise of poststructuralism feminism helps us to see the building blocks within feminist theories from which it departed, specifically the shift from a conceptualization of gender as an ascribed characteristic (as in standpoint feminism) towards gender as being dynamically constructed through people's sayings and doings. In the next section we can see how poststructuralist feminism re-elaborated the ways its precursors produced androcentric-oriented accounts of gender.

2.1. A legacy for feminist poststructuralist theory

Since 1980s, and especially in the 1990s, a growing body of literature (Butler, 1990; Martin, 2003; Czarniawska, 2006; Gherardi, 1995, 2005) has critically questioned a feminist standpoint approach in gender studies. Within feminist theories, feminist standpoint attributed a particular attention to women's perspective in experiencing reality, and set gender and power relations as central issues to be investigated. Feminist standpoint foundation lays in the epistemological resemblance with Marx's analysis of oppression in society, in this case applied to understanding and challenging the patriarchal order (Flax, 1990). This approach gives attention to the woman as a subject from whose standpoint researchers could gain challenging insights. The point of view of the oppressed (the woman) entails a conceptualization of the woman not as a subject damaged by her social experience (Flax, 1990), but as a privileged knowing subject: women have higher objectivity on reality acquired through life experiences, of denial and repression of their knowledge in the realm of scientific authority (Haraway, 1988). In this perspective, giving space to the oppressed could enrich boundaries of knowledge regarding the social world, inherently male dominated, due to the different type of knowledge women possess.

The idea at the root of feminist works in the 1970s was recognizing the legitimacy of women's experience, in opposition to a dominant view that often neglected the plausibility of women's positions and women's responses to their experiences (Alcoff, 1997). Standpoint feminism stands as a reaction to the appropriation of interpretations perpetrated by the androcentric scientific community. Feminists in the 1970s started conducting research based on women's incidents from the point of view of the women undergoing these experiences. The validation of women's feelings and lives became a node of attention of academics, beginning to suggest that events regarding women should be studied principally by women researchers. The contribution of women in researching women's experiences was believed to produce less distorted accounts:

> "The dominant conceptual schemes of the natural and social sciences fit the experience that Western men of the elite classes and races have of themselves and the world around them. Political struggle and feminist theory, they say, must be incorporated into the sciences if we are to be able to see beneath the partial and false images of the world that sciences generate. By starting research from women's lives, we can arrive at empirically and theoretically more adequate descriptions and explanations – and less partial and distorted ones" (Harding, 1991:48).

This perspective has been strongly contested by feminist theorists in the past three decades, namely for its "naively empiricist" approach (Alcoff, 1997). One of the main critiques to standpoint feminism is the perpetration of a gender ideology which is androcentric:

> "How can women confer epistemic authority on their own interpretation of experience without relying on a naive empiricist methodology? How can social criticism operate effectively within a climate of inherent ambiguity? How can women justify the epistemological relevance of a researcher's gender identity if identity is only an ideological construction?" (Alcoff, 1997:10)

Moreover, standpoint feminism has been defined as essentialist (Flax 1990), leading to critical political consequences: to define a unitary cause on gender identity against patriarchal domination leads to understanding gender issues in a monolithic way, therefore excluding those subjects that do not fall into the category of the women to which the theory addresses (e.g. women of race minorities, gays and lesbians, etc.). Such an approach has therefore been criticized for making "difference" a "deviance" (Butler 1990): standpoint feminist researchers could not see beyond their standpoint of white middle class women, leading to the exclusion of women of different cultural, social and economic conditions, and the construction of a unified epistemic point of view, limited to the researcher's conditions.

Despite its early uses for political action (the first feminist battles), the universal category of woman supported by traditional feminist standpoint discourse has been highly questioned by feminist thinkers (Stanley & Wise, 1983) in its validity as an ontological unity for political action as it tends to homogenize the woman's position, and underestimate the multiplicity of women's experiences. In the context of this thesis, it is important highlighting standpoint feminism's drawbacks, such as the monolithic way of approaching gender and its essentialist tendencies, as this piece specifically moves away both from an approach to research that privileges women's standpoint, and also from thinking of gender as a unitary category, thus reducing the multiplicity and complexity of differences among human bodies, minds and actions. A poststructuralist approach to gender instead allows us to grasp such multiplicities, specifically the eliminations of binaries (such as male/female), and of linguistic totalities (such as one single way of seeing discourse on masculinity or femininity) on which standpoint feminist is premised.

2.2. The poststructuralist turn in gender studies

Feminist critiques to the ontological status of the subject and the assessment of the centrality of the body in the process of knowing has lead researchers to re-evaluate the feminist standpoint project. This shift,

> "[...] has taken root within the humanities in the post-sixties, post-new left, post-Marxism period. Whether postmodernism[18] entails a repudiation of Marxism is still under review, but it clearly marks a shift away from previous understandings of Marxism, from any historicism, teleology, class-centered politics, or standpoint epistemology (the latter of which, we should remember, Marx was the first proponent)." (Alcoff, 1997:6)

In this wave, feminist theorists critically investigated the socially constructed nature of gender (West and Zimmermann, 1987), by neglecting the essentialist nature of the subject towards the consideration of a more relativistic approach to universal categories. Additionally, this shift meant abandoning a unity of the concept of gender in favour of an assumption of the existence of multiple and complex differences among human bodies, minds and their actions. The passage from standpoint towards poststructuralist feminism finds its roots in the increasing need to find a different, and methodologically stronger, explanation for the androcentric domination in knowledge creation and circulation.

I here turn to a clarification of the historical developments of post-structuralism, as it helps us grasping the key tenets about gender on which the entire thesis is premised. Historically, the turn from a feminist standpoint theory to a poststructuralist approach to gender can be traced to the linguistic turn in the Derridean critique (Derrida, 1974) from the attribution of an essential character to language, for which language is

[18] The term postmodernism is here equated to poststructuralism.

representative of the objects of our thoughts, towards a reformulation of language as a constitutive tool of objects. Language is not only an instrument through which an object is assigned a word, rather its role is more decisive as through language a variety of significances can be attributed to objects of our thoughts (Derrida, 1985). In particular, the attribution of a word to an object does not only represent the definition of the artefact itself, but it implies the composition of a "mental image" (Barthes, 1967:43) of that object. This image incorporates several meanings which are attributed to the word. For example, "woman" does not only represent a female actor, but it also addresses a specific set of thoughts, and a matrix of implications for women's everyday lives, according to the historical, cultural and social contexts in which this "woman" is located.

Jacques Derrida challenges Saussure's view on the importance of text and oppositions. For Saussure, the meaning of a text is the difference and opposition between the signifier[19] and the signified. For Derrida, the binary opposition identified by Saussure encloses strong limitations on social frames. Derrida (1985) uses as the key element of his elaboration of a semiotic post-structural analysis the concept of "deconstruction" of the text. Deconstruction criticizes the integrity of the text and calls for its fragmentation and multiplicity of meanings attributable to a text. Deconstruction does not erase structures in social life; instead, it offers a perspective through which they can be dismantled:

> "At that time structuralism was dominant. "Deconstruction" seemed to be going in the same direction since the word signified a certain attention to structures (which themselves were neither simply ideas, nor forms, nor syntheses, nor systems). To

[19] The signifier is defined as a spoken or written word; the signified carries along images and meanings of the signifier, of the word. The signified is a mental picture which is formed by the signifier: *"Saussure himself has clearly marked the mental nature of the signified by calling it a concept: the signified of the word ox is not the animal ox, but its mental image (…)*" (Barthes, 1967: 43).

> deconstruct was also a structuralist gesture and its fortune rests in part on its ambiguity. Structures were to be undone, decomposed, desedimented (all types of structures, linguistics, "logocentric", "phonocentric" – structuralism being especially at that time dominated by linguistic models and by so-called structural linguistics that was also called Saussurian -socio-institutional, political cultural and above all and from the start philosophical.) this is why, especially in the United States, the motif deconstruction has been associated with "post-structuralism" (a word unknown in France until its "return" from the United Stated). But the undoing, decomposing and desedimenting of structures, in a certain sense more historical than the structuralist movement which it called into question, was not a negative operation. Rather than destroying, it was also necessary to understand how an "ensemble" was constituted and to reconstruct it to this end." (Derrida, 1985:3-4)

Denial of a linguistic totality and binary oppositions of structures is at the core of a poststructuralist project, specifically in gender studies. This opened up the possibility of elimination of gender categories, and the rejection of a monistic subject. Nonetheless, abandoning a monistic ontology has been argued to lead to an inability of a unified political action which serves women's emancipation. Lawson (2003) has explicitly argued the debilitating power of the elimination of ontology for feminist action. Neglecting any form of ontology as the extreme of the refusal of an essentialist position, even if apparently strategically advantageous[20], could be damaging for the feminist cause. As a response, feminist poststructuralist perspectives attempted to maintain their political scope of action, by introducing a definition of gender which is flexible and malleable, along with a politics of heterogeneity (Flax, 1983). The shift from a standpoint theory on gender to a poststructuralist approach is a change in the

[20] For a more substantial knowledge of the possibility of the elimination of ontology for strategic purposes see: Harding, S., 1999. "The case for strategic realism: a response to Lawson", in *Feminist Economics*, 5(3): 127-133.

conceptualization of political action: from political action as factual, towards the understanding of this action as emerging from the destructuralization of the categories that sustain dominant gender discourses.

A poststructuralist approach connects well feminist theories and organizational theories[21]. In this thesis I delve briefly into the connection between poststructuralist feminist theories and organizational theories; a comprehensive literature review would exceed the scope of this thesis[22]. Post-structuralism emphasises the process of deconstructing subjectivity within a discursive order. Derrida finds feminist theorizing as a fruitful field for rupture and resistance to the essentialist and logocentric dominant discourse (Alcoff, 1988). The Derridean deconstructionist approach in conjunction to

[21] A more detailed account of the interrelation between organization theories and feminist theories can be found in: Gherardi, S., 2005. Feminist theory and organization theory: a dialogue on new bases". In Tsoukas, H., and Knudsen, C. (ed.). *The Oxford Handbook of Organization Theory*, Oxford: Oxford University Press.

[22] To briefly summarize, poststructuralist feminist approach has been widely adopted in organization studies literature (Alvesson & Billing, 1997). Specifically, many areas of feminist concern emerge in management literature, and traditional concepts have been revisited in light of a feminist poststructuralist approach: work-life balance or work and family roles (Gregory & Milner, 2009; Watts, 2009), women and men in gendered professions and organizations (Ahuja, 2002; Gillard et al., 2007: Guerrier et al., 2009, Gherardi & Poggio, 2001), gender and professional self (Bruni & Gherardi, 2001), women and managerial work (Eriksson et al., 2008; Whitehead, 2001; Priola, 2007), linkages between forms of masculinity and femininity and work practices (Bruni et al., 2004a; Martin, 2001; Powell et al., 2009), gender issues and effects in group performance and team-work (Fenwick & Neal, 2001; Myaskovsky et al., 2005; Metcalfe & Lindstead, 2003).
The main claim of these studies is the importance of taking into account a gender dimension in organizational life: gender is present in everyday work interactions, therefore we cannot think of organizations as gender neutral (Kelan, 2010; Martin, 2003, 2006; Fenwick, 2008; Tanggaard, 2006; Powell et al., 2009; Gherardi and Poggio, 2001; Cozza, 2008; Bruni & Gherardi, 2001). Following this line of thought, Gherardi (1995:169) notes that through work individuals create material products and social relations, that every work role is gendered and represented within gender relations which actively define rules of behaviour. Gender is an activity performed and negotiated through social interactions (West & Zimmerman, 1987). Therefore, power relations among differently gendered actors and power exertions in the definition of a shared conceptualization of gender acts are crucial themes of interest for feminist poststructuralists. As Poggio (2006) and Czarniawska (2006) argue, practicing gender is mostly an unconscious activity which involves tacit knowledge and a shared definition of gender practices, roles and expectations. Instances of power emerge through discourse (Bruni, et al. 2004) and language (Holmes & Meyerhoff, 1999; Eckert & McConnell-Ginet, 1992, Gherardi, 1995): it is through language, but also through "body positions, speech acts, reflexive processes, and other performative behaviour including consumption and production itself" (Borgerson, 2005:68) that individuals position themselves in a gender oriented context, and it is within dominant discourses that gender belonging and expectations are constructed. Yet, Eckert & McConnell-Ginet (1992) note that meanings attributed to linguistic forms are reinforced in daily practices, whilst they are never uniform and nor controllable. Moreover, language is relational: meanings created by it are a product of interactions and interdependency (Gherardi, 1995). Language is central for poststructuralist feminists in organization studies; language is the locus of power exertion and resistance to it.

the questioning of the essence of gender has lead feminist theorizing to the reformulation, de-construction and de-essentialization of "women". The woman is no longer the *other*, towards whom male's desire is oriented; the subject woman is no longer a unity, a unitary projection as it was for Hegel (Butler, 1987). Rather, it is always challenged by the multiplicity of affective experiences, by the different involvements in ordinary life. This opens up to several ways of understanding doings and experiences of gender and desires. Nonetheless, this approach fosters the woman as ungraspable and un-determinable entity[23], leaving little space of manoeuvre for individual action (Alcoff, 1988). This leads to a total negativity of the existence of the category, with the risk of getting trapped into "de-gendering" the subject. Lawson (2003) draws attention to the criticality of eliminating a gender category for the feminist programme. Yet, the problematization of this category as unitary and internally coherent (Butler, 1993) does not elude the possibility of tracing communalities in women's experiences. Intersectionality of different dimensions, such as genders, races, classes and sexual orientations has been developed in current gender literature, as a solution to nominalism (Calás & Smircich, 1993; Calás & Smircich, 1996; Holvino, 2010).

To summarize, this section aimed to clarifying the roots of a poststructuralist feminist approach, on which this project is premised on. Specifically, I illustrated how poststructuralist feminism came as a reaction to monolithic and essentialist approaches to gender, and how the linguistic turn helped feminism to deconstruct subjectivity within a logo-centric and androcentric gender discursive order. The next section elucidates how poststructuralist feminism deconstructed the binaries which are at the premise of a standpoint approach. This is relevant for the thesis as it illustrates the

[23] Alcoff (1997) refers to this as the problem of a "nominalist" approach to gender.

existing traces of specific dichotomies (such as male/female, femininities/masculinities) in gender studies, and how we can, in practice, overcome them, by using an approach such as the one Judith Butler offers.

2.3. The arising interest in de-constructing binaries and hints to the concept of performativity

To address the importance of de-constructing binaries, poststructuralist perspectives have adopted as political force of their action the body, as the locus of knowledge. The Cartesian view on the body, as an element subjected to the mind, is rejected in poststructuralist feminist theories. The Derridean shift in gender studies has seen the elimination of "innate gender differences", as well as the consideration of bodily acts as constitutive of gender identity. The body has become a central element in the formation of the subject, as a "materializing of possibilities" (Butler, 1988: 521), as impregnated by meanings. This entails that the body is not only expression of meanings, but contains meanings, norms, discourses and power:

> "Body is a site where regimes of discourse and power inscribe themselves, a nodal point or nexus for relations of juridical and productive power." (Butler, 1989:601)

The body is a "historical situation" (Butler, 1988:521) in continuous doing, which differs from subject to subject, that takes place in multiple historical contexts. Butler applies a radical acceptation of phenomenology to the constitution of gendered body in the sense that:

> "In order to describe the gendered body, a phenomenological theory of constitution requires an expansion of the conventional view of acts to mean both that which constitutes meaning and that through which meaning is performed or enacted. In other words, the acts by which gender is constituted bear similarities to performative acts within theatrical contexts. My task, then, is to examine in what ways gender is

> constructed through specific corporeal acts, and what possibilities exist for the cultural transformation of gender through such acts." (Butler, 1988:521)

Therefore, phenomenology allows us to understand the body as the site of meanings but it does not attribute to the body a performative character. This is the criticality Butler identifies in a phenomenological approach to gender formation. The key aspect of agreement for Butler with the phenomenological tradition is in the identification by Merleau-Ponty of a body which is impregnated by meanings expressed in its habits and doings. The phenomenological approach locates experiences inside the cultural and historical dimension. Butler's critical phenomenological position sees boundaries of differences not in essentialist terms (therefore not conceiving differences as oppositions) but as:

> "[…] constituting each other's intelligibility through performativity, reiteration and foreclosure." (Borgerson, 2005:76)

Adopting this particular view on the phenomenology of acts, subjects are not constructed prior language, but as materiality through which these acts are performed. The repetition of acts is stylized (Butler, 1990), and it defines the subject's identity. Since this repetition occurs over time, it implies instability of this identity as over time such repetition can be modified and contested: through bodily acts a gendered self is formed. In other words, the use of body for appropriation and re-elaboration of femininity/masculinity is for example rather evident in transgenderism: a feminine/masculine bodily act is used to create a particular gender identity radically that contests the dominant conceptualization of feminine/masculine, so to open up to alternative gender forms. This leads to conceptualizing gender as performative, as a repetition of acts over time. This is relevant to my thesis as one of the aspects that will

be illustrated is how a specific gender identity in innovation processes is constructed through repetitions of doings and sayings at work that affect the people involved.

2.3.1. Performativity as citational practice: Engaging Butler

Judith Butler identifies the difficulty of defining what performativity is; from Austin's speech acts theory, a plethora of approaches to performativity have flourished. Butler (1997) recognizes the role of Austin's distinction between "illocutionary" and "perlocutionary" speech acts, and specifically how perlocutionary speech acts have consequences for the actors involved. For example, the expressions "it's a boy" or "it's a girl" of a doctor determining the sex of a foetus can be understood as a perlocutionary speech act. For Butler (1988), a perlocutionary act, as for example "it's a boy/girl", is not only a speech act of *someone* entitled to speak. Thinking performativity as exhausted by a speaking subject is, for Butler, misleading, as what is said has consequences for other humans and nonhumans involved. A Butlerian approach to saying "it's a boy" would see this act as performative to the extent that it establishes a set of consequences for the baby and their family, such as expectations on the body configuration and measurements of the foetus, the choice of the name, design of room, selection of clothes colour, and so on. Hence, performativity is not an act of a single individual; rather performativity is:

> "[…] a repetition and a ritual, which achieves its effects through its naturalization in the context of a body, understood, in part, as culturally sustained temporal duration." (Butler, 1990: XV)

Performativity is a framework which rejects culturally constructed categories and "describe(s) a set of processes that produce ontological effects" (Butler, 2010:147). Butler defines performativity as "citational practice" (Butler, 1993:2); a becoming, a set of activities, rather than nouns (Butler, 1990).

This thesis takes performativity as a key concept in the understanding of gender dynamics in innovation, and in providing a more nuanced account of innovation as process. A Butlerian performativity enables us to grasp *i)* the doings and sayings enacted at work, *ii)* how these doings and sayings produce and re-produce specific norms on gender at work, *iii)* what these doings and sayings enable us to see, and specifically, who they allow to do and say, *iv)* what these sayings and doings allow but specifically what they foreclose, *v)* therefore who (what specific acceptations of gender identity, and what gendered bodies) they marginalize and exclude.

Gender performativity materializes through the body (Butler, 1993); in other words, people use their body to articulate and express a gender identity. Yet by doing so, they reproduce the norms around a certain conceptualization of gender, such as the binary opposition of male and female. These norms come to be questioned, through the body, when alternative performances are enacted, particularly when the body is used to express and affirm different gender identities. Judith Butler's notion of performativity stresses the reiteration of social norms through the expression of the body, and the cultural arbitrariness of the construction of identity. Specifically, the body is the locus of inscription of social norms and their experience, and, simultaneously, it is the space for their modification and resistance:

> "In other words, acts, gestures, and desire produce the effect of an internal core or substance, but produce this on the surface of the body, through the play of signifying absences that suggest, but never reveal, the organizing principle of identity as a cause. Such acts, gestures, enactments, generally constructed, are performative in the sense that the essence or identity that they otherwise purport to express are fabrications manufactured and sustained through corporal signs and other discursive means. That the gendered body is performative suggests that it has no ontological status apart from

> the various acts which constitute its reality. This also suggests that if that reality is fabricated as an internal essence, that very interiority is an effect and function of a decidedly public and social discourse, the public regulation of fantasy through the surface politics of the body, the gender border control that differentiates inner from outer, and so institutes the "integrity" of the subject." (Butler, 1990:185)

For Butler, gender is performative to the extent that an assignation of a gender to the body is persistently repeated over time. Performativity is not a doing: performing gender does not mean that gender is done by an individual a-priori defined (Butler, 1990); rather, performativity is the basis and the effects of doings that are culturally sustained over time. Gender is performative as the "internal essence of gender" (Butler, 1990: XV), an internal psyche, is constantly expressed and sustained through gendered stylized bodily acts. The process of interiorization of this "essence" is therefore the place of resistance, through dismantling and reformulating the sequential repetition of these acts, and the meanings carried out through them. These acts are reproduced, modified and contested over time in accordance to some restrictions which render gendered bodies culturally constructed through sanctions and tacit conventions (Butler, 1988). The bodies which do not perform accordingly to the implicit social norms are punished; tacit laws that determine corporeal actions do emerge and significantly play a role in regulating deviant acts. For political action, the question is whether and to what extent these acts -defined through the social, cultural, and historical context- reciprocally undermine the legitimate status of their existence and foster a renegotiation of legitimate normative bodily acts. These acts range from the more manifest use of specific clothing, to the ways bodies move in the public sphere, through spaces, delineating gender identities and reaffirming power relations and feeding discourses on gender.

Butler sees phenomena (e.g. gendering) as performative, as on-going processes shaping the "I", the "we". This rejects an entitative approach to reality which supposes entities pre-existing their actions, and as acting in specific time and space configurations. In this sense, Butler takes a Nietzschean approach to gender identity: saying that gender is performative means to recognize that there is no pre-constituted person behind doings, that is to say:

> "There is no gender identity behind the expressions of gender; that identity is performatively constituted by the very "expressions" that are said to be its results." (Butler, 1990:34)

What we see as "expressions" of gender are gender manifestations through the body, artefacts, and the self; no pre-constituted being is behind these expressions. To summarize, for Butler performativity -and specifically gender performativity- is:

> "[…] not a singular "act", for it is always a reiteration of a norm or set of norms, and to the extent that it requires an act-like status in the present, it conceals or dissimulates the conventions of which it is a repetition." (Butler, 1993:12)

Through performativity power is enacted, norms are re-affirmed or disguised, reshaped, divisions are made among intelligible identities and bodies that do not matter. Performativity in this sense is strictly human: although Butler focuses on the role of the body -whether we can think of it as purely matter- yet it is thought as the locus of performative acts, which are always human (Burkitt, 1999; Thrift & Dewsbury, 2000). Such a Butlerian reading of gender is specifically relevant to this thesis as it embeds political power, that is through bodily acts existing conceptualizations of gender identities are not only performed but can also be subverted. Thus, Butler helps us to open up to the ways our doings and sayings marginalize specific gender identities,

exclude some gender experiences for people involved in innovation processes, such as the parental experience, as we will see in chapter V.

Despite its political power, such an approach contains some criticalities. First, Butler is mainly concerned with people and their bodies; her view is anthropocentric, overlooking the role of objects in making one's gender identity. Specifically, her approach does not tell much about how objects come to be embodied in performative acts, how bodies -human or nonhuman- intervene in the performance, whether matter is the result of human activity, hence being completely social. Barad (2007:64) summarizes as follows the main shortfall of Butler's approach:

> "In other words, while Butler correctly calls for the recognition of matter's historicity, ironically, she seems to assume that it is ultimately derived (yet again) from the agency of language or culture. She fails to recognize matter's dynamism."

Specifically, Butler's performativity has been fundamental in feminist theorizing for questioning sex/gender binaries and for its recognition of matter (e.g. the body) as the site of change[24]. Her contributions extend to the re-conceptualization of the notion of agency, as traditionally opposed to structure. For Butler the body (matter in general) is historically and contextually dependent, as its form is shaped through negotiations of social norms over time. Yet, this implies that culture (and language) shape matter, therefore seeing agency as part of human action through discourse. Nonetheless, Barad (2007) notes Butler's account on matter fails to recognize the dynamic nature of agency, and agency belonging not only to culture and language, but to matter itself. In other words, Butler's perspective does not take into account how matter (body, technological artefact, and so on) acts and contributes to shaping phenomena:

[24] Change performed by some human actor.

> "How might we understand not only how human bodily contours are constituted through specific psychic processes but also how even the very atoms that make up the biological body come to matter, and more generally how matter makes itself felt? It is difficult to imagine how psychic and sociohistorical forces alone could account for the production of matter." (Barad, 2007:66)

To integrate Butler's strictly humanist account of performativity and inattention to matter's agency (as above, how atoms themselves act in shaping phenomena), Barad introduces the notion of "posthumanist performativity" (Barad, 2003). Post-humanist performativity recognizes the role of material-social forces in shaping phenomena. Analytically, this implies considering geopolitical, economic, social, biological, physical, historical elements that produce the phenomenon the way we see it as part of its constitution.

In other words, when looking for example at innovation in an organizational context, a Baradian reading of innovation would see it not as an outcome, but as an entangled process. Such entanglement is not only, as an ANT theorist would argue, made of people, technologies, institutional bodies, and regulations, but also by the very materiality of these elements. A Baradian approach would bring into light how specific human bodies react to certain technological artefacts, how such reaction is embedded in current legislation or work practices, how the reaction of matter through experiments shapes test results and the people involved in it, and so on. This is consistent with a strong process approach to innovation, as it looks at all "elements" involved not as fixed entities, but as in continuous movement and never accomplished. Such a Baradian reading of innovation would therefore augment the description of the complexity of the

innovation process, by elucidating not only the networks among entities[25], but how their substances (atoms, physical appearance, etc.) are emergent, contingent, shaped in the process so that no distinction among substances and phenomenon can be made.

I now turn to the details of a Baradian agential realist approach, showing its implications for the purpose of this thesis.

2.3.2. Engaging Barad

Barad defines her framework as "agential realism", to denote an approach that sees phenomena, rather than objects, as constitutive of reality, therefore resembling a strong process approach, as described in previous sections:

> "The point is that phenomena constitute a non-dualistic whole so that it literally makes no sense to talk about independently existing things as somehow behind or as the causes of phenomena." (Barad, 1996:176)

Her agential realist approach implies looking at reality is a way that transcends dualisms, such as culture/nature, mind/body, social/material, physical/conceptual, and so on: "Phenomena are material-cultural be-in's" (Barad, 1996:181).

Despite the commonality with a poststructuralist feminism and ANT framework in eliminating binaries, a Baradian agential realism is distinct from both approaches as it sees matter as active and agentive, not as merely containing inscriptions from actors:

> "Matter is not mere stuff. It is not an inanimate giveness. Matter is not in need of some supplement to put it in motion, to enliven it, to give it agency. […] it is not an inert canvas for the inscription of culture and meanings, a static thing without memory, history, or an inheritance to call its own. It is not simply some thereness available for

[25] As we will see in the next paragraphs, there is not so such idea of "networks of entities" in Barad's conceptualization of performativity.

> the making. A mere backdrop to what really matters. Matter is a substance in its iterative intra-active becoming –not a thing, but a doing, a congealing of agency. It is morphologically active, responsive, generative, articulate, and alive." (Barad, 2013:17).

Matter is not passive; matter is actively engaged in shaping "things in the world". This relates to another key distinction from ANT. Barad re-works the concept of "interactions", specifically in the way it has been conceptualized by ANT theorists, mainly (for the scope of this thesis) in innovation literature. Drawing on Niels Bohr's advancements in quantum physics and atom constitution, Barad affirms that:

> "There are no separately determinate individual entities that interact with one another; rather, the co-constitution of determinately bounded and propertied entities results from specific intra-actions." (Barad, 2013:22)

This has several implications. The first refers to the inseparability between all entities in constructing a phenomenon. This is to say that what we come to define as for example "innovation" is not the result of evolving interactions among various entities, as ANT approaches would instead argue; moreover, innovation is not an object itself. The phenomenon (innovation) is not made up by pre-defined, pre-constituted entities (such as national legislation, stakeholders, researchers, governmental institutions, and so on). Rather, what has been defined by ANT theorists as distinct entities interacting, are rather entangled agencies, never separable. Specifically, the word "intra-action" denotes:

> "[…] the mutual constitution of objects and agencies of observation within phenomena (in contrast to "interaction", which assumes the prior existence of distinct entities). In particular, the different agencies ("distinct entities") remain entangled." (Barad, 2007:197)

Therefore, there are no pre-existing entities of a phenomenon; rather, "phenomena are ontological entanglements" (Barad, 2007:333). To explain this key point in her account, Barad draws on the Schrödinger cat paradox and highlights how cat and atom, in the observed phenomenon, are entangled to each other so that the condition of one (whether the cat is dead or alive) is dependent on the condition of the other (whether the atom has decayed or not). Barad (1996) explains her refusal to use the word interactions to connote entanglements, such as the one between cat and atom. In her view, there are no things existing before acting:

> "Since there is no sense of two things interacting, I have introduced the term "intra-action" to avoid reinscription of the contested dichotomy." (Barad, 1996:179)

Therefore, we cannot think of the cat and atom in the Schrödinger's paradox as separate entities existing before their entanglement: the cat's existence (or fate) is strictly dependent and linked to the one of the atom (also mathematically, in the wave function system including cat and atom[26]). Barad (2007) goes further in defining entanglements. She notes that no separation between the phenomena studied and the persons studying them, namely the "objects" and the "agencies of observation" can be made: they are all part of the entanglement. Let's look back at the Schrödinger cat paradox. When an observer attempts to measure the experiment by opening the device, the recorder becomes part of the entanglement instead of solving the dilemma of whether the cat is dead or alive, or whether the atom has decayed or not (Barad, 2007): the measuring system becomes part of the phenomenon so that the borders of "individual sub-systems" (namely cat and atom) are blurred.

[26] See Barad (2007:278) for further details on the mathematical function, inclusive of cat and atom.

In line with these key points, Barad's agential realism re-defines the concept of entanglement of time and space. Whether in current innovation literature time is seen as the sequential unfolding of events, occurring in specific locales, for Barad "neither space nor time exist as determinate given outside of phenomena" (Barad, 2007:383). To say that phenomena are entanglements (e.g. the wave function is an entanglement, innovation is an entanglement, gendering is an entanglement) means that they cannot be located in time and space[27]. This contains a political power: entanglements can be made, undone, and accounted for, in such way so to potentially produce phenomena differently. As Butler points out in her definition of performativity, we do not mirror learnt norms on gender identity, we don't act in mimesis, rather we can creatively undo these norms, or make them different, and maybe more justly?

To the term reiteration (a citational practice, for Judith Butler), Barad prefers the word "diffraction". Diffraction is a phenomenon in physics that for Barad (2007) can be used to think critically on several aspects. "Diffraction" extends the notion of Butlerian reiteration, as it spawns outside theoretical implications of the concept (such as the ones related to gender identity for Butler) to also methodological ones, namely its effects in the research practice and its difference from the concept of "reflexivity", as in ethnographic research[28]. Moreover, diffraction is not only linked to language and discourse, as the concept of reiteration for Butler is (again, something strictly human); rather, by being an optical phenomenon, diffraction is engrained in matter first and furthermost. Barad (2007) notes the concept of diffraction has been previously used, more or less overtly, by feminist science thinkers (namely, Haraway, 1997; Harding,

[27] Is gendering occurring at the time of the observation or has it been already there, in other forms, or somewhere else before, in the same way? How can we grasp time and space of a phenomenon when its contours are continually evolving?

[28] See chapter III for a more in-depth account of diffraction as complementary to reflexivity in qualitative research.

1991; and Rouse, 1996) to introduce social factors (such as gender, race, ethnicity, etc.) in shaping scientific practices.

To summarize, Barad's agential realist approach rejects dualisms, such as culture/nature, mind/body, social/material, thus aligning with the wider poststructuralist feminist project. Specifically, her notion of intra-action, as different from interactions, re-affirms the inseparability of all entities that constitute a phenomena and the inexistence of an essentialized subject before any its actions and relations with other people and objects. In innovation this has specific repercussions; specifically "innovation" is not the result of evolving interactions among various self-existing entities (form an ANT perspective), but of entangled agencies, never separable. As another consequence, Barad's agential realism re-thinks the role of time and space in shaping a phenomenon, and specifically re-looks at time in innovation processes not as a sequential unfolding of events, but as not located in a specific time and space. I concluded by suggesting that a Baradian approach enhances the political power of a Butlerian lens: entanglements of elements constituting a phenomenon can be done and undone in ways that can open up alternatives and differences.

In the next section, I show how the two theoretical frameworks, a poststructuralist feminist approach, combined with Barad's agential realism, and a process ontology are entangled together and how such connections can shed light on gender, innovation, and ethnography at work.

3. Taking a step further: intertwining poststructuralist feminism, process ontology, and agential realism

I here engage in bridging poststructuralist feminism, process ontology, and agential realism, and specifically argue that Barad's agential realism extends and merges existing key points in both perspectives, by developing a more dynamic approach to performativity, re-positioning as central the role of non-human agency in shaping phenomena, offering a view of phenomena as fluid entanglements, re-conceptualizing the role of time, space, and matter, and refusing an essentialist approach to identity.

As previously discussed, process ontology understands the world as a continuous flux of processes, rather than entities, always in a perpetual motion, never accomplished (Hernes, 2008). This implies taking distance from stability (Tsoukas & Chia, 2002), to see everything in the world, from organizations, individuals, networks of people, technologies (paradoxically, nounmaking is necessary for explicatory purposes), as a flux of interactions, a stream of processes, on-going initiatives. This means to see for example a woman, not just as a person with a specific sex designation, engaged in various activities, such as balancing work and family demands. Rather, process ontology would view "woman" as an arbitrary portion of a wider social world. Woman "is" what she does in relation to others, and as everything in the world is in continuous movement, what a woman "is" now, is not the same as what she "will be" in a consecutive or "has been" in a previous point in time, so to speak. Also, what a woman "is" is just our "abstraction", in Whitehead's terminology (Bakken & Hernes, 2006), of a process forming this "woman". What we call "woman" in a process perspective would be just our label for indicating emerging gendering processes. Similarly, poststructuralist feminism, in the voice of Butler (1990:xxxi), would see "woman" not as a natural fact, rather as "cultural performance", as constructed and defined by

normative forces -social, cultural, political- which is historically dependent and intersecting race, class, ethnicity, sexuality, and so on: woman is not a coherent and stable subject. With gender, as with many other concepts, Butler (1993) does what a strong process thinker, or at least one who takes on Weick's sensemaking approach, would do: transforming *gender* (a noun) into *gendering* (a verb). Butler's intentions are to show that gender is a process, not a prescribed characteristic assigned to individuals that pre-exist their gender:

> "For if gender is constructed, it is not necessarily constructed by an "I" or a "we" who stands before that construction in any spatial or temporal sense or "before". Indeed, it is unclear that there can be an "I" or a "we" who has not yet been submitted, subjected to gender, where gendering is, among other things, the differentiating relations by which speaking subjects come into being. Subjected to gender, but subjectivated by gender, the "I" neither precedes nor follows the process of this gendering, but emerges only within and as the matrix of gender relations themselves." (Butler, 1993:7)

For Butler "gender" is not a stable identity, as it is not done once for all by the entanglement of socio-cultural-political-economic norms. Rather, gender is a continuous process of negotiations, of performances which occur through bodies (Butler, 1988): what we define as masculinity and femininity is part of emergent frameworks on gender. These ideas of gender are never stable, as they are reproduced by, and at the same time produce, individuals. As a consequence, any category, such as the one of gender, or sex, needs to be problematized. Barad's (2007) agential realism can be translated as extending this entanglement from the socio-cultural-political-economic-geographical facets, to also the researcher's frameworks. By introducing the notion of ontological inseparability (namely the measurement issue in the

Schrödinger's cat paradox), Barad negates ontological distinction between subject and object, observer and observed, social and material.

What we grasp as "gender" in our research endeavours is nonetheless dependent on our frameworks, our understandings of it. If we consider gendering in innovation as our phenomenon to observe (namely the wave function in Schrödinger's cat paradox), and ourselves as researchers (the measurement agents in the paradox), then we must acknowledge our entanglement with gendering, once we start observing it. Such entanglement is not only related to a problem of how we measure what we observe, nor is it matter of accounting for our influence/power on it (as "reflexivity" in ethnography would suggest). Rather, part of this entanglement is our framework on gender, as we have learnt it through our experiences in the world and at frayed university desks, which shape the observed gendering processes (and not only our *post-facto* interpretations of it).

On another level, similarities and differences can be drawn between process approaches to innovation, such as the ones develop by ANT oriented researchers, and Barad's agential realism. Specifically, in the next paragraphs I outline how the concept of "enrolment" connects with "performativity", and more generally "agency". Exploring these connections is key to see the crossings among the theoretical frameworks sketched above, and to shed light on the existing, yet overlooked, dialogue among them.

When Akrich (1992) outlines the concept of enrolment, she refers to a process in which an object is constructed by a variety of forces enacting some sort of action on it. Akrich denotes two key aspects involved in this process. Firstly, she considers enrolment as the expression of the objects' embodiment of relations among different elements. Enrolment in this articulation contains sets of "multilateral negotiations" (Callon, 1986:

211) among actants. Secondly, a notion of action pervades this process. Agency becomes central in Akrich's visualization of the process of enrolment of objects: objects contain (embody) and at the same time "measure" sets of forces (relations, networks) existing among elements. For Akrich objects are at the same time containing and constructing relationships among actants. Again, agency plays a central role in this definition. Furthermore, Akrich (1992) questions the roles objects play in this construction and embodiment of relations, attributing agency to objects in two senses: on one side, objects constrain actants in their relation to the objects themselves and to other actants; on the other, these networks among actants perform (reshape) objects and their use. This is consistent with Barad's (1996) agential realist view for which non-human matter enacts agency:

> "There are three important points that we can take from this passage: (i) nature has agency, but it does not speak itself to the patient, unobtrusive observer listening for its cries – there is an important asymmetry with respect of agency: we do the representing, and yet (ii) nature is not a passive blank slate awaiting our incriptions, and (iii) to privilege the material or the discursive is to forget the inseparability that characterizes phenomena." (Barad, 1996:181)

These key points are useful if taken and adapted into the innovation domain. In fact, enrolment in the dual connotation highlighted previously allows for a better understanding of innovation in process terms. Moving from Akrich's first conception of enrolment, objects enrol networks among actants. It is interesting to notice how objects (technological, material, and discursive) are part of humans' relations with one another and with objects themselves, in the making of innovation. The above discussion suggests that innovation is the necessary process through which relations among actants

emerge. Furthermore, the innovation process contains a performative dimension as it results from these relations (networks) but also (re)configures these relations.

Some important issues are raised here: what are these relations about? What actants are involved in these networks; and how do they constitute them? Furthermore, how are these networks constitutive of actants? Following this and taking into consideration Akrich's second articulation of enrolment, the focus moves on to actants and their networks as constitutive of the innovation process itself through the ways they define materiality of all kinds, by shaping and making innovation, and in setting constraints to the innovation process.

To summarize, enrolment as an analytical viewpoint nurtures an understanding of innovation grounded on the different roles of objects and of networks among actants shaping their reality and defining the innovation process. It also puts agency at the centre of attention in the making of innovation. In this sense the notion of enrolment enriches the analysis of the ways the innovation process and the actants involved in it are mutually constitutive. This makes the concept easily connected to the idea of performativity. We see from this how both Madeline Akrich and Karen Barad discuss extensively the performative dimension of human and nonhuman agency, even if in different terms. For the purpose of the thesis, it is fundamental to clarify what and whose agencies the two perspectives refer to, as one of the key aims of the entire piece is to engage with the ways the entanglement of agencies, and their performative actions shaping both innovation processes and gender identities, have effects for the people involved.

Akrich and Pasveer (2004) elaborate an analysis of the performative dimension of technology and medical practices on the pregnant body. Their approach is centred on the elimination of the Cartesian scission between body and mind, materiality and

emotions, the body and the self ("embodied self" is the term used to reduce this dichotomy). They also refer to the importance of unfolding and identifying different entities involved in the making of a phenomenon. While in their study that is the childbirth experience, we will see in chapter IV how this can be extended to innovation processes. It can be therefore argued that such entities are crucial in the making of innovation, with innovation defined as the result of the "relations between various entities, themselves defined through this process" (Akrich and Pasveer, 2004:65). The common ground with Barad's performativity is first a notion of agency that pervades both Akrich's enrolment and Barad's performativity, and second a rejection of the existence of "faits accomplis" (Langley & Tsoukas, 2010) as constituting a phenomenon.

Barad's performativity refuses representationalism thus taking into account Actor Network Theory's and Butler's ontological stands on the rejection of *a priori* constituted entities, and is hence similar to Akrich's perspective. In Barad's view, that resonates with that of Butler, identity is a doing and not an essence; there exists an elimination of the contraposition between agency and structure; it understands subjects as historically constituted (as iterative citationality, which Butler derives in turn from Foucault); and emphasizes regulatory practices (a constitutive outside). Nonetheless, Barad highlights a key missing point in Butler's view: the consideration of matter's dynamism. In Barad's opinion, Butler limits matter's historicity as being derived from agency of language and structure. Barad (2007) rejects this, as it assumes that matter is merely a product. Instead, she sustains, materiality needs to be enhanced and brought into the discourse on power, as materiality plays a crucial role in its workings:

> "What is needed is a robust account of the materialization of all bodies - "human" and "non-human" - including the agential contributions of all material forces (both "social" and "natural")." (Barad, 2007:66)

Agency, for Akrich, is the action undertaken by actants -or to which actants undergo. Actants are for Akrich of various types; they are heterogeneous elements. Here the link between Akrich's and Barad's perspectives on agency becomes clearer: Akrich's heterogeneous elements can be seen as Barad's (2007) "agentially intra-acting components". Both terms are founded on an understanding of agency as constituting them. According to these two perspectives, intra-relating elements contribute to -and are part of- the phenomenon: "phenomena are the ontological inseparability of agentially intra-acting components" (Barad, 2007:33). For Akrich (Akrich and Pasveer, 2004:68), the body, actors, the mirror, etc., constitute the phenomenon "as an acting entity". Accordingly, for Barad (2007:197), "phenomena are physical-conceptual (material-discursive) intra-actions whose unambiguous account requires "a description of all relevant features of the experimental arrangement".

To summarize, for Akrich and Barad, materiality – of any kind – is central in constituting a phenomenon. Similarly, this materiality comprises not only the human body, but also the non-human. Akrich and Barad's ontological stands critically question the distinction between human and non-human objects as part of the action. For Akrich the separation of the two is problematic: in her analysis of childbirth narratives, she notices how non-human objects are entangled with the human; moreover, she implicitly claims an ontological absurdness of such separation. For Akrich it would be paradoxical to disassociate the delivering body from the embodied self of the woman and from the intra-acting elements that constitute it. Likewise, Barad's agential realism rejects the separability between social and material (Scott & Orlikowski, 2013), as it is

based on a non-essentialist view of phenomena and on the entanglement between technology (materiality) and social structures. Combined together, these two theoretical frameworks can shed new light on the understanding of the elements implicated in the evolving of innovation (Langley et al., 2013). Specifically, and this is the key point of departure from Van de Ven's view, the nature of this evolving phenomenon is processual not due to its temporality in longitudinal terms, but to its reiterative forming and performing through the intra-activity of elements, which are never accomplished but in continuous motion in their making. In other words, to capture a phenomenon processually, I suggest accounting for the evolving relations constituting the phenomenon at the micro level, where the temporal dimension is circular and dependent on the intertwined relations of elements, rather than focusing on changes over a linear temporal dimension.

Barad's ontology is an agential and posthumanist one. It is agential in the sense that it conceives reality as our participation within nature, as not made by fixed elements, but by the actions of its forming, by the entanglements of agency of all kinds that constitute the phenomena. It is posthumanist because the elements entangled are not categorizable in the dichotomous way human or non-human, but they are non/human in the sense that all elements constitute each other in their intra-actions. This has consequences on how reality is seen: no separation exists between the material and social, culture and nature, observer and observed, as every type of matter is entangled and inseparable. This resonates with process theorizing. Furthermore, social constructivist and traditional forms of realism are fallacious as the former sees science as a mirror of culture and the latter science as a mirror of nature. In an agential realist perspective, there is not such a distinction among science, nature and culture; there is no autonomous world out there, hence no distinction between materiality and social construction, or an outsider

attributing meanings to reality (as in poststructuralist views). There is no outside reality, only one wholeness; this entirety is one that incorporates entangled elements. Barad's agential realism surpasses a positivist/empiricist programme as the observation process needs to be taken into account. Hence, the measurement process is not outside the phenomenon but constitutive of it. This is relevant, as we will see in chapter III, when approaching the phenomenon of our interest, and in this specific case, when conducting an ethnographic study of gender dynamics in innovation processes, as it allows us accounting for our performative stances in the making of gender as a phenomenon, not only as an object of enquiry. Specifically, the relational and agential ontology, for which elements constitutive of reality intra-act, and the elimination of a distinction between observer and observed are key common tenets of the two perspectives that in chapter III help engaging with a different lens for conducting politically responsible ethnographies. As for MacKenzie et al (2007) economics makes markets in the sense that there is no outer reality (the market) which is described by economics, but economics does affect the market while explaining it, similarly we can argue that ethnographers do not discover gender in innovation as a phenomenon "out there", but they do affect gender (and specifically its dynamics) while searching for it in the field.

However, a significant point of dissonance between Barad's and Akrich's standpoints is found in the politics of their theoretical framework. This is particularly an aspect of their theoretical frameworks that need clarification, as the thesis is oriented, as discussed in the introduction, towards a political project, both in the way we understand our participation in the field, and the ways we account for a phenomenon, thus making effects and consequences central in the analysis.

Barad (2011:450-451) is interested in how science can be done more justly. This is not the case for Akrich (1992), for which even in the cases where the political is emergent - as in the example of the electrification of the Ivory Coast (Akrich, 1992: 214) - this is dependent on the role of actants in the network: the political is contingent to the enrolment process. In this sense a strong difference is found here: Barad (2011) is strongly concerned with questions of how this entanglement can actually make our reality a better one (how can we produce more responsible ethnographies?), whereas Akrich downplays the autonomy of elements to perform such action: the political for Akrich is in the objects and their inscriptions and the distribution of roles. In this sense, the political dimension is found in the power certain roles detain, which is connected to a prior event: the process of inscription of roles into objects. It is in this inscription that power dyscrasia is found (who and how inscribe roles into objects) and, only consequently, in the outcome of such inscription: the role itself.

Differently, for Barad questions of power are found in the entanglement and the agential cuts that accompany it (thus, on how the researcher is performatively entangled with the phenomenon she is studying). For Barad, agentially cutting phenomena means taking a position from which reality materializes. This agential reality hence takes a particular form according to where the cut is defined: "different agential cuts produce different phenomena" (Barad, 2007:175). This implies that meanings attributed to elements of phenomena emerge only through the ways the apparatuses cut the phenomenon. In other words, power is found for Barad in the ways apparatuses ("macroscopic material arrangements" (Barad, 2007:142), active instruments of observation and measurement, in Bohr's terms) define concepts and especially which concepts are excluded from the formulation of the phenomena. Following this, for Barad the political dimension is inherent in all aspects of reality, as she believes

practices are connected to certain "axes of power" (Barad, 1996:162). Differently for Akrich, the questioning of the power of actants is linked to their roles in the intra-activities, and her theoretical stand lacks considerations on the potential alternative ways of such construction, on how roles can be negotiated or performed differently, in a more just way.

This fundamental discrepancy in the two perspectives also reflects in a different way of connecting micro and macro. The connection with the macro context for Akrich is related to the enfolding of the complex structure of the forces that represent our reality (as she clearly exemplifies in Akrich, 1992: 205 with the car example) and the set of political forces driving such a representation. Similarly for Barad, attention is dedicated to all elements (social-material) that constitute the phenomenon at different levels. Nonetheless, Barad makes further considerations by questioning what matter is excluded and how (which I engage with when looking at what gendered identities of innovators are included and excluded, by whom, and how). Instead, for Akrich roles are *a priori* set-out if not precisely defined, before the unfolding of the phenomenon. This can be seen as a naturalization of the political inscribed in objects and the formation of the status quo through such stabilization.

Despite of these dissimilarities, the two approaches if taken in broad terms they can be complementary and useful in the understanding of innovation. Differences can be back grounded when the aim is not to address specifically the politics of objects, for which then some further considerations on the two different perspectives are necessary. More importantly, the two perspectives offer a focus on agency which, while it stems from two different angles, can also be integrative: agency for Akrich is found in the process of inscribing roles in materiality of different kinds, whereas for Barad agency is inherent in the performative nature of entities. What both perspectives have in common

is to identify agency in matter. As it will be shown in the thesis, objects create a feeling of attachment and engagement for the subject and can become the object of quarrels and contestation among them. At the same time, researchers exercise action on objects in their re-shaping through manipulation.

In short, Barad's agential realism extends and merges existing key points in poststructuralist feminist theorizing (namely, the one developed by Judith Butler), process-oriented research, and ANT approaches, specifically pervading the innovation literature, by *i)* developing a more dynamic approach to performativity, one which transcends the scission between human and nonhuman matter; *ii)* adding a new nuance to the role of non-human agency in phenomena constitution, by seeing matter of all types as agentive in phenomena; *iii)* understanding phenomena as flowing entanglements, not as interactions among pre-constituted entities; *iv)* re-conceptualizing time-space-matter ontological status, by flattening the distinctions among time and space, and reconceptualising them as evolving entanglements; *v)* rejecting a representationalist epistemology, with the belief that phenomena are not static representations/images of a priori defined entities; and *vi)* rejecting an essentialist approach to identity, by negating the existence of an essence of subjects.

4. Departure point: summary of my approach

Intertwining the varied approaches, a number of key points emerge as guides for the openings of the articles. Most importantly, taking a process perspective as an onto-epistemological stand implies seeing the world as in continuous flux (Hernes, 2008; Tsoukas & Chia, 2002): things in the world are never fixed but in continuous making. Empirically, this means that when studying gender and innovation we cannot think of them as ascribed characteristics, but as the results of a web of negotiations among different actors, located in specific social, economic, cultural contexts. As shown in the

section above, these two key points (the world as a flux, and phenomena as the entanglement of differential contextual facets) connect with Butler's and Barad's premises of phenomena as being the result of performances. Therefore, what bridges a process perspective on innovation and a poststructuralist and posthumanist feminism together is that phenomena are enactments of doers that do not pre-exist their deeds (Butler, 1999), but that are shaped and constituted (never in a fixed way) through their intra-activities (Barad, 2007) with others, and with the contexts - social, geographical, political, economic, cultural (see for example, Garud & Munir, 2008).

This reflects a common shift in gender studies and innovation as process research from articulating phenomena as nouns towards accounting for them in terms of verbs. In other words, there is a common shift from the "said and done" towards the "saying and doing" (Martin, 2003) pervading extant gender literature, and the Whiteheadian movement from nouns to verbs in organization studies (Bakken & Hernes, 2006; Weick et al., 2005). Empirically, this means that when approaching gender in innovation we see the two as processes of emergent relations, and that what we capture is one of the possible cuts operated, making what we see the way we see it. More explicitly, what we see about gender and innovation is dependent on the specific entanglements of objects and people in the contexts analysed as they emerge at that specific moment in time. Indeed, thinking of a phenomenon as in constant change and relational to people and objects allows us grasping its complex interconnections and the consequences for people involved.

To summarize, poststructuralist/posthumanist feminism and process-oriented research on innovation share two key aspects. The first refers to an ontology premised on seeing the world as a constant flux, and phenomena as the entanglement of differential contextual facets. The second common ground is a devotion to verbs rather than nouns,

which is a direct implication of the above elaborated ontological stance. More specifically, emergent relations (whether they refer to gender or innovation making) shape the phenomenon in an arbitrary and constantly changing way that needs to be reflected in researchers' vocabulary throughout their research enquiries and texts.

Bridging these two frameworks on gender and innovation is not only an academic exercise, but it also taps into current interests on gender and innovation at the institutional level. Specifically, the importance of gender in innovation has increased over the past few years. The European Commission has recently (December 2013-October 2014) sponsored a "Call for Promoting Gender Equality in Research and Innovation" (EC, 2013) as part of its Horizon 2020 programme, with the aim of fostering Europe's innovative potential with particular attention to the societal challenges of its development. The call stresses the importance of tackling "impacts of gender diversity in research teams and organisations on research quality and productivity, as well as on innovation" (EC, 2013). This is the most recent activity of a series of programmes lead by the European Commission on gender equality in research, science and technology areas (EC, 2013a, b, c; EC, 2009).

Conversely, few empirical works have addressed this debate (for example, Andresson et al., 2012; Danilda & Thorslund, 2011; Lindberg, 2007, 2010; Lindberg et al., 2012; Lorentzi, 2011), yet remaining liminal in management studies. Within these studies, I identify two directions exploring how innovation is a gendered phenomenon: *i)* the understanding of *who* is acknowledged as an innovator; and *ii)* the definitions of *what* innovation is. As for the former, Andersson (2012) finds that innovators and innovations are premised on certain forms of masculinities, specifically within innovation policies. Petterson (2007) found that the Swedish innovation strategy for technical innovation and industrial development embeds an ideal centred on a male

engineer as innovator, and notes that the policy implicitly indicates men as main actors in natural sciences, technology and mathematics fields, and women as those lacking technical skills and propensity to mobility. This suggests that women are "silently excluded" in innovation policies specifically, and in male-connoted industries at large, thus "reinforcing and perpetuating the gender system" (Berglund & Thorslund, 2012:41). Moreover, Poutanen & Kovalainen (2013) note that women are absent in innovation processes, or their presence is made absent through different strategies, such as by creating barriers to their participation and promotion of ideas in group discussions.

As for the latter, some innovations Andersson et al (2012:13) find that "a man with an idea on how a high-tech product can affect renewal processes in a traditional industry fits better as innovation than an ethnic minority woman with an idea on how a process may bring about social justice in society." This is quite a debatable observation, as it will be further discussed in chapter IV, as also non-profit and women-lead innovative projects have gained public attention and funding. Moreover, Berglund & Thorslund, (2012) note a specific construction of masculinity that stresses traditional masculine industries as places where innovations emerge (the so called "growth areas"), specifically evident in Swedish innovation policies. Likewise, Lindberg (2012) suggests that "innovation system concept is mainly linked to two kinds of technology, both related to hegemonic masculinities (physical strength/mechanical and calculating rationality/technological experts)" (ibid, p. 57-58).

Despite the gains of this body of work in breaking through a gender blindness, they present some limitations. The first is the focus primarily on innovation policies, thus treating innovation as an outcome, or better yet, as an object specifically definable in its properties. The second critical point is that by concentrating on how innovation policies

promote certain gender categories (e.g. Ljunggren et al., 2010; Andersson et al., 2012; Pettersson, 2007), these works neglect how gender is "done" and "un-done" (Kelan, 2010) through its doings and sayings in organizations. In other words, their interest in innovation and gender has overlooked how gender is practiced in organizations, in daily activities in innovation-oriented jobs, and how gender dynamics more broadly affect people involved in innovation.

Therefore, this thesis aims to tap into this debate and to develop necessary research on gender and innovation within organization studies, by using a specific lens on gender, a poststructuralist feminist one, combined with a process-oriented approach to innovation. The thesis enriches our understanding of gender in innovation by specifically looking first at *i) what* are the practices enacted in research organizations involved in innovation? Then, we can turn to see whether practices in innovation-oriented jobs construct and sustain particular gender dynamics, by questioning: *ii)* are these practices in innovation-oriented jobs gendered, and *if* so, *how, and with what consequences*?

For answering the first question (chapter III), we need to account for all elements involved in innovation making (actors, objects, organizations, norms, interactions, context). This can be done by integrating the analysis with a posthumanist and processual framework, such as the one proposed in this thesis, as it brings out the dynamic nature of innovation, and the variety of actants involved (non/humans), and their role in the innovation process. In doing so, the thesis adds a finer granularity to extant innovation process models (Garud et al., 2013), and specifically sheds light on the constitutive relations among the differential elements involved in innovation and their consequences for its people.

For answering the second question (chapter IV), namely if practices in innovation-oriented jobs are gendered, and *how, and with what consequences*, a lens on gender that enables capturing the dynamic creation of gender performances at work, and their effects for people involves, is needed. As discussed throughout chapter II, feminist research, specifically in management areas, has seen a trend towards the use of poststructuralist approaches to gender.

We have thus far seen that one of the central aspects of poststructuralist feminism, and specifically of Judith Butler's works, is a critique to the claims for natural differences among women and men, differences that lead and justify role attribution and subordination. Butler's works, and poststructuralist feminism at large, have informed gender research in organization studies in a variety of ways, from a focus on intersectionality of gender, class and race (Calás & Smircich, 1993; Calás & Smircich, 2006; Holvino, 2010), work-life balance (Emslie & Hunt, 2009; Smithson & Stokoe, 2005), work practices and masculinity/femininity (Bruni et al., 2004a and b; Hatcher, 2003; Powell et al., 2009, Pullen & Simpson, 2009), gender and team-work (Metcalfe & Lindstead, 2003), gender and group performance (Fenwick & Neal, 2001; Myaskovsky et al., 2005), conformity and resistance to gender norms in organizations (Kelan, 2010; McDonald, 2013), women and managerial work (Whitehead, 2001; Priola, 2007), among others.

Butler's works have illustrated that gender is a performative act, a mode of looking at how certain norms of gender are embedded in doings and sayings, and specifically a sensitiveness towards gender positions made intelligible, and the ones that are marginalized. Focusing on gender dynamics means to investigate what gender positions are acceptable and which ones are not in the context analysed, but specifically what the effects/consequences of doings and sayings are for the people involved: what are the

available forms of gender, and how these forms create "trouble" (Butler, 1999) to them. In relation to gender in innovation, this approach sheds light on norms defining roles throughout innovation processes, sayings and doings sustaining these norms, forms of resistance to them, and consequences of such resistance.

As an empirical contribution to extant works on gender and innovation, I follow the suggestion of taking into account different types of "idea generators" (Petterson & Lindberg, 2013). Specifically, I focus on two innovation-oriented organizations, respectively working in the pharmaceutical (Biomedicine for Life, BfL) and information technology (Techie) sectors, employing over 80% women (BfL) or over 80% men (Techie), not for profit (BfL) and for profit (Techie), thus going beyond accounting for gender dynamics in male-populated for profit high-tech organization.

To summarize, the framework proposed in the thesis enables us to see gender and innovation as processes of emergent relations, and to problematize how what has been captured as gender dynamics in innovation is one of the multiple ways in which it could have materialized. Taking the proposed theoretical framework on gender and innovation contains a radical re-thinking of gender and innovation, which questions our responsibilities in accounting for the effects of entanglements of different elements in innovation (chapter III), in capturing performances enacted through the shaping of a gender order in innovation making (chapter IV), and in performing ethical ethnographies (chapter V).

5. Summary of the chapters

This thesis is comprised of three research questions on the topic of gender and innovation that are presented in the form of three articles. This section offers an overview of the content of the papers.

5.1. Chapter III

Redefining the roles of objects and people: Towards a stronger view of innovation processes

In this chapter[29], I show that traditional conceptions of innovation as a process of tangled practices, events, people, technologies and objects at large, side-line the role of objects and the effects of their relations on innovation participants. In the article I argue that despite Van de Ven and colleagues' advancements on relations amongst innovation participants, their approach oversees changes affecting innovation participants directly. In other words, their stake on processes sees innovation participants as constant, thus making such process model "a weak" (Hernes, 2008:23) approach to innovation. Additionally, I also argue that this constitutes the premise for another withstanding problematic: the tendency of ontologically defining entities (people, organizations, etc.) as independently-existing. By doing so, this body of research neglects questions on how subjects themselves change in innovation, and the role of objects in shaping participants. Moreover, a weak approach sees outcomes of innovation processes as the result of multiple human distributed agencies, with little attention on role of technologies and more mundane objects in shaping innovation. Emotional and practical involvements of researchers with specific technologies, their effects on work practices and researchers' identities are overlooked. In the article I argue for the need of further insights on the ways people and objects are constructed through their relations in innovation processes, and how their mutual shaping affects innovation.

The article contributes to extant process innovation literature by enriching our understanding of the processual complexity of innovation, specifically by showing that

[29] A preliminary idea of this chapter with a single dataset was presented at the Fifth International Symposium on Process Organization Studies, June 2013, in co-authorship with Nikiforos Panourgias. A revised version was presented by the single author at the 30th Egos Colloquium, July 2014.

relations among people and objects at work (constitutive entanglements) are at the basis of micro-dynamics shaping innovation participants.

5.2. Chapter IV

Excluding the Other: Re-producing gender dynamics throughout innovation processes

The article[30] aims to explore gender dynamics enacted throughout innovation processes. I here show how innovation research is inherently gender-blind (Ranga & Etzkowitz, 2010), and offer a review of recent works on gender and innovation. Despite the arising interest on gender and innovation, much research is still needed towards the understanding of how gender is enacted - in practice - throughout innovation processes. Alsos et al (2013) claim the need of more research on practices enacted within organizations that show how innovation is "fundamentally gendered" (Alsos et al., 2013:9). The article engages with these recent developments, and explore - through the use of a poststructuralist feminist approach (e.g. Butler, 1999) - how women and men involved in innovation experience dynamics of inclusion and exclusion. The article elaborates on the difficulties in managing the "dual presence" (Gherardi, 1995), for both men and women. I thus show how doings and sayings of researchers sustain specific stereotypical notions of gender, and reinstate the very masculinity that Ranga and Etzkowitz (2010) find being associated with innovation processes. The article suggests that a gender order is enacted in the two organizations, one that creates distinctions between those performing competitiveness, withholding knowledge, perseverance, fighting, dedication to research, and others, who privilege cooperation, sharing ideas, balancing the dual presence, and including gender-related aspects such as

[30] At the time of submission, the revised version of the article is under review in Human Relations, and a decision of revise and resubmit was passed on. Also, the paper is under consideration for the Academy of Management Annual Meeting (August, 2015). An earlier version of this article was discussed at the 30th Egos Colloquium Paper Development Workshop on Gender and Diversity.

the parental experience. The findings enrich empirical research on the practical implications of gendering in innovation making.

5.3. Chapter V

From a reflexive to a diffractive ethnographic enquiry in management research: An outline for a promising methodological approach

This chapter[31] configures as a reflection on the ethnographic journey of this study, and specifically on an increasing awareness that I was deeply engrained in the very phenomenon I was aiming to grasp. More specifically, the article explores how reflexivity has arisen concerns and considerations within management research on our engagement with knowledge making processes, the social, political and institutional infrastructures within which knowledge is produced (Clegg & Hardy, 2006). Reflexivity has encouraged researchers to being ethically responsible for their knowledge-making, their roles in the field, and specifically the consequences of research practices.

However, in the article I outline that the ways reflexivity has been utilized in management and organization studies leaves some open problematics. The most salient one is a tendency of producing narcissist ethnographies that overshadow participants (Weick, 1999, 2002; and Clegg & Hardy, 2006). In the article I take "warped narcissism" (Rhodes, 2009:661) in ethnography as a departure point to question my own reflexive practices in this study and to open up to ways of enriching our reflexivity.

Following Rhodes's (2009) suggestion that the ethical dangers engrained in narcissistic use of reflexivity are related to the ontological separation between researcher and

[31] At the time of submission the article is under consideration for the 31st Egos Colloquium, July 2015.

participants, I propose a Baradian approach to ethnography as useful tool in ethically and politically responsibilizing our ethnographic practices, with the aims of making moves away from the narcissism trap.

The article enriches current debates on the critical aspects of reflexivity, by contributing with a complementary framework to reflexivity in ethnographic enquiry informed by a Baradian perspective (Barad, 2007). I here propose a framework which flattens the epistemological and ontological separation between observer and observed, thus suggesting that we (researchers) are part of the on-going articulation of the world. In doing so, we can acknowledge not only our "responsibility" for what we theorize about (Cunliffe, 2003:985), but also our embeddedness in the reality we seek to explore, making us further responsible for our practices in the field.

CHAPTER III

Redefining the roles of objects and people: Towards a stronger view of innovation processes

Abstract

Innovation is a process of tangled practices, events, people, technologies and objects at large. It is through their relations that novelties emerge. Yet, when accounting for the relations among individuals, organizations, and institutions, the role of objects and the effects of their relations on innovation participants have been often overlooked. Drawing on two studies of practices occurring in innovation processes at Biomedicine for Life and Techie Labs, I identify how relations among people and objects at work - which I call constitutive entanglements - are at the basis of micro-dynamics shaping innovation participants.

Keywords

Process ontology, innovation, enrolment, posthumanism, entanglements

Organizations strive for innovations. Yet, innovation processes are complex and difficult to sustain for an organization (Garud et al., 2011). Innovation is complex because it involves interactions among different stakeholders (Van de Ven et al., 1999; Van de Ven, 1986; Van de Ven and Rogers, 1988; Von Hippel, 2005), which over time develop and implement novel ideas or re-combine old ideas differently (Van de Ven & Poole, 2000).

Despite Van de Ven and colleagues' works have advanced significant insights on the relations amongst innovation participants, their approach to processes often overlooks the changes participants undergo throughout innovation processes. Hernes (2008) argues that their stake on processes sees innovation participants as constant, thus making such process model "a weak" (ibid, p.23) approach to innovation. This is premise for another withstanding problematic of a weak process view, which is ontological defining entities (people, organizations, etc.) as independently-existing, acting on each other. As a consequence, questions on how subjects themselves change in innovation, and how objects have a role in shaping participants are left unsolved. Also, a weak approach conceptualizes innovation as a process whose outcome is the result of multiple human distributed agencies, thus neglecting the role of technologies and more mundane objects in favouring and shaping innovation. In doing so, the emotional and practical involvement of researchers with specific technologies, its effects on work practices and researchers' identities are overlooked. If we take that identity is itself a process, relational to our "environment" (Nayak & Chia, 2011), then we cannot but question how different people and objects are shaped in an innovative environment, and how in turn their shaping affects innovation. Thus, more insights are needed on regards to "How people and objects are constructed through their relations in innovation processes?" and "How their mutual shaping affects innovation?"

In this paper I address these questions on the micro dynamics of innovation, by providing illustrations drawn from data in two research organizations (Biomedicine for Life and Techie Labs) developing, respectively, a regenerated kidney and a simulator for detecting symptoms of a cyber-attack. By working with the concept of "enrolment[32]" (Akrich, 1992) combined with a posthumanist lens (Barad, 1999, 2003; 2007), I contribute to extant process innovation literature by enriching our understanding of the processual complexity of innovation, specifically with regards to the ways elements (people and objects) are formed in innovation, the micro dynamics emerging from their relations - that I call constitutive entanglements, and entanglements' impact on innovation.

Process perspectives on innovation

Much research has contributed to understanding innovation as process, focusing on multi-level and longitudinal dimensions of innovation, and the involvement of several actors, artefacts and institutions. These literatures develop in line with process ontology, namely an approach that sees everything in the world not as separate and autonomous, but as in relation to other entities (actors, ideas, institutions, organizations, etc.). Extant literature on process innovation diverges into two strands of research. I name the first "process innovation as unfolding interactions" - a weak process approach to innovation (Hernes, 2008) - and the second "process innovation as dynamic entanglements", which moves towards a stronger process approach.

I therefore build on Hernes (2008:23) who distinguishes between strong and weak process views:

[32] Enrolment refers to the emergence of a web of relations among different elements (objects and people) playing a role in innovation.

> "A weak view (…) treats process as important but ultimately reducible to the action of things, which in a sense serve to objectify process. A weak view gives ontological primacy to actors. A strong view, on the other hand, deems actions and things to be instantiations of process complexes."

A weak process approach focuses on entities engaging in processes. Instead, for a "strong" process approach, elements or actors are never accomplished and never stay the same; they change when entering in contact with other elements, forming a complex unity of related elements (events) taking place at several points in time (Nayak & Chia, 2011). For Bakken & Hernes (2006), elements do not pre-exist their actions, but are formed through actions and interactions. Bakken & Hernes (2006) use the example of the pseudopod (a unicellular animal) to clarify the concept of relationality. The pseudopod pulls itself up when moving from one spot to another; this is a process involving simultaneously the movement and the animal, which become one unity and express a situation of relationality (there is no animal in a second spot without movement and no movement without the animal). Also, the process of the pseudopod's movement from one point to another is composed by phases. In innovation literature, adopting a process approach meant to tightly focus on phases and entities involved. Members of the Minnesota Innovation Research Program (MIRP) analysed a variety of innovations (administrative, technological, organizational) in different organizational settings (entrepreneurial start-ups, inter-organizational joint ventures, internal corporate venturing) and found innovation to be a process formed by phases, namely invention, development and implementation, engaging different actors in decision-making events, within and outside the organization (Van de Ven, 1986). This empirical research has offered a model of innovation as a sequence of events around five concepts: people, ideas, outcomes, relationships, and context. Schroeder et al (1986:158) note that people,

ideas, transactions, outcomes and context are conceptualized as "factors"; changes within their state constitute what are called 'events' (Van de Ven & Poole, 2000).

Events are moments of change over a linear timeline: users, resource endowments, academic institutions, and institutional capabilities present a change from one point in time to another (Garud & Van de Ven, 2000). Van de Ven & Poole (2000) suggest that capturing events in innovation means to track and code how people's roles in various activities and ideas change over time. For example, Garud & Van de Ven (2000) found that the cochlear implant originated from several events involving actors in the public and private sector, comprising a first period in which basic knowledge in the resources subsystem was developed (before 1976), a second period in which five private firms entered the cochlear implant industry (form 1977 onwards), and a third period (1980-1985) in which the instrumental and resource endowment subsystem developed. Garud & Van de Ven (2000) also found that resources (such as technical and economic activities, institutional endowments, etc.) foster the development of a social infrastructure for innovation. Organizations and individuals are part of this infrastructure: professional/industry trade associations, regulatory agencies, investors, academic and research institutions, private and for profit organizations.

Nonetheless, Hernes (2008) identifies a prevailing way in which organization studies engage with a process perspective:

> "There is already a distinguished history of process thinking in organization studies, but much process thinking is based either on evolutionary theory or on the idea of organizations as things, or both." (Hernes, 2008:xxi)

Specifically, within innovation literature, Hernes (2008) suggests that Van de Ven's process approach relies on narratives of some central subjects who are not changing:

> "Such an assumption may be legitimate in the view of the choice of the kind of narrative method used, but it should not be seen as a universal assumption underlying all process approaches. On the contrary, it is perfectly possible that anything can change, including the central subjects, precisely because central subjects intervene in processes and are changed by their intervention." (Hernes, 2008:51)

Here Hernes (2008) suggests that extant innovation research designs and methodologies, such as narratives, have not yet enabled to grasp how subjects are also changed by the innovation process. Hernes (2008:23) defines Van de Ven and colleagues' process model "a weak" process approach they theorize subjects as constant, and interactions happening among entities - things and people at large. Entities are fixed throughout the innovation process: institutional context and firms are independently-existing entities, acting on each other. For example, when Van de Ven and colleagues (1999) describe the cochlear implant program initiation, they notice that the development of a "bionic ear" started after the project gained credibility among 3M[33] management team, and it initiated as a joint project among two research groups in 3M, the University of Melbourne, and a start-up company. Such initial cooperation was then interrupted due to lack of agreement on funding opportunities among the university and 3M. By overlooking the ways the two management teams and their researchers in 3M were affected by shifting collaborations, this example suggests that 3M, the University, and the start-up company are independently-existing entities.

Also, how the example shows no attention to how the emotional and practical involvement of researchers with specific technologies (the medical device, the magnetic coupling system, electrical signals, patients, etc.) affected their work practices,

[33] 3M is an innovative private enterprise, one of the case studies part of the MIRP programme.

specifically how they conducted their everyday tasks and the meanings attributed to their practices and their identity as researchers. In a process view, identity is a process:

> "Even our individuality and identity must be understood as socially constructed in this way so that we are not naturally autonomous units but instead are relatively stabilized nodes in a dynamic and evolving network of relations. Who we are and what we make of our 'environment' is very much a consequence of how we respond to the demands we face on a day-to-day basis." (Nayak & Chia, 2011:289)

A strong process approach calls us to include how we construct our identity in relation (practical and emotional) to "our environment", which encompasses also technologies, artefacts, and other objects. By focusing on the ways objects are used for identity construction and on how entities themselves change throughout innovation, we could gain insights on processes occurring in innovation, such as how 3M researchers engage with objects at work, and how that feeds into their identity definition.

This, for example, helps us extending Angle & Van de Ven (2000) insights on human emotions and dynamics of participants (euphoria, confidence, expectations) in the different innovation phases, as developed in relation to objects at work. For Angle & Van de Ven (2000) individual participants have different emotions in innovation, which can create disturbances in teamwork within innovation processes. Specifically, Van de Ven (1985) identifies "hung juries", "acquiescent team players" and "tolerance for ambiguity and trust" as dynamics and emotions occurring across the three innovation phases in the group-individual relationship. On a more individual level, Angle & Van de Ven (2000) suggest that initial euphoria for a new project turns on a later stage to disappointment and shock deriving from setbacks in innovation development. Angle & Van de Ven (2000) infer that consideration of emotions is necessary for orchestrating successful innovation management:

> "Innovation participants often experience euphoria in the beginning, frustration and pain in the middle period, and closure at the end of the innovation journey. These changing human emotions represent some of the most gut-wrenching experiences for innovation participants and managers." (ibid, 1989:666)

Yet, in their accounts of emotions in innovation, there is scant attention to how people experience emotions in their interactions with objects, and to how such emotions feed processes of constructing innovator's identities, and the relations with other innovation participants.

To summarize, for "weak" process approach[34] - embraced by innovation scholars such as Pettigrew (1992), Ring & Van de Ven (1994), Schroeder et al. (1986), Van de Ven (1987) - entities are pre-constituted (before the process), they change over time, through phases traceable over a longitudinal timeframe. Differently, a "strong" (Hernes, 2008) process perspective[35], based on the works of Whitehead, James and Bergson, focuses on mechanisms producing and reproducing events (Bakken & Hernes, 2006), and rejects a substance approach, which conceptualizes organizations and individuals as discrete entities. This requires thinking of innovation processes not as "processes of things" (Nayek & Chia, 2011:288).

Research focusing on the continuous connections among actors and technologies shaping innovation has recently developed; yet it has not solved the issues that a weak approach holds, such as the emotional relation with objects, and the understanding of micro processes (such as of identity construction) in innovation. I call this body of literature "process innovation as dynamic entanglement", as it conceives environments and actors not as pre-defined, rather as part of on-going processes of reciprocal shaping.

[34] MacKay & Chia (2013) name this weak approach "owned" process theory.
[35] Namely "Approach III" (Van de Ven & Poole, 2005), or "unowned" process theory (MacKay & Chia, 2004)

For example, Garud & Munir (2008) spot out the tensions of different players in the making of the S X-70 Polaroid. They find that a technology, as observed in a specific point in time, is one of the possible outcomes of development: technologies don't have a definite form once for all, but they are always contingent to endogenous pressures among diverging interests. For example, Garud & Gehman (2012) found that the changing governmental standards on carbon emissions, and more broadly the changing weight of concerns on environmental health in early 20th century led to the success of internal combustion engines vehicles over electrical ones (EV), and to the re-emergence of EV as an alternative some decades after. This example shows that technologies produced are contingent to the historical moment - defining rules and frames of references - and the impact of actors' roles on the innovation process. Whereas this understanding of the reciprocal making of technologies and humans helps us appreciating the complexity of the interplay among social and material (batteries, management decisions, CARB laws, etc.), it nonetheless doesn't offer insights on how the identity of researchers, managers, and furthermore objects, are constructed throughout innovation. We can say more about how these entities (non/humans) are themselves constructed through relations, and the effects of these bundles of interactions - that I call "constitutive entanglements" (Orlikowski, 2007:1438) - on innovation, by asking the following questions: *i)* How are people and objects constructed through their relations in innovation? *ii)* How does their mutual shaping affect innovation?

Engaging with these research questions means to problematize researchers' and practitioners' stand on the "politics of who" (Mol, 2002) is acting in innovation - firms, multi-party networks and communities, but also objects and identities at work. These research questions also re-position our interest in a "politics of what" innovation

processes are about, whether we should give ontological priority to entities or entanglements in grasping innovation.

Thus, a perspective that focuses on constitutive entanglements of entities in innovation contributes to current process approaches to innovation by enriching our understanding of the micro-processes affecting innovators and their work practices. Specifically, it sheds light on the ways people integrate material elements as part of their self, how in turn their "embodied self" (Akrich & Pasveer, 2004:71) changes in relation to different objects, and the effects of these dynamics on innovation. Such perspective assumes that social and material are not distinct, but "performed relations" (Orlikoswki, 2007:1438):

> Thus, for example, we have tended to speak of humans and technology as mutually shaping each other, recognizing that each is changed by its interaction with the other, but maintaining, nevertheless, their ontological separation. In contrast, the notion of constitutive entanglement presumes that there are no independently existing entities with inherent characteristics (Barad 2003: 816). Humans are constituted through relations of materiality - bodies, clothes, food, devices, tools, which, in turn, are produced through human practices. The distinction of humans and artefacts, on this view, is analytical only; these entities relationally entail or enact each other in practice. (Ibid, p.1438)

Orlikowski (2007) suggests that an approach to entanglements as constitutive of entities themselves - such as the one of Karen Barad - can help eliminating analytical separations among humans and artefacts, and developing a relational approach which looks at relations within the shaping of entities.

The following section aims to extend the gaps in current process approaches to innovation, and offers a theoretical framework which can help outlining mechanisms within innovation processes constituting elements and affecting innovation.

Toward a (post) humanist approach to innovation

Both "innovation as unfolding interactions" and "innovation as dynamic entanglement" perspectives adopt a process approach to innovation. The former looks at how innovations entail different phases, how they evolve over time, and what players are involved in this journey (Van de Ven et al., 1999). People, outcomes, transactions, contexts are conceptualized as independently-existing entities (Hernes, 2008). By contrast, some scholars have argued for a more dynamic approach, with a tighter attention on how institutional frameworks, people, and organizations mutually influence each other throughout the innovation process (Garud & Rappa, 1994; Garud et al., 2011). Informed by ANT and STS perspectives, this strand has added to the innovation-as-unfolding-interactions perspective the role of material objects, such as technologies, in making innovation.

The "innovation as dynamic entanglement" perspective has significantly contributed to opening up towards a stronger process approach to innovation. Whilst thinking of people, technologies, institutions, and firms in terms of entities has been useful for analytical purposes, much more can be said on the processual complexity of innovation. An analysis of the creation of elements in the innovation process, and an account of the social-material inseparability are two aspects still under-investigated by this strand. Specifically, although "innovation as dynamic entanglement" literature offers detailed accounts of interactions of contexts, people and ideas, and their reciprocal influences, this literature has not explicitly addressed the ways identities of innovators and objects are formed throughout innovation. A focus on constitutive entanglements can inform us on the micro dynamics emerging from relations among entities impacting the innovation process. A focus on micro dynamics helps us grasping the overall mechanisms of identity construction through objects in innovation, and spots out how

relations among elements turn back into processes, by affecting innovation. In other words, understanding the processes of formation of elements (and not only humans) sheds light on the interconnections among them, and helps reconceptualising researchers and objects in line with a stronger process ontology, that is as relationally shaping each other.

Positioning my work within the 'innovation as dynamic entanglement' literature, I propose an approach that combines Madeline Akrich's "enrolment" and Karen Barad's "posthumanist performativity". Enrolment is the processes through which objects come to embody a set of relations among different elements. The hypoglycaemic body described in Berg & Akrich (2004) is not pre-existing any action: it is a body shaped through insulin measurements, nurses' and doctors' operations, such as inserting needles, checking pressure, and so on. Similarly, French manufacturers, African clients, local electricians, lamps and batteries are all part of the making of the photovoltaic lighting kit (Akrich, 1992). Akrich's enrolment helps us to think of elements as constituting through relations (thus constitutive entanglements are at the basis of phenomena). Nonetheless, her approach analytically separates objects and humans. This separation is problematic - Hernes (2008) outlines - as it is an artificial construct of the researcher which can hinder accounting for the fluid interconnections among entities:

> "Entities may need to be treated analytically as being different and distinct, although the boundary between them may be both fluid and ambiguous. A machine may be regarded as a machine even if it is made by humans, for humans, and operated and changed by humans. If we don't drive a wedge between things, how can we then reconnect them? The machine may be seen as a technological 'ideal-type', just as humans may be seen as human 'ideal types'. Where the material and the human come

> together is in the reconnection of the two. The problem is, as Latour (1999c) points out, that the wedge is driven between problematic connections to understand what happens when the connections are made; but how can we then know that reconnecting the entities enables us to explain a world which is never really disconnected? The act of disconnecting is like surgery. We may reconnect a severed finger surgically and expect it to function more or less as it did before. But can we do something similar in the social world? The question is, mildly speaking, debatable." (ibid, p.13)

Thus, separations - such as the ones between humans and nonhumans - are categorizations of the researcher for the analysis, whereas "the world really couldn't care less about our categories" (Hernes, 2008:12). To overcome the analytical separation between objects and humans still existing in Akrich's accounts, I integrate this with Barad's (2007) understanding of entanglements as made of ontologically inseparable social-material entities. Specifically, enrolment is a process of articulation of sets of "multilateral negotiations" (Callon, 1986: 211) among actants[36] (elements, actors): objects embody and at the same time measure a set of forces or relations (Akrich, 1992). For example, actants can be hydraulic pistons, springs and hinges, as well as the bell boy keeping a door open (Latour, 1992). For Akrich (1992), actants have agency in a double sense: they contain networks (the photovoltaic kit contains associations among different objects and people), and at the same time they shape them (the photovoltaic kit produces non-users, as it cannot be easily maintained by non-technicians). This aligns with Barad's approach to agency as being dispersed among various entities, elements are never passive, but actively shape phenomena. Similarly to Akrich & Pasveer, (2004) glycaemic body, Barad exemplifies distributed agency with

[36] To define "actant" I borrow Latour's (1992:256) definition: *"We use actant to mean anything that acts and actor to mean what is made the source of an action. This is a semiotician's definition that is not limited to humans and has no relation whatsoever to the sociological definition of an actor by opposition to mere behaviour."*

the foetus. The open debate on whether the foetus should be universally considered a human with agency leads us to see the foetus, and the marking of the woman's body as a maternal environment, as a phenomenon, historically and culturally located. It is a phenomenon made by people and objects altogether: the foetus is shaped by the amniotic fluid, the maternal body, the woman's emotions, the uterus, blood and so on.

What Barad adds to this shared view with Akrich are considerations on the nature of actants, and on the inseparability of social and material that characterizes them. In other words, whereas for Akrich actants are either humans or objects, for Barad - in line with a strong process approach - there is no such distinction: all elements in innovation are emergent, contingent, shaped in the process. Orlikowski (2007) takes up on this point and clarifies that an elimination of analytical separations among humans and objects aligns with a more relational and strongly-connoted process view of innovation, thus needed in organization studies. It is in this sense that Barad's posthumanist approach is useful as an integrated lens with the one of Akrich.

By combining these two perspectives, we can gain more insights on the ways (material-social-cognitive) objects are part of relations amongst humans and other objects. Innovation as a phenomenon of investigation is emergent through the intra-activity of elements, never accomplished but in continuous making. Intra-activity is semantically different from the term "interaction". Interaction presupposes objects and agencies to exist prior the phenomenon; rather, intra-activity suggests that what we see as an action is the ongoing construction of people and objects together (Barad, 2007). Thus, I suggest that a stronger process approach to innovation does not only entail tracing events of changes occurring over time (in a longitudinal way), but mostly it is about

grasping unfolding activities of elements (objects and humans), their constitutive entanglements, and the effects[37] on innovation.

I explore constitutive entanglements and their effects on innovation through an ethnographic work involving two research intensive organizations, illustrated in the next section.

Methods

This research is based on ethnographic fieldwork in two organisations: Biomedicine for Life and Techie Labs. Biomedicine for Life (BfL) is a not-for-profit biomedical research organization based in Italy. BfL is located in four areas in Italy, employing overall 900 people, of which approximately 60 in the locale studied. In 2012 BfL was intensively working on a renal dialysis project for renal function replacement, and it was at its 8th month of development, over a total period of 60 months. The other site, Techie, is a multinational IT company founded in the U.S.A. This study focused on one of Techie's four advanced research groups, the only one in Europe. Techie Labs in the United Kingdom employs over 40 people, ranging from researchers, managers to administrative staff. A team working on the "Defending the Cloud" project was followed. The UK based team cooperates with Techie Labs in the U.S.A., with whom they hold weekly video conferences.

Both firms were working towards implementing an innovative output. BfL was searching for an alternative to dialysis or human kidney transplant in patients suffering from renal disease. This meant to develop a whole-kidney scaffold, a structure of a kidney that is three-dimensional and can be vascularized. Techie was creating a device

[37] Barad (2007) explicitly discusses the notions of "effects" and causal relations. These notions are reworked in Barad (2011b), stressing out the importance of looking at the effects of boundaries drawn between human and non-human. In Barad (2011b), effects refer to the consequences of specific ways of defining materiality (human and non-human) and agency.

able to detect new threats to cloud and enterprise IT systems without the attack having happened. Exploring two organizations, rather than one, dealing with different types of artefacts, technologies and expertise offers a way to synthetize different ways of dealing with a variety of objects and several work practices in innovation. The scope is not to compare the two cases, but to observe similar occurring processes across different innovation phases, in order to grasp how people and objects are constructed through their relations in innovation, and the effects their mutual shaping on innovation.

The data refers to two observation periods of three and half months each, first in BfL, and then in Techie Labs. All data has been fully anonymized: names used in the paper are fictitious, but quotes from interviews and documents are translated and/or reported verbatim. Below follows a summary of the data collected in BfL and Techie.

Organization	Semi-structured interviews	Field notes	Audio/Video files	Documents: PDF/Word/PPT
BfL	25	37 pages in Word format (21100 words)	7	21
Techie Labs	17	85 hand-written pages	0	30

Figure 1 Data collected in Biomedicine for Life and Techie Labs over the observational period between May 2012 and December 2012

Data analysis

The analysis followed a grounded theory approach, as a general set of flexible guidelines facilitating an emphasis on what happens in the scene when we code our data (Charmaz, 2006). Yet, despite being "grounded" in the data, we need to recognize, as Suddaby (2006) points out, that

> "[…] what you observe is a function of both who you are and what you hope to see." (ibid, 2006:635)

Thus, a fully inductive analysis is hardly achievable. Both sets of data were firstly coded incident by incident; incidents include descriptions of actions observed or narrated by participants. To answer the two research questions: "How are people and objects constructed through their relations in innovation processes? How do their constitutive entanglements affect innovation?" I focused on researchers' daily practices in the laboratories and their descriptions of such practices. For example, when George (Techie Labs) narrates his role in Techie, he describes his involvement with work as follows:

> "I have been here for 18 years now, always working for Techie. […] For the last 10 years I have been involved with a technology called Trusted Computing, and this technology tries to deal with reassurances, behavioural, of technical artefacts." (George, Techie)

In the first order coding, I summarized this as "I have been involved with this technology for many years". As a second step, I clustered first order categories into broader themes-conditions, and consequences. This allowed moving across the different material and among the two data sets. In the second-order theme this excerpt was coded "describing materiality as external", part of the processes of producing discourses on technologies, which refers to the process of description of objects related to research as something external. A third step involved developing theory-driven dimensions from some of the categories emerged in the second order coding. The two sets of data also include dimensions on gendering practices, not enclosed in this paper as they do not relate to the research purpose.

The figure below summarizes the data analysis, namely how second order themes and theory-driven dimensions answered the research questions.

Second-order themes	*Theory-driven dimensions*	
Discourses on materiality • Describing materiality as external • Describing materiality in terms of ownership of it • Defining material artefacts • Describing work practices in terms of material artefacts • Defining project as a unitary object	**Constitution of matter through citationality**	Mechanisms of formation of sociomaterial elements
Use and effects of material artefacts • Using artefacts to express ideas • Impact of materiality on the researcher • Ethical and emotional issues of the relationship with material objects • Intertwining of ultimate target patient, artefacts and researchers • Use of physical spaces for identity appropriation	**Incorporation of matter in an embodied self**	
Meaningfulness of being a researcher • Being a researcher • Qualities	**Formulation of identity of innovative researcher**	Effects of entanglements
Impact of material artefacts on researchers • Artefacts as critical elements in researchers relationships • Impact of material artefacts on work practices and researchers relationships	**Creation of conflicts among researchers**	
Invention • Communicating		
Counterparts of innovation • Communicating • Sharing ideas		
Impact of material artefacts on work practices • Role of material artefacts in shaping innovation • Material artefacts and their impact on innovation process • Impact of technological changes on daily practices	**Performing the innovative environment**	
Manifestations of organizational culture • Centrality of employees • Informality and openness		
Managers roles in fostering organizational culture • Influence of managerial attitude on work culture		
Organizational control • Norms of the organization		
Flexibility • Perceiving flexibility as a rewarding tool • Flexibility as an aspect of organizational culture		
Positive counterparts of innovation • Trusting members		
Innovation development • Differential roles within innovation process		
Impact of hierarchies • Feeling the hierarchical structure		

Figure 2 Data analysis summary

In the next section, I present the data in the form of two vignettes, as an explicatory tool for introducing two main "analytically structured narratives" (Knights & Scarbrough, 2010:1295), organized around the headings "matter starts taking shape" and "matter is entangled and effects emerge. The vignettes serve as scenery-setting for the dynamics and effects discussed.

Vignette 1: Matter starts taking shape

This vignette narrates part of a day at BfL, within the Biomedical Engineering Department, following Anna in the cells laboratory. Anna's work involves producing a regenerated kidney, so to offer an alternative cure to dialysis or human kidney transplant. She is currently decellularizing the kidney of a rat, by keeping its scaffold in order to implant other cells in a later phase. Anna is a young researcher, assisted by Sue, Head of the Tissue Engineering Unit. The procedure happens as follows (Excerpt of field notes in BfL, 02/05/2012):

> "Sue is putting on some sterilized gloves; Anna is helping Sue with the gloves while talking about some internal laboratory procedures. To prepare the liquid for the cleaning of the kidney, they filter the liquid with different pumps. Anna then wears the sterilized gloves in order to hold the kidney of the rat in her hands. Sue explains to me the kidney of the rat has the same characteristics of the human one; same shape, but different dimensions. Anna immerses the kidney in the liquid. The device constructed with the pumps cannot contain air bubbles and it needs to be full of liquid, otherwise the kidney would be damaged. The device is connected to a laptop for monitoring the kidney pressure. Sue and Anna connect the tube distributing the liquid to the kidney, and notice that there is an air bubble. Once the bubble is removed, they insert the tube. The monitor starts measuring the kidney's pressure which gradually increases. Sue and Anna observe the kidney meticulously. A syringe connects the kidney to the tubes. They leave the rat kidney in the laboratory hood for 17 hours. Sue explains to me that once the kidney was left over night and the day after the catheter was found unplugged […].
>
> *The day after…*
>
> The kidney is all white - as expected - since all cells have been removed. Its pressure is stable and within the parameters. Anna is checking the kidney: she looks at both kidney and computer screen displaying the pressure. Anna wears her gloves and starts

> working. She takes out the catheter and with a syringe extracts the liquid. While engaged with these activities, she tries reaching Sue over the phone. At that very moment of Anna's call, Sue enters the room and Anna smiles saying she knew Sue was coming. Sue immediately asks how the kidney is doing and she is happy to find it white. Then she puts on gloves and they start working together to prepare the liquids for cleaning the kidney. Anna says: "It's all white". Sue and Anna are thrilled for the result. Anna starts putting some liquid in the pump machinery. This job always requires high precision and carefulness not to touch the sterilized parts with the non-sterilized ones. The body movements need to be as precise as possible. […]"

In this passage, Anna and Sue show engagement with objects at work. First, they meticulously observe it, look for anomalies, and scrupulously attach tubes. These practices express Anna and Sue's care and attentiveness towards objects. At the same time, Anna and Sue manifest emotions (happiness and enthusiasm) towards the kidney and the results of their actions on it in instances such as: "Sue asks immediately how the kidney is doing and she is happy to find it white. Sue and Anna are thrilled for the result". From the excerpt we can see that emotions emerge as part of researchers' activities with objects. Angle & Van de Ven (2000) note emotions, such as euphoria, manifest in the initiation period, frustration in the developmental phase, and closure when innovation processes terminate. Whereas for Angle & Van de Ven (2000) emotions take a complete humanist sense, the data suggest instead that they are constructed in relation to objects. I clarify this point in dynamic 2, where I show how researchers engage in a relation with objects (which shapes them as researchers), and clarify how the proposed lens extends Van de Ven and colleagues' humanist lens on emotions.

The next sections aim to unveil processes through which researchers are entangled with objects and specifically highlight two dynamics of these entanglements, namely the

characterization of objects as separate from the researcher, and the counteracting dynamic of incorporation of objects into an embodied self.

Dynamic 1: Naming and describing matter

BfL and Techie Labs researchers have a way to define their objects of work and the material used in their daily practices. When asked: "What do you do here?" researchers would answer directly: "I am on the cells area and of course also on the part of characterization of these IPF cells", or "For the last 10 years I have been involved in research with a technology that is called Trust Computing". We can see here that members use objects, namely technologies and substances, to describe their role in the organization:

> "I work with cells, and also on the characterization of these IPF cells. They are staminal cells, they are also semi-tumour cells; they proliferate very quickly; they can evolve into different cell types spontaneously. So they are cells to be controlled, not cells you can use randomly. Hence you need to characterize them with a particular method. After characterising them, not an easy task to do because you need to find the area in which they integrated, […]." (Sandra, researcher in BfL)

When Sandra describes IPF cells, she doesn't mention a medium or conditions in which these cells are developing, as if these cells were external (to the researcher), proliferated in a vacuum, and the context in which cells are located had no influence on their form. More mundanely, these types of descriptions can be interpreted as a way for referring to one's own work practices. Yet, we can see that researchers think of objects at work in a specific way: IPF cells are already constituted, as staminal cells, before entering the laboratory.

Thus we can say that researchers engage with different objects throughout the innovation process, objects that at first glance seem defined as ontologically separate

from the researcher and with which researchers engage for their practical use in innovation making. Nonetheless, throughout the data a second dynamic emerged, one that questions an ontological separation between researcher and objects, and the mere practical use of objects. This dynamic is illustrated next.

Dynamic 2: Making matter part of "self"

The first dynamic shows us that objects are described as something external to the researcher. But is this really the case? The data tell us something more. For entering the two firms, I was asked to sign a document: for BfL this was an ethical consent for research on animals; for Techie Labs it was a confidential information agreement. Whilst these can be seen as routinized access procedures, they also express a specific relation between subjects and the objects of work. Whereas for Techie Labs information security is a main concern, for BfL it is the alignment to the organization's ethics, specifically towards research on animals. Once entered the companies, I could observe members working with animals and technologies. In their work practices they would refer to objects in terms of "mine" and "yours". Cells, codes, etc., were not just objects existing autonomously, as dynamic 1 showed; but furthermost, they were "my cells, her cells", "my code, his platform". In many accounts researchers in BfL would illustrate their difficulties in treating animals. Specifically, a common term for killing an animal was "sacrifice", implying the recognition for the role of the animal in research. Also, BfL researchers expressed emotions of sadness or disappointment when one or more animals died unexpectedly. Despite the number of years in biomedicine, many senior researchers would still feel challenged in sacrificing, or witnessing an animal suffering. Similarly in Techie, during a video conference with the U.S.A. Techie Labs, a joke was made on the safety of plugging Benjamin's usb stick into Humphrey's computer to present the work done, as described in the following extract of field notes:

> "As usual on Wednesdays every two weeks there is a reading group. This is a space where the Defending the Cloud team members can present their work, a presentation on a paper, etc. After the first one which was held by a member of the American team, in which the entire hour was spent on his presentation, the manager sent around an email setting new rules: presentation confined to 20 minutes, as a conference presentation, or if it contains a demo, to 40 minutes. This leaves time to Q&A. Five researchers wait for Benjamin to present his work on Zeus. Henry is following the meeting over the phone. They start joking on Benjamin's usb stick, if it is safe to put it on Humphrey's computer, along with jokes on a possible malware and William's *Grocemarket* malware. When Benjamin starts the presentation, he talks about the fact that he has information he cannot send through email but give it offline as they discussed about traceability in the past. The presentation is on Zeus, a Trojan they can use for the demo in December. On one slide he presents the Zeus symptoms, and he says he came up with the list after a chat with Nathan and David. […]" (Fieldnotes, 10/10/2012)

This extract refers to an accident involving William who involuntarily infected his workstation with a malware contained in the usb stick bought at a supermarket. The event soon became a common joke: a poster was hung on a wall in the middle of the Security Lab with William's picture holding the usb stick and saying: "I buy my malware from *Grocemarket*". Techie Labs members were using irony in referring to circumstances when objects caused problems to their technologies, or disrupted their work flow. Also, much of the engagement of researchers with objects is in a playful form, thus indicating an emotional engagement with objects. In the two events (the sacrifice of an animal in BfL and the usb accident joke in Techie Labs) researchers responded to the changing conditions of objects. For example, naming the "killing" of an animal a "sacrifice" suggests that the animal is not only thought of as an object necessary in work practices - as a weak process approach would argue - but also as part

of the concerted actions that drive innovation and as agentive in such process. Animals are agentive in their engagement with researchers and other objects. In many instances researchers articulated rats' reactions to operational procedures (such as biting or impeding tests to be performed on them) as non-cooperative behaviour. Without animals' cooperation - such as allowing humans to touch them, inject drugs in them, monitor or test them - there would be no possibility to draw results of experiments.

In a weak perspective objects are somehow neglected, and specifically not regarded as agentive. For example, Van de Ven (2000) identifies euphoria and disappointment and shock from setbacks as emotions towards a new project. In his perspective emotions are developed towards the object (the project), a passive artefact recipient of innovation participants' attention. The project does not act, nor are the material components of the objects clarified as part of the emotional engagement. Differently, we can see from the data that researchers' emotions (playfulness, sadness, embarrassment, joy) and naming of objects in terms of "mine" and "yours" suggest that objects are at last made part of their identity as researchers and are used to create distinctions among researchers. The dynamic described illustrates that researchers engage with objects and with them they establish a relation, and through them they shape themselves as researchers. Such relation is among objects and humans, thus extending Van de Ven's (1985) view on emotions as occurring - throughout innovation processes - within the group-individual level.

Vignette 2: Matter is entangled and effects emerge

From Vignette 1 we have seen that in daily work practices, researchers engage with objects in specific ways. Yet in the data another mechanism emerges. When narrating their work practices, and what it takes to be a researcher in the firms, BfL and Techie Labs members would explain that their work involves many objects. A researcher in

pathophysiology of experimental renal disease is surrounded by animals, kidneys, test tubes, and pharmaceutical products. Depending on the type of object at stake, specific actions need to be performed. BfL researchers start their day by putting on a gown. The gown is white, left on a hanger in the laboratories every evening once work is finished. Each gown has a name, or some distinctive sign to recognize it. The white gown is a necessary outfit for all employees. When I entered the laboratories, I was given a green disposable gown, as I was a visitor. The white gown is not only a work uniform, but it is also a personal protection equipment (PPE). In the Safety Manual, one of the first key points mentioned is the use of the gown either as a PPE or as a simple gown. How can the researcher distinguish between the two cases? The manual says:

> "For example: the gown, in laboratory work, is usually a uniform, so it is not necessary that is has the characteristics above mentioned prescribed by law; nonetheless, for many works (for example: manipulating substances carcinogenic or toxic by ingestion or contact, or with drugs, specifically if antitumor or cytostatic mutagenic) the gown is a device for individual protection of the worker." (Safety Manual, BfL, 12/2007)

The manual clarifies that when using specific types of matter, researchers need to change the way they use the gown. In practice, researchers distinguished among different material at work and they would change their uniforms accordingly (extra protection when dealing with human tissues, or unbuttoned white coat when operating on a computer in the laboratory). What we can see here is that one white gown has multiple meanings. The type of objects at stake (a carcinogenic cell, a laptop, a human cell, or a murine cell) suggest different uses of a white gown, and requires researchers to act differently in each situation they come in contact with these objects. Thus the several meanings of a white gown are not imposed by the researcher (or the "Safety Manual" committee), but are negotiated across different people and objects involved.

An example of emergent relations among objects and people and negotiation of meanings emerges also in an episode occurred in Techie. At the time of the observation, Techie Labs Security division was developing the "Defending the Cloud" project. The team in charge would meet regularly to discuss technical issues and advancements. Among the ideas proposed was to develop a malware laboratory, to be confided in a specific area of Techie, with access limited to team members. Access to the first location of the malware lab was granted by a badging system. Confinement was necessary for the types of technologies and software used. It was not a surprise then that when I headed to the temporary malware labs, and I accessed it with my badge, the team immediately referred to the security team member for verifying what went wrong. Several events took place in the initial design of a malware lab. First, the team decided that a malware lab needed to be created separately from other research activities and offices, for security purposes. This meant seeking for a suitable place, within Techie Labs, where the lab could be set up. The team then decided who could have access to the malware lab: not all Security researchers would be granted access, nor all Defending the Cloud project members. The team had to reach out for someone within the Security group who would take care of building an access system. Thus, the malware lab is the emergent result - constitutive entanglement - of different relations among people (team researchers, external staff), technologies (the malware, hardware and software material), objects (badges, office spaces).

Constitutive entanglements involve humans as well as nonhumans. For example, national legislative decrees regulating PPE, or the badging system to access areas in Techie Labs, are nonhuman materiality: they are a piece of paper, a PDF file, or a chip card. As many other objects, they all contain human agency: regulators define health standards in biomedical laboratories, HR managers inscribe access to certain spaces in

the chip card of the badge, and researchers arise concerns on self-protection to their managers or when they require special access to spaces. In the PPE regulation, managers delegate to the gown the role of protecting the researcher's health, in case the researcher mishandles some substances; similarly, the badging system in Techie Malware lab reminds a forgetful researcher of his inaccessibility to a certain laboratory space. Thus, we see objects being delegated values and ethics from humans, hence containing a "prescription" (Latour, 1992). But are these objects just containers of human prescriptions or are they agentive as well? Researchers in BfL argued that experiment outcomes are based on the reactions and interactions of animals, drugs, instrumentations, researchers. For example, when treating animals, decisions need to be prompt; delaying a decision, such as whether to inject a drug in an animal, can compromise irreversibly the animal or the experiments' results. Thus, the entanglement among researchers, animals, instrumentations, hardware and software equipment, shapes the innovation outcome, but also innovation participants (researchers, technical instrumentations, animals, etc.).

Below I discuss the implications of the entanglements, specifically their role in defining work practices and self at work, in creating conflicts among participants, and in shaping an innovative environment.

Effect 1: Defining work practices and self at work

So far, we have seen different entanglements among objects and people are implicated in work practices in innovation. But how do these entanglements affect people, objects, and matter in more general terms and the innovation process itself? To see entanglements in action, we can look closely at two examples of interviews, in which Camilla and Olivia describe their work in the firms.

> "Probably most of people working here because we are scientists, we like technology, we like problems, we have a nature of sensitivity for technical problems. We prefer to be around problems and we naturally like problems, we think about them and try to solve them. [...] We like problems, we like to solve problems, we like technical stuff. [...] No matter whose idea is, who makes money, who is eventually making money I don't care. I don't know who buys the patent, how much Techie sold it for, whether they finally use it or not, how much they made. It is not my business, I don't want to hear. This is kind of … no matter what the reward is." (Olivia, researcher in Techie)

This instance represents a common narrative of researchers describing their work in Techie. Accounts such as "We are scientists, we like technologies" put objects at the centre of the account, and specifically suggest that objects take a part in defining "yourself" in relation to things (knowledge, outcomes of experiments, bugs fixed, etc.). Olivia defines herself as a scientist, and constructs a definition of identity around "technologies", and "problems". For Camilla, being a researcher in BfL has sense to the extent that she engages with experiments, results, various knowledge from the field, techniques:

> "I don't think everyone is able to do this job. Anyway you need to be a person always ready to challenges, because it can happen that the experiment - as you thought it - gives you an unexpected result. Hence, you need to be able to re-design the experiment at the very moment; you always need to make links and comparisons. Every day you relate yourself with your results; maybe you don't get the results you expected. It is a continuous challenge, a questioning of the ways you get involved. You always need to be dynamic and very flexible: I thought it this way, but maybe it is better to do it in another way. And then there is the operation at the labs desk, for which you need a certain precision, a certain orderliness, operationally speaking, you need to be precise because you risk contamination. And you need to wait after the experiment as you

> don't immediately see results. Some results are visible after a month, if you are lucky […]" (Camilla, senior researcher in BfL).

Camilla's interview aligns with Olivia's account, to the extent that she develops her understanding of being a researcher around the objects of her work, which challenge her in constantly defining herself as someone "able to do this job". Camilla' and Olivia's engagement is manifested in the precision and accuracy of handling different objects, an attention towards technical problems. The insight gained here is that constitutive entanglements affect the researcher's perception of her identity as researcher. As Camilla notes, being a biomedical researcher means to be a person "always ready to challenges", precisions in handling objects, tidiness, etc. Thus, objects handled by Camilla and Olivia shape their research practices and affect their ways of moving around them.

Whereas the data presented above shows that the entanglement of matter shapes practices and self at work, the next section argues that these entanglements also create disturbances in the innovation flow.

Effect 2: When matter creates conflicts

Effect 1 described how different types of matter not only prescribe, but also actively participate in embedding meanings, crafting relations among matter, and affecting processes of identity regulation. The above effect also suggests that matter is at the centre of researchers' practices, and it is furthermore agentive in setting out relations among researchers. The type of matter in question is not only technologies or work spaces, but especially practices, ideas, and knowledge. For example, several researchers in BfL and Techie identified as a key issue in the organization a myopia in understanding the importance of sharing capabilities and "domain specific knowledge" (Carlile, 2004:555):

> "Often you don't find out lots of the things that are going on here unless you talk. So it's tricky to know what is going on. I discovered something has been happening for six months now because I never had a conversation about that project and because it is a large organization, especially things happening elsewhere and not in the UK. Sometimes the first time I know about things is through maybe external publications, or internal tech reports updates: Oh I didn't know about that. It's the kind of communication that is not good. […]" (John, researcher in Techie)

The passage shows that acquiring knowledge from within the organization can be a difficult task. John's extract suggests that knowledge is perceived to be critical in researchers' communication (to what extent can knowledge of projects/research interests be acquired?), but specifically it can harm the innovation process, when knowledge becomes an unshared object. Knowledge is an unshared object when researchers don't communicate to others instances in which technical issues emerge, or new developments in their project, potentially beneficial for other participants.

In this sense, participants materialize knowledge and ideas as objects, which are either hidden or publicly accessible (for example, through technical reports in Techie, or through open seminars in BfL). From an "innovation as dynamic entanglement" perspective, keeping competences isolated and lack of ideas sharing summarize "tensions" (Garud & Munir, 2008:691) of different people involved (managers, researchers and technicians), and the lack of congealment of "distributed efforts" (Garud & Karnoe, 2003:296) of different players. Also, extant literature on innovation as dynamic entanglement would see players (stakeholders, researchers, institutions) as actors shaping innovation outcomes. To these players, a sociomaterial approach adds knowledge and ideas as agentive in shaping viable innovation directions. Knowledge and ideas are active agents to the extent that their presence/absence causes disturbances

in a fluid innovation development, or else to enhance such flow. For example, Natalie, researcher in BfL, summarizes the ways hiding knowledge and ideas inhibits the understanding of innovation as a whole process, and undermines the beneficial effects of knowledge sharing for innovation:

> "On regards of certain groups if you don't share a project with them you don't even know what they are doing. […] It is about understanding if they encounter the same problems as you, a problem that might be similar to yours and maybe together you can solve issues more rapidly; thinking over certain solutions on your own is harder. Maybe they have more competencies than you on that matter, but even simply sitting down and discussing is fundamental in this type of work. […] Maybe after a long time you are fossilized on specific experiments, you need to finalize a work, but you cannot do it because you have a vision which is not limited but conditioned. Whereas an external person - seeing the issue for the first time - can offer solutions that are totally different from what you could have imagined." (Natalie, senior researcher in BfL)

This extract shows that, despite the physical proximity of researchers in BfL, knowledge as unshared object can affect the fast resolution of problems encountered in experiments. It also clarifies that positioning knowledge as a shared object with other participants is integral part of innovation, and that its retention inhibits the full development of innovation and undermines its beneficial effects. To summarize, the instance above suggests that knowledge and ideas are entangled with humans; they are at the centre of relationships among different researchers not only as disputed objects, but as active agents when causing delays and lack of coordination among participants. By adding to extant "players" in the innovation process also knowledge, ideas and practices, we can gain more insights on how their entanglements with other players (researchers, laboratories, technologies) creates issues in the innovation process.

Effect 3: Building a creative workplace

The last effect of entanglements relates to researchers' engagement with the organizational environment:

> "When I arrived here, Emily [Head of Department] told me: this is not the work of the post office. And it is true. You don't come here to do the piping, use a thousand tubes. This is a job that in a year you can get out many publications on what you are researching. But you have to study, update, and learn new techniques as well as assimilating all information and building on it, not only to passively receive information. So while you are building up knowledge, and assimilating it, you also suggest directions. To me this is what a researcher has to be, and I think that's what they expect. By "they" I mean the managers; they expect this from the majority of people." (Gabby, researcher in BfL).

By illustrating her work in opposition to a "post office job", Gabby defines her daily practices - such as continuous reading, learning new techniques, actively seeking information - innovative and challenging. The instance also proposes that daily research practices, such as using pipes, solutions, enacting protocols, writing codes, are not innovative practices per se: "piping" all day does not necessarily produce innovative outcomes. What instead makes these practices innovative is their entanglement with researchers, new knowledge, the environment, and so on. Piping and using tubes is connected to new techniques, to the researcher as an active player in seeking out for new expertise, to the laboratories as spaces in which researchers have ample freedom for developing ideas, to solutions present in the laboratory, and animals reacting to treatments. Whereas Garud & Van de Ven (2000) found the "innovation infrastructure" is composed by professional/industry trade associations, regulatory agencies, investors, academic and research institutions, private and for profit organizations - mainly

humans, differently the data shows that the entanglement of managers, researchers, protocols, methods, extant literature, technologies, and knowledge altogether create the flexible "infrastructure" in which innovation can take place.

Such flexible infrastructure is also constructed through space and norms within the organizations. In the instance above Gabby notes managers define as a norm of being a researcher a strong passion towards biomedical (or engineering) research and specifically towards their daily work. Many BfL researchers worked with animals, which they kept in a protected environment in the underground level of the firm. Each day, holidays and weekends included, researchers fed them, and checked their health conditions on regular basis throughout the day. On the other hand, Techie Labs researchers spent long hours in the firm, and when working from home, they were available at any hour of the day. Statements as "You don't come here to do the piping" or "You have to study, update, learn new techniques", are part of a common narrative in both organizations on the meanings and ways of being a researcher. Commitment reflects their passion towards work, sustained by managers, and made part of their identity as researchers. In both organizations this had practical effects: accepting long working hours (in Techie and BfL) and low wages (in BfL) or temporary contracts as a good compromise for working in the desired firm or field.

Passion and dedication in their working practices, as part of an "embodied self" (Akrich & Pasveer, 2004), space configuration (open door policies and accessible laboratories), a propensity to expand their knowledge, are elements part of the creative environment shaped by managers, researchers, protocols, methods, extant literature, altogether acting in "coordination" (Mol, 2002:53). Reading all this from a posthumanist lens extends Van de Ven and colleagues' (1999) understanding of the innovative environment as dependent from the concerted actions of external economic forces, stakeholders'

interventions, managers' requirement, and sponsors, by introducing objects as part of the infrastructure. Innovation is not only dependent from the interplay among firms, multi-party networks, and communities, but also includes objects - such as animals, codes, hardware equipment - as part of the embodied self of researchers.

Discussion

Cutting across the data, the significant roles of constitutive entanglements throughout the innovation process emerge. I distinguish among "constitution dynamics" and "effects" of entanglements, the latter referring to the roles different types of matter play in the innovation process, and create consequences for researchers, their relations, and the working environment. Dynamics refer to two processes in which entities take shape, namely the naming of matter and the incorporation of matter into a "self". Also, I identify three effects of entanglements on innovation. Entanglements affect the ways researchers define work practices and self at work, their relationships, and the creation of innovative environment. I name these "effects" to highlight that entities are active agents, and not only repositories of human intentions and actions, and that entities are neither human nor nonhuman, but sociomaterial. Rather than revealing a separation between material and social, human and nonhuman, in innovation processes, my analysis highlights how innovation is a mangled process involving several dynamics, entanglements, and effects. Instead of seeing entities (organizations, firms, technologies, and people) as separate, my analysis shows their constitutive relations and inseparability.

The picture below summarizes the innovation model emerging from the analysis. As a point of departure, I integrate Garud et al (2013:780) innovation model with two emergent dynamics -constructing and effecting- and a further level of analysis of the process, that of objects.

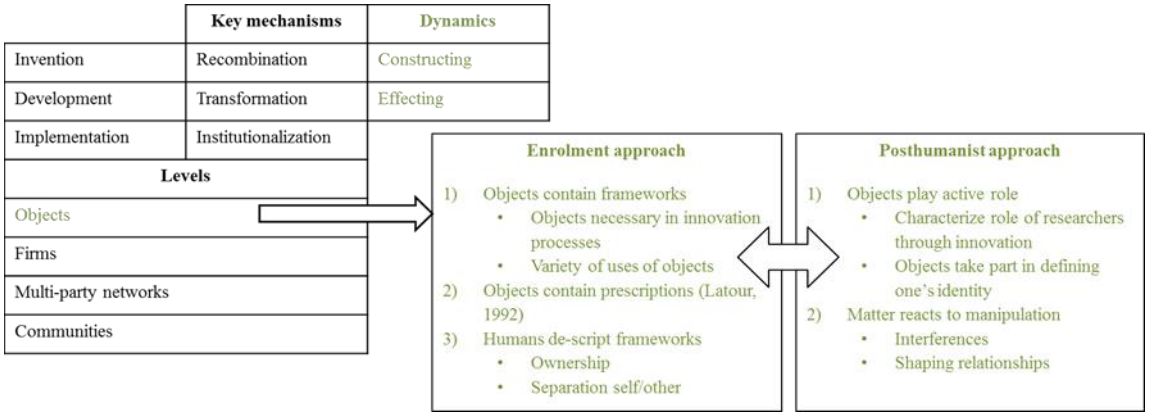

Figure 3 Integration of Garud et al. (2013) innovation process model -Garud et al. (2013) model in black

To theorize about entanglements and their implications for the innovation process, I revisit constitution processes and effects in light of a posthumanist approach (Barad, 2007), to widen the existent enrolment approach (Akrich, 21992).

Engaging with *constructing*

This section illustrates how the material presented answers the first research question: "How are people and objects constructed through their relations in innovation?" The first dynamic of constructing relates to the ways researchers define materiality and its role in innovation. I call this dynamic "naming", a discursive practice constituting matter (Barad, 2004). In other words, naming refers to instances in which researchers characterize their work by explicitly describing it in terms of objects (IPF cells, Trust Computing). Naming is not only part of researchers' accounts of work, but also embeds the constitutive relation between objects and researchers: objects are formed in actively discerning among researchers' roles in innovation, and shaping researchers' (emotional, practical) engagement, as we have seen in the instances in which participants use objects - technologies and substances - to characterize their role in the organization. Below I summarize how "*constructing*" can be theorized in relation to both Akrich's Actor-Network-Tehory (ANT) approach and Barad's posthumanism.

Akrich (1992) suggests that objects contain and reproduce inscriptions of a framework. For example, regulators define health standards in biomedical laboratories through health and safety manuals, or when managers restrict access to certain spaces in the chip card of the badge. We can see inscriptions here in the ways actors think of objects' roles: what objects are needed in the innovation process, and what they are useful for in innovation. A posthumanist approach instead reveals that objects play an active role in innovation: types of biological artefacts discern among researchers working on molecular or cellular biology, in vitro or in vivo. Particularly, objects, as used by researchers, become part of a definition of researchers' identities involved with IPF cells, trust computing, cloud infrastructure, etc. This reading of objects and researchers gives agency to objects, and recognizes matter's dynamism (Barad, 2007).

Whereas these two perspectives seem diverging in whether matter has agency per se or not, yet they share a common ground. The process of naming shows that matter is materialized through the ways researchers define it. Barad (2003) calls this "citationality". When citationality takes place, a framework is inscribed in the object. The emergent framework from the data is a definition of matter as an external and yet internal entity. Thus, citationality links to Akrich's (1992) concept of "de-scription": through the repeated process of naming objects, actors can inscribe a framework in the object. In other words, the researcher, by repeatedly naming objects in different ways, can contest, modify, or reaffirm the very use of an object, for example by assessing the importance animals (by using words such as sacrifice instead of killing), human or murine cells (by discerning among cells that are faster than others and assessing ways to react on them), technologies, and software. "De-scribing" also takes place when researchers define objects as "mine", "his", "yours". By doing so, researchers make matter less passive and objects become part of a constituting self at work. Following up

on this ANT perspective, a posthumanist lens clarifies the active role of these objects in a two-folded way. First, matter - such as cells, systems, codes - is owned by the researcher who defines it as “mine” or “yours” or “someone else’s”: matter is used as an object which is owned and which helps separating self from others. Second, matter can react to the researcher’s manipulation: matter intra-acts with our reality and manifests itself by interfering with our constituted systems, such as William’s malware on Grocemarket usb interrupting and affecting his work, and by sparking jokes around its disturbances. Thus matter is dynamic not only as it is a work object for researchers, but also because it acts as point of reference around which researchers define their identities.

Whereas for Latour (1992) objects have agency to the extent that they are a “prescription” of delegated moral and ethics dimensions, a posthumanist approach instead suggests a more dynamic view of matter. A posthumanist lens advocates that matter’s agency stems from the constitutive entanglement of matter with other matter (researchers and objects at large), and its role in shaping researchers’ identities, as we have seen in vignette 1 when researchers incorporated objects into an embodied self. If read through a posthumanist lens, the data suggest that researchers don’t exist apart from their entanglement -emotional, operational- with objects. This aligns with a strong process approach (Hernes, 2008), for which agents do not pre-exist their actions, but they are formed through actions and interactions (Bakken & Hernes, 2006), they consist of what they do (Rescher, 1996). Thus, whereas extant ANT-informed approaches to innovation highlight the active roles of humans in shaping technologies, objects, and the social context, the data suggest that actors, technologies, and contexts are mangled together and they are shaped through intra-actions.

The data also outline joyfulness, sadness, puzzlement, and playfulness as part of the emotional engagement of researchers and objects. As Mol (2002) notes, a phenomenon (e.g., sacrifice of an animal, creation of insulin transplant device, etc.) to be practiced needs an entangled combination of non/humans acting in coordination. My framework nonetheless suggests that this coordination is among entanglements of matter, rather than among self-existing entities - faits accomplis (Langley & Tsoukas, 2010) - as a weak approach in innovation literature suggests.

Engaging with *effecting*

The data show that being a researcher entails a specific way to engage with matter. Matter refers not only to objects, technologies and artefacts, but also to researchers. From a posthumanist lens, the researcher's identity enrols boundaries that are created over time according to the changing conditions of the relation among different elements, people, and contexts. For example, the gown in BFL has different meanings (a uniform or a PPE) according to the varying roles of researches, whether working in a toxic-free laboratory or dealing with toxic substances. Yet, this is linked to the changing conditions of matter: from being a substance that, if let alone, would not harm the researcher, to becoming toxic when a researcher handles it. It is here that we can see matter as a bundle of constitutive entanglements. Nonhuman matter (such as toxic substances) requires a specific involvement of researchers in the ways they manipulate it. This matter also shapes meanings attributed to other matter: the laboratory gown becomes a protection tool when toxic substances are handled, whereas it is simply a work uniform when substances are not toxic. Also, matter is part of constituting researcher's actions, by for example requiring additional clothing protection or changes in laboratories, and her interactions with other researchers. In BfL, coordination was essential when utilizing microscopes, their use needed to be scheduled promptly, and

eventual cancellations quickly notified. Conflicts emerged when researchers would use test tubes, mice trays, and chemical solutions of another laboratory. This was seen by researchers as incapacity of self-organization, misuse someone else's budget, leading often to resentment towards researchers' inability of efficiently planning materials usages.

Thus, we can summarize that a posthumanist approach helps to see matter at the centre of a "stabilizing and destabilizing process of iterative intra-activity" (Barad, 2007:210), a process through which we can come to understand how researchers' relationships with each other and objects as constructing and affecting innovation, thus answering the second research question: "How does their mutual shaping affect innovation?"

Also, a posthumanist lens allows us to see ideas and knowledge as sociomaterial matter impacting innovation flow. The data show that matter such as ideas and knowledge, along with objects, can hinder the fluidity of innovation, by becoming the node of miscommunication, quarrels, and lack of sharing. Van de Ven & Garud (1993) conceptualize knowledge, ideas, technical expertise as resource endowments: knowledge and ideas, along with institutional arrangements and economic activities, are reciprocally related in the development of an innovation. Resource endowments advance over time: scientific knowledge of cochlear implants was gained over years by university and institutions researchers. What a posthumanist framework suggests is to consider these resources not as an external elements sustaining innovation, but as part of constituent entanglements which shape and affect innovation. In other words, from a posthumanist approach, knowledge, ideas, expertise are not entities definite at several point in time, whose changes are systematically traceable, such as Van de Ven & Garud (1993) suggest in their cumulative events graphs. Rather, they are social-material-cognitive entanglements that do not exist before their relation with researchers,

technologies, animals, codes, etc.

Conclusions

Innovation has been a longstanding concern for scholars and practitioners. Along the way, more process oriented approaches have been developed to understand the evolving nature of innovation. Overall, I found extant literature on innovation falling short on a strong process approach on several aspects. A strong process approach calls for rethinking the ontological separations among entities - "things in themselves" (Hernes, 2008:14) - or as dichotomies, thus moving towards an ontology of inseparability. In the paper I provided examples of innovation literature in which dichotomies and "things in themselves" still reign. Despite the interest in a strong process take on innovation, extant literature misses out the complexities of the micro processes that construct innovation processes. It does so by looking at processes as evolving longitudinally, that is "how things emerge, develop, grow, or terminate over time" (Langley et al., 2013:1). Drawing on the cases of Biomedicine for Life and Techie Labs, I instead suggested that for looking at processuality in innovation more strongly we need to conceptualize processes as emergent from constitutive entanglements of elements, rather than following entities and their change on a linear temporal dimension. I suggest that this theoretical shift integrates current innovation models (Garud et al., 2013) by identifying two additional dynamics -constructing and effecting, which enfold through the three innovation phases (invention, development, implementation) and through three key mechanisms (recombination, transformation, institutionalization; Garud et al., 2013).

My posthumanist approach engages with researchers' and practitioners' stand on the "politics of who" (Mol, 2002) is acting in innovation, thus questioning who innovation

participants are (are they only firms, multi-party networks and communities?). The paper answers by introducing the role of objects as in relational constitution with other elements (people, and other objects), and by showing such constitution in micro-dynamics throughout innovation. My framework also questions a "politics of what" this process is about: entities or entanglements or else? This leads us to think of innovation as having multiple bodies and multiple voices, intra-acting and shaping each other.

As a strong process approach, or unowned process theory (MacKay & Chia, 2013), I recognize the limitation of the "*necessarily incomplete or partial understanding*" (ibid, p.210) of the entirety innovation process, and the lack of certainties on innovation outcomes. Nonetheless, my framework adds to Van de Ven and colleagues' innovation model (see Garud et al., 2013) a finer granularity and depth of accounts of the relational constitution of elements (people and objects) playing a role in innovation. This is useful to understand how everything we see as involved in an innovation process constantly changes, researchers included.

CHAPTER IV

Excluding the Other: Re-producing gender dynamics throughout innovation processes

Abstract

Despite the arising interest on the intertwining of individuals, organizations, and institutions in innovation research, scant attention has been given to the ways their relations produce and reproduce - throughout the innovation process - specific gender dynamics. Innovation research has been characterized by a gender blindness that obfuscates the gendered nature of innovation processes. This article is concerned with shedding more light on innovation and gender in organizations, and exploring *if*, *how*, and *with what consequences* gender dynamics are enacted and shape innovation processes and the people involved. The article draws on material collected through an ethnographic investigation in two research organizations, and illustrates how doings and sayings in innovation processes are strongly and insidiously gendered. The article shows that innovation processes are gendered when performances of a gender order are enacted, when specific forms of masculinities are engrained in what is understood to be innovation, and when these performances negate specific gendered bodies and practices, such as the pregnant body and the parental experience.

Keywords

Gender, innovation, poststructuralist feminism, performativity, gender dynamics.

Innovation is a longstanding topic in organization and management studies. Current innovation research focuses on its disruptiveness (Bower & Christensen, 1995), on the ways innovation is created through breakthroughs (Bessant, 2008), on the constitutive networks building an infrastructure for innovation (Swan & Scarbrough, 2005), and on the role of users in the innovation process (Von Hippel, 2005). Notwithstanding the importance of these aspects of innovation making, relatively limited attention has been devoted to its links with gender. Ranga & Etzkowitz (2010:2) note that innovation research has been characterized by gender blindness and bias:

> "Here, we turn on its head the general perception of innovation gender-blindness due to the lack of visibility of the individual innovator in innovation policy and research. We argue that although the individual innovator is not seen in such studies, innovation is not gender-blind, but rather inherently gender-biased, because of an implicit, socially constructed assumption that women are less innovative than men as a function of traditional gender relations, that men-dominated industries/sectors are more innovative than women-dominated ones, all rooted in a social perception of technology that is more often associated to men than to women and call for more empirical research on the gender dynamics pervading innovation."

Ranga & Etzkowitz (2010) claim that much of the blindness towards gender within innovation studies actually masks a more important issue, that of the predominance of masculinities in understanding innovation processes and ideals of innovators. Their claim is sustained by recent empirical research (e.g. Andresson et al., 2012; Danilda & Thorslund, 2011; Lindberg, 2007, 2010; Lindberg et al., 2012; Lorentzi, 2011) which suggests that often certain innovations do not gain much of public interest, especially those innovations not related to highly technological products in traditional sectors, and that men and certain masculinities are prioritized within innovation policies (Andresson et al., 2012). Despite the arising interest on gender and innovation, much research is

still needed towards the understanding of how gender is enacted - in practice - throughout innovation processes. Alsos et al (2013) claim the need of more research on practices enacted within organizations that show how innovation is "fundamentally gendered" (Alsos et al., 2013:9).

I position myself within these recent developments, and explore - through the use of a poststructuralist feminist approach (e.g. Butler, 1999) - the gender dynamics of inclusion/exclusion for the men and women involved in doing innovation in practice. This study draws on empirical material collected through an ethnographic investigation in two settings: a non-profit biomedical research centre in Italy (Biomedicine for Life [BfL]), and the British R&D division of an IT multinational company (Techie Labs). The findings recount the ways in which gender emerged as such in the practical negotiations of participants.

I focus first on the sayings of who is understood as an innovator in the two firms, and suggest that the identity of an innovator is shaped around sayings regarding what it means to do innovative research that sustain specific "stereotypical notions of gender" (Andersson, 2012:13) for which family responsibilities intrude on innovators' working lives (Ranson, 2012). I show how difficulties in managing the "dual presence"[38] (Gherardi, 1995) encompass both women and men at work. I explore the stereotypical notions of gender in innovation enacted in the two organizations, and shed light on how competition is understood as part of researchers' relations, and how it furthermore reinstates the very masculinity that Ranga and Etzkowitz (2010) find being associated with innovation processes.

[38] With the term "dual presence" Gherardi (1995:94-95) refers to "cross-gender experiences and the simultaneous presence (in the consciousness and experience of women) of public and private, of home and work, of the personal and the political."

Second, I focus on the doings occurring in innovation making, and their shaping of an ideal of innovator as someone who does not possess a body (a pregnant body), nor family relations. I suggest that this re-instates a gender order that produces a distinction between researchers performing competitiveness, withholding knowledge, perseverance, fighting, devotion towards research, and *others*, who privilege cooperation, sharing ideas, balancing the dual presence, and including gender-related aspects such as the parental experience. By showing the performance of a gender order within innovation practices, the findings enrich empirical research on the practical implications of such gendering.

The article proceeds with a first section outlining recent advancements in gender and innovation research. The article then provides an overview of the theoretical framework underpinning the analysis, that of Butlerian poststructuralist feminism, and shows its benefits for innovation and gender research. After a brief discussion of the methods and data analysis, the article presents the findings of the empirical research in form of stories, and closes with some suggestions for further research.

Gender in innovation literature

Innovation is "the invention, development, and implementation of new ideas" (Garud et al., 2013:776). Van de Ven et al. (1999) found that innovation does not follow set stages, and that uncertainty characterizes its phases (invention, development and implementation). In each phase interactions of different actors build an infrastructure for innovation to take place, but also define which directions need to be taken, based on a specific view of what constitutes successful innovation for the people involved. Garud and Gehman (2012) note that what makes an innovation process successful are not only the technological capabilities, but the interconnections among different actors involved

in the process (institutions, organizations, users), and the "prevailing ideas of gender, health, and environment" (Kirsch, 2000:25, in Garud & Gehman, 2012:984). For example, the introduction in the market of the car Model T by the Ford Motor Company, on an affordable price for its employees, generated an ecosystem that re-shaped and transformed society at large, such as its environmental infrastructure. Similarly, Akrich (1992) found that in developing the photovoltaic lighting kit in Africa, a network of people and technologies sustained the development of that innovation, from the French manufacturers, to the local electricians, and their tools. Central in these accounts are actors, their experiences, and the relations of people, institutions and technologies.

Despite the arising interest on the intertwining of individuals, organizations, institutions, and frameworks on reality, scant attention has been given to the ways these frameworks produce and reproduce -throughout the innovation process- specific gender dynamics. Ranga & Etzkowitz (2010) note that innovation research has been for too long characterized "either by gender blindness or male dominance" (ibid, p.1). The authors call for more empirical research on gender dynamics that pervade innovation processes.

What are the possible ways in which innovation crosses gender? In recent gender and innovation research we can see two directions shedding light on innovation as a gendered phenomenon: *i)* the understanding of *who* is acknowledged as an innovator; and *ii)* the definitions of *what* innovation is. As for the former, Alsos et al (2013) argue that gender blindness in innovation research reflects an invisibility of "people" in innovation. The authors point out that innovation research privileges a focus on outcomes, processes and systems, rather than on its people. In these lines, Andersson

(2012) finds that innovators and innovations are premised on certain forms of masculinities:

> "The dominating image of innovation and innovators builds on stereotypical notions of gender; promoting men and certain forms of masculinity as the norm" (ibid, p.13)"

A promotion of men and masculinities as the norm in innovation pervades innovation policies. For example, Petterson (2007) found that the Swedish innovation strategy for technical innovation and industrial development embeds an ideal centred on a male engineer as innovator. Petterson (2007) suggests that the policy implicitly indicates men as main actors in natural sciences, technology and mathematics fields, and women as those lacking technical skills and propensity to mobility. This translates into "reproducing social exclusion, strengthening traditional masculine gender-marked areas and thereby failing to identify promising future innovative areas" (Andersson, 2012:13). In other words, women are "silently excluded in the technological innovation policy which focuses on male-connoted industries and makes female-connoted organisations invisible […] reinforcing and perpetuating the gender system" (Berglund & Thorslund, 2012:41). Whether the invisibility of people is a debatable critique to innovation literature[39], it nonetheless questions the ways identities of innovators have been conceptualized in innovation literature, and specifically outlines its blindness towards gender.

Are innovations only created by a single individual male? Garud et al (2011) suggest the opposite:

> "Innovation involves interactions among networks of people and technologies from different practice domains." (ibid, p.737)

[39]Schumpeter's (1934) elaborations on individual entrepreneurial inclination towards novelty have been at the basis of early works on innovation. Schumpeter (1934) suggested that people have ascribed characteristics driving them towards innovation, and innovation is the result of individual adoption of new technologies or practices.

For example, Garud & Van de Ven (2000) found that the cochlear implant was developed through the cooperation and relations of different people, in the public and private sector, regulatory agencies, private companies, trade associations, stakeholders and investors, academic institutions, and so on. This suggests that we cannot focus solely on one individual (a man) as the promoter of innovation. Thus, in order to grasp gender dynamics in innovation we need to be attention towards the web of relations among different actors in innovation.

Berglund and Thorslund (2012), among other (e.g. Blake & Hanson, 2005; Danilda & Thorslund, 2011; Lindberg et al 2012a; Ranga & Etzkowitz, 2010) also found that promoting men and certain masculinities as the norm for innovation minimizes the role of women and certain femininities in innovation making and tends to re-produce their exclusion at work. For example, Poutanen & Kovalainen (2013) illustrate women's absence in innovation processes. Even when women occupy R&D positions, their presence is made absent through different strategies, such as impeding the creation of spaces for their participation and promotion of ideas in group discussions, or when their innovations are hijacked by other colleagues. Moreover, some innovations are expected to be publicly ignored based on their inability to fit a prominent model of innovation, one that involves high tech products and men as innovators (Andersson et al., 2012:13):

> "In short, a man with an idea on how a high-tech product can affect renewal processes in a traditional industry fits better as innovation than an ethnic minority woman with an idea on how a process may bring about social justice in society. Innovations with the potential to reduce poverty and combat inequalities may be easily excluded since they seem unclear (and perhaps also incomprehensible) in relation to what has traditionally been presented as innovation. Thus, it is easy to dismiss promising innovations or, for

> that matter, entrepreneurial men and women with innovative ideas that do not "fit" according to traditional understandings."

But is this really the case? In 2002, Dean Karlan, professor in Economics at Yale University, founded Development Innovations (now called "Innovation for Poverty Action"), a non-profit organization dedicated to designing and evaluating potential solutions to global poverty problems. In the last 10 years IPA has designed 190 solutions to poverty issues (such as after-school girls' empowerment and satellite-transmitted classes in Ghana). IPA's revenues in 2012 financial year amount to $36.4m. This is an example[40] of a successful innovation aiming towards social justice. The example shows that social innovations are not necessarily a domain of women (the idea of funding IPA is of a white American man), it questions whether their innovations embed a masculine framework, and whether innovation is successful only when it relates to a new high tech product in the traditional industry.

As we have seen above, Garud and Gehman (2012) found that innovation success is complex, and dependent on the networks of people, organizations, and institutions. Garud et al (2013) illustrate that the adoption of an innovation depends on various elements, such as how the innovation is presented, a firm's capabilities to promote its innovations, and the role of regulatory institutions in setting conformity standards. Innovative outputs result from the actions loops of environmental (external) events intervening in the innovation process (Van de Ven et al., 1999). Thus, what is problematic in the link between the success of an innovation and its inability to fit a prominent gender model is the neglect of wider political, economic, social, and geographical elements shaping the environment in which innovations develop. Instead,

[40] Another example is the Skoll World Forum, taking place yearly at Oxford (UK).

looking at how these elements are gendered can shed light on the ways gendered forms of innovation and specific gender orders are created and sustained.

A second direction shedding light on innovation as a gendered phenomenon is analysing definitions of what innovation is, specifically *what* is understood to be innovation. For example, Berglund & Thorslund, (2012) find that in the innovation policy text "Innovative Sweden" there is a specific construction of masculinity that stresses traditional masculine industries as places where innovations emerge (the so called "growth areas"). Similarly, Lindberg (2012) suggests that gender and innovation are linked in innovation policies when

> "the range of sectors being prioritized corresponds to the sex-segregated labour market and when the innovation system concept is mainly linked to two kinds of technology, both related to hegemonic masculinities (physical strength/mechanical and calculating rationality/technological experts)" (ibid, p. 57-58).

What is problematic looking at gender and innovation solely in innovation policies is the risk of treating innovation as a "thing", an object that is specifically definable in each of its properties. Also, by focusing on how innovation policies promote certain gender categories (e.g. Ljunggren et al., 2010; Andersson et al., 2012; Pettersson, 2007), the ways gender is "done" and "un-done" (Kelan, 2010) through its doings and sayings in organizations are overlooked. Thus, we can enrich our understanding of gender in innovation by specifically looking at the ways practices in innovation-oriented jobs construct and sustain particular gender dynamics, and by questioning: *i) What* are the practices enacted in research organizations involved in innovation? *ii)* Are these practices gendered, and *if* so, *how (and with what consequences)*?

By integrating analysis of two innovation-oriented organizations, respectively working in the pharmaceutical (Biomedicine for Life, BfL) and information technology (Techie)

sectors, employing over 80% women (BfL) or over 80% men (Techie), I take into account different types of "idea generators" (Petterson & Lindberg, 2013), and explore how practices carried through innovation processes generate gender dynamics in which a particular gender order is constantly performed. As a theoretical framework, I engage with a poststructuralist feminist approach, and specifically, Judith Butler's understanding of gender as a "doing" (Butler, 1999:34). Through the data, I illustrate how this framework helps us grasp gender dynamics in a way that transcends the binary opposition of female/male.

Analytical framework

One of the central aspects of poststructuralist feminism, and specifically of Judith Butler's works, is a critique to the claims for natural differences among women and men, differences that lead and justify role attribution and subordination. Butler's works, and poststructuralist feminism at large, have informed gender research in organization studies in a variety of ways, from a focus on intersectionality of gender, class and race (Calás & Smircich, 1993; Calás & Smircich, 2006; Holvino, 2010), work-life balance (Emslie & Hunt, 2009; Smithson & Stokoe, 2005), work practices and masculinity/femininity (Bruni et al., 2004a and b; Hatcher, 2003; Powell et al., 2009, Pullen & Simpson, 2009), gender and team-work (Metcalfe & Lindstead, 2003), gender and group performance (Fenwick & Neal, 2001; Myaskovsky et al., 2005), conformity and resistance to gender norms in organizations (Kelan, 2010; McDonald, 2013), women and managerial work (Whitehead, 2001; Priola, 2007), among others. All these works share the common interest in the ways organizational knowledge is gendered so that certain genders are privileged over others. They also attempt to break down the traditional dualistic vision of gender, by bringing in empirical work on different forms of doing (and undoing) gender in work contexts usually exclusive of either men or

women (Gherardi, 1994). For example, Martin (2003) finds that the two vice-presidents (Tom and Betsy) of the Fortune 100 company she observed were "citational of the gender order" (ibid, p.347), in other words Tom's request towards Betsy to answer a phone call during a meeting among the two, and Betsy's compliance to such request, placed her as a subordinate, as a woman, reinforcing the symbolic gender order of men and women at work. Tom's and Betsy's doings and sayings embedded gender meanings based on a symbolic order of gender, which is never stabilized, but that they dynamically enact and reiterate.

Butler's works challenge binary structural oppositions: a conceptualization of reality in a dualistic way creating distinctions such as between body and mind, male and female, feminine and masculine. Gherardi (1995:4) outlines the dangers of binary oppositions:

> "If we are to escape the gender trap, if we are to free ourselves of the idea that there exist two and only two types of individual, if we are to ensure that social differentiation is no longer based on sexual differentiation, we must destabilize all thought which dichotomizes (either male or female) and hierarchizes (male as One, as the norm, and female as the Other, as the second sex)."

Gherardi (1995) notes that conceptualizing gender as male/female forecloses other forms of gendering. As a response, she suggests that gender practices need to be understood as "interdependence, inseparability, ambiguity" (ibid, p.4): gender is flexible, never stabilized, and relational to others as well as to the context. Such perspective implies that gender has a dynamic and performative nature. In relation to gender in innovation, this helps us grasping the ways the gendered identity of an innovator is created within the organizational context as relational and as including and excluding specific gender forms.

For Butler (1988), gender is performative to the extent that what people do and say, if repeated over time, has an effect: actions and discourses shape gender identities. Similarly Kelan (2010) claims that discourses can be both a way of doing and undoing gender: they shape gender identities, but at the same time offer a space for resistance to dominant gender positions. Resistance happens, for instance, when individuals act in a way that does not conform with the dominant view of the male/female, when they enact, through their body, a gender that subverts dominant "unitary gender meanings" (Kelan, 2010:190). For example, transgender individuals use their body for political action, as a way to undo social gender norms tending to overlap our assigned sex at birth with our gender identification.

Butler (1988) indicates that gender is an act which is simultaneously "intentional and performative" (ibid: 522). Gender is a series of acts that confirm or contest the gender a person is assigned (usually at birth). Gendered bodies are culturally constructed through sanctions and tacit conventions, which are reproduced, challenged, and modified over time by the ways individuals do their gender. Butler (2004) finds that these norms are at the same time measurements - for subjects on what characteristics they should display according to their assigned gender - and means though which a standard is produced. Norms not only guide our understanding of gender identity, they not only tell us how to act according to our assigned gender, but also sustain gender dynamics that include and exclude individuals not adhering to such historically and contextually constructed gender norms. In other words, when someone is born - or even in earlier stages - a gender is assigned to their sexed body. From that point onwards, what an individual does or says is constantly referred to their attributed gender. By doing so, gender norms are reproduced and maintained (this is what Butler calls "performativity"):

> "Performativity is not a social constructionist account of what gender is or may be (i.e. its basic insight is not 'doing gender'); rather it is an analytical approach for problematizing such 'doing'." (Calás & Smircich, 2006: 312)

Gender performativity is a mode of looking at how certain norms of gender are embedded in our doings and sayings, how our doings and sayings inform us of enacted gender dynamics, that is what gender positions are intelligible, and which others are left out. Focusing on gender dynamics means to investigate what gender positions are acceptable and which ones are not in the context analysed, but specifically what the effects/consequences of doings and sayings are for the people involved: what are the available forms of gender, and how these forms create "trouble" (Butler, 1999) to them.

Butler (1993) points out that the repetition of norms through body and discourse (citationality), and specifically forms of contestation of these norms, helps grasp the constructing of a dominant symbolic order, and how *other* gender positions emerge. Butler's poststructuralist approach thus focuses on identities as relational, and on the ways norms are defined, sustained and modified. In relation to gender in innovation, this approach sheds light on norms defining roles throughout innovation processes, sayings and doings sustaining these norms, forms of resistance to them, and consequences of such resistance.

Studying innovation and gendering processes in organizational settings

I turn to extant innovation as process and gender at work literatures to outline the methods I used in answering the two research questions on *what* doings and sayings are enacted in research organizations involved in innovation, and *if* and *how* these are gendered.

Langley et al (2013) and Langley (1999) illustrate various methods for capturing processes within organizational contexts, and specifically innovation, ranging from ethnographic accounts to documentary analysis. Similarly in gender studies, Poggio (2006) notes that ethnographic approaches provide accounts of daily actions and production of meanings and gender order in the workplace. Specifically, Bruni et al (2004b) use observations and narrative interviews as particularly helpful methodological tools for capturing the interactive and process nature of gendering, gender sayings and doings. I next illustrate my use of these tools in the two organizations.

Research design

The article is based on an ethnographic study of two settings, implying participating, covertly or overtly, in the daily lives of the observed, engaging in informal and formal conversations with them, listening and observing their actions, and related meanings, basically: what they say when they say it (Hammersley & Atkinson, 2007). I conducted overt participant observation, in-depth interviews, and documentary analysis in both firms. In Biomedicine for Life (BfL), a pharmaceutical non-profit research centre based in Italy, I spent three and half months observing members of the Tissue Engineering Unit, and conducted 25 in-depth interviews at different hierarchical levels. The result of this observation is a 37 pages research diary including field notes[41], together with various documents and videos of project presentations and seminars held within BfL. Following the first field, approximately four months of participant observation, internal documents, 43 hand written pages of field notes, and 17 in-depth interviews were conducted in Techie Labs, the British Research Laboratory of an IT multinational

[41] The field notes diary is constituted by 21,089 words, 91572 characters (excluding spaces). To this need to be added documents and videos collected in the field.

company. I followed members of both organizations on a daily basis, according to their working hours.

The underlying logic of the research design is to articulate innovation not as a context for gendering, rather as the process in which gender emerges in its sayings and doings. In order to do so, I first focused on definitions of innovation and its practices for the members of the organizations, how they perceived innovation should be done (normative stance), and what innovating requires both from the organization and from its members. By focusing on these dimensions, gender dynamics emerged as part of the innovation process: the normative stances enclosed meanings associated to a specific gender order and reflected dynamics of inclusions and exclusions of innovators' gender identities.

Biomedicine for Life and Techie Labs

BfL is a pharmaceutical not-for-profit research centre. BfL was founded in the 1960s following a conspicuous donation of its founder, who envisioned the organization as offering research - without profit - for medicine and patients. Over the years, Biomedicine for Life has expanded to four institutes across Italy, one of which was the locale of this research. BfL develops innovation and research in several biomedical areas, for cardiovascular diseases, psychiatric/neurological diseases, cancers, with a specific focus on adopting the latest technological developments. Overall, BfL employs 900 people, of which over 60 in the research setting studied[42] [BfL Alpha]. A team working in the tissue engineering unit of the Bioengineering Department in BfL Alpha was followed throughout the data collection period.

[42] Including administrative personnel.

The second setting is Techie, a multinational North American company operating in the IT sector. Techie employs more than 330,000 people on a global scale. It has offices and production sites internationally, and the setting explored is one of the four advanced research laboratories of Techie[43]. In this laboratory, based in the United Kingdom, around 40 people[44], from researchers, managers to administrative staff, were employed. The team followed during the ethnographic study consisted of researchers working in the Security and Cloud department, specifically on the "Defending the Cloud" project, developing a demonstrator in which forensic virtual machines are used to provide early-warning systems for detecting malwares in a more efficient and prompt way.

Below follows a summary of the demographics and organizational structure of the two sites. For simplification reasons, the figures represent the skeleton of the hierarchical structure of the two organizations.

Company	Males[45]	Females	Total	Males in percentage	Females in percentage	Males interviewed	Females interviewed
Techie Labs (UK)	31	7	38	81.57 %	18.43 %	13	4
Biomedicine for Life (Alpha)	10	48	58	17.24 %	82.76 %	7	18

Table 1 Demographics of BfL Alpha and Techie Labs UK, inclusive of all personnel

[43] Techie Labs worldwide employs around 200 people.
[44] Including administrative personnel.
[45] The use of male and female to connote the sex of the interviews reflects my political stand on gender as not identifiable with the ascribed sex connotation.

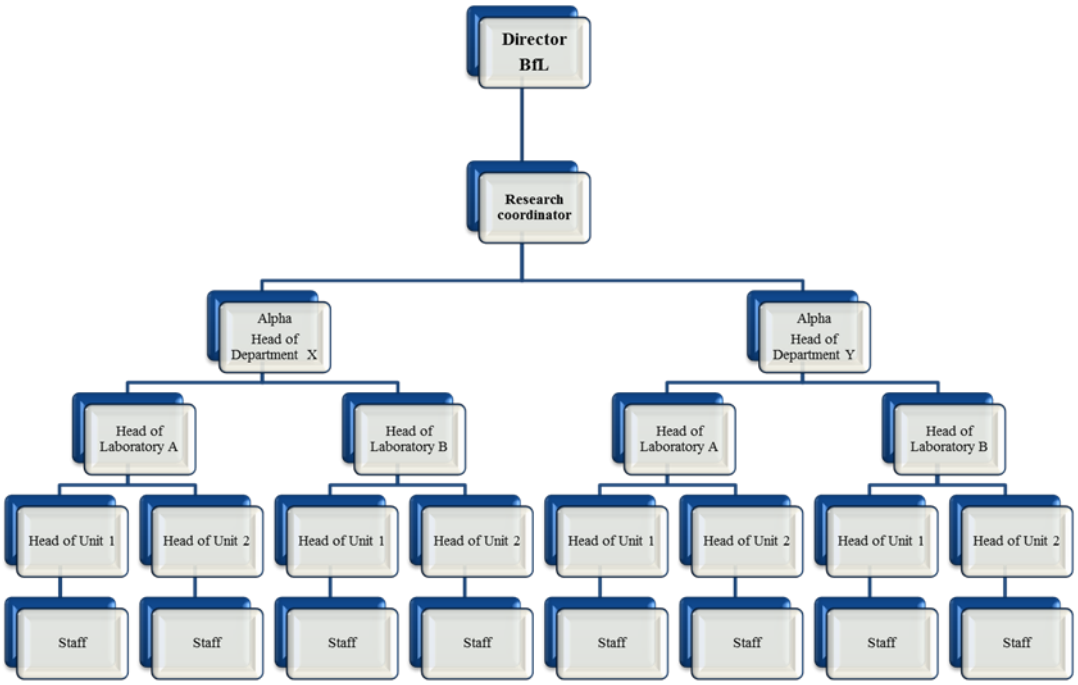

Figure 4 Organizational structure of BfL

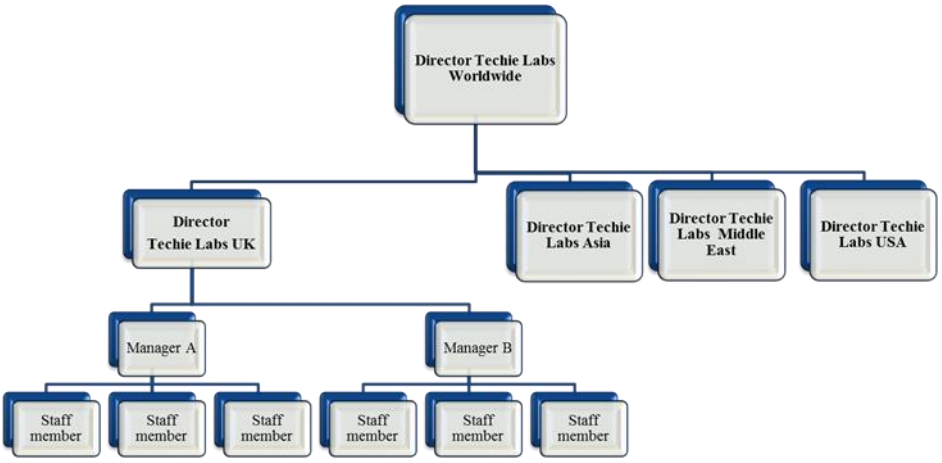

Figure 5 Organizational structure of Techie Labs

Data analysis

The analysis of the data follows similar steps as Gioia et al. (2012) and Nag et al. (2007). The data was first open coded separately. This coding resulted in over 70 codes for Techie Labs and approximately 60 for Biomedicine for Life. Codes focus on actions as described by interviewees and on emergent actions traced throughout documentary material and field notes. The first codes stick closely to the data (Charmaz, 2006), and summarize actions such as: accounting, explaining, perceiving, and identifying. On a further level of analysis, first order codes were summarized under a second order theme. This step involved identifying patterns of actions and grouping them into sub-categories, joining the two sets of data. Sub-categories describe the processes inferred from actions, and are grouped into second order themes, so to reduce the numerosity of the first order codes. Second order themes are combined into aggregate dimensions (induced by the researcher), identifying the macro-areas of processes emerging from the data. These dimensions include: *i)* hierarchies and organizational/managerial power, *ii)* shaping identity through identification, *iii)* sayings attributing meaning to researcher's identity, i*v)* innovation practices, *v)* innovation process, *vi)* organizational culture, *vii)* engagement of artefacts, researchers, and work practices, *viii)* sayings on gender differences, i*x)* experiences of gendered environments, and *x)* managing time. Below follows a summary of the data analysis on which the article is premised.

	Aggregate dimensions	**Second order themes**
Sayings on gendered innovator identity	*Sayings attributing meaning to researcher's identity*	• Meaningfulness of being a researcher - Being a researcher • Meaningfulness of being a researcher - Qualities
	Sayings attributing meaning to doing innovation	• Playfulness - Attributing playfulness to innovation practices • Enjoyment - Enjoying innovation research • Enjoyment - Passion towards innovation research
	Sayings on gender differences at work	• Discourses on gender differences at work • Gender disadvantages at work and impact on career

		prospects
Doings of innovators and effects on gender identity	*Shaping identity through identification*	• Processes of identification - Organizational identification • Processes of identification - Group identification
	Experiences of gendered environment	• Difficulties of having women in research positions • Difficulties in group acceptance and effects on own performance • Impact of gender dominated environment on workplace satisfaction • Impact of gender-related aspects on work practices
	Managing time	• Time for blue-sky research and reality of work life • Time for work and time for family • Struggling in managing family and work

Figure 6 Summary of the data analysis at the premise of this article

Seeing gender in innovation processes

In this section, I report five intertwined stories: Jonathan the juggler, Valery's sense of guilt, Grace's knife-fight, Julia's neutralization of herself as an individual, and Laura's work with radioactivity. I chose to present the findings in form of "repertoire of legitimate stories" (Czarniawska, 2004:5) because they inform on past performances and how present performances can open up to future ones (Czarniawska, 1998). I open with Jonathan's story, the only story I present narrated by a man, working in biomedical research for more than 20 years. I choose to open with Jonathan's account because it is explicatory of what women and men in both organizations face when engaged in innovation practices: the performing of a gender order and the conceptualization of family as an impediment to work. Grace's story and her experience of BfL as a "knife-fight" environment follows Jonathan's. Third, I present Julia's story, one that shows the complexities of being a scientist, and the related negation or, better said, marginalization of other personal experiences, such as the ones of maternity and childcare. Valery's story follows on similar lines the one of Julia. Valery positions herself in the traditional gender order of the woman as the carer, thus legitimizing her sense of guilt in deciding to advance hierarchically. I conclude with

Laura's story as a researcher working with radioactivity. Laura's story is emotionally intense; it is a story of commitment to biomedical research, and a story of internal battles of resistance and compliance to a gender order that places her experience as a mother second-ordered to the one of being a scientist.

Jonathan and his running around and about

> "I am the only one…the videoconference room, as if you needed a university degree to start a videoconference room. My son was three days old and I had to come here because no one can turn on the videoconference kit. You should have seen my wife what she yelled at me…and she is right. But how can I say no? They were in deep trouble. So I left for an hour, I live 40 km away from here, so that means driving to here, turn on the kit, and leave […] when I have a videoconference I eat in 20 minutes, because you need to get ready 10 minutes before, and you need to be there. So you have to drop everything and you need to organize yourself […] how can I say to a person that earns 800 euro per month that they need to eat in 20 minutes…no. I do it [eating in 20 minutes] but it is an illogical thing to do. Also because it takes time away. Being responsible of all the IT part means that every time something does not work on someone's computer you need to drop everything and go, from the simplest connection of a network, to fixing something complicated. We are now 85 people here, we are not few. You need to take care of the printers…today email accounts don't work. My phone already rang 7 times to be told that emails don't work. In Milano no one picks up the phone. So what do you tell them? If the boss' email doesn't work it is a huge problem. What if I was all day operating on animals? What do you choose to do? Should I operate on the animal or fix other things? […] today the technician is absent. So I am the one that needs to put the probe at -80°, should I wait for the technician and waste another 4 days? No, I spare 10 minutes and I do it. But this means that I came at 10.05 to your interview [scheduled at 10]. […] this morning I had to take my son to his nanny, which means I arrived at work at 9. Before, I used to work 9, 9 and half hours per day. I was here at 8 in the morning, leaving at 6.15. Now I have to juggle everything…I cannot

> tell the nanny: keep him 2 hours extra. Unfortunately, I have to pack and go home. And the phone keeps ringing, and I receive emails on Sundays too."

Jonathan's story is one of a juggler. Jonathan has a family, a wife who works full time in a private company, and a new-born son. Jonathan is a researcher in BfL, who in the past 20 years has worked in a variety of aspects of chemistry and biology. Alongside with his research activities, he helps with the maintenance of the IT infrastructure in BfL and the more mundane technical practices, such as starting the videoconference kit or changing the probe, which are not part of his employment arrangements. Nonetheless, Jonathan does the man's job; he engages with the technical and the manual aspects of a job that are associated to masculinity (Lupton, 2006). By doing so, and by positioning himself as the only person capable of fixing technical issues, he performs a gender order which associates men with unrestricted availability (even when at home caring for their sons), and as the ones capable of fixing technical and practical issues. This gender order traps Jonathan in situations for which family becomes an impediment: "Unfortunately I have to pack and go home, I work less hours because I have a son", making the parental experience a barrier or a limit to a full engagement. Jonathan's story shows us that family responsibilities do intrude in men's working lives (Ranson, 2012), similarly to what happens to women, signalling that doing innovation cuts off transversally women and men at work in their difficulties to balance the dual presence.

Grace and the "knife-fight": performing masculinity

> "When I first arrived I was told that, being a public entity, there is not much you can be offered; you will be precarious for life and you get on with it, but if you don't leave, no one will kick you out. When I came in here the message was completely different: if you work hard, leak feet, and so on the possibility of being employed exists. Therefore

> there is a knife fight, a fight that does not allow collaboration, a common objective, working altogether. The idea of uniting forces so to reach the common goal does not exist. This should be at the basis of this type of job, at a global level, and especially in the same laboratory. There is the concept here that who has reached a position, they reached it with this strategy, and as a consequence they don't deserve it. These are all personal conclusions and are dictated by preconceptions." (Grace, researcher in BfL)

One of the ways for capturing gender is the understanding of *who* is acknowledged as an innovator, and what "stereotypical notions of gender" (Andersson, 2012:13) - as the norm - it embeds. The identity of an innovator is shaped around sayings on what it means to do innovative research. In order to be innovative, researchers need to be strongly committed to their research. Descriptions of being an innovator refer to someone with strong commitment towards research, defined as a "special activity", and the acceptance of limited career prospects (in both organizations), low economic rewards (particularly in BfL), long working hours, or working from home, no clear separation of personal and work time, and a struggle in managing time for family and work: "This is not the post-office job!", a BfL researcher summarizes.

Like Grace, many other researchers in both organizations experienced competition as part of their relations at work. Grace's story is particularly fascinating for the openness of her account. She defines this process of competition a "knife fight", suggesting aggressiveness is part of her relations at work. "Fighting", "persisting", "convincing" are ways BfL researchers define the requisites for dealing with high competition within the organization, among employees. Competitive behaviour, "a knife fight", is perceived across all BfL laboratories and hinders collaboration and achievement of a common goal. Cooperation among researchers is what BfL members believe to be at the basis of innovation-oriented jobs. They believe cooperation being essential for

keeping up with external competition, allowing being the first company producing a new drug or paper, and speeding up internal procedures. Yet, such cooperative spirit clashes with internal rivalry, for which "keeping things private" and "cultivating your own snippet" are perceived as effective behaviours in securing job continuity or career opportunities. Similarly in Techie Labs, researchers recognize high competitiveness to be a deterrent of collaboration, though being necessary behaviours for surviving the workplace.

Competition - specifically towards upward progress - is often associated with a display of conventional masculinity at work, such as the idea of careerism being the breadwinner's primary focus (Collinson & Hearn, 1994). In innovation literature, competition is theorized as associated with a "male gendered cultural element of the innovation process, while "consensus-building" appears to be a more feminine approach" (Ranga & Etzkowitz, 2010:5). As Grace argues, this competition - a male gendered feature of innovation processes - clashes with the very objective of innovating, that is creating a network of collaboration that can speed things up and beat competition. Rivalry, aggressiveness and a tendency to withholding knowledge have become in the two organizations "regulatory practices" (Butler, 1999, p.23) that constitute researchers' identities as innovators, and embed a masculine connotation. In other words, competition, rivalry, and the negation of a legitimized upward progress (as Grace notes "they don't deserve it") are norms of behaviour that regulate intelligible identities in the two firms. Regulatory practices are recognizable standards of what makes a successful innovator: passion, curiosity, out of the box thinking, strong commitment (as in Jonathan's story), ability to set research as first priority in one's life, as well as aggressive competitiveness. Also at the stage of convincing top management for making an idea successful in the selection process, researchers need to convince

managers (and peers), with perseverance and aggressiveness, of its feasibility and usefulness. These norms define who is qualified to be recognizable as a successful and innovative researcher. In this sense,

> "[…] recognition becomes a site of power by which the human is differentially produced." (Butler, 2004:2)

Power here is defined as a "regulatory mechanism" (Butler, 2004:50), determining what innovators are and what they can be. This definition of an innovator is unitary and exclusionary at the same time. It is unitary as it defines in monistic terms what a good researcher in innovation-oriented jobs should be like, that is a committed, dedicated, strongly minded individual. Conversely, this definition is exclusionary. Its exclusionary power is one that eludes a gender dimension in such definition. Gender is in the definition of "good researcher" neutralized: experiences of parenthood are marginalized (Jonathan's story), certain bodies (e.g. the pregnant body, as we will see in Laura's story) neglected, and borders between personal and working time blurred (as Julia's account next outlines). In the next stories, we see how these dimensions particularly emerge in the innovation practices of researchers and have specific effects on their gender identity.

Can I be an individual if I am a scientist?

> "I think this is where there could be a gender issue. It is a male dominated environment here, I think there are like 10% women, or maybe less, and I think it is quite competitive. I don't know if it's because of the American influence, because it is an American company, or whether because it is male dominated, but that seems not to match with me, I don't really like it. It is so competitive and you need to justify yourself as an individual, and the way you get on, when younger people ask me, you need to get into an area of technology, or expertise that identifies you as a person, so

> that people can come to you and ask about. You need to make yourself known for something and this is the way to progress and get on. […] almost it's a way of putting people too much against each other [...] you collaborate with people that at the same time are your competitors, and they shouldn't be […]" (Julia, researcher in Techie Labs)

Julia is a principal research scientist in Techie, she has been working in Techie for 20 years during which she has produced more than 80 patents. Julia's position as a lead scientist is well recognized by her co-workers; colleagues turn to Julia for her great capacity to craft research funding proposals, for her expertise in trust technologies, cloud systems, and more generally privacy policies. Yet, her experience of being an innovator, and the practices that being an innovator entail, make Julia constantly question herself as an individual. Julia's words are striking: "that seems not to match with me". Julia reflects on her work practices as a scientist. Innovating in principle entails cooperation, and cooperating means that people must know what expertise she is valuable for. Her value as a scientist in cloud accountability depended on her ability to specialize and make herself known as an expert within the organization. Julia achieved a recognized status of scientist; she has extensively travelled, worked intensively on patents and academic writing, and gained the sought after title of "principal research scientist". Yet, Julia acted unreflexively in accepting the weight and implications of being an innovator impacting herself as an individual. In Butler's (1993) terms, she acted citationally of the gender order. Julia shows awareness and abilities in reinstating the gender institution in which she lives at work –as scientist, as a person. In other words, Julia understands and accepts that being a scientist comes to the forefront of any other role.

Julia is not only a scientist. She is a mother. She travels frequently for work; she sometimes has compelling deadlines that push her to stay up until late. For her, it is "hard and stressful" to manage being a scientist and a mother. Across the two organizations, the parental experience is described as difficult to conciliate with work, and the separation between family and research as hardly achievable: detachment from work in an innovation-oriented job is challenging. Also, travelling, developing experiments that can last longer than expected, and elaborating ideas even after working hours are part of practices of both BfL and Techie Labs researchers. To these is associated emotional distress, derived from attempting to manage their dual presence, and a sense of guilt stemming from the inability of balancing time for family and work. Regardless of the flexibility of the two organizations in setting working hours or working from home, women and men researchers still perceive as challenging complying with deadlines and at the same time creating a family. This emotional distress can be associated to some requisites of being an innovator, such as strong passion and commitment to research. Jonathan narrated his struggle in reconciling his research in BfL and his role as a father, when having to pick up his son from nursery while still deeply involved in his research activities, or juggling between being in BfL and spending time with his toddler. Similarly, Julia's late working nights from home as an IT expert when raising her toddlers is part of the struggle in managing roles of parent and innovator. For those not experiencing parental obligations, family is still perceived as contrasting with the strong commitment required by innovation activities.

The sayings that sustain intelligible identities of researchers also spawn into the doings in innovation processes, as they are linked to the nature of the job, and bear a perspective for which activities - experiments, running codes, taking care of animals in the laboratories, etc.- cannot be always contained in fixed hours. Practices in innovation

have a performative nature, as they affect the people involved: they produce emotional distress and experiences of struggle, and create a gender symbolic order which enhances, as acceptable identity of innovator, those that comply with such characteristics and enact related practices. Valery's story is an example of this compliance.

Valery and her sense of guilt: "I think it is normal for a woman"

> "It is hard, it is like this everywhere, it is hard to conciliate your private life and work, it is indeed very hard. Especially when you have little children, and then when your children grow up things become slightly better to manage. My mom always told me: you should have taken more care of your children. You always feel this…you divide yourself between work and family, and you have this sense of guilt from one side and from the other. I think it is normal for a woman. But you know…then here it is not a job that you can do part-time, you do not have much free time. In the sense that you don't need to be sharp with your work time, here you don't have fixed working hours. If you have scheduled your experiment and it lasts more than expected, you stay here. Or if you have deadlines, you stay here longer. At the end you need to conciliate work and family without neglecting either of them. Sometimes you wonder if you had another type of job, which is more manual, for which you stay there and then you end it there. Whereas here you cannot, it means you always have to think. Maybe you are in bed and you happen to think about the experiment: I should do it this way, maybe, or have a meeting for that. It is like this. You don't leave work when you go home, you take it with you, maybe not physically, in the sense that you don't bring things to read with you, but honestly you cannot detach yourself from it. What it is hard is to detach completely, to "pull the plug out". Honestly, I am happy to have made this choice, even if it is not easy. Maybe I have some regrets, because I never had time to follow properly my kids while growing up…" (Valery, Head of Laboratory in BfL)

Valery narrates her story of being head of Laboratory; throughout the interview I can sense discomfort when I ask her about working in a predominantly female environment. Valery silences specifically when we come to touch upon competitiveness and how it affected her work in BfL. Her silence is explicatory of her difficulties in working in an "all women" place, a competitive one, in which you can survive only if you have "strong personality", in Valery's words.

Valery also accounts for her difficulties of balancing her "dual presence" (Gherardi, 1995): it is "hard to conciliate work and family". Her being an innovator means that her daily practices at work collide with other personal commitments: "you don't need to be sharp with your work time; here you don't have fixed working hours. If you have scheduled your experiment and it lasts more than expected, you stay here". What is most interesting in Valery's account of her dual presence is the normalization of the sense of guilt, as part of the experience, as a woman, of managing work and family life. In other words, by saying "I think it is normal for a woman", Valery locates her sense of guilt as part of the experience of being a mother and a researcher. She furthermore complies with a traditional gender order that puts women as responsible for the family's emotional well-being. Whereas Valery resists to that gender order by being simultaneously a mother and an innovative researcher, this comes with the price of a sense of guilt, which she cannot escape. With her sense of guilt, Valery constantly refers back, or better said, performs the very gender order that positions her as an innovator-with guilt.

Also, Valery's account shows an alignment between her conscious performative acts that sustain a traditional gendering of relations and her satisfaction/happiness towards such choice. Such alignment nonetheless leads to a slight regret at the end: "Honestly, I am happy to have made this choice, even if it is not easy. Maybe I have some regrets,

because I never had time to follow properly my kids while growing up", suggesting that despite her satisfaction in committing to an innovative job she is still trapped into the sense of guilt accompanying her choice.

Next follows Laura's story, which expands the performativity of a gender order traced in Valery's account.

Laura and radioactivity

This is the story of Laura, a researcher in BfL, a mother. This is the beginning of my interview with her, an interview that took place in two moments, as we will see at the end of the excerpt. This is the first part, when I explicitly asked Laura about her experience as a woman, mother and researcher in BfL.

> Something I faced and that every woman faces is that when you have a family and decide to have a child somehow a door closes. My experience is that when I told my boss I was pregnant…I did things of all kinds, despite the fact that I was aware of being pregnant… when there was an emergency in the laboratory I did not step back saying: I am pregnant. I did things of all sorts. Also putting into risk...but I have been crazy in doing these things seeing the results. When I told him this and asked for a decision on a potential permanent contract after my maternity leave, he told me: you are pregnant, what do you want now? Being pregnant didn't cut off half of my brain. I kept working until I was due and further on, not allowed by law, but I was feeling good, so I agreed to come to work and use the three months leave after. I started coming back to work three months after delivering, with reduced working hours. I am not a lazy person. In this place the first pregnancy was passed on, because it is fine, but the second has been blamed on me, especially in relation to my permanent contract. Of course I waited to have the permanent contract before planning my second child. And I made the mistake, and I would still do it again, to reply to my boss when she asked me "Was it an accident?", "No, I looked for it". What I noticed here is that every second child is an

> accident. To me this is ridiculous. They made me pay back my second pregnancy in many ways. I kept working until the end of my due date, I stayed home three months, if there were problems they called me, I should have gone back immediately to work because…things happened and I was not made aware of. When I came back they expected me to work more, but I was breastfeeding, so at one point the situation was slightly uncomfortable […] they said that since I could not use radioactive substances because I was breastfeeding and since I always had plenty of milk… I was told that I could stop breastfeeding and start bottle feeding so I to go back working with radioactivity. This was not a life-or-death situation. It was simply that the person who should have done this job, and who did not have these physical impediments, didn't feel like going once or twice a week to Milano to learn a new technique and import it here. So I did it. I was taking out milk when I had it. Idiot. I have the word idiot printed on my forehead. It was useless […]. The strong sexual discrimination I faced was with my pregnancy. Also because I was always present, I never refused to work or try new things […] -The interview is here interrupted. Laura cries and she will explain to me in the second part of the interview that it was not the episode per se that affected her emotionally while narrating her story, but that she was reminded of her children and her experience as a mother.

Laura's story is emotionally powerful, and contains several performative stances of gender. Laura reflects on her way of reinstating a gender order, and on the outcomes of her resistance to it. Laura started working in BfL with no specific plan on her personal life: she was not married nor was planning a pregnancy when she joined. Along the years, she decided to become a mother, although she did not expect that her decision would have influenced her being a researcher in a negative way, as she admits, "a door closes". Laura's practices in the laboratories, and the risks she takes while being aware of her pregnancy, illuminate on Laura's doings of a gender order which frames scientists as individuals without a body (a pregnant body) or personal relations (having

a family and children). In going to work in the laboratories until her due date, in giving up part of her maternity leave for working full time after her first pregnancy, reflect a shared view on sexuality, and parenthood, as negated and problematic aspects of a scientist's life. Laura's story shows how her condition of pregnancy is defined in terms of a "problem" and an "impediment" to innovation practices. She needs to use radioactivity[46], learn new techniques and travel from one site to another. The interruption of these practices is blamed on her.

Laura reinstates a gender order also with her second pregnancy. Laura legitimizes her colleagues' calls when at home on maternity leave. Furthermost, she changes her practices as a mother who is breastfeeding and puts them as dependent from innovation practices: she changes the method of feeding her child; she adapts her body to the necessity of being present in the laboratory: the situation (breastfeeding and collecting milk) became uncomfortable. Laura's decision is to interrupt breastfeeding, instead of requesting different work arrangements to her boss. Her doing gender is "intentional and performative" (Butler, 1988:522). It is intentional to the extent that Laura acknowledges her decisions and evaluates them a posteriori as unwise: "I have the word idiot printed on my forehead". On the other hand, her doing gender is performative as she repeatedly embarks in practices that exclude her pregnant body, that make it problematic when it emerges abruptly, and second-orders her practices as a mother to innovation ones.

[46] Working with radioactive substances (art. 8, D. Lgs. n. 151/2001 of the Italian Legislation) or in biomedical laboratories (attachment B, D. Lgs. n. 151/2001 of the Italian Legislation) when pregnant is not legally permitted. In these situations BfL researchers experience a change in the types of practices performed: from working in laboratories to writing research proposals in an office; or a change in the type of engagement with work: working from home, setting time for family and time for work, for managing their dual presence (Gherardi, 1994).

Discussion and implications

Gender in innovation is an often overlooked topic within management literature; specifically innovation research is defined as gender-blind and biased (Ranga & Etzkowitz, 2010:2). Alsos et al (2013) argue for the need of more research on practices enacted within organizations that show the gendered nature of innovation. By exploring *i) what* doings and sayings are enacted in research organizations involved in innovation; and *ii) if* and *how* these are gendered, and with what *consequences*, the article contributes in enriching current debates on gender and innovation.

The article answers the first research question on what doings and sayings are enacted in the two organizations, and contributes to extant literature by illustrating the variety of gender performances in innovation-related jobs. For example, we see that doings framed in terms of "fighting" and "convincing" are enacted daily by members of the two organizations and that a repetition of a gender order positions innovators as individuals whose personal commitments are overshadowed by innovation practices. The article also contributes by outlining that experiences of inclusion and marginalization, in BfL and Techie Labs, were based not on a separation between women and men innovators (Danilda & Thorslund, 2011; Ranga & Etzkowitz, 2010). Features such as fierce competition, strength, passion, out of the box thinking, creativity, neglect of personal life, engage women and men transversally.

Moreover, the data answer to the second research question - if, how and with what consequences doings and sayings are enacted - by showing that characteristics of innovators are linked to some sort of masculine features (competitiveness, erasure of family life and parenthood, etc.). The article contributes to our understanding of the consequences of enacted gender practices by showing that characteristics of innovators, as emergent in the two contexts, neutralize gender and create a type of gender order

(Gherardi & Poggio, 2001; Gherardi, 1994; Butler, 1993) based on norms of neglecting experiences related to a gender dimension, such as the nurturing aspect of being a parent or devoting time to one's own family, fostering a collaborative behaviour at work, among others.

The data illustrate that the construction of the identity of an innovator has effects for the people involved, as it touches upon forms of gender which set continuity "among sex, gender, sexual practice, and desire" (Butler, 1999:23). For example, Valery's sense of guilt and legitimization of such guilt as part of any woman's experience of the dual presence reinstates the gender norm which associates women to heterosexual desire/reproduction/family care. Yet, the data also show that this is not a prerogative of women, but also of "working fathers" (Ranson, 2012), with the effect of producing dynamics of inclusion/exclusion that transcend the mere distinction between men and women, thus contributing to extant literature on gender in the workplace by suggesting that both women and men (in non-traditional professions) experience marginalization.

Using a feminist poststructuralist lens, and specifically Butler's elaboration of gender, leads to understanding gender dynamics of participants in innovation-oriented jobs in terms of performativity and re-production of a gender order. Empirically, this lens has shown us that doings and sayings of innovators create a legitimized and ideal of innovator who does not possess a body (a pregnant body), nor family relations. This sustains a gender order that produces a distinction between an individual who embraces characteristics such as competitiveness, withholding knowledge, perseverance, passion, curiosity, fighting, devotion towards research, and the de-legitimized *Other* - the subjugated- who privileges the *status quo,* cooperation, sharing ideas, harmony, balancing work and family, and including gender-related aspects such as the parental experience. This adds to extant innovation and gender literature empirical evidence of

the ways researchers involved in innovation activities frame themselves and the requirements for their job in a way that purports a specific gender order, one that enhances a particular type of masculinity (competitiveness, perseverance, passion, curiosity, fighting, devotion) over what traditionally is understood as belonging to the feminine (cooperation, sharing ideas, harmony, balancing work and family).

Conclusions: limitations and considerations for future agenda

The results of the study show that several elements interplay in constituting the innovator's identity, such as the problematization of maternal and paternal experiences, emerging through sayings and doings. The D. Lgs. n. 151/2001 in the Italian legislation has a direct impact on the innovators' practices. Practices change when BfL researchers are pregnant, along with the development of a sense of guilt and perception of one's innovativeness. Another example is how the economic framework acts on both organizations: in BfL the credit crunch led to a harsher competition for public funds; in Techie Labs, the downsizing has produced effects on the ways innovators experience the performance review process. These elements, which pertain more to environmental and organizational dimensions, have repercussions on daily activities: researchers opt for keeping competences private, so to ensure one's uniqueness in the organization, and privileging individual performance over collaboration in teams, which nonetheless is perceived by researchers as hindering innovation.

All this suggests that this study encounters some limitations. The first refers to the lack of attention to social and political structures in which norms are created. Social and economic factors impact the ways relations, across members of the organization and with external institutions, are structured throughout the innovation journey. Such relations shape the outcome of the innovation process (Van de Ven et al., 1999), and

are relevant in the context of understanding gender and innovation as identities of innovators are relational to not only other members of the organizations or external institutions, but - from an Actor-Network-Theory perspective - also to the historically and contextually situated frameworks on the viable identities of innovators and successful innovation. By taking into account these frameworks, it is possible to see how views on what constitutes innovation and innovator, external to the organization, shape and affect the gender identity of the members involved in producing innovation.

The second limit is that using Butler's performativity framework entails a predominant anthropocentric view of gender: for Butler, human bodies and human social practices are the exclusive actors of performativity (Barad, 2007). This is a drawback as the article did not develop an analysis of the role of material elements in shaping innovation and, specifically, in structuring gender relations. Further research could address this limitation, by taking into account a posthumanist performativity approach (Barad, 2007), which emphasizes the centrality of material and nonmaterial agencies and their interventions on organizational processes. This could provide a more comprehensive account of the elements that influence innovation and the gendering processes emerging through it. In other words, what should also be addressed is how objects, playing a role in the innovation process, help constructing a gender order. Using a posthumanist performativity can give voice to scientific, technological, economic, medical, political, social, and cultural elements, the ways they relate to each other, and how their entanglement produces certain configurations of innovation and gender dynamics, not only within the organizational context, but across all the components of the innovation process. By doing so, political interventions for gender equality in scientific research and innovation can be done by identifying what elements engender innovation processes the way they do it in the contexts analysed, how the

entanglement of these elements can be modified to create a different symbolic gender order, which fosters more balanced and equal gender relations.

Nevertheless, by adopting Butler's poststructuralist acceptation of gender identity, the article contributes to enriching current research on gender in organizational contexts, and specifically in innovation, by providing evidence of the emergent processes of Othering in innovation-oriented organizations, which have repercussions on dimensions of the gender identity of individuals involved, such as the emotional distress, the privileging of competitive over collaborative behaviour, and so on. The study suggests that processes of marginalization transcend distinctions of women/men, and can affect genders transversally, by making experiences of maternity, paternity, of caring towards the family, and a balance between work and family, particularly challenging for the men and women involved.

CHAPTER V

From a reflexive to a diffractive ethnographic enquiry in management research: An outline for a promising methodological approach

Abstract

Reflexivity has been a focal component of responsible and ethical ethnographic work in the past decades. Reflexivity enables accounting for the self of the researcher in ethnographic practice, thus acknowledging our responsibilities in knowledge-making and our impact on participants. Yet, the same practice has been suggested to have a darker side, including accusations of "overshadowing participants", "warped narcissism", and "self-indulgence". I explore these argumentative positions on reflexivity in ethnography, and clarify that the premise of a "narcissism" critique is an ontology of separateness that the concept embeds. I suggest and illustrate empirically how an ontology of inseparability of participants and researchers, such as one engrained in diffraction, can contribute in extricating narcissist tendencies of those ethnographic works weighting more on the left side of the "Self-Other" continuum. My theoretical contribution is to elaborate a framework enabling a *politically responsible* ethnographic practice, which takes *differences* as methodological premise for grasping a phenomenon.

Keywords

Reflexivity, diffraction, ethnography, political responsibility

> "Reflexivity is about turning back on one self. It is about seeing oneself in the data. It is about truth in advertising and about telling where the author is coming from." (Weick, 2002:984)

Reflexivity in ethnographic research within organization studies has raised concerns regarding the relationship between researchers and participants, on the nature of reality, and on the validity of our claims (Cunliffe, 2003, 2004). Specifically, Hardy & Clegg (1997) advocate that reflexivity has helped researchers to re-evaluate their relation with the research process and the type of knowledge produced. Reflexivity is thus an engagement with knowledge making processes, the social, political and institutional infrastructures within which knowledge is produced (Clegg & Hardy, 2006). A variety of terms indicate the reflexive turn in organization research: practical reflexivity, critical reflexivity, self-reflexivity, radical reflexivity (e.g. Alvesson et al., 2008; Calás & Smircich, 1991; Jeffcutt, 1994; Hardy et al., 2001), all sharing an interest in our ethical responsibility on what and how we theorize about (Hardy & Clegg, 1997).

Yet, despite providing us with a way to account for our ethical responsibilities in knowledge-making, our roles in the field, and specifically the consequences of our research practices, reflexivity leaves some open-ended problems in the ways it has been utilized in management and organization studies. Chia (1996) questions whether reflexive ethnographers can still produce valid claims, given the "precarious, incomplete and fragmented" (ibid, p.54) nature of knowledge making. In other words, if we are to question the "accuracy and objectivity of knowledge" (Cunliffe & Easterby-Smith, 2004:34) in reflexive ethnography, how can we still claim validity for the knowledge we produce?

Weick (1999; 2002) and Clegg & Hardy (2006) recognize that some reflexive authors have produced narcissist ethnographies, tending to overshadow participants. Rhodes (2009:661) calls this a "warped narcissism", one that separates researchers and subjects in the field, with an unbalanced focus on the ethnographer, in their ethnographic practices. Weick (1999:802), in turn, finds narcissism and self-indulgence to be the "darker consequences" reflexivity involves. Narcissism refers to the displacement of the researcher in their position within the data, summarizing a tendency of organization studies scholars to be in "love with themselves" (Weick, 2002:894) in their overly scrupulous attempt to see themselves in the data, and to acknowledge their movements under the particular fieldwork circumstances.

Weick (2002) suggests that some ethnographies, overwhelmed by the attempt to engage in self-conscious ethnographic work, have tended towards exaggerating their reflectiveness. Weick (1999) traces this type of narcissism in autobiographic accounts, which privilege ethnographers' reflections "on their reflectiveness" (ibid, p.803), rather than advancing theoretical insights. Nonetheless, such critique misses out the consideration that auto ethnographies are not premised on an exercise of "advancing theoretical insights", rather one of clarification of how ethnographic work has been conducted. Yet, Rhodes (2009) finds that auto ethnographies risk an unbalanced 'movement to the left of the "Self-Other hyphen"' (Humphreys, 2005:841). As an example of reflexive auto ethnographic work, Humphreys (2005) places the researcher epistemologically and ontologically at the centre, a move that Rhodes (2009) considers problematic as it goes against the very aim of reflexivity. In fact, reflexivity calls for exposing our situatedness and arbitrariness, as researchers doing ethnography. But it does so by questioning our "authorial authority to know (i.e. to say the said)" (Rhodes, 2009:664), and by assuming that us (researchers) can be fully responsible and aware of

our partiality in meaning making; thus, once acknowledged such arbitrariness, we can produce truthful knowledge.

For Rhodes (2009) the ethical dangers engrained in this use of reflexivity are related to the ontological separation between researcher and participants:

> "While methodological reflexivity has brought attention to the ethical concern for displaying 'in our writings/conversation the interactions between our selves and our participants' (Etherington, 2007: 599), its ethical limitations arise from the still distinct notions of self and Other on which it is founded. This means that a response to the question of responsibility is not one that comes in the form of a concreted answer that might be codified into practice, but rather calls for continued deliberation and innovation – in particular, deliberation over the meaning of the ontological relation between self (as researcher) and Other (as researched) and the exercise of power that is embedded in this relation." (Ibid, p.665)

Rhodes (2009) arguments that an unbalanced attention towards the researcher in ethnography is rooted in the separation between self (of the researcher) and Other (participants) taking place in our field practices, and in our understanding of the field as separate from us.

Thus, I introduce a Baradian approach to ethnography as useful tool in ethically and politically responsibilizing our ethnographic practices, with the aims of making moves away from the narcissism trap. The paper contributes to current debates on the critical aspects of reflexivity, by setting out a complementary framework to reflexivity in ethnographic enquiry. Barad (2007) argues that there are no pre-existing, separately determinate entities which are either detached spectators or necessary components of actions. By assuming that we are embedded in the phenomena we study, such approach

invited to account for our ethical positioning in the field, but furthermost for the differences and effects we create and re-create through our practices in the field.

The paper is organized as follows. First, I delve into current understandings of reflexivity in ethnography, and engage with narcissistic tendencies and researchers' unbalances in authority as unresolved issues in reflexivity. Then, I delineate a Baradian methodology, and show, through empirical material collected in an ethnographic study on gender processes in innovation, how such a lens suggests a particular ethnographic enquiry with consequences on our responsibilities in meaning making. In the following sections, I show that the flattening of epistemological and ontological separations between observer and observed helps us to think of ourselves as part of the on-going articulation of the world. In doing so, we can acknowledge not only "responsibility" for what we theorize about (Cunliffe, 2003:985), but also our embeddedness in the reality we seek to explore, making us question our separateness from the "field" we immerge into. The article shows that one of the political implications of a diffractive ethnography in studying gender dynamics in innovation is that it is not enough for an ethnographer to reflexively offer a variety of interpretations to gender processes. Rather, a diffractive ethnographer brings to the fore the effects and consequences of these processes, such as the exclusions and inclusions created by enacted gender processes, the causes of these exclusions, and the inequalities produced.

A reflexivity framework

Reflexivity means

> "[…] to go further than questioning the truth claims of others, to question how we as researchers (and practitioners) also make truth claims and construct meaning." (Cunliffe, 2003:985)

Alvesson et al (2008) identify three forms of reflexivity. "Reflexivity as multi-perspective practices" involves juxtaposing different lenses, thus producing more comprehensive ethnographic accounts. As Holland (1999) suggests, we are "socialized into assumptions as we internalize world views, world hypotheses, cultures, cosmologies, thought styles, or paradigms." (ibid, p.467). Thus, being reflexive means accounting for the underlying assumptions guiding our ethnographic research and writing and answering the question: how can we understand a phenomenon in different ways? This type of reflexivity spawns across management and organization theory (Gioia & Pitre, 1990; Gioia, 1999; Hassard, 1994; Poole & Van de Ven, 1989; Van de Ven & Poole, 2005; Weaver & Gioia, 1994). For example, Van de Ven & Poole (2005) identify four different approaches to studying organizational change, by intersecting two ontological premises (organization as a noun or a verb), and two epistemological frames (variance or process methods). By intersecting different lenses, they open up opportunities for understanding organizational change, and highlight the problematic of each framework. A second reflexive approach extends the relationship between participants and researchers to the broader research network. For example, Hardy et al (2001) use actor-network theory to inform on reflexive practices in organizational research. They suggest that not only the relationship between researchers and participants is important in knowledge production, but also the one between researchers and their research community. A third way to engage with reflexivity is by bringing into front its "multi-voicing practices", and questioning the relationship among participants and researchers, thus suggesting that meanings are collectively created. Cunliffe's works (2003; 2004; 2005) are an example of research situated within this framework. Her radical approach to reflexivity problematizes the Other-researcher

relationship and recognizes the crisis of authenticity of our claims[47]. Particularly, this approach to reflexivity has helped researchers in management and organization theory to produce ethically responsible accounts; for example, critical management studies (CMS) scholars (e.g. Alvesson & Willmott, 1992, 1996; Alvesson & Deetz, 2000), have committed to "philosophical and methodological reflexivity" (Fournier & Grey, 2000:19) as part of their ethical practice, that is a critique of the observed and of CMS itself, thus perpetually questioning the intellectual premises of its accounts.

I specifically engage with the latter conceptualization as it is representative of work on reflexivity, and because it offers useful ways of critically engaging with the concept. I wish to build on this approach to reflexivity, by exploring its specific ontological and epistemological cues. Our work and experiences are culturally, historically, and linguistically situated. Reflexivity questions our authority in producing interpretations of the phenomenon we study, and implies that there is no objective knowledge we can produce with our accounts. All forms of enquiry are circumscribed to the researcher's paradigmatic positions, which engrain specific epistemological and ontological assumptions on the world (Chia, 1996). As reflexive researchers, we construct assumptions and meanings of the field based on our taken-for-granted suppositions, actions and linguistic practices. For being responsible reflexive researchers, we should question who we are and how we interact and create our realities with others. This implies a collision of epistemology and ontology (Rhodes, 2009:655), in the sense that there is no primacy of knowledge over being (and vice versa). In other words, knowing and being the field are parts of a process of construction:

[47] Cunliffe (2003:983) overlaps the notion of reflexivity with "a crisis of truth". A crisis of truth emerges in several disciplines (philosophy, sociology, psychology, organziation studies), and refers to questioning the unified and single truth researchers produce on social experiences. A crisis of truth implies destabilizing implicit epistemological and ontological assumptions guiding our view on the world.

> "Reflexivity 'unsettles' representation by suggesting that we are constantly constructing meaning and social realities as we interact with others and talk about our experience. We therefore cannot separate ontology and epistemology, nor can we ignore the situated nature of that experience and the cultural, historical, and linguistic traditions that permeate our work (Jun, 1994)." (Cunliffe, 2003:985)

What Cunliffe (2003) suggests is that the reality we seek to study and the knowledge we produce is emergent from our social constructions and interactions with that reality. In other words, reflexive ethnographers acknowledge that they partially create the world they explore in their interaction with it. This suggests that there is no fixed reality to be studied out there; rather, what we come to know are time and space specific configurations of "meanings, experiences and identities" (Cunliffe, 2003:994).

Chia (1996:43) relates the ontological and epistemological premises of the reflexive turn in organization studies to the advancements in quantum physics, and specifically the dialog initiated between Heisenberg's uncertainty principle and Bohr's complementary principle[48]. Niels Bohr's interpretation of the quantum postulate[49] suggests that we allow interactions with agencies of observations in order to make any

[48] To briefly summarize, Heisenberg's uncertainty principle (Heisenberg, 1927) states that all measurements of atomic quantities are uncertain, that we cannot know simultaneously the position and the momentum of a particle. Differently, Bohr's complementarity principle suggests that the particle themselves do not have a specific value of momentum and position simultaneously: "Indeed, it follows from the above considerations that the measurement of the positional coordinates of a particle is accompanied not only by a finite change in the dynamical variables, but also the fixation of its position means a complete rupture in the causal description of its dynamical behaviour, while the determination of its momentum always implies a gap in the knowledge of its spatial propagation. Just this situation brings out most strikingly the complementary character of the description of atomic phenomena which appears as an inevitable consequence of the contrast between the quantum postulate and the distinction between object and agency of measurement, inherent in our very idea of observation." (Bohr, 1928: 584)

[49] Bohr (1928:580) defines the quantum postulate as follows: "Now the quantum postulate implies that any observation of atomic phenomena will involve an interaction with the agency of observation not to be neglected. Accordingly, an independent reality in the ordinary physical sense can neither be ascribed to the phenomena nor to the agencies of observation. After all, the concept of observation is in so far arbitrary as it depends upon which objects are included in the system to be observed. Ultimately every observation can of course be reduced to our sense perceptions. The circumstance, however, that in interpreting observations use has always to be made of theoretical notions, entails that for every particular case it is a question of convenience at what point the concept of observation involving the quantum postulate with its inherent 'irrationality' is brought in."

observation of a phenomenon, thus making impossible any "unambiguous definition of the state of the system" (Bohr, 1928: 580). Also, the quantum postulate is in contrast with the separation between object and agency of measurement, part of our ways of thinking about observations. In other words, Bohr's interpretation of quantum postulate problematizes the way we think of observations (of a phenomenon), our roles as researchers in the observation, and our ability to make truth claims on the observations made. As Chia (1996) outlines, this has been an inspiration for ethnographers in thinking though the research process.

As we will see in later sections, Barad (2007) takes Bohr's quantum postulate interpretations further, by questioning not only researchers' objectivity in theory building, but also the very boundaries between observers and observed.

Challenges in reflexivity

Reflexive ethnographers have problematized participant-researcher relationships, and have produced more ethically responsible insights on the research process developed. This self-reflection questions researchers' positions in the data, and displaces the subject of our research enquiries; yet it is not free from criticism of its own. I here delve into recent critiques to reflexivity, in order to unravel problematic aspects of the concept, withstanding that "simply recognizing the "situatedness of knowledge" that we produce by filtering what we see in particular ways "is therefore not enough" (Hardy et al., 2001:555) for being politically ethical ethnographers.

In other words, it is not enough acknowledging the multiplicity of interpretations of events in the field, and specifically accounting for our analytical angle. Rather, I suggest that through a diffraction framework we can add a political stand, one that focuses on unravelling how a phenomenon (such as gender dynamics in innovation)

creates differences, differences that matter and differences that don't, and for whom. As anticipated in the introduction, diffraction enables us - further than reflexivity - to capture distinctions, drawn in practice, and to analyse those distinctions and cuttings, and their consequences.

Fournier & Grey (2000) note that by shifting focus from participants to researchers, reflexive accounts can fall into the trap of privileging researcher's practices rather than participants' voices. The shift towards the "left of the Self-Other hyphen" (Humphreys, 2005:841) is for example characteristic of auto ethnographic accounts. Yet, centring attention on researchers as participants and knowledge producers is not unproblematic. Weick (1999) defines the unbalanced shift towards the researcher, rather than the observed, and the exaggeration of researchers' reflectiveness, a form of narcissism. Along with Weick (1999, 2002), Rhodes, (2009) argues that narcissism engages researchers in consciously mirroring and contemplating themselves in their ethnographic texts. In other words, whereas reflexivity has been pivotal in reflecting critically on our roles in the research practices, and our "ways of carving out" (Chia, 1996:43) realities and meanings, if taken to the extreme in researchers' reflections on their roles in the field, it can lead to producing "self-promoting confessionals" (Rhodes, 2009:522), rather than testimonials of observed reality, as experienced by participants. Yet, we need to acknowledge that reflexive ethnographers have indeed been oriented towards exchanging reflections on their knowledge-production practices as functional sharing for stimulating learning to do ethnically responsible ethnography. What we can take from Rhodes' provoking critique to reflexivity is that in many ethnographic accounts, and specifically in auto ethnographies, "the boundaries between self-indulgence and reflexivity are fragile and blurred" (Coffey, 1999:132), and the "balance

between the voice of ourselves as knowing subject/object, and the desire to recognize and reveal the voices of others" (ibid, p.132) a critical tension.

Thus the question of how much an ethnographic text should reveal of the self, of others or both (Coffey, 1999) still remains. While such conundrum is rather difficult to solve, my intention here is not to dig into the reflexivity debate for assessing whether a narcissist and self-referential monologue is un/justly attributed to specific auto-ethnographic works[50], or how to deal with Coffey's point on where to set the boundary of revelation. Rather, I take the charge of narcissist tendencies as a starting point for inquiring on the ontological and epistemological cues at the basis of this problematic, and for questioning the possibilities for creating more responsible - and less self-centred - ethnographic works, auto-ethnographies included. Thus, what are the grounds making this researcher's centeredness, and the related risk of overshadowing participants (Clegg & Hardy, 2006), problematic?

As Keevers & Treleaven (2011) note, reflexivity is premised on an "ontology of separateness" (Orlikowski, 2009:10), that is a dualistic ontology that discerns among individuals and things, researchers and researched. Rhodes (2009:665) argues that "ethical limitations" can emerge from such distinction, a distinction that legitimizes tendencies to grant more voice to the researcher, thus falling into a narcissistic trap. Such ontological separation is therefore problematic for two reasons. First, it draws a continuum with researchers at one end and researched at the other. It thus leaves researchers to responsibly reveal themselves in their practice, without overshadowing participants whilst acknowledging their paradigmatic situatedness and roles in constructing reality. Second, by separating us and them we conceptualize researchers

[50] For an in-depth review on the debate of auto-ethnographies and advocated self-indulgence and narcissist tendencies see for example Austin (2005), Bruner (1993), Denzin (2011), Holt (2003), Sparkes (2000).

and participants as self-existing entities constructed in some way before their interaction, therefore assuming that there is "out-there" a self-existing reality to be studied. Thus, such ontological separateness, by assuming that we are part of what we study only when we approach it, can minimize our responsibilities as being already part of the world we seek to bring into light, before we enter the field.

Sandberg & Tsoukas (2011) advocate for the inseparability of self and other in the research process, and propose a Heideggerian reading of the "entwinement[51]" (Sandberg & Tsoukas, 2011:342) of us (researchers), things and others we study. In other words, to avoid the "artificialization" of the field, they propose a framework of practical rationality which eludes the separation between subjects and observers, with the underlying logic of "ontological priority of being in the world" (Sandberg & Tsoukas, 2011:345) over the subject-object distinction. For example, when a nurse is monitoring the blood pressure of a patient, and the manometer suddenly stops working, the nurse experiences a temporal break in her practice. This is what Sandberg & Tsoukas (2011) would define as an event that changes our "mode of engagement" with the world, and shows that we are already immersed in the practice before we even start our reflections on them. Whereas their framework is particularly valuable in the analysis of sociomaterial practices in which objects and people are involved, it does not suggest how we can come to untangle our "being in the world" in ethnographic practices. Yet, ontology of inseparability as premise of practical rationality, as termed by Sandberg & Tsoukas (2011), does have implications in ethnography. First, it implies a shift from focusing either on the researched or the researcher (the "Self-Other hyphen"), to a tighter attention on the relational whole of the practices constructing the

[51] Entwinement means that "we are never separate but always already entwined with other and things in specific sociomaterial practice worlds" (Sandberg & Tsoukas, 2011:343), that is we are always embodied in the practices we carry out.

reality we seek to observe. Thus, before we begin reflecting on practices in the field, we are already absorbed in them. This resonates, for example, with the reflexive practice Contu (2013) engages with while observing the content design practice in a digital media agency:

> "It was in the early stages of the fieldwork that I reflected on the fact that I (the researcher) was learning about this design practice, but some of the AML members (the newcomers) were learning it too." (Contu, 2013:295)

As Contu (2013) suggests, her reflections on learning a design practice took place after her, and some participants' (newcomers), involvement in the practice itself.

Another implication of practical rationality is that it calls us to look for "temporary breakdowns" (Sandberg & Tsoukas, 2011:347), those moments during which things stop working as expected. This can be useful for example in grasping events in which relational meanings-making processes reveal themselves, as a rupture with the natural flow of events. Thus, we can enrich our reflexivity as ethnographers by shifting from an ontological separation between observer and researched towards an ontology of inseparability. This is not merely to say that we are implicated in what we observe and understand (they are our practices, not just practices we observe), but especially, in ethnography, that the phenomenon we observe, such as the gendering dynamics enacted, is also part of our/their practices and the breakdowns we are part of.

I have argued that insofar as reflexivity has been a powerful tool for more responsible ethnographic accounts, its tendency towards narcissism premised on the separation between "us" and "them" can limit such responsibility, by positioning the researcher and participants as temporarily yet still self-existing entities. Below, I propose a

framework that taps into this problematic, with the aim of advancing our reflexive stances in ethnographic research.

The framework of Baradian diffraction

Sandberg & Tsoukas (2011) practical rationality brings in ontology of inseparability of us and the objects of our practices. Yet, by focusing on such sociomaterial practices, it does not offer insights on how such inseparability occurs in our ethnographic practice and how we can come to understand inseparability not only between humans and objects, but among humans as well. For example, Contu's (2013) absorption in the design practice clearly emerges from reflections on her participation in the organization, in her relation with other designers and processes at work.

However, the application of the notion of inseparability as Sandberg & Tsoukas (2011) delineate, one that focuses on absorption and disruption (of ethnographer and design practice), does not enlighten on how the ethnographer came to understand the design practice she was absorbed into as emergent from differences (for example, differences in what she or the newcomers understood as a design practice).

Thus, I here use diffraction to extend our understanding of reflexive ethnography. For a definition of diffraction I draw on the works of Karen Barad (2003, 2007), to show that her interpretation of Bohr's works can help us extending our critical reflexive engagement in ethnography. Diffraction is an optical phenomenon, and refers to the patterns of differences created:

> "[…] diffraction has to do with the ways waves combine when they overlap and the apparent bending and spreading of waves that occurs when waves encounter an obstruction." (Barad, 2007:74)

When we throw two little stones in a pond, we see several overlapping circles of water waves; this is an example of diffraction. Barad proposes diffraction as an alternative framework to the idea that we can mirror reality using words, concepts, and ideas, which is representationalism. Barad openly criticizes the ways reflexivity, founded on the idea of turning "the mirror back to oneself" (Barad, 2007:86), has been used for understanding the world, and denotes reflexivity as still a representationalist approach in our methods. Nonetheless, Barad's reading of reflexivity as "being based on the belief that practices of representing have no effect on the objects of investigation and that we have a kind of access to representations that we don't have to the objects themselves" (Barad, 2007:87) is arguably naive. Influences of our practices of representation on the field have been widely explored. For example, Hammersley & Aktinson (2007) account for the several ethical issues ethnographers have encountered in doing fieldwork and in ethnographic writing, from informed consent and privacy, to harm and exploitation, with a constant questioning of whose interests are preserved. Nonetheless, Barad's critique is useful as it highlights the ontology of separateness still engrained in reflexivity.

Despite moving away from reflection's calculative nature (Cunliffe & Jun, 2005), reflexivity is still trapped in the subject-object division. Differently, diffraction is premised on an "ontology of inseparability". Subject and object do not pre-exist as such, but emerge through intra-actions[52] (Barad, 2007:89). Ontological inseparability means that the line between subject and object is not fixed and does not pre-exist particular practices of their engagement, but neither is it arbitrary. What does all this mean for ethnography? It means that when we observe a phenomenon, for example

[52] Barad defines intra-action as "[…] the mutual constitution of objects and agencies of observation within phenomena (in contrast to "interaction", which assumes the prior existence of distinct entities). In particular, the different agencies ("distinct entities") remain entangled." (Barad, 2007:197)

gendering practices in innovation processes, we don't see it from the outside. As Barad sustains, a quantum mechanics reading of the world entails that there is no outside, but that ethnographers would be already situated within the phenomenon they study. Thus, there is no possibility to describe an entire system from the outside, and the knowledge we gain is therefore of parts of the phenomenon that are made intelligible. We are not cause, spectators, or effects of the phenomenon we want to observe, but fundamentally part of it. There are no pre-existing, separately determinate entities called humans that are either detached spectators or necessary components of all intra-actions (Barad, 2007:338). By doing so, we can reflect on the ethical implications of our intra-activities as part of the phenomenon we study.

What then becomes critical is to answer the following question: "How can we know the phenomenon if we ourselves are a part of it? To what extent can we know?" Barad (2007) suggests that if we follow Bohr's epistemology, we come to understand the world as if there was nothing outside of it. A condition of exteriority is not anymore necessary for ensuring objectivity. Since there is no outside, descriptions and accounts come from within the phenomenon. Yet, what we know is just one part of the phenomenon:

> "Only part of the world can be made intelligible to itself at a time, because the other part of the world has to be the part that it makes a difference to." (Barad, 2007:351)

Ethnographically, a Baradian approach makes clear that the "object of investigation is constructed through the enactment of particular cuts and not others" (Barad, 2007:217), and hence can be understood only from within. The notion of "cuts" does not suggest a partiality of ethnographic accounts, in reflexive terms; different cuts are not differential

perspectives on a phenomenon. Rather, cuts are configurations of phenomena that emerge as different from other parts of the phenomenon.

When entering the field a reflexive ethnographer would acknowledge that being a white, female and with similar cultural background of the women in the field is indeed facilitating participants' comfort in discussing gender issues (this would probably not be the case if the same researcher entered an environment composed of non-western men). Also she would argue that concepts used to describe gender when talking to participants, or observations made on gender already contain certain gender assumptions deriving from her academic readings and personal experiences. What Barad adds to this is that not only assumptions, but also the phenomenon itself (gender) is inevitably made by us before stepping into the field, in the sense that we are already participants, even before our ethnographic enquiry:

> "We are not merely differently situated in the world; "each of us" is part of the intra-active ongoing articulation of the world in its differential mattering." (Barad, 2007:381)

In other words, I am not differently situated in the world before I engage with my research project, as an ethnographer, but I am already working towards the materialization of that phenomenon, thus making me responsible for what is already there. In other words: can I (researcher) ever escape doing gender, even before I interact with the participants? In reflexivity our "responsibility" is on what we theorize (Cunliffe, 2003:985), and in acknowledging our interpretation is one of many. In a Baradian approach we are part of our participants' reality not only when we interact with them (reflexive ethnographer), but even before entering the field. This does not imply that what we seek to study is merely ourselves, thus turning back to narcissism, rather, that the explored reality is already part of us. A Baradian's diffractive reading

adds responsibility to researchers not only for the knowledge that we seek -in a reflexive fashion- but also for what exists (Barad, 2007:207). As a consequence, we reflect differently. The implications and consequences for an ethnographer, like myself, exploring gendering practices in the field are to recognize that my position in the field is not simply different from the one an older, black, male, non-feminist ethnographer would have, but that I am already acting in constructing gender, by *i)* making it important as a research topic; *ii)* by justifying in specific ways my presence as an ethnographer interested in gender; *iii)* by enabling/resisting certain gender practices and discourses to be performed through me; *iv)* by actively looking for instances in which gendering comes to the fore as being different from what we (the participants and the researcher) understood gender was through our experiences. I explore in-depth the implications of a diffractive lens in the next section, by providing examples drawn from empirical material.

What we know is not limited, but relies on the "cut" operated, and since cuts are never fixable, what we see is contingent to specific spatial-temporal-material configurations materializing, made intelligible by the cut operated. Cuts are not operated by an authoritative researcher-observer, rather they emerge (materialize) from the tangled relations of different social, economic, cultural, geographical, political components shaping the phenomenon.

Barad (2007:351) defines agential cuts as the separation between the measuring agency and the measured object. In a Baradian framework, the measuring agency is not the observer, nor does the "measured object" mechanically resonate with participants, as a reflexive approach would argue. The anthropocentric conception of measurement does

not hold in Baradian's diffraction[53]. Instead, everything we (researches and participants) see and experience is emergent and measured in contrast with something else. For example, when accounting for gendering practices, these materialize in the specific way we describe them because they emerged as being different from other practices and the meanings associated to them, which nonetheless constitute competing alternatives that could materialize in different circumstances. I provide an example of the flattening of researcher/researched separation and the agential cuts in the next section.

For now what I wish to stress is how following Barad's approach in doing ethnographic work strengthens our political stance to ethnographic enquiry. This is because it allows us to grasp cuts of phenomena, which "are not enacted from the outside, nor are they ever enacted once and for all" (Barad, 2007:179). It also enables us to acknowledge and act on the fact that "some things come to matter and other are excluded, as possibilities are opened up and others foreclosed" (Barad, 2007:393), thus acknowledging the potential alternatives, and the political interventions that need to be enacted for such alternatives to happen.

In response to subjectivity issues in knowledge production in reflexivity, Barad (2007:91) suggests that objectivity in a diffractive ethnographic practice "is about being accountable to the specific materializations of which we are part". Methodologically, this can be done by tightly focusing on our (researchers and participants) material and discursive practices drawing boundaries, and to question our responsibility in boundaries making. Reflexivity's ethical perspective is extended: we need to account not only for our positioning in the field, and for our meaning making processes as being

[53] See Barad (2007:337-337) for an in-depth account of a posthumanist elaboration of measuring agencies and measured objects.

one of the multiple interpretations, but also for the effects of the differences created through our (in conjunction with participants') practices that make parts of a phenomenon visible, and who these differences affect:

> "[…] the crucial point is not mirroring but its creative undoing, not sameness reproduced without end but attentiveness to differences that matter." (Barad, 2007:382)

Thus, what is important in our ethnographic enquiry is not just to merely produce an interpretation of the events happening in the field and to account for our roles in knowledge-making, but to focus on how the phenomenon emerges, what differences it creates, what differences matter and which ones do not, and for whom. In other words, a diffractive ethnographer grasps distinctions or boundaries, which are drawn in practice, and studies those drawings or cutting. The elimination of the ontological separation between researcher and participants allows us to shift focus from our responsibilities in purporting a specific interpretative angle on a phenomenon, towards the differences created and their effects.

Barad's standpoint reconfigures the way we think of our role as researchers. To the question "What are we in the field?" Cunliffe (2003) argues that we are social participants and we construct meanings through interacting with others. Differently, for Barad there is no such thing as participant-researcher relationship: we do not exist as separate from others in the field, nor from the field itself. For example, as I will show in later sections, I was not involved in the organization's work practices, as I am not a biomedical nor an IT researcher. Within the two companies, clearly I was a welcomed outsider; I was perceived by participants as distinct from them. Nonetheless, what I was not distinct from, instead, were our co-joint makings of specific configurations of a gender order.

This last point answers Rhodes' (2009:664) critique to responsibility as formulated in current reflexivity discourses. Whereas reflexivity debunks our authority in knowledge making, it instates a more problematic "self-authority", that is our ability to truly account for ourselves in our ethnographic practices.

To summarize, in these paragraphs I sketched the key components of a Baradian diffractive approach to ethnography, and showed that it extends reflexivity on several claims. First, it re-balances the narcissist tendency of reflexive accounts, by suggesting that researchers are already part the phenomenon they want to observe, even before entering the field. Yet, accounting for our "being part of the phenomenon" is not sufficient for producing politically responsible ethnographies. I proposed that following a Baradian approach can help us producing less researcher-centred accounts. A Baradian approach flattens the relation between researchers and participants, and makes us responsible only partially for our "subjective" accounts, but furthermore responsible for the political implications of our participation in the phenomenon. Below I work with the Baradian framework within a specific ethnographic enquiry. The aim is to help us see its implications for method, and illustrate more clearly how cuts are operated within a phenomenon, how parts of the phenomenon materialize and are made intelligible.

A diffractive ethnography

I here draw on empirical material collected in 2012 as part of a research on gendering in innovation processes in two research organizations to propose that a Baradian approach can effectively help an ethical ethnographic enquiry. The research was conducted in Biomedicine for Life (BfL), a not-for-profit biomedical research organization based in Italy, and in Techie, a British branch of a multinational IT

company founded in the U.S.A. At the time of the observation, BfL was at the 8th month of the development of a renal dialysis project for renal function replacement. The Techie team was implementing the "Defending the Cloud" project, aiming to create a device able to detect new threats to cloud and enterprise IT systems without the attack having happened. The data refers to two observation periods of three and half months each, first in BfL (May-August, 2012), and then in Techie Labs (August-December, 2012). Daily observations of the team members, according to their working hours, were integrated with 42 semi-structured interviews, diary notes, and 60 other audio/video/text material.

In the next sections, I suggest that a diffractive lens has methodologically two implications for practice. First, diffractive ethnographers shift their attention from thinking of their accounts as one of many, to producing accounts based on how what is seen/experienced is different from from what we already know or see. Second, the co-joint responsibility of our participation in the phenomenon that diffraction entails makes us responsible for the political implications of such participation, and helps us addressing narcissistic tendencies in reflexive ethnography.

Engaging with diffraction in the making: political responsibilities

To see empirically how diffraction works, I bring an example of the first interview conducted within an ethnographic enquiry on gender and innovation comprising observations. I use an interview as example of diffraction workings because it provides the granularity of details necessary to see the performativity of gender in action.

The interview with Jonathan, researcher in BfL, took place towards the second month of observations in BfL. This is the opening of the interview, which lasted 79.55 minutes. In this piece of interview reflexivity is enacted in practice, it is not a *post-facto*

concept, but as embedded in our ethnographic doings and sayings. To this, I juxtapose diffraction as happening within the ethnographic practice, with the aim of illustrating how a diffractive ethnography unravels a phenomenon.

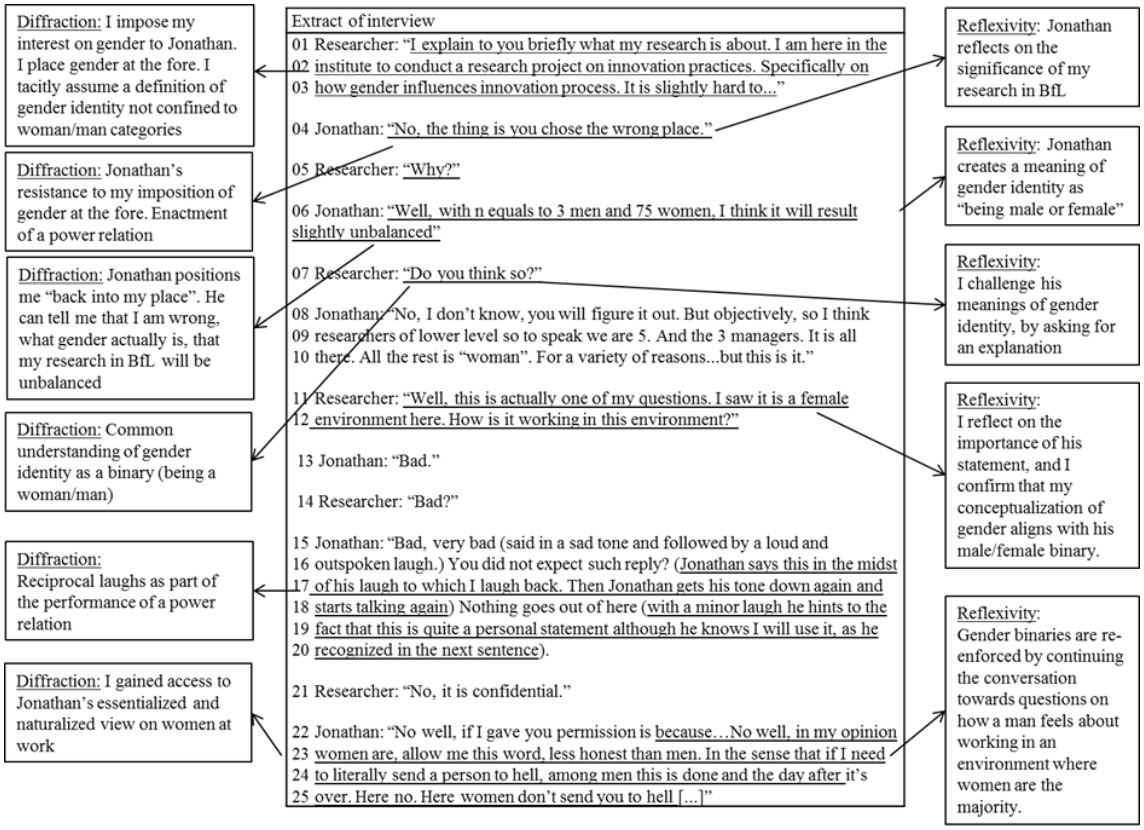

Figure 7 Reflexivity and diffraction at work in the encounter with Jonathan.

A reflexive account

What has happened in this part of my interview with Jonathan? Jonathan and I are actively engaged in co-constructing a definition of gender identity as identification with either the category of woman or man. We construct gender as a binary (women/men) in five moments. In lines 01-04 Jonathan reflects on the salience of my research as I explain it to him. In lines 05-06, as a response to my interest in gender, he frames gender as identification with the categories of man and woman. I then challenge such association of gender as "being woman or man" in line 07, which nonetheless Jonathan reinstates in lines 08-10, and hints to some potential causes of the numerous presence of

women in the firm. In lines 11-12, I take Jonathan's stake on gender and agree that gender identity is about being a man or a woman, thus asking how it feels for him, a man, to work in a predominant female environment. We reiterate together this binary gender in the rest of the interview as lines 22-25 suggest. This shared understanding of gender allows Jonathan to feel comfortable in rather openly expressing his emotions towards working with women and to include me, a woman, in his binary categorization: "allow me this word" suggests that Jonathan is aware that I, a woman, might be offended by his coming statement (women are dishonest).

We can see from this example that thinking reflexively means to question how much of my intervention has contributed in shaping an understanding of gender in that particular way, and how that specific configuration has then affected the remaining interview: How did my presence, as a young white woman, influence Jonathan in this specific enquiry on gender? Could have I acted differently? How do my actions reflect in his accounts of gender and gender relations experiences?. Indeed Jonathan's challenges had shaped the way I then approached other interviewees. This is how I started the second interview a few hours later:

> "My research focuses on gender practices, if there are some ways of being a woman/man that influence innovation processes. So what is that I want to look at? I want to see, I want to have your insight on how gender is done, how you understand masculinity, femininity, how gender is done in this working environment."

The second interview shows a reflexive action: I started the interview by taking into account the definition of gender co-constructed with Jonathan, and by placing it at the forefront of the interview. By placing gender as a binary in my own understanding of gender, and by suggesting it as a lens for the other interviewee, I took that specific definition of gender as a guideline for the following interviews.

A diffractive account

The reflexive account of my interview with Jonathan has shown the consequences of my engagement with the participant, and has also placed me, the researcher, as the fulcrum of the account and as responsible for the ethical implications of my participation.

A diffractive account builds on a different ontological and epistemological premise. We are part of what we seek to explore before immerging in the field. I am already constructing gender before I start my interview with Jonathan: gender is my research interest and I am imposing this interest on Jonathan (lines 01-03). I place gender at the fore, and implicitly assume a definition of gender identity not confined to woman/man categories. Nonetheless Jonathan resists this placement. His resistance is violent: "No, the thing is you chose the wrong place", Jonathan says. He challenges my research interests and choice of BfL as a case. His first words –audio recorded- are daring and show his confidence in interacting with me.

Gender is performed, in this opening exchange, at great extent. Gender does not only emerge as participant' and researcher's co-construction of gender identity as male and female dichotomy, through challenges ("Do you think so?") and affirmations ("Well, this is actually one of my questions"), thus producing a common understanding of gender which helps the flow of the interview, as the reflexive account has shown. In fact, reflexivity in this episode clarifies that we construct reality in our conversations with others (Cunliffe & Easterby-Smith, 2004). Most importantly, gender is actively enacted. Diffractively, the researcher and the participant were already part of gendering processes, which come to the fore in the performative dialogue between the two. I was thus responsible for allowing Jonathan to define gender for me and through me, with three implications.

First, this enabled me to appreciate what exposed view of gender Jonathan had. Jonathan reports the number of men and women in relation to a discourse on gender. Here we can see that he understands gender as being a woman/man. By asking "Do you think so?" I show an understanding of his association between male/female differences in numbers within BfL and gender. These elements show us that gender identity as a binary (being a male or female) was already present before researcher and participant interacted, thus providing a common ground of understanding throughout the interview. Not only, as a reflexive ethnographer, I earlier emphasized that a gender definition is co-constructed by participant and researcher. Differently, as a diffractive ethnographer, I performed the very phenomenon I ought to study, and I acted politically. I performed the gender relations I was seeking to explore, through the interplay with Jonathan. Also, I acted politically, by performing this gender identity as a binary, with no resistance. If gender is a performative act[54] (Butler, 1999), then Jonathan and I were doing gender, and we produced tangible effects, such as the reiteration of a specific power relationship, and the reinforcement of a precise understanding of gender, through my conformity to it. Thus, acting diffractively in ethnography means to work performatively. Diffraction enabled a certain power relation, in this instance a rather traditional gendering of relations, between Jonathan and me. This power relation emerges in my acceptance of the way he was positioning me in as far as he could tell me that I was wrong (on my conceptualization of gender), and that he could clarify to me what gender actually means. Third, by exposing questions such as "Do you think so? Why?" I gained access to something that reveals central on gender, that is the essentialization and naturalization of all women (myself included) as dishonest. My position also produced a subject legitimized to reveal the "truth" on conceptualizations

[54] Butler defines gender identity as "a performative accomplishment compelled by social sanction and taboo." (Butler, 1988:520)

on gender, and on gender relations, as they stand. For example, I legitimized Jonathan to say that I am wrong, that I chose the wrong organization, and that my research on gender will be fundamentally biased. My positioning also allows him to put me straight, by being honest and telling me how actually gender works in the organization -as if the gendering in the organization was not already reified in our exchange.

This is a power relation enacted also through the body. When negatively accounting for his experience in a female environment, Jonathan laughs openly. My response is a continuation of his laugh. Reflexively, this suggests that informant and researcher are at ease in their conversation; they can discuss the impact of gender with supposedly neither of them being influenced by the other's experiences. Diffractively, I am being responsible for enacting and not resisting to a gender binary in the making -and the power relations associated to it- through Jonathan's and my bodies: laughter that legitimizes the natural evolvement of the conversation, and implies acceptance and performance of the said and done.

From the above, we can appreciate the positive effects of doing ethnography diffractively, a method that extends our reflexively-oriented ethical responsibility in the knowledge we seek and produce (Cunliffe, 2003), to questioning our political responsibilities for what exists "in the field".

Accounting for differences

> "Knowing is a specific engagement of the world where part of the world becomes differentially intelligible to another part of the world in its differential accountability to and for that of which it is part." (Barad, 2007:379)

Barad here suggests that we come to know a phenomenon when part of the world we are observing reveals itself (intelligibility) as *difference* from what we already know or

see. This means that whereas reflexivity tell us that our theorizing is just one of the many lenses that could be used to interpret what we see, a Baradian perspective instead reveals our theorizing is premised on the emergent differences among our (participants' and researchers' as an interconnected whole) knowledge and experiences of the phenomenon. This is not to say that we need to keep an anthropological strangeness in the field in order to account for the phenomenon, but that strangeness occurs within the phenomenon itself, how parts of it materialize -configure as difference from- other parts. It also does not entail that things have agency on their own; rather that what we observe is one of the intelligible configurations of the phenomenon.

How is all this possible in practice? As we have seen in the previous section, by arguing that there is no outside of a phenomenon, Barad suggests that researchers are already embedded in what they observe, so that the only way pursuable to knowing is by recognizing differences from within. In practice, this means to look for instances of differences -diffractions, in physics terms. These diffractions extend the concept of "deviations and boundary crossing" which Sandberg & Tsoukas (2011:348) propose as part of our engagement with the world. We experience deviations when "new discursive items" (Sandberg & Tsoukas, 2011:349) or actions emerge, interrupting old ones. As an example of deviations and boundary crossing, Sandberg & Tsoukas (2011) note that in the medical interview discussed in Katz & Shotter (1996), the focus on symptoms of a disease, which represents a medical discourse, was then deviated towards the patient's personal world involving a reaction of the doctor and a crossing of the boundary of medical discourse. Similarly, drawing on Jonathan's interview, we can read in line 04, Jonathan's deviation from the presentation of my research objectives ("No, the thing is you chose the wrong place"), and my boundary crossing in replying to such shift towards further questioning of site's relevance for the research. We can

find another example of deviation in lines 15-20, when Jonathan's reply to my question on the working environment moves towards re-gaining assurances on the confidentiality of the data, followed by the boundary crossing on confidentiality reassurances. These deviations and boundaries crossing align with being reflexive in ethnographic doing, showed in the previous section, and help us grasping what is significant to participants.

Yet, they do not highlight how the phenomenon of investigation is itself emerging, how we are actually doing gender. Instead, with the theoretical tool of diffraction we can capture the dynamic nature of gendering and its emergence from differences. For example, the hegemonic sense of gender as a binary (male/female) emerges in Jonathan's discursive engagement with the researcher. Both Jonathan and I were at the time aware of the organization's demographics; he had vast experience of working in BfL, whereas I started the observations two months before interviewing him. In the opening lines (04-05), I "failed" to promptly recognize Jonathan's association between the major presence of women in the workplace. The underlying conception of gender for Jonathan is one that juxtaposes gender with being a male or a female. His association between "gender" and the "male/female" dichotomy, thus an understanding of gender an ascribed category, emerges as a difference from my de-essentialist perspective, which sees gender not as something some is, but as something someone does -a "stylized repetition of acts" (Butler 1999:179). Therefore, it is also in the friction between these two understandings of gender that the concept materializes. This appears going back to the difference between my view as researcher and Jonathan's perspective as a participant. Yet, if we think of researcher and participants as ontologically not separate, what emerges is not my view as opposed to Jonathan's, but a specific configuration of gender (gender as a binary) materializing as difference from a

de-essentialist one. Both conceptualizations are part of gender as a phenomenon. Yet, the cut is operated from within the phenomenon, and the boundaries between the two conceptualizations materialize gender, and make it relevant for the people involved, in the specific way Jonathan describes it as part of his experiences at work.

Following the above, I suggest that Barad's diffraction extends Sandberg & Tsoukas' (2011) model of theorizing through "practical rationality". Practical rationality focuses first on sociomaterial practices, and specifically on what people actually do. It progresses by "zooming in" (Nicolini, 2009) on how practices are accomplished through objects and bodies, with specific attention on understanding what makes the practice distinct, and by zooming out on connections among practices. To these five steps, I suggest a diffractive lens adds a focus not on differences between our theories and participants' meanings (in reflexive terms), but on how a facet of a phenomenon emerges as in relation to its difference from other aspects, as it follows from the example above.

This helps us to acknowledge *differences* created and *their effects*, thus making central in any ethnographic account not only differences but where the "patterns of differences that make a difference" appear (Barad, 2007:72), in other words, where the cut is operated. By way of illustration, in Table 1 I contrast examples of questions guided by a reflexive approach, and a diffractive one following practical rationality described above, that an ethnographer would ask in order to grasp gendering in the field.

Reflexivity	Diffraction
• How do participants enact gender through their doings and sayings at work? • What are the meanings participants give to their gender identity? • What interpretation have we given as researchers to these gendering practices? • What alternative interpretations/theoretical frameworks could have we articulated?	• What are the sociomaterial practices[55] linked to doing gender? • How do they emerge as different from other practices? More precisely, what is specific of these sociomaterial practices that makes them gendered? • What do these practices tell us of how gender is understood as different from other gender practices/ understanding of gender? • What effects differences in understanding gender produce? And for whom?

Table 2 Contrast between reflexive and diffractive questions in approaching a phenomenon ethnographically.

In the table above, I aimed to reconstruct some key questions reflexive/diffractive ethnographers could ask themselves, in this instance in relation to an empirical task of tracing gendering practices. Specifically, in these questions, the focus shifts from participants' gender doings and sayings, towards the interconnected material and social aspects of their practices (use of objects, bodies, tools to construct their gendered self). Whereas this is also feasible under a practice-informed reflexive empirical engagement, a diffractive lens extends focus to the instances (where, when, and for which reasons) of emergence of practices, as in relation to others, and how the specific configuration

[55] Attention to the sociomaterial of doing gender are part of a Baradian posthumanist framework, resonating with Sandberg & Tsoukas (2011) focus on sociomaterial practices.

accounted for has implications and effects for gender. In other words, a diffractive ethnographer would look at the ways certain uses of objects, words, and bodies are gendered as in contrast with the ways in which they are not or in other ways in which they could be gendered. The focus is always on differences.

A diffractive ethnographer queries the effects of gender practices not only for the people involved, but also for gender as a phenomenon itself. In other words, how would another cut inform us on gendering practices? How is this cut operated -where do boundaries stand, who constructs them, who do they affect, what possibilities do they open or foreclose? For example, how is gender dialogically and materially constructed among participants and researchers as different from a binary of male/female? Who operates these differences, how and with what consequences? For a diffractive ethnographer it is not enough to offer a variety of interpretations to gender processes. Rather, what is needed is also accounting for the effects of these processes, such as how gender becomes a political stand for exclusion and inclusion, the causes of such exclusions, and the potential inequalities created. In addition, the questions above show that the emphasis on researchers' interpretations are flattened by a tighter focus on the phenomenon itself: the researcher is already part of the reality studied, hence what needs to be privileged is the ways researchers and participants can tease out the phenomenon through differences and effects.

This differs from current critical reflexive works. For example, Contu & Girei (2014) explore practices of shaping the "partnership discourse", and how such process reinstates oppressive and subordinate relationships among diverse participants. They also engage in different readings of the partnerships investigated, clarifying how their political lens offers a fruitful explanation of partnerships (see Contu & Girei, 2014:224). Their work engages with a critical reflexive approach; it moves towards

diffraction in the attentiveness to how practices create differences and inequalities; it reflexively recognizes the multiplicity of voices in constructing partnership. Yet, it is not fully a diffactive ethnographic account. A diffractive ethnography would have not priviledged the multi-voicing practices (Alvesson et al., 2008) of partnerships, that is "how meanings are constituted, and on its social consequences" (Contu & Girei, 2014:222) for development stakeholders, INGOs, and NGOs, nor would it have used multiple perspectives on parternship. Rather, diffraction would enhance how participants' and researchers' definitions of partnership emerge as in contrast with other definitions of partnership. This helps researchers to think of research and theory-making processes as a joint activity, not in the sense of co-production of meanings (typical of reflexivity), but as operating cuts that make a phenomenon emerge in a specific way. This re-shapes the way we think of our role and our responsibility in ethnography.

Conclusions

Reflexivity in ethnographic research has explored the meaning-making processes of our research enquiries. Reflexivity has offered a more relational understanding of our roles in the field and our responsibilities in producing truth claims (Alvesson et al., 2008; Hardy et al., 2001); it has questioned the distance and objectivity in our relations with participants, and sought to unravel the differential meanings mutually shaped by participants and researchers. Increasing numbers of researchers in organization and management theory have used reflexivity as a conceptual tool for their ethnographic practice (see for example, Cunliffe, 2002 and 2004; McDonald, 2013; Nicolini & Roe, 2013; Keevers & Treleaven, 2011).

Yet, despite the proliferation of approaches to reflexivity (Alvesson et al., 2008; Cunliffe & Easterby-Smith, 2004), the concept and its use still contain ambiguous and contested aspects. I outlined that in reflexivity we can trace an ontological distinction between researcher and participant, and that such distinction is the premise of the issue of narcissist tendencies Rhodes (2009) finds problematic in some ethnographic works. Weick (2002) suggests that, by overstating their reflectiveness, auto-ethnographies tend to be narcissistic accounts, focusing more on the researcher's reflections rather than on participants' actions (Weick, 1999). Specifically, as Rhodes (2009) clarifies, the risk of auto-ethnographic works is the epistemological and ontological separation of researcher and researched, and the 'movement to the left of the "Self-Other hyphen" (p.131)' (Humphreys, 2005:841).

To tackle the issues deriving from an ontology and epistemology of separateness, I propose a move towards diffraction in ethnographic practice. By drawing on empirical material collected during an ethnographic study on gendering in innovation processes, I compare the two different ways reflexive and diffractive ethnographers engage with in approaching their research practice. Diffraction is a physical phenomenon spotting out patterns of differences created. In ethnography, diffraction enables the production of accounts based on differences, and the effects of these differences. Whereas reflexivity helps us exploring meanings created through our interactions with participants, such as by asking "What interpretation have we given as researchers to these gendering practices?" and "What are the alternative interpretations/theoretical frameworks?", diffraction is "attuned to widening possibilities" (Nicolini & Roe, 2013:14). In fact, diffraction urges us to use divergences as a way to understand a phenomenon, by asking in our ethnographic enquiry questions such as "What do these practices tell us of how gender is understood as different from other gender practices/ understanding of

gender?" and "What effects differences in understanding gender produce? And for whom?"

In the paper I have shown how diffraction enables us to grasp gendering as a *difference* from the known and experienced. Gender emerged as an ascribed characteristic of individuals, in Jonathan's dialogue with me, as different from my de-essentialist and performative understanding of gender. It was thus in this difference that the concept of gender materialized. We are then left with some political questions: How do we (participants and researchers as participants) make cuts on the phenomenon? What cuts matter, and for whom? Which possibilities do they foreclose?

I also argued that diffraction in ethnography means to think of researchers as already embedded in the phenomenon observed, thus making researches politically responsible for what they ought to study. Diffraction is funded on ontology of inseparability; it flattens any separation between participants and observers, by conceptualizing them as part of the phenomenon. In the ethnographic work presented in this paper, I was -with the participants- part of gendering processes, before I entered the field, and then in the field through the performative dialogue with Jonathan. My position as being part of the phenomenon I ought to study in the organization made me responsible not only for producing certain accounts and shaping a co-joint understanding of gender as a binary, but furthermost for allowing Jonathan to define gender for me and through me. First, I was politically responsible for not resisting the gender binary and its power relations through the discursive and material interplay with Jonathan. Second, I co-produced a subject legitimized to reveal the "truth" on what gender is and how it is done in the organization. The gender relations Jonathan hold the truth of, and which I aimed to reveal through my ethnographic study, were nonetheless already there in as far as we were performing them. Third, our performances of gender produced tangible effects,

such as the repetition of a gendered power relationship, and the strengthening of a specific conceptualization of gender (as a binary, as an ascribed characteristic). In so doing, engaging with diffraction in doing ethnography has enlarged my responsibilities towards participants, and towards gendering processes as a phenomenon.

The diffraction framework to ethnography proposed is particularly suitable for political projects, such as the one here described on gendering in innovation, but more generally suits ethnographies concerned with the ways a phenomenon engrains power dynamics. The proposed lens can be used as a tool for grasping differences, among practices and meaning making processes, thus accentuating which practices, meanings, and subjects are legitimized, which others are marginalized or silenced.

CHAPTER VI

Concluding thoughts and suggestions for future research

At the end of this journey, some remarks need to be set in place as conclusive of the overall enterprise, and at the same time departure points for future research. This work is premised on an interest in the intersections between gender and innovation, and specifically in gender dynamics, and their effects, created throughout innovation processes. The thesis aimed to show gender dynamics impacting the social ecology of innovation and the consequences of such dynamics for different bodies and actans. The narrative driving this work is one that aims to answer the following: How do people in organizations influence and are influenced by gender dynamcis throughout the innovation process?

The above suggests that pillars of this work are innovation processes, gendering processes, and bodies at work. Such foundation implicate a framework on innovation and gender which sustains the dynamic nature of the phenomena, that contemplates the possibility of endless change, the citational character of what we do and say, and that has a comprehensive outlook on what actors are involved, and how they are shaped through these changes and in relation to their environment.

Narrative threads

The thesis elaborated a framework that intersects three perspectives which we see in extant management literature as stand-alone pillars. The first refers to a Baradian-inspired posthumanist feminism, for which matter of all types is agentive. The second is a Butlerian-informed poststructuralist approach that elaborates on the reiterative nature of norms and shows their detrimental effects for people (hence integrating the overall enterprise of the framework with a more humane outlook on phenomena. The third is

process ontology – a view on the world that sees its constant flux and change. Despite their individual relevance in management literature[56], their interconnectedness has been overlooked. On the theoretical level, the thesis contributes to extant works in management research, by showing that connecting these three theoretical angles creates a prism that enhances our outlook on complex and entangled phenomena, such as gendering in innovation processes.

Such entwinement of perspectives brings the three articles altogether, however each paper feeds into the discussion of the others. More specifically, the first article is strongly linked to the second, specifically as it sets the framework for a relational approach to innovation, which the second paper argues being the basis for seeing frameworks on gender as constituent part of innovation making. Particularly, the first article defines innovation as "the invention, development, and implementation of new ideas" (Garud et al., 2013:776). Van de Ven et al. (1999) found that innovation does not follow set stages, and that uncertainty characterizes its phases (invention, development and implementation). In each phase interactions of different actors build an infrastructure for innovation to take place, but also define which directions need to be taken, based on a specific view of what constitutes successful innovation for the people involved. Garud and Gehman (2012) note that what makes an innovation process successful are not only the technological capabilities, but the interconnections among different actors involved in the process (institutions, organizations, users), and the "prevailing ideas of gender, health, and environment" (Kirsch, 2000:25, in Garud & Gehman, 2012:984). For example, the introduction in the market of the car Model T by the Ford Motor Company, on an affordable price for its employees, generated an ecosystem that re-shaped and transformed society at large, such as its environmental

[56] See chapters II, III, IV, and V for independent analysis of each perspective within management studies.

infrastructure. Similarly, Akrich (1992) found that in developing the photovoltaic lighting kit in Africa, a network of people and technologies sustained the development of that innovation, from the French manufacturers, to local electricians, and their tools. Central in these accounts are actors, their experiences, and the relations of people, institutions and technologies.

Despite the arising interest on the intertwining of individuals, organizations, institutions, and frameworks on reality - an interest in the relational constitution of innovation- an explicit attention to the prevailing ideas of gender dynamics that feed into the innovation process has been marginal in management literature. In other words, extant innovation literature has so far given scant attention to the ways frameworks produce and reproduce -throughout innovation- specific gender dynamics. This represents the bridge between the first and second article.

The second article delves into this debate and shows the gender dynamics emerging in the two innovation processes of this study. In the article I engaged in a feminist poststructuralist lens, specifically framed around Butler's notion of gender, and contributed in empirically substantiating research on gender in innovation. The landscape captured along this road was one that illustrated the multiplicity of gender performances in innovation-related jobs, such as when "fighting" and "convincing" framed daily practices of members in the two firms, or when gender order positioned innovators as individuals for which personal commitments are second-ordered to innovation practices. Altogether the landscape contributes to current debates on gender and innovation by offering insights on the continuity "among sex, gender, sexual practice, and desire" (Butler, 1999:23) emerging in innovation processes. By embracing a poststructuralist approach to gender in innovation, I took distance from a conceptualization of gender as a variable, an ascribed characteristic of individuals,

which merely would show how the number of women and men taking part of the process reproduces gender inequalities. Instead, the framework sheds light on "Othering" in innovation-oriented organizations, the repercussions on gendered identities for the men and women involved, such as emotional distress, the privileging of competitive over collaborative behaviour, the neglect of a parental experience as part of their identities of innovative researchers.

The second article engages with a particular notion of gender, one that sees gender as a multiplicity of affective experiences, in the different involvements in ordinary life. This entails a multiplicity of doings and experiences of gender and desires. Such perspective has informed the analysis of the data, but it also foregrounded the entire process of data collection. In other words, when entering the field and engaging with participants, this lens on gender has affected my interactions with participants. This has become an increasing concern for me, which I aimed to acknowledge and develop in the third article. More specifically, the third article connects to the second as it poses a reflection on how gender is constructed not only by participants in the field, but also at a broader level, through participants' interactions and engagement with the researcher. In other words, the third article not only reflects on the researcher's responsibilities in ethnographic enquiries, but marks the researcher as responsible for creating gender (as a phenomenon) throughout the study.

The third article thus clarifies that I (as a researcher) was interdependently doing gender in several ways, such as in allowing gender to be defined for me by participants, by avoiding resistance to such construction, and by producing specific subjects who could voice their understanding of what gender is, and as a consequence, producing other subjects that would be silenced.

Findings and contributions

The thesis drove us through different roads and few crossings. The first article begins on a path of performativity and effects, travelling across the tangled forest of constitutive entanglements (Orlikowski, 2007) of different elements shaping innovation processes. In this path on innovation as process, I showed that extant innovation literature overlooks complexities of the micro processes that construct innovation, as it conceptualizes processes as evolving longitudinally - that is following entities and their change on a linear temporal dimension (Langley et al., 2013). I crossed this road with a theoretical framework that intertwines "enrolment" (Akrich, 1992) and posthumanist performativity (Barad, 1999, 2003; 2007), and advocated that such an approach is attuned with a "strong" process approach (Hernes, 2008). In the article, I showed that a strong process approach urges us to account for how people construct their identities in an emotional and practical relation to their environment, which is formed by technologies, artefacts, and other objects, in order to gain insights on processes occurring in innovation, such as how researchers engage with objects at work, and how that feeds into their self-definition.

The first article specifically contributes to the debate on innovation as a process. By looking at the entanglements of elements (people, objects, technologies, etc.) at the micro-level, I integrated Garud et al's (2013) innovation models with: *i)* two additional dynamics - constructing and effecting, enfolding through three phases (invention, development, implementation) and three key mechanisms (recombination, transformation, institutionalization); and *ii)* the introduction of the roles of objects as in relational constitution with other elements (people, other objects). This article was not about empirically enriching our knowledge on the components of the innovation process, but rather intended to provide a stronger process-oriented theoretical lens

useful for grasping different nuances of the innovation process. Such a lens also allowed the problematization of a "politics of who" (Mol, 2002) innovation participants are, thus questioning whether innovation is confined to firms, or traceable in multi-party networks, or across communities. This theoretical lens also opened up to questions on a "politics of what" innovation processes are about, and what we can identify as elements shaping innovation.

Overall, the proposed framework in the first article contributes to extant understandings of innovation processes, by adding a finer granularity and depth regarding the relational constitution of elements (people and objects) to Van de Ven and colleagues' innovation model (Garud et al., 2013), thus showing that all elements involved in innovation processes change, innovators included. Along with the role of objects in innovation, the article re-positions researchers involved in innovation activities at the centre of our attention.

Whereas the first article took innovation as a gender neutral phenomenon, in the second article I contributed by showing in detail the inherently gendered nature of innovation processes. This second road is a scarcely travelled one. In the article we dodged the pitfalls encountered along this road, such as the absence of connection between gender and innovation within management literature. Specifically, extant innovation research focuses on innovation disruptiveness (Bower & Christensen, 1995), breakthroughs (Bessant, 2008), networks (Swan & Scarbrough, 2005), and users (Von Hippel, 2005), with no attention to its links with gender. As Ranga & Etzkowitz (2010) suggest, blindness towards gender within innovation studies actually masks a predominance of masculinities in understanding innovation processes and ideals of innovators. Recently, empirical research on gender in innovation policies has been developed (e.g. Ljunggren et al., 2010; Andersson et al., 2012; Pettersson, 2007), yet with the drawback of treating

innovation as a "thing", and of overlooking the ways gender is "done" and "un-done" (Kelan, 2010) through its doings and sayings in organizations.

Therefore, the second article explores *i) what* doings and sayings are enacted in research organizations involved in innovation; and *ii) if* and *how* these are gendered, and with what *consequences*. The article contributes in empirically substantiating current developments of gender and innovation in management research, by specifically illustrating the variety of gender performances in innovation-related jobs.

In the article we find that doings framed in terms of "fighting" and "convincing" are enacted daily by members of the two organizations and that a repetition of a gender order positions innovators as individuals whose personal commitments are overshadowed by innovation practices. Inclusion and marginalization in the two organizations are based not on a separation between women and men innovators (Danilda & Thorslund, 2011; Ranga & Etzkowitz, 2010): fierce competition, strength, passion, out of the box thinking, creativity, neglect of personal life, engage both women and men in a similar manner.

The article aligns with current research on gender and innovation by providing empirical evidence of the gendered nature of innovation processes, and more specifically by showing that characteristics of innovators are linked to masculine features (competitiveness, erasure of family life and parenthood, etc.). Such masculine nature of innovation processes affect women and "working fathers" (Ranson, 2012) in the two organizations, thus suggesting that inclusion/exclusion transcend the mere distinction between men and women and that both women and men (in non-traditional professions) experience marginalization.

This contributes to extant innovation and gender literature with empirical evidence of the ways researchers involved in innovation activities frame themselves and the requirements for their job in a way that purports a specific gender order, one that enhances a particular type of masculinity (competitiveness, perseverance, passion, curiosity, fighting, devotion) over what traditionally is defined as belonging to the feminine (cooperation, sharing ideas, harmony, balancing work and family).

The second paper thus brings to the fore the dominant presence of gender in innovation processes. The introductory part of this thesis clarified the salience of gendering in organizational life (Gherardi, 1995). If we do gender constantly, and if gender is located in multiple spaces, and affects us all, then I could not but question the extent to which I -as part of the observational apparatus[57] (Barad, 2007)- was doing gender in my intra-actions with the participants and the context.

Here is the bridge between the second and third paper: a clarification of how the intra-actions among researcher, participants, and the environment created the phenomenon of interest. Such link is premised on a posthumanist approach to gender, namely inspired by the works of Karen Barad, which highlights the intra-connectedness of multiple agents in the making of the apparatus of observation (and consequently of the phenomenon itself).

A posthumanist approach enriches current understanding of gendering processes and innovation work in at least two ways. The first refers, as mentioned above, to an attention to intra-actions that make the apparatus of observation. In other words, when

[57] Barad (2007) clarifies the multiplicity of understandings of apparatuses, from Foucault's notion of dispositif, to Latour's inscription (or Akrich's as discussed in chapter III). However, her understanding of apparatus goes beyond the mere assemblage and entanglements of non/humans (apparatuses are not the result of the performativity of social forces or laboratory instruments), rather, apparatuses are "material reconfigurings of the world that do not merely emerge in time but iteratively reconfigure space-timematter as part of the ongoing dynamism of becoming." (Barad, 2007:142). In other words, apparatuses are not instruments of measurement of a phenomenon, but they are actively shaping the phenomenon.

grasping gendering in innovation we need to account not only for the interactions among participants and how they create a gender order through their citational practices, but furthermore, we need to acknowledge that also the researcher is part of such construction, and that s/he as well is enacting the very gendering that s/he ought to understand. This can be a complex task, which in the thesis has been addressed by the third article. The second contribution of a posthumanist framework relates to a particular interest in the non/human, which brings to the fore in any analysis on gender the role of bodies as inseparable from the self - as Akrich and Paasver (2004) define it, "embodied self"- and therefore one's gender identity. In other words, by introducing a posthumanist lens, bodies (and specifically pregnant bodies as emerging in chapter IV) are seen as material extensions of researchers in their making of innovation, thus affecting gendering processes as well as innovation processes.

The third road we travelled was one of reflection on my doings as an ethnographer approaching the two organizations. I took reflexivity as a departure ethical stand for my work, and questioned the extent to which my engagement with a specific perspective on gender has impacted my research journey. More specifically, reflexivity helped me to problematize my intervention and to question further not only how my lens on gender affected the accounts produced, but furthermore, how I un/willingly participated in shaping gender dynamics in the field and the effects of such participation. This sparked from a consideration on the ways I was subjecting my "self-body, belief, personality, emotions, cognitions – to a set of contingencies" (Van Maanen, 2011:219) in BfL and Techie, and how visiting two different fields created similar/dissimilar responses and dynamics. I elaborated these initial reflections in a paper accepted at the Academy of

Management Annual Meeting (2014)[58]. The third article takes a step further. It comes as a conclusive consideration on the overall enterprise, and specifically as an elucidation on how I (researcher) and participants intra-actively shaped not only our identities but furthermost the phenomenon itself.

The third article thus explores my role (as researcher) in making a gender order and my responsibilities in producing truth claims on what I was observing (Alvesson et al., 2008; Hardy et al., 2001). In the thesis I argued that reflexivity in ethnography (see for example Cunliffe, 2003 and 2004) still contains ambiguous and contested aspects, linked to the ontological distinction between researcher and participant which is the premise of those narcissistic tendencies that Rhodes (2009) and Weick (2002) attribute to some ethnographic works, such as auto-ethnographies. In the thesis I suggested that a specific framework constructed around the concept of diffraction, as it emerges in feminist studies specifically in Barad's (2007) agential realist onto-epistemology, extends our ethnical responsibilities as researchers in several helpful ways. First, it spots out how researchers are already embedded in the phenomenon observed, thus making researchers further responsible for what they ought to study: in the ethnographic work presented in the thesis I was - with the participants - part of gendering processes, before I entered the field, and then in the field through the performative dialogue with participants.

The article contributes by enriching our reflective stances, and specifically by suggesting at least four ways in which my being part of the phenomenon made me ethically and politically responsible: *i)* by allowing participants to define gender for me and through me; *ii)* by not resisting the gender binary and its power relations through the discursive and material interplay with participants; *iii)* by co-producing a subject

[58] The paper is titled: "Organizational Multi-Sited Ethnography: Challenges and Strategies in Management Research".

authorized to reveal a "truth" on how gender is done in the firm; *iv)* by co-acting in producing tangible effects, such as the re-affirmation of a gendered power relationship, solidifying a binary conceptualization of gender.

Limitations and future research

Here we come to the end of this journey. A journey that has contributed in making some roads brighter and clearer, however leaving some others open[59], discussed below. Overall, the intersection between gender and innovation is still widely unexplored, and recent calls for more empirical research have been made at the European level, for example in the "Call for promoting gender equality in research and innovation". From the thesis we have seen that an investigation looking at gender dynamics in innovation is promising thanks to its ability to enrich our understanding of multiple identities of innovators, and specifically which identities are included or excluded. This research direction clearly emerges from chapter IV, in which I suggested that innovation processes are gendered when *i)* performances of a gender order are enacted; *ii)* when specific forms of masculinities are engrained in what is understood to be innovation; *iii)* and when these performances negate specific gendered bodies and practices, such as the pregnant body and the parental experience. Through this road we come to view a landscape of gender dynamics which produces and reproduces power imbalances in the workplace, and the *Othering* practices that are enacted for "excluding" and "silencing" (Hearn, 1996) specific gender forms. Much more work in this direction is desirable, specifically in different sectors and in non-profit organizations, so to include different clusters of ideas generators.

[59] The research directions described next are part of the ideas I proposed as an affiliated member to SEIN, Identity, Diversity & Inequality Research, Hasselt University, Belgium for the Horizon 2020 "Call for promoting gender equality in research and innovation".

Whereas this work has taken a relational perspective to innovation, it has nonetheless neglected team dynamics through which ideas are discussed, filtered, and taken further. No consideration was given to assessing which ideas within a project team emerge and which ones are developed and implemented into an innovation outcome. By looking at emergence and development of ideas throughout the innovation process, we can see whose ideas are implemented, and the strategies developed for promoting one's ideas. This represents a second potential direction of future work, which could tackle the impact of men and women on producing innovation outputs. This is possible by first identifying ideas created within a project/team, and following such ideas over time until their termination into an innovation outcome (still in line with a process ontology). Group performance and gender equality in teams is a widely discussed topic. Extant organization studies literature finds women have a positive effect on group performance. Groups are more effective when women equal or outnumber men, specifically when complex tasks, decision-making, and complex information management are at stake (Fenwick & Neal, 2001). Diversity in work group increases a firm's ability to capture different trends emerging in the market and clients' needs (McMahan, Bell, & Virick, 1998). Workgroup diversity also enhances innovation and creativity (Amabile, 1983; Caudron, 1994; Jackson, May, & Whitney, 1995; O'Reilly, Williams, & Barsade, 1998). Deszo & Ross (2012) found that when a firm is focused on innovation as part of its strategy, women's presence in top management leads to better performance. Yet, Myaskovsky, Unikel, & Dewm (2005) note that diversity fosters conflict within the group. Despite the arising importance of diversity (hence, also gender diversity) in teams at work, Foss et al. (2013) note women's ideas are less implemented than men's. More empirical substantiation is needed in order to tackle the

reasons of such imbalances and the effects of these discrepancies on the ecology of innovation.

Both research directions suggested above (multiplicity of identities of innovators, and promotion and implementation of ideas in the innovation process) however disregard the final outcome of the innovation process: the product (or service) created. An arising interest towards how research priorities and outcomes embed specific conceptualizations of gender has developed over the past few years. Particularly, the Gendered Innovations consortium[60] works towards developing methods for gender analysis for science and technology sectors, and provides case studies illustrating the importance for a gender lens in innovation development. However, much more work is needed within management literature that focuses on the innovation output and traces back what gender characteristics it embeds, how these have been encapsulated in the output throughout the innovation process. This helps to understand whether gender diversity has been addressed as integral part of the innovation process, and if innovation outcomes reflects such gender diversity. This represents a third potential line of future enquiry.

As a methodological limitation of this thesis, I lacked the practical time to explore the entire innovation processes of the development of the renal replacement functions device in BfL and of the Defending the Cloud software. Following these would entail more time than the length of a PhD allows. It was thus only practically feasible to follow a specific timeframe of the innovations developments. Despite the practical reason for which I limited observations to a specific timeframe, such choice is justified also by the theoretical understanding of (innovation) processes driving this piece. My interest was not on the evolvement over time of events (in longitudinal terms), but on

[60] http://genderedinnovations.stanford.edu

the dynamic and evolving entanglements constituting innovation, and on producing an account of the effects of such entanglements. Whereas this partiality can be seen as a drawback of a "strong" process approach (Hernes, 2008), one informed by agential realism, nonetheless this specific lens allowed us grasping the micro dynamics of innovation making and of gendering innovation processes. Moreover, the decision of limiting observations on a specific timeframe meant that the innovation output was not taken into account: no considerations can be drawn on whether and in which ways the output (the product itself) embeds the gender dynamics I accounted for in this thesis, thus leaving us with an uncertainty of how such dynamics feed into other processes, external to the organizations.

Other limitations concerning the fields are the limits of this research to two organizations. Whereas the choice of two organizations that employ symmetrically different numbers of women and men helps capturing gender dynamics in innovation processes, a third field of investigation could have provided the empirical material for a comparative analysis of the cases. On regards of the analysis, the choice of merging the datasets after the first order coding resulted in a loss of granularity on the single differences between the two organizations. My choice was instead to privilege similar dynamics across the two sites, which offered a more comprehensive outlook on gendering in innovation processes, not singularly located in jobs predominantly performed by either men or women.

Moreover, I recognize that this work could have engaged more soundly with the material/nonhuman. Specifically, the third article did not reveal how objects -and more broadly the environment in which the enquiry was conducted- influenced the co-construction of a gender order. Additionally, the second article develops the materiality of gendering in a tangential way, with focus more on the pregnant body as one among

the many aspects of "othering", rather than treating it as a human/material element which matters in its engagement with other people and technologies.

At last, I recognize the absence of political interventions in this thesis. This work showed that being a researcher entails producing the phenomenon we ought to study. This becomes a political stance particularly in research on gender: we (researchers) can resist or engage differently with the ways gender is proposed and done through us. However, I did not engage fully with the political responsibilities deriving from an ethnography of gender and did not engage throughout this project in actions of resistance.

Nonetheless, such limitations lead to some future openings. The first is to engage more substantially with such political responsibility when doing ethnographies of gender. Moreover, as discussed above, other trajectories depart from the very crossing of gender and innovation. Future research could focus on idea generation, specifically in one or more organizations at the invention phase of the process, with the aim of exploring whose ideas are heard, what strategies are necessary for making one's ideas being heard, thus tackling the impact of men and women (and the gender orders produced) in shaping innovations. Another opportunity for future research is start from the end of the innovation process and explore what gender characteristics a specific innovation output embeds, and whether possible, to see how such attributes reflect a specific understanding of gender relations. I suggest these research opportunities as some among many roads to innovation and gender that problematize the impact of men's and women's participation in innovation processes, and the consequences of gender orders created throughout innovation processes, for people involved. Continuing in these lines of research can thus enhance our understanding of gender dynamics, the inequalities and differences created, the problematic aspects of doing innovation that

affect women and men at work, which align with both a recent academic interest in innovation and gender, and a public concern, such as the European Commission's strive for grasping the societal challenges of innovation making.

In highlighting the varied ways in which feminist theories grasp gender, innovation and ethnography, the thesis has made a much needed step toward bringing light to gender-blindness in innovation research, the micro-dynamics of innovation processes, and our responsibilities in both producing ethnographies that acknowledge researchers' roles in producing the phenomenon they study, and in fighting back gender-blindness.

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APPENDIX A

Tables of formal interviews conducted and recorded in the two organizations

NB: Names are fictitious to preserve anonymity. All interviews in BfL and one in Techie Labs were conducted in Italian, the rest in English: the choice was based on the preferred language by the interviewee.

Biomedicine for Life

Name	Position	Sex	Form of interview	Duration (in mins)
Jonathan	Researcher	Male	In person, recorded	58.50+21.05 (consecutive, short break)
Penelope	Researcher	Female	In person, recorded	43.37
Valery	Head of Laboratory	Female	In person, recorded	1.35.59
Debora	Postdoc	Female	In person, recorded	22.42
Diane	Researcher	Female	In person, recorded	43.48
Camille	Researcher	Female	In person, recorded	42.48
Jessica	Researcher	Female	In person, recorded	52.57
Rafaela	Head of Unit	Female	In person, recorded	39.30+06.12 (consecutive, short break)
Giusy	Head of Unit	Female	In person, recorded	41.18
Claire	Research assistant	Female	In person, recorded	36.39
Sandra	Postdoc	Female	In person, recorded	01.01.02
Gabby	Postdoc	Female	In person, recorded	55.45
Karen	Head of Unit	Female	In person, recorded	45.15
William	Research assistant	Male	In person, recorded	26.43
Brian	PhD student	Male	In person, recorded	01.02.04
Natalie	Researcher	Female	In person, recorded	01.00.09
Grace	Postdoc	Female	In person, recorded	01.33.41
Mark	PhD student	Male	In person, recorded	43.54
Simon	Postdoc	Male	In person, recorded	01.04.00
Margaret	Head of Laboratory	Female	In person, recorded	01.02.16
Fanny	Postdoc	Female	In person, recorded	01.41+43.16 (consecutive, short break)
Laura	Researcher	Female	In person, recorded	10.32+01.04.06 (consecutive, short break)
Mark	Researcher	Male	In person, recorded	01.47.15
Martha	Head of Laboratory	Female	In person, recorded	55.32
Ryan	Head of Department	Male	In person, recorded	28.58

Techie

William	Master Technologist	Male	In person, recorded	54.10
Rupert	Researcher	Male	In person, recorded	42.04+05.20 (consecutive, short break)
Tony	PhD student	Male	In person, recorded	01.00.50
Elisabeth	Research engineer	Female	In person, recorded	48.20
David	Intern	Male	In person, recorded	51.15
George	Researcher	Male	In person, recorded	01.40.13
Alan	Principal researcher	Male	Phone interview	26.41+39.03 (two different phone interviews)
Howard	Principal research scientist	Male	In person, recorded	45.07
Hugh	Researcher	Male	In person, recorded	36.07
John	Senior research engineer	Male	In person, recorded	39.54
Charles	Senior researcher	Male	In person, recorded (recorder broke)	07.37 (Recorded minutes of interview)
Ralph	Researcher	Male	In person, recorded	58.42
Pamela	Researcher	Female	In person, recorded	50.43
Warren	Researcher	Male	In person, recorded	01.38.59
Olivia	Senior researcher	Female	In person, recorded	35.05
Julia	Principal research scientist	Female	In person, recorded	41.59
Humphrey	Researcher	Male	In person, recorded	01.01.38+06.04
Trevor	Researcher	Male	In person, recorded	54.33

APPENDIX B

Table of further material from Biomedicine for Life

Type of material	Name of material	Length	Date
Audio	Presentation of part of project on decellularized kidney	25.05 min	14/05/2012
Audio	Meeting between Head of Bioengineering Department, Head of Unit and researcher	57.00 min	15/05/2012
Audio	Meeting between Head of Tissue Engineering Unit and two researchers	17.54 min	16/05/2012
Audio	Meeting between Head of Tissue Engineering Unit and one researchers -Part 1	14.12 min	17/05/2012
Audio	Meeting between Head of Tissue Engineering Unit and one researchers -Part 2	39.46 min	17/05/2012
PDF	Information for new entrants -general information	3 pages	Created on 19/10/2011
PDF	Information for new entrants -security manual	13 pages	Created on 19/10/2011
PDF	Information for new entrants – smoke issues management	4 pages	Created on 19/10/2011
PDF	Information for new entrants – norms for hepatitis B prevention	2 pages	Created on 19/10/2011
PDF	Information for new entrants –emergency evacuation plan	23 pages	Created on 19/10/2011
PDF	Information for new entrants –precautions and recommendations for cryogenic gases	6 pages	Created on 19/10/2011
PDF	Information for new entrants –liquid azote safety norms	5 pages	Created on 19/10/2011
PDF	Information for new entrants –ethics of quality	3 pages	Created on 19/10/2011
PDF	Information for new entrants –IT norms	12 pages	Created on 19/10/2011
PDF	Information for new entrants –code of values and ethics	28 pages	Created on 10/01//2011
PDF	Information for new entrants –code of values and ethics	28 pages	Created on 30/09//2011
PDF	Laboratory procedure: preparation of membranes in pva	2 pages	Created on 30/09/2011
PDF	Laboratory procedure: circuit assembly for the decellularization of rat kidney	7 pages	Created on 22/04/2011
PDF	Internal procedures: protocol for health and security management	17 pages	Created on 30/03//2011
PDF	Internal procedures: protocol for managing relationships with public administration and surveillance authority	8 pages	Created on 30/03//2011

PDF	Internal procedures: protocol for managing research activities	9 pages	Created on 30/03//2011
Video	Seminar: Technology exchange day	Recordings of a full day seminar (4 CDs)	05/07/2012
Video	Project presentation initial results	Recordings of 4 presentations	14/05/2012
Word document	Press release	1 page	24/07/2012
PDF	BfL Statute	12 pages	Created on 02/01/2007
PDF	BfL structure	1 page	01/01/2012
Word document	Publication statistics from 2007-2012 by department and author	1 page	02/08/2012
PDF	ERC advancement grant (part B2) on the chronic renal disease project	19 pages	Accessed on 20/07/2012

APPENDIX C

Table of further material from Techie Labs

Type of material	Name of material	Length	Date
PDF	"Trusting the Cloud" project overview	2 pages	05/09/2012
PDF	"Trusting the Cloud" project description	52 pages	05/09/2012
Word document	Email exchange between team members on virtual machine introspection	5 pages	Conversation occurred on 05/11/2012
Word document	Screen shots of internal resources: Creating a best work environment	2 pages	Last updated 19/03/2012
Word document	Screen shots of internal resources: culture and employee engagement	2 pages	Last updated 04/04/2012
Word document	Screen shots of internal resources: driving diversity and inclusion	1 page	Last updated 31/07/2012
Word document	Screen shots of internal resources: Employee programs	1 page	Accessed 12/11/2012
Word document	Screen shots of internal resources: Global Flexwork Policy	2 pages	Revision date 04/08/2010
Word document	Screen shots of internal resources: Global Best work environment policy	2 pages	Revision date 30/08/2010
Word document	Screen shots of internal resources: Global Corrective action policy	2 pages	Accessed 31/05/2012
Word document	Screen shots of internal resources: Global employee data privacy policy	5 pages	Revision date 01/12/2011
Word document	Screen shots of internal resources: Global employee resource groups policy	2 pages	Revision date 03/08/2010
Word document	Screen shots of internal resources: Global Flex-time policy	2 pages	Revision date 04/08/2010
Word document	Screen shots of internal resources: Global harassment-free environment policy	2 pages	Revision date 17/05/2011
Word document	Screen shots of internal resources: Global job share policy	2 pages	Revision date 04/08/2010
Word document	Screen shots of internal resources: Global misconduct policy	2 pages	Revision date 14/09/2012
Word document	Screen shots of internal resources: Global non-discrimination policy	3 pages	Revision date 17/05/2011
Word document	Screen shots of internal resources: Global open door policy	2 pages	Revision date 16/03/2012
Word document	Screen shots of internal resources: Global part-time policy	2 pages	Revision date 04/08/2010
Word document	Screen shots of internal resources: Global telework policy	2 pages	Revision date 04/08/2010
Word document	Techie history screen shot	9 pages	Last updated 17/08/2011
Power Point document	Techie Way overview	14 slides	Last updated 2004

Word document	Cloud-based solution for cloud sourced open innovations – Project abstract	3 pages	Acquired after interview to project leader
Power Point document	Field notes on sketches at whiteboard of FVMs architecture	3 slides	Acquired during fieldwork
PDF	Innovation process model	1 page	Created on 03/2002
Image	Picture of FVM final architecture model	1 image	02/11/2012
Image	FVM visualization screenshot from one researcher's laptop	1 image	02/11/2012
Image	FVM testbed screenshot from one researcher's laptop	1 image	02/11/2012
Word document	Screen shots of internal resources: "Defending the Cloud" project description	8 pages	Created on 26/03/2012
Word document	News July-September 2012: "Defending the Cloud" project feature article	1 page	Created on September 2012
PDF	Standard of business conduct	20 pages	Last updated in 2012

APPENDIX D

Informed consent form for interviews in both organizations.

Research Topic: Workers' practices in the innovation process

Doctoral Researcher: Lara Pecis

Supervisor: Dr Alessia Contu

Institution: Warwick Business School, University of Warwick

I, _____, state that I am over 18 years of age and that I voluntarily agree to participate as a subject in the above-named research project conducted by Lara Pecis, representing Warwick Business School, University of Warwick (UK).

Purpose of Research Project

The purpose of this study is to understand members' interactions within research teams in the biomedical sector. The focus of the research is the analysis of the role of gender in the process of producing innovation. This research aims to understand which elements in workers' interactions influence the innovation process by specifically focusing on how gender manifests in the innovation process.

Benefits and risks

The benefit of your participation is the experience to reflect on some existing practices in the innovation process and gender practices in the sector. Your participation to this study may assist to outline some criticalities within the Institute by defining desirable practices which would foster innovation. There are no known risks associated with participating in the study.

Confidentiality and Use

The interview will be electronically recorded; however, your name will not be recorded. Your name and identifying information will not be associated with any part of the written report of the research and will be assigned an anonymous code. All of your information and interview responses will be kept confidential. The researcher will not share your individual responses with anyone other than the doctoral supervisor.

Furthermore, the data collected will not be released to anyone outside the study. However, I will be using parts of this anonymous data in my PhD thesis and in other publications. Any information used in these instances will still not identify individuals directly.

You grant rights to the use of the audio recording or data derived from the recording resulting from your participation in this study for the following purposes only: inclusion in and publishing of the researcher's doctoral thesis, directly related to research venues, such as presentation, meetings, or conferences open to the public or press, without your further written consent. If additional permissions are required, you may be requested at some time in the future to grant a further extension of the usage you grant here.

You acknowledge that Lara Pecis has explained your participation to you fully; has informed you that you may withdraw from participation at any time without prejudice or penalty; has offered to answer any questions that you might have concerning the research procedure; has assured you that any information that you give will be used for research purposes only and will be kept confidential.

If you would like any more information, please contact me at lara.pecis.10@mail.wbs.ac.uk or my supervisor at Alessia.Contu@wbs.ac.uk

By signing below you acknowledge that you have read and understand the above information.

Signature: _____

Date: _____

APPENDIX E

Informed consent form for observations in both organizations.

Research Topic: Workers' practices in the innovation process

Doctoral Researcher: Lara Pecis

Supervisor: Dr Alessia Contu

Institution: Warwick Business School, University of Warwick

I, _____, state that I am over 18 years of age and that I voluntarily agree to participate as a subject in the above-named research project conducted by Lara Pecis, representing Warwick Business School, University of Warwick (UK).

Purpose of Research Project

The purpose of this study is to understand members' interactions within research teams in the biomedical sector. The focus of the research is the analysis of how innovation is produced, and what is the role of workers' interactions in the creation and transfer of knowledge. This research tries to understand which elements in workers' interactions influence the innovation process, specifically focusing on gender practices in the innovation process.

Procedures

During my time at *[Name of the Company]* I will conduct a participant observation. This is a method that requires a description of events that happen both to the observer and participants being observed. It entails detailed notes of my experiences, the experiences of others and of activities, meetings and general goings on at *[Name of the Company]* that are systematically collected. When appropriate, it could also consist in recording or videotaping some activities. Furthermore, I would consider conducting ad hoc interviews regarding critical issues; however, I will have a separate consent form for this.

At any time you may notify the researcher that you would like to stop your participation in the study. There is no penalty for discontinuing participation.

Benefits and risks

This research can provide the opportunity to investigate existing practices on the innovation process and its practices and also on gender practices in the sector and therefore outline their criticality by defining and implementing desirable practices which would foster innovation.

Also, I can offer my feedback on issues of concern to the institute. There are no known risks associated with participating in the study.

Confidentiality and Use

Any information that is obtained and that can be identified with you will be fully anonymous, remain confidential and will be disclosed only with your permission or as required by law.

Moreover, my notes will remain anonymous and will list no one by name. Furthermore, the data collected will not be released to anyone outside the study. However, I will be using parts of this anonymous data in my PhD thesis and in other publications. Any information used in these instances will still not identify individuals directly.

In signing this document you grant rights to the use of data derived from your participation in this participant observation for the following purposes only: inclusion in and publishing of the researcher's doctoral thesis, directly related to research venues, such as presentations, meetings or conferences open to the public or press, without your further written consent. If additional permissions are required, you may be requested at some time in the future to grant a further extension of the usage you grant here.

You acknowledge that Lara Pecis has explained your participation to you fully; has informed you that you may withdraw from participation at any time without prejudice or penalty; has offered to answer any questions that I might have concerning the research procedure; has assured me that any information that I give will be used for research purposes only and will be kept confidential.

If you would like any more information, please contact me at lara.pecis.10@mail.wbs.ac.uk or my supervisor at Alessia.Contu@wbs.ac.uk

By signing below you acknowledge that I have read and understand the above information.

Signature: _____

Date: _____

APPENDIX F

Interviews design, by field

NB: These represent drafts of the interview plot. However most of times interviews led to ad hoc questions and reflections, based on the interview's flow.

Biomedicine for Life

Introduction: Introduction of my research, what I do, why am I doing this interview and what I am looking for from this interview. Signing informed consent form and asking for permission to record.

1. Could you please describe to me what is your role in the institute, how long you have been here, in which unit you are located.

First dimension: Dominant gender modes

2. I have been here a while now and I have seen the Institute is mainly composed by women. How is it working in a female environment?
3. When you entered the place which has been your first impression? How did you familiarize with the place and your colleagues?
4. Do you perceive there are some norms, maybe tacit, on the way a worker needs to behave in your unit or in general in this environment?
5. What do you think makes a good worker here? What are the qualities that are stressed? And who defines them?
6. Are there situations in which you need to dress/talk/behave in a specific way? Can you give me an example?
7. Did you have to change something of your behaviour (or dress code, or ways of talking) when you started working here?
8. Do you feel being a woman or a man has an influence on your work or on how your work is perceived by others? (Do you think there is an advantage in being a woman or a man here at work?)

Second dimension: Gender power relations in the innovation process

9. I would like you to think about a situation in which you had an idea about a new practice (or something else related to your work) and you wanted to discuss it with your boss or colleague. What happened in that situation? Where you able to communicate it? And how did you approach your colleague/boss?
10. Can you think about a situation in which you were not able to express your idea? Why do you think that happened? (Have you ever felt your ideas where not put forward? And why?)
11. What would you suggest to your student on how to manage his/her presence at work, for example on how to communicate with their managers, etc.?

12. (Let’s gossip a little) Can you recall an incident in which there has been a sexual/gender comment involved? Like some man making a comment on a woman or vice versa?

Techie Labs

Introduction: Introduction of my research, what I do, why am I doing this interview and what I am looking for from this interview. Signing informed consent form and asking for permission to record.

1. Could you please describe to me what your role in the institute is, how long you have been here, in which unit you are located.
2. I would like you to think about a situation in which you had an idea about a new practice (or something else related to your work) and you wanted to discuss it with your boss or colleague. What happened in that situation? Where you able to communicate it? And how did you approach your colleague/boss?
3. Can you think about a situation in which you were not able to express your idea? Why do you think that happened? (Have you ever felt your ideas where not put forward? And why?)
4. I have been here a while now and I have seen the Institute is mainly composed by men. How is it working in a male environment?
5. Do you perceive there are some norms, maybe tacit, on the way a worker needs to behave in your unit or in general in this environment?
6. What do you think makes a good worker here? What are the qualities that are stressed?
7. Did you have to change something of your behaviour (or dress code, or ways of talking) when you started working here?
8. Do you feel being a woman or a man has an influence on your work or on how your work is perceived by others? (Do you think there is an advantage in being a woman or a man here at work?)
9. Do you feel being a woman or a man has an influence on your work or on how your work is perceived by others? (Do you think there is an advantage in being a woman or a man here at work?)
10. What would you suggest to your student on how to manage his/her presence at work, for example on how to communicate with their managers, etc.?

APPENDIX G

Tables of data analysis summary of Biomedicine for Life and Techie Labs data: first-order categories, second-order themes, and aggregate dimensions.

Organization	First-order categories (ACTIONS)	Second-order themes (PROCESSES)	Aggregate dimensions
Techie	Asking for help as rude depending on the type of work	**Impact of hierarchies** Feeling the hierarchical structure	Hierarchies and organizational/ managerial power
BfL	You need to first ask to the boss if you can talk to her researcher	**Impact of hierarchies** Feeling the hierarchical structure	Hierarchies and organizational/ managerial power
BfL	There is this hierarchical structure that hinders possibilities of professional growth; there is a preference of managers towards a certain type of people	**Impact of hierarchies** Feeling the hierarchical structure	Hierarchies and organizational/ managerial power
Techie	Immobility of career progress	**Impact of hierarchies** Static career	Hierarchies and organizational/ managerial power
BfL	You need to show some personality; you cannot ignore their hierarchical superiority; you feel lots of performance anxiety, especially towards some managers	**Impact of managers** Establishing meaningful relationships with managers	Hierarchies and organizational/ managerial power
BfL	Tacit rules for managing relationships with managers	**Impact of managers** Discourse on how to establish relationships with managers	Hierarchies and organizational/ managerial power
BfL	Describing managerial preferences and impact on career prospects	**Impact of managers** Requirements for progressing	Hierarchies and organizational/ managerial power
BfL	Describing managers influence on researchers practices and research directions	**Impact of managers** Managers influence on researchers practices and research directions	Hierarchies and organizational/ managerial power
Techie	Describing management role in research development	**Impact of managers** Roles in research development	Hierarchies and organizational/ managerial power
Techie	Describing managers expectations on how to work and complying to managers' requests	**Impact of managers** Discourses on work practices	Hierarchies and organizational/ managerial power
Techie	If you want to get a promotion, I really don’t know how to do it!	**Career paths and progression** Limitations in career advancement	Hierarchies and organizational/ managerial power

Techie	Describing the ways of entering the job market	**Career paths and progression** Involving different steps	Hierarchies and organizational/ managerial power
Techie	Describing career progression as requiring more involvement and influence over people	**Career paths and progression** Qualities	Hierarchies and organizational/ managerial power
BfL	Describing requisites for dealing with external entities	**Career paths and progression** Qualities	Hierarchies and organizational/ managerial power
BfL	Describing what makes a person survive the workplace	**Career paths and progression** Qualities	Hierarchies and organizational/ managerial power
Techie	Describing types and levels of work	**Career paths and progression** Job distinctions	Hierarchies and organizational/ managerial power
Techie	Describing patenting processes and connection with performance review	**Career paths and progression** Monitoring performance	Hierarchies and organizational/ managerial power
Techie	Describing performance review	**Career paths and progression** Monitoring performance	Hierarchies and organizational/ managerial power
Techie	There is this ranking system that does not take into account teamwork	**Career paths and progression** Monitoring performance	Hierarchies and organizational/ managerial power
BfL	You feel destabilized when you enter at first the organization, it's like you enter on the tip of your toes	**Career paths and progression** Process of entering the company and career prospects	Hierarchies and organizational/ managerial power
BfL	There is high turnover in the organization; few people remain here	**Career paths and progression** Turnover	Hierarchies and organizational/ managerial power
Techie Labs	We are a team	**Processes of identification** Group identification	Shaping identity through identification
Techie Labs	I belong to this group	**Processes of identification** Group identification	Shaping identity through identification
Techie Labs	Examples of roles in a project team	**Processes of identification** Group identification	Shaping identity through identification
Techie Labs	Feeling part of the group	**Processes of identification** Group identification	Shaping identity through identification
Techie Labs	I am part of this project	**Processes of identification** Group identification	Shaping identity through identification
Techie Labs	Using "us" as a form of self-identification in conversations	**Processes of identification** Group identification	Shaping identity through identification

BfL	Defining work as "we do"	**Processes of identification** Group identification	Shaping identity through identification
BfL	Feeling the importance of working for BfL	**Processes of identification** Organizational identification	Shaping identity through identification
Techie	Referring to the labs as a unitary group	**Processes of identification** Organizational identification	Shaping identity through identification
Techie Labs	Comparing interactions in the labs with the larger organizational context	**Processes of identification** Organizational identification	Shaping identity through identification
Techie Labs	I'm a researcher and I do this type of job	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	Being a researcher is something special	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	Identity defined as related to work practices	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	Identity not as a researcher	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	What it means to be a researcher	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	What research entails and how it should be done	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	Stereotype of computer scientist	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	Feeling the need to temporally frame the job experience	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity

Techie Labs	Process of learning work practices within the company	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	Characteristics of work practices	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
BfL	Being a researcher as something special	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
BfL	Identification as a researcher	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
BfL	Identification with a department and boss	**Processes of identification** Group identification	Discursive arrangements attributing meaning to researcher's identity
BfL	Identity definition not as a researcher and its consequences	**Meaningfulness of being a researcher** Being a researcher	Discursive arrangements attributing meaning to researcher's identity
BfL	Importance of a continuous learning	**Meaningfulness of being a researcher** Qualities	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	It's crucial to be up to date and learn new things	**Meaningfulness of being a researcher** Qualities	Discursive arrangements attributing meaning to researcher's identity
Techie Labs	What makes a good researcher in the labs	**Meaningfulness of being a researcher** Qualities	Discursive arrangements attributing meaning to researcher's identity
BfL	Qualities of a good researcher	**Meaningfulness of being a researcher** Qualities	Discursive arrangements attributing meaning to researcher's identity

Techie Labs	Strategies for surviving the workplace	**Meaningfulness of being a researcher** Qualities	Discursive arrangements attributing meaning to researcher's identity
Techie	"Playing" at work	**Playfulness** Attributing playfulness to innovation practices	Discursive arrangements attributing meaning to doing innovation
Techie	Enjoying work	**Enjoyment** Enjoying innovation research	Discursive arrangements attributing meaning to doing innovation
Techie	Being motivated towards work	**Enjoyment** Passion towards innovation research	Discursive arrangements attributing meaning to doing innovation
BfL	What motivates me to work	**Enjoyment** Passion towards innovation research	Discursive arrangements attributing meaning to doing innovation
BfL	Passion is the key drive in daily work	**Enjoyment** Passion towards innovation research	Discursive arrangements attributing meaning to doing innovation
Techie	Collaboration is central	**Positive counterparts of innovation** Collaborating	Innovation practices
Techie	Process of formation of a team for a project	**Positive counterparts of innovation** Collaborating	Innovation practices
Techie	Organizing into project groups	**Positive counterparts of innovation** Collaborating	Innovation practices
Techie	Sharing knowledge	**Positive counterparts of innovation** Collaborating	Innovation practices
Techie	Networking as a strategy to enter projects or change division	**Positive counterparts of innovation** Collaborating	Innovation practices
Techie	Creating connections among various institutions, also external	**Positive counterparts of innovation** Collaborating	Innovation practices
Techie	Rivalry is an exception in the labs! We collaborate	**Positive counterparts of innovation** Collaborating	Innovation practices
BfL	Importance of researchers relationships in defining work practices and shaping	**Positive counterparts of innovation** Collaborating	Innovation practices

	technology		
BfL	Collaborating among different knowledge holders in the organization in order to beat external competition (Keeping up with external competition)	**Positive counterparts of innovation** Collaborating	Innovation practices
Techie	Communicating among researchers	**Positive counterparts of innovation** Communicating	Innovation practices
BfL	Workload division and importance of communication	**Positive counterparts of innovation** Communicating	Innovation practices
BfL	Workload division and importance of communication	**Positive counterparts of innovation** Communicating	Innovation practices
Techie	Interacting face to face is central in innovation	**Positive counterparts of innovation** Communicating	Innovation practices
Techie	Interacting face to face is central in innovation	**Positive counterparts of innovation** Communicating	Innovation practices
Techie	Communicating as a strategy to take ideas further	**Positive counterparts of innovation** Sharing ideas	Innovation practices
Techie	Debating as a way to improve ideas and foster innovation	**Positive counterparts of innovation** Sharing ideas	Innovation practices
BfL	Sharing ideas and practices has consequences on shaping innovation	**Positive counterparts of innovation** Sharing ideas	Innovation practices
Techie	Differentiating among types of interactions and work practices	**Positive counterparts of innovation** Differentiating	Innovation practices
Techie	Ideas emerging through talking with others	**Positive counterparts of innovation** Sharing ideas	Innovation practices
Techie	Trust	**Positive counterparts of innovation** Trusting members	Innovation practices
Techie	Trust among researchers	**Positive counterparts of innovation** Trusting members	Innovation practices
Techie	Trust as an organizational value	**Positive counterparts of innovation** Trusting members	Innovation practices
BfL	Implications of interactions among researchers	**Negative counterparts of innovation** Lacking collaboration	Innovation practices
BfL	Spatial allocation shaping relationships among researchers	**Negative counterparts of innovation** Lacking coordination	Innovation practices
BfL	Not cooperating within the laboratories	**Negative counterparts of innovation** Lacking collaboration	Innovation practices
BfL	Expressing issues around publications	**Negative counterparts of innovation** Lacking collaboration	Innovation practices
Techie	Ways and limits of knowing what people do in a large	**Negative counterparts of innovation**	Innovation practices

	organization	Creating disunity	
Techie	Limited knowledge on other projects within the organization	**Negative counterparts of innovation** Creating disunity	Innovation practices
Techie	Differences among labs and business units on work practices	**Negative counterparts of innovation** Creating disunity	Innovation practices
Techie	Division within the labs	**Negative counterparts in innovation** Creating disunity	Innovation practices
Techie	Domain specific knowledge of researchers	**Negative counterparts of innovation** Creating disunity	Innovation practices
Techie	Separation between labs and bu	**Negative counterparts of innovation** Creating disunity	Innovation practices
BfL	Separation among labs	**Negative counterparts of innovation** Creating disunity	Innovation practices
Techie	Relationship between labs and business units	**Negative counterparts of innovation** Creating disunity	Innovation practices
Techie	It's important to keep things for yourself	**Negative counterparts of innovation** Knowledge seclusion	Innovation practices
Techie	Strategies for survival implicate establishing competition	**Negative counterparts of innovation** Creating competition within	Innovation practices
Techie	Rivalry among researchers	**Negative counterparts of innovation** Creating competition within	Innovation practices
Techie	Innovation perceived as a characteristic of the organization	**Sayings defining innovation processes** Defining innovation	Innovation process
Techie	Importance of diversity in the innovation process	**Sayings defining innovation processes** Requirements for innovating	Innovation process
Techie	Innovation as coming from inner resources	**Sayings defining innovation processes** Requirements for innovating	Innovation process
Techie	Organizational tools enabling taking ideas further	**Sayings defining innovation processes** Requirements for innovating	Innovation process
Techie	Organizing space for innovation purposes and situations in which it does not work	**Sayings defining innovation processes** Requirements for innovating	Innovation process
BfL	You need to have lots of patience (Impact of innovation on the researcher)	**Sayings defining innovation processes** Requirements for innovating	Innovation process
Techie	Tools for innovation set by the organization	**Sayings defining innovation processes** Requirements for innovating	Innovation process
Techie	Unstructured environment as fostering innovation	**Sayings defining innovation processes** Requirements for innovating	Innovation process
Techie	Definition of innovation and its change over time according to corporate strategy	**Sayings defining innovation processes** Innovation as a process evolving over time	Innovation process

Techie	Describing the evolvement of an idea into a product	**Sayings defining innovation processes** Innovation as a process evolving over time	Innovation process
Techie	Innovation is when you make an invention a product itself, and there are several steps and requirements to reach it	**Sayings defining innovation processes** Innovation as a process involving different steps	Innovation process
Techie	Emergence of ideas	**Invention** Process of creation	Innovation process
Techie	Describing innovation as a process of selecting ideas and throwing bad ones away	**Invention** Process of creation	Innovation process
Techie	Looking at external work to spark internal innovation	**Invention** Process of creation	Innovation process
Techie	Considerations of different angles for developing an idea	**Invention** Process of creation	Innovation process
Techie	Ways of emergence of ideas and tools for innovation through interactions	**Invention** Process of creation	Innovation process
BfL	Rise of innovative ideas	**Invention** Process of creation	Innovation process
Techie	Importance of having a champion that takes ideas further	**Invention** Establishing leadership	Innovation process
Techie	Importance of interactions in ideas sharing for finding solutions	**Invention** Communicating	Innovation process
Techie	Taking ideas further	**Innovation development** Evolvement of ideas	Innovation process
Techie	Idea evolvement and requirements for its success	**Invention** Evolvement of ideas	Innovation process
Techie	Example of project evolvement	**Innovation development** Evolvement of ideas	Innovation process
BfL	Success of an idea	**Innovation development** Evolvement of ideas	Innovation process
Techie	There are different roles between researchers and managers in innovation process	**Innovation development** Differential roles within innovation process	Innovation process
Techie	Unpredictability of innovation and research	**Innovation development** Uncertainty of process	Innovation process
Techie	Elements concurring in the choice of a project or research direction	**Innovation development** Choosing among alternative paths	Innovation process
Techie	We have many ideas, but only few become a project	**Innovation development** Choosing among alternative paths	Innovation process
Techie	You need to think about implications for the business	**Innovation development** Choosing among alternative paths	Innovation process
BfL	Reasons for failure of an idea	**Innovation implementation** Dead end of innovation process	Innovation process
Techie	When ideas are not successful	**Innovation implementation** Dead end of innovation process	Innovation process
Techie	When projects are interrupted	**Innovation implementation** Dead end of innovation process	Innovation process

Techie	I have been involved with this technology for many years	**Discourses on materiality** Describing materiality as external	Engagement of artefacts, researchers, and work practices
Techie	How to integrate other technologies with my system?	**Discourses on materiality** Describing materiality in terms of ownership of it	Engagement of artefacts, researchers, and work practices
Techie	How can I make this system run without crashing?	**Discourses on materiality** Describing work practices in terms of material artefacts	Engagement of artefacts, researchers, and work practices
BfL	These cells have certain characteristics; you cannot stress animals too much	**Discourses on materiality** Defining material artefacts	Engagement of artefacts, researchers, and work practices
BfL	The project is a common product	**Discourses on materiality** Defining project as a unitary object	Engagement of artefacts, researchers, and work practices
Techie	Drawing on a white board the lower level architecture	**Use and effects of material artefacts** Using artefacts to express ideas	Engagement of artefacts, researchers, and work practices
BfL	We clean the common hood, we get the delivery: but that material is theirs!	**Use and effects of material artefacts** Artefacts as critical elements in researchers relationships	Engagement of artefacts, researchers, and work practices
BfL	We share many instrumentations, we need to be coordinated	**Use and effects of material artefacts** Impact of material artefacts on work practices and researchers relationships	Engagement of artefacts, researchers, and work practices
BfL	I could not use certain substances while pregnant	**Use and effects of material artefacts** Impact of materiality on the researcher	Engagement of artefacts, researchers, and work practices
BfL	It's not always easy to do this work	**Use and effects of material artefacts** Ethical and emotional issues of the relationship with material objects	Engagement of artefacts, researchers, and work practices
BfL	This drug was useful for one symptom, but also created other positive effects on the patient, so we had to think on how to combine the two things	**Use and effects of material artefacts** Intertwining of ultimate target patient, artefacts and researchers	Engagement of artefacts, researchers, and work practices
BfL	In that laboratory you sometimes feel like escaping, so work hard, or you go in the cells lab where there is no one	**Use and effects of material artefacts** Use of physical spaces for identity appropriation	Engagement of artefacts, researchers, and work practices
BfL	Sometimes a technical instrument doesn't work and it creates false results	**Use and effects of material artefacts** Role of material artefacts in shaping innovation	Engagement of artefacts, researchers, and work practices
BfL	Sometimes you don't have the technology to do it	**Use and effects of material artefacts** Role of technology in shaping innovation	Engagement of artefacts, researchers, and work practices

BfL	There are experiments for which you can also not plan; some others you need lots of time and planning	**Use and effects of material artefacts** Material artefacts and their impact on innovation process	Engagement of artefacts, researchers, and work practices
BfL	Technologies have changed significantly over the years	**Use and effects of material artefacts** Impact of technological changes on daily practices	Engagement of artefacts, researchers, and work practices
Techie	We do engineering work	**Manifestations of organizational culture** Being an engineering company	Organizational culture
Techie	Centrality of employees in organizational culture	**Manifestations of organizational culture** Centrality of employees	Organizational culture
Techie	Being customer and employee centric (Company's objectives)	**Manifestations of organizational culture** Centrality of employees	Organizational culture
Techie	We have an open door policy; it is a very informal environment	**Manifestations of organizational culture** Informality and openness	Organizational culture
Techie	My boss expects the email to be written in a certain way; some other managers are very flexible and tend to engender team culture	**Managers roles in fostering organizational culture** Influence of managerial attitude on work culture	Organizational culture
Techie	It's in the policy that you shouldn't	**Organizational control** Norms of the organization	Organizational culture
Techie	There is a way things should be done here	**Organizational control** Norms of the organization	Organizational culture
Techie	Meanings of working for profit on daily practices and research	**Effects of the organization on research** Working for a for-profit	Organizational culture
Techie	As a researcher you cannot disregard the corporation	**Effects of the organization on research** Pursuing organizational objectives	Organizational culture
BfL	We depend on external funding	**Effects of the organization on research** Implication of working for a non-profit organization	Organizational culture
BfL	Describing economic difficulties as a key issue	**Effects of the organization on research** Lack of resources	Organizational culture
Techie	There has been absolutely a shift, he's more business oriented, also for Techie research	**Effects of organizational changes on research directions** Impact of the change of director on the labs	Organizational culture
Techie	As Techie Labs, we are just surviving now, but we cannot use this survival mode for much longer	**Organizational change** Changes over time	Organizational culture
Techie	Things have changed over time in the organization (Organizational structure and its change over time)	**Organizational change** Changes over time	Organizational culture
Techie	Everything became more settled, serious; we were fun	**Organizational change** Impact of organizational	Organizational culture

	before that	change on working experience	
Techie	It is career for quite a lot, but it's also the opportunity to do what you want	**Flexibility** Perceiving flexibility as a rewarding tool	Organizational culture
Techie	Flexibility in daily practices	**Flexibility** Flexibility as an aspect of organizational culture	Organizational culture
Techie	Flexibility of management	**Flexibility** Flexibility as an aspect of organizational culture	Organizational culture
Techie	Freedom of not being told what to do	**Flexibility** Flexibility as an aspect of organizational culture	Organizational culture
Techie	Freedom to work on what you want	**Flexibility** Flexibility as an aspect of organizational culture	Organizational culture
Techie	Managerial flexibility in allowing people to decide which project they want to join	**Flexibility** Flexibility as an aspect of organizational culture	Organizational culture
BfL	Obviously I had to learn how to behave, and some practices around work	**Norms and their effects** Existence of tacit rules and their impact on daily practices	Organizational culture
Techie	Women don't enter the profession of IT very much. It starts in early stages at school (Gender divide)	**Effects of gendered environment** Difficulties of having women in research positions	Experiences of gendered environments
Techie	Sometimes it's hard to have your voice heard, as a woman in IT (Working in a male dominated environment)	**Effects of gendered environment** Difficulties in group acceptance and effects on own performance	Experiences of gendered environments
BfL	I would prefer a more mixed environment	**Effects of gendered environment** Impact of gender dominated environment on workplace satisfaction	Experiences of gendered environments
BfL	Maternity leave meant a loss in number of researchers for the lab	**Effects of gendered environment** Impact of gender-related aspects on research	Experiences of gendered environments
BfL	Women are more precise, and they also accept low-paid and unstable jobs	**Creating gender differences** Sayings on gender differences at work	Sayings on creation of gender differences
BfL	Having family or children collides with this work; being pregnant is a disadvantage	**Creating gender differences** Gender disadvantages at work and impact on career prospects	Sayings on creation of gender differences
Techie	We have time for blue-sky research, but it's hard to conciliate its time and time for on-going research	**Managing time in organizational life** Time for blue-sky research and reality of work life	Managing time
Techie	I work all the time: no weekends, no evenings	**Managing time across organizational and private life** Time for work and time for family	Managing time
Techie	I find it hard to keep things	**Managing time across**	Managing time

	going, conciliate family and work	**organizational and private life** Struggling in managing family and work	
BfL	It's hard to balance work and private life	**Managing time across organizational and private life** Time for work and time for family	Managing time

APPENDIX H

Tables of second order themes and supporting evidence

Aggregate dimension: Hierarchies and organizational/managerial power

Second order themes and first order codes	Supporting evidence
Impact of hierarchies A. Feeling the hierarchical structure B. Static career	A. "I don't go around…people here have enough to do themselves. And for development purposes..it is not what a full grown researcher should be doing.[…] so I don't go to Warren to ask him to do some of my programming for that. I think it would be somewhat rude to do that " (Tony, Techie) B. "If you want to get promotion, I've never known how to do it" (Olivia, Techie)
Impact of managers A. Establishing meaningful relationships with managers B. Discourse on how to establish relationships with managers C. Requirements for progressing D. Managers influence on researchers practices and research directions E. Roles in research development F. Discourses on work practices	A. "Always the key word is respect. Do not ignore their superiority." (Simon, BfL) B. "The best thing with managers is to go there with clear ideas. For example, if they ask you: how did you do the experiment? You need to have clear what you have done." (Sandra, BfL) C. "Everyone has their ways of living things. I never accepted conformity behaviours, not sure it's the right word, and I never managed to do them. Hence, probably you need to demonstrate you are worth something, with tools that I am not able to use. (Natalie, BfL) D. In my opinion if there is something unclear, you need to tell them [managers]. Then obviously final decisions are justly in their hands" (William, BfL) E. "For example, Paul [Director] would rather, without going too much into the details of the technology, look at program analysis in a classic sense, which is using theoretical computer science. And the conclusion is that it would be an extremely long project…" (Ralph, Techie) F. "The management expects to see practical results. So if they don't see someone producing either tools, demonstrations, papers, something visible, then of course this is a concern. Management expects people to be productive and to engage as much as possible. They don't like to see people working by themselves, in areas irrelevant to the Labs. There is an encouragement to focus on impact, and to work together." (Rupert, Techie)
Career paths and progression A. Limitations in career advancement B. Involving different steps C. Qualities D. Job distinctions E. Monitoring performance F. Process of entering the company and career prospects G. Turnover	A. "I have no idea. You don't change grade very often, there is no career advancement in techie." (William, Techie) B. "I have been with Techie for 24 years, haven't been in Labs all the time. I have joined Techie Labs in […] I expected to have that job for two years, how wrong was I […]."(Ralph, Techie) C. If a person is bold and not humble, I think she will never find peace here. In the sense that she is going to be catalogued in the wrong way. From my experience, I have not lived on my skin, but what I see every day, that every day, you see, the person who wants to stand out …well, you have no option. So, either you adapt to it and you say: ok, I do my work, whatever comes comes, otherwise if you enforce yourself on others in my opinion you are likely to be side-lined, well not really put aside, but you hit against a rubber wall all the time. Sometimes it so happens, you'll impose yourself, you say: no, this is not what I see, but in the end you do not have a voice. And indeed, in danger of being put in a bad light." (Penelope, BfL) D. "I am an intern, right. I am here because no one wanted to do it. I suspect that. When I arrived here I didn't know what a mini OS was […] Someone It's a lot of time to be interested in a platform, they are more interested in pure research as ***." (David, Techie) E. "There may be times when patenting things is a good thing, or situations when scientific implementations are more important,

	or when direct transfer of technology to division is important. Apart from this there are still other criteria […].” (George, Techie) F. “The way of a graduate researcher is very long. Firt you do the thesis here, after the thesis you enrol in the Regional School, and then a period abroad. And eventually they will prospect to you a possibility of being hired, as you know, it is very long.” (Karen, BfL) G. “In my opinion is really hard [to remain here], because it is a place where people come and go, very few remain here. I knew this beforehand; people who worked here told me so: there is much professional development but at a certain point very few people stay here.” (Sandra, BfL)

Aggregate dimension: Shaping identity through identification

Second order themes and first order codes	Supporting evidence
Process of identification A. Group identification B. Organizational identification	A. “He is not part of our group. He is working for Nathan” (David, Techie) “We have various types of renal cells, that we study in relation to some mediators that we believe are very important for renal diseases.” (Martha, BfL) B. “I was obsessed with BfL [..] This is an excellent Italian research institute. (Giusy, BfL) “We need people with ideas, and energy. There is no questioning of that. And when we say ideas, we sometimes forget to day, we mean ideas and understanding. We are a computer research lab, and one of the biggest computers companies in the world, there are only two or three. We can afford to hire highly intelligent people […].” (Humphrey, Techie)

Aggregate dimension: Discursive arrangements attributing meaning to researcher’s identity

Second order themes and first order codes	Supporting evidence
Meaningfulness of being a researcher A. Being a researcher B. Qualities	A. “Most of the people working here, because we are all scientists, we like technology, we like problems, we have a natural sensitivity to technical problems, to further understand a technical problem, and we naturally like those problems, and think about them and try to solve them.” (Olivia, Techie) “This job is a mission sometimes. Because you dedicate to it lots of time, not many gratifications economically wise or career related. So making other people understand this, especially for someone who has never been involved with research, even of industrial research, it is very different.” (Gabby, BfL) B. “These people need to be experts of what they do, they a very good sense of, coming up to speed with the domain in a really fast way, and getting the sense of what can be done next. Also, they need to be able to draw analogies between different fields [….]” (Alan, Techie) “It is important not to do always the things you are told, but to go beyond them. Once it happened to me that I was doing some experiments and I saw a parameter that had nothing to do. I said it and from there another project started on that observation that had nothing to do with the scope and the reasons of the initial project. This is typical in research. Nonetheless, there are people that seeing this secondary effect, they don’t do anything. You need to be curious, not someone who always fears, you need to be open to novelty.” (Martha, BfL)

Aggregate dimension: Discursive arrangements attributing meaning to doing innovation

Playfulness A. Attributing playfulness to innovation practices	A. "For example, when they were playing around the FVM and Gauss […]" (Trevor, Techies)
Enjoyment A. Enjoying innovation research B. Passion towards innovation research	A. "People usually like to be involved in these kind of things, from the point of view of the organizer of the innovation workshop […]" (Alan, Techie) B. "The only reason why I stay in this job is because I am in love with my job. It teases me, I enjoy looking at things, compare them, understanding. So you are in an environment where if you have an idea you can actually implement it." (Gabby, BfL)

Aggregate dimension: Innovation practices

Second order themes and first order codes	Supporting evidence
Positive counterparts of innovation A. Collaborating B. Communicating C. Sharing ideas D. Differentiating E. Trusting members	A. "Nowadays it is hard to do a project on your own. Maybe you can have an idea, you can publish or patent, but when it is time to concretize the idea, that is what we have to do, usually different people are necessary: people that implement, that communicate, that writes reports, there are different roles. So if someone is good and able to engage other colleagues, raise interest and gain support, this is fundamental for having a stronger impact. If you are alone the impact is the impact of just one individual. […]." (Howard, Techie) B. "It is very important to manager properly a team. You manage it by assigning a project, by separating projects to different people, so that not to overlap one and the other. Otherwise if someone feels robbed of his project, competition starts." (Jessica, BfL) C. "I think it is very important to get validation of your ideas. […] there might me some flaws on what you are doing, you just won't know it. The more widely you can share your ideas, the better. Empirically it is very important" (Julia, Techie) D. "It depends really on what you are working on here. There are people who tend to work in isolation, or they don't want to see people. There are people that work collectively on an occasional basis. And other people that work on demonstrators, that work very well together […]" (Ralph, Techie) E. "I don't think by thinking, I think by talking. A lot of the times when you are talking ideas are rubbish. Most of the time they are rubbish. It took me a while to get to the point where I didn't care if other people thought I had a bad idea, if every so often there would be a really good idea. You talk and 9 out of 10 is rubbish. 1 out of 10 is great. […] Olivia has been one of these victims. There have been a number of them over the years. You become really good friends because you share everything. You give them all the ammunitions to sort out your idea, they trust you, and all the conversations remain secret between you two, they don't use the ammunitions against you." (William, Techie)
Negative counterparts of innovation A. Lacking collaboration B. Creating disunity C. Creating competition within D. Knowledge seclusion	A. "So there is this knife fight, a fight that does not allow collaboration, a common objective, working altogether. The concept of unifying so we get all to the same objective doesn't exist here. This on the contrary should be the base of this type of job, globally, and specifically within the same laboratory." (Grace, BfL) B. "There are different ways of working. There are different ways also in doing the same experiment. There are people that follow the protocol precisely, and they don't distance from it. Other people maybe skip some steps, they change steps, and they try to do something different. There are different ways of doing things. In the same laboratory you tend to hand down the same protocol." (Fanny, BfL)

	C. "The environment that we have here is a very competitive environment. The company makes us all competing against one another. It is difficult to have friends in this company because you are forced to compete against one another." (Hugh, Techie) D. "There is a lot of competitiveness in the labs, this is dominant, there is lots of competitiveness. Between researchers between research groups. People want to show they are doing good work, they want to produce more outcome […]" (Rupert, Techie)

Aggregate dimension: Innovation process

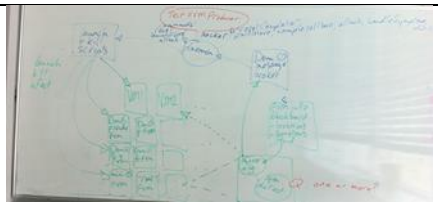
Second order themes and first order codes	Supporting evidence
Sayings defining innovation processes A. Defining innovation B. Requirements for innovating C. Innovation as a process evolving over time D. Innovation as a process involving different steps	A. "No company can operate in vacuum. You have to interact with the wider community, to be known in that community; otherwise you cannot be recognized as a player, you can't close in in yourself. Techie engages in open innovation, the module at Techie is always to engage with external partners, and both feed to them and bring back from them ideas, research, useful methods. And at the end of the day, because this is a company, you always try to bring in value in the company." (Rupert, Techie) B. "Also, you need lots of patience. Especially on studies that we are doing now, results come after a long time or as I heard, there have been many studies that did not lead to any result. Not getting discouraged after the first difficulty is very important. Immediately leaving a project is useless." (William, BfL) C. "That could be the outcome if we can make this work. What we do with these things because they are quite theoretical, we run a trial and we discover interesting things, things going on that we would have not discovered if they did not have what we have got. That would be the most exciting outcome. And after that we persuade one of the business in Techie to turn that into something that we sell to customers. Because again, in engineering a very good test of whether you have done a good work is whether people are willing to pay money for." (Humphrey, Techie) D. "There are different ways. One is to create awareness […] sharing ideas, strengthening ideas by getting feedback. Another is to publish, such as technical reports. Usually this is very useful if one has clear ideas and is very important to concretize them by writing down concepts, technologies, or approaches, technical reports, because they help to crystallize. If the idea is really innovative, then from that you can get patents. This creates more strength. Another approach is to create prototypes […]" (Howard, Techie)
Invention A. Process of creation B. Establishing leadership C. Communicating	A. "You can also try to be a genius. It is possible. It happened that a small team came up with some foundational innovation, we had a technical applicability after a couple of years, but this was something where people have been scratching their heads for some time." (George, Techie) B. "What I have observed is that the ideas that make it further are ideas that have a champion. You need to have someone who stays with them. We have more ideas than what we know what to do with them. And we have more ideas than people to develop them. so the ideas that make it further that first obstacle, the ones that make it through the next stage, and that can be continued invested further, are the ones that someone can make a stand for it. Yes I really believe in this, I really believe I can make some time for this and take it further […] And specifically at the beginning phases of a project what happens is usually a negotiation phase: what should we do? And it is not just a push mechanism […]" (Alan, Techie)

	C. "Don't sit on your own. If you cannot do something go and talk to someone […] it is good to be sociable in general, it is not good to..get involved. […] often you don't find out about things that are happening unless you talk with people." (John, Techie)
Innovation development A. Evolvement of ideas B. Differential roles within innovation process C. Uncertainty of process D. Choosing among alternative paths	A. "One of the innovations we developed here is the technique of identification of podocytes. It was described in the literature, it existed, but it was based on a different method than the one we developed. I carried out the development. I looked into the literature on what they were using. There was at the time a technician working here, a girl that did the experiments." (Valery, BfL) B. "You can talk to them [managers] all the time; they are part of the process of discussing. If you want to bounce ideas, Paul is one of the best people to do it […] I never had a formal meeting where I had to propose something, they already know what I am doing […] I know what is important to them [managers] because they say that. We don't develop products in this place, we develop opportunities. Lauren [manager] said that their job was to give her positive dilemmas. We would go to her and say: there is another product we could put out there in the future to solve customer's headaches. And that would mean that she could choose this new idea or she could choose some other. We put her in the position to make a decision, this is the positive dilemma. The downside is that when she makes the decision, she doesn't need to take yours. So you present the idea and the company can say: thank you, no. " (William, Techie) C. "If you have got a well know idea that is fully understood, it is just the case of project planning. So this can be achieve, if you want to write a web application, using fairly standard technology, anyone can do it, with the right skills. But can we do with the constraints of time? And other aspects. But at least you know the problem base. With something like "defending the cloud project" we don't even know if we can do it. Having discovered that we can do that, do we have enough time to do it? I think I identified a way to detect Gauss on a fvm. Ok, how long is it going to take to write the code? Oh, 18 months. Clearly: yes, I can do it. But the other constraint is unacceptable because you are constrained by time." (Trevor, Techie) D. "We had some ideas about the futural web page communications and there was a business in Techie that was quite interested in the idea, but they were desperately needing to bring the feature soon into the market […] we actually implemented the feature because it gave us the common ground for things we were actually interested in, which had a more future looking. […] unfortunately we sold the business to the competitor. We spent a year doing engineering and then had no opportunities […] The risk is always there, your partners might pull out. It is always risky" (John, Techie)

Innovation implementation A. Dead end of innovation process	A. "It did not go further maybe because the uidea at the beginning was wrong. So after the first experiments, you realize that they are going in the opposite direction. So either you decide to go in the same direction of the experiments, or if you are not interested because you had to demonstrate something, you leave it. It happens, sometimes not very often, to have to abandon a stream of research either because results are not the ones expected, so if you want to work on a molecule, but the molecule is not part of that process, then you leave it, you do something else. Or maybe you do not have the methods to do it and you cannot find someone else who can help you to do it methodologically. It happens to lack instruments or molecules, so you have to give up, leave it aside. Anyway you carry on work for a long time, and it is frustrating to carry it on for long. You want to have a result, whether negative or positive, but you need one" (Rafaela, BfL)

Aggregate dimension: Engagement of artefacts, researchers, and work practices

Second order themes and first order codes	Supporting evidence
Discourses on materiality A. Describing materiality as external B. Describing materiality in terms of ownership of it C. Describing work practices in terms of material artefacts D. Defining material artefacts E. Defining project as a unitary object	A. "I have been here for 18 years now, always working for Techie. […] For the last 10 years I have been involved with a technology called Trusted Computing, and this technology tries to deal with reassurances, behavioural, of technical artefacts." (George, Techie) B. "What I did was to build a framework which effectively said: look, it has to do all these kinds of things. First thing is: how could I run something that was standard in volatility, see if it could be run from my code and not from somebody elses'. What you had to do is all these forensics investigators would try to go on command line and get the hyper text and put into a file. Wait a second, how do I do that in a programmatic way? Fortunately everything for that plug-ins was in python, so that meant that I could simply take my code, knowing the protocol they were using without having the source code and I could then plug in my pieces using my framework." (Warren, Techie) C. "They [colleagues in the project team] have a more broad set of questions to answer. Me, I have horrible machine bits. It's not less trivial; it's just a different type of problem. It's like: I have these problems, how do I get them out of the way? They have more questions like: oh if I search for this, would I have false positives? Is this going to detect malware? For me is: how can I make it run without crushing?" (David, Techie) D. "It happens but not often that we take to them some data, some pieces of animals that need to be analysed. We take them in different laboratories and then, when they have time, they analyse them." (William, BfL) E. "It's not so spread [competition], because we happen to work together all for the institute. So we have all a common goal, so that the institute has more external acknowledgements, being a non-for-profit, and not a public one, we need to work hard in every sense. We have a common objective, so competition is not so wide spread as it would be in other places, as in a multinational company, where the need is the individual need. We need to work, we need to think of all of us, it's different. But you always find people that for emerging they don't care much about the other person […]" (Giusy, BfL)

Use and effects of material artefacts A. Using artefacts to express ideas B. Artefacts as critical elements in researchers relationships C. Impact of material artefacts on work practices and researchers relationships D. Impact of materiality on the researcher E. Ethical and emotional issues of the relationship with material objects F. Intertwining of ultimate target patient, artefacts and researchers G. Use of physical spaces for identity appropriation H. Role of material artefacts in shaping innovation I. Role of technology in shaping innovation J. Material artefacts and their impact on innovation process K. Impact of technological changes on daily practices	A.  (Lower level architecture, drawn on a white board during a technical meeting at Techie) B. "Other rules are of coexistence that become always tougher. There is a waste liquid under the hood to be thrown away? But why do I always need to do it? I cannot ask to other people, so the issue is mine. Because if I ask they reply: well, yes, it should be done. But no one does it. This trash can is overloaded? Soon or later someone has to do it, and I do it because I hate mess." (Brian, BfL) C. "The problem is that working with animals is not easy. It is hard to find workers; it's a horrible thing in this laboratory. […] Because animal work is the most sacrificing. Because not many are keen to, because for some aspects it is very routinized, you get bored easily, you get bored to stay downstairs [in the animal labs, which is underground with no windows] for hours, it is not easy. […] Working with animals is not something you learn in a day. You need lots and lots of experience, because the animal is never the same, each reacts differently, so before you reach a certain experience to say: let's do this instead of that, it takes time." (Karen, BfL) D. "They also that that, because I could not use radioactive substances, until I was breast feeding, I was told to interrupt breast feeding and start the artificial feeding, in order to start again working with radioactivity." (Laura, BfL) E. "There was also the impact of working with animals that was a new thing for me. I've never worked with rats or mice, so at first it was a moment like that, but after the first week you get used to it quite easily. Then I was amazed because the girls who work with mice, you know, usually they are pretty picky, in fact it is only a first period of habit, after […]" (William, BfL) F. "The thing is, the medicines I discussed earlier are against hypertension, they contrast the effect of angiotensin. So the idea of seeing if these drugs that are anti-hypertension and are commonly used in clinic practice can be also used for patients with progressive diseases." (Valery, BfL) G. "So you prefer, since you have stuff to do, to keep yourself busy, go in the cell labs so you don't see anyone, because sometimes you feel like escaping." (Brian, BfL) H. "For example, we have different groups of animals. It happened that two of them were totally busted in comparison with the trend of the project. So they have been left aside, taken out of the project. Others were slightly differing from the trend and we took them until the end to see if over the course of further experiments they would fix themselves or would keep a reasonable line. You tend to try to go forward if they are busted of the order of a few values, if they are too busted, fortunately few cases, you leave them. Otherwise, at the first difficulty you should erase everything and is also an economic cost. Because the animals that I'm studying now were initially 60 rats and were quite expensive." (William, BfL) I. "I finally found a person in the organization, a man, who gave me the tools, some software without which I could have not done anything." (Laura, BfL) J. "it happened to have an idea: I did the experiment immediately because these were experiments you could not plan for, you do them at the spot if you have the machine free, so they are apt to that. Maybe with cells you cannot do this because it takes you a week." (Sandra, BfL) K. "Many things have changed, as well as equipment that are

	completely different, the development has been very great, but above all has changed … for example the difficulty in doing the work. I remember my first job I typed using a typewriter. Clearly if something went wrong you had to do it all over again, it is not that you could redo it a thousand times. When making statistics there was only one computer for 50 people, so all of that. The time now is clearly very different as the literature search was not on the internet, you went to see, skim through the work that came out. It was all different. Perhaps communications were slower, maybe there was more time to assimilate, there was more time to try to figure things out and organize; now things have become more chaotic." (Rafaela, BfL)

Aggregate dimension: Organizational culture

Second order themes and first order codes	Supporting evidence
Manifestations of organizational culture A. Informality and openness B. Centrality of employees C. Being an engineering company	A. "Within the labs, and this is very fundamental for the labs, there is a very open atmosphere. People regularly meet on an individual basis or as small groups, to work on a particularly topic. There is freedom to engage with whoever in the lab you want to produce joint work, and this is particularly encouraged […]" (Rupert, Techie) B.  Extract of Techie official presentation C. "I spend most of my time doing engineering stuff." (David, Techie)
Managers roles in fostering organizational culture A. Influence of managerial attitude on work culture	A. "And that depends on the type of manager. I was once with an ex-military so that would much more..if you wanted a request, my boss would expect the email to start with: "Dear Mike, I respectfully request…" […] and that depends on the background they come from. If your manager is a strong personality, you tend to act like that. Paul has a strong personality, but he is much more flexible" (Ralph, Techie)
Organizational control A. Norms of the organization	A. "You are expected to be self-sufficient, to be able to work a lot on your own, you are expected to criticize other people and not being offended if others criticize you […] if you are giving a presentation to a group here in the Labs, you will go through your presentation and then it's almost like you have been attacked at the end. People ask questions, but are almost a form of attack on your work and on the way you thought. Some of the questions are not very nice. And if you were to accept it personally, you would say: this person is not being nice to me. But this is part of the environment […] You have to do it, you are expected to do it, it is almost an essential requirement for someone who works here." (Hugh, Techie)
Effects of the organization on research A. Working for a for-profit B. Implication of working for a non-profit organization C. Pursuing organizational objectives D. Lack of resources E. Impact of the change of director on the labs	A. For me it becomes exciting if we make a difference, if something new can be done, and people end up using us. The deal with Techie is that they give me the salary. So the deal with Techie, and Techie Labs, is to do something and transform it into a product or service that Techie can sell for money." (Humphrey, Techie) B. "Something much felt here that I need to learn is, well even at university you do research, but it is different. Whereas the university depends on the State funding, here it is a mixture between company and university, because it is a non-profit, it's

	an institute, there are no logs of product, but still we need to have a sort of productivity as I heard people saying: "This yeas I haven't published anything, last year neither, maybe they fire me". This is then not true, but it is what I heard, so obviously this is something evident. It is true that you are not a seller, but it is likewise true that they judge you based on your productivity, so there is not much difference." (Sandra, BfL) C. "I am working in a corporation, some requirements need to be fulfilled, these are the area of importance, so it is better not to ignore it 100% because otherwise you find yourself without a job if you say I don't care what the corporation is doing […] you have this external pressure that allows you to focus on more general goals, or more ambitious goals and helps you to achieve this and this is a competitive advantage of such a place. Therefore this is instilled by the context; part of the role of the management here is to make people understand this you contribute into a story that is then sold by the organization." (George, Techie) D. "The negative thing…I think others have already told you so, it's the economic aspect, you really struggle. Many times you get demotivated because you work so hard, you work very hard…I am lucky, I have a salary, the majority fo the others have a scholarship, but still salaries are very low. If I worked outside in an analysis lab or in a company, I would earn much more. Then one weights it against this […]." (Karen, BfL) E. Extract from field notes 02/11/2012: "In the morning I read the news of the new labs director announced last night. Over the morning Paul (Techie Labs Director) gathers people in the big conference room to discuss about it. The new director has never been part of the labs, and the corporate aim is, as Paul says, to make a shift in the company. Nominating this person means "good news" for the labs, Paul says, in the sense that they are going to be again an engineering company. In fact, the former director has been promoting more the academic side, by pushing for people to write articles. Now the emphasis is on producing knowledge that is useful for the company to create products that can be sold. The emphasis is on the marketing. So the role of the new director is to see which R&D ideas/work can be transformed into useful marketable products. They say he is more on the business side, and he is sustained by another person, an engineer (interim director), which will give him better insight on the labs work. Then questions arise for Paul. Employee 1: "So are we going to be again an engineering company?" Paul: "Yes". Employee 2: "Does he have an idea of the existence of Techie Labs UK? The director replies that it is too early. The new director is relocating to the headquarters in January and he still needs to get his head around it. Another employee at lunch time tells me that this change was much needed, as the company has drifted away from engineering towards a focus on papers/. He says that if they wanted that they could have easily sold the labs and make it an R&D centre at Stanford or MIT."
Organizational change A. Changes over time B. Impact of organizational change on working experience	A. "Techie is in big fluff. I have no idea of how the next director will look at Labs, he will communicate his ideas within the next 100 days, if his ideas are long term or if we are going to survive for the next few years. But I don't think we can afford to use a survival mode for more. We have been in a survival mode for the last past two years, we shrank quite a bit, we don't expect things growing. […]" (George, Techie) B. "I remember I got more interested in coming into work and to stay long for years because I knew two of my colleagues would just be here. This was before the .com crush. We would just show up to enjoy each other's company, even over the weekend, when we had work we could not do. This has changed. [What has changed?] Well, the crash of technology, everyone has invested in this technology […]" (George,

	Techie)
Flexibility A. Flexibility as an aspect of organizational culture B. Perceiving flexibility as a rewarding tool	A. "You don't have to be at your desk, you can seat at the beany all day if you want. No one actually goes around and check how many line codes or how many papers you have written. Then cake tomorrow..also the working times, no one checks if you are in or not, as long as work is done it is ok […]" (Tony, Techie) B. "It is career for quite a lot [as a reward], but it also the opportunity to do what you want, which for some people is to expand […]" (Humphrey, Techie)
Norms and their effects A. Existence of tacit rules and their impact on daily practices	A. "The discourse around norms here is particularly strong and highly perceived. There aren't. and because there aren't, there is nothing written on the contract, we have nothing, but the rules are the ones that a person feels, that a person authorizes, norms are the ones circulating in the corridor. The problem is that there is nothing written down. It's all oral, like the game of the wireless phone.so the rule is: we need to participate to seminars because it is for your own good; it opens up your mind to listen to other things. And at the end of the other phone the message is: I fire you tomorrow if you don't go to the seminar. In this way obviously you augment exponentially stress and dissatisfaction." (Grace, BfL)

Aggregate dimension: Experiences of gendered environments

Second order themes and first order codes	Supporting evidence
Effects of gendered environment A. Difficulties of having women in research positions B. Difficulties in group acceptance and effects on own performance C. Impact of gender dominated environment on workplace satisfaction D. Impact of gender-related aspects on work practices	A. "I don't think this is a particularly testosterone filled anti-female environment. But for reasons that I don't fully understand girls don't tend to come, girls don't find the kind of these things interesting." (Ralph, Techie). B. "I think this is where there could be a gender issue. It is a male dominated environment here, I think there are like 10% women, or maybe less, and I think it is quite competitive. I don't know if it's because of the American influence, because it is an American company, or whether because it is male dominated, but that seems not to match with me, I don't really like it. It is so competitive and you need to justify yourself as an individual, and the way you get on, when younger people ask me, you need to get into an area of technology, or expertise that identifies you as a person, so that people can come to you and ask about. You need to make yourself known for something and this is the way to progress and get on. […] almost it's a way of putting people too much against each other [...] you collaborate with people that at the same time are your competitors, and they shouldn't be […]" (Julia, Techie) C. "I would much more like a more mixed environment. Because women from a point of view are more terrible, they look at stupid things. A man does not bother much with certain issues. In a work environment it happened to me at work to have a mixed group of women and men and the working environment is much better, because they don't pay much attention to certain things and they belittle problems. Whereas in a women only group, one pays attention to what the other says, if you say a word more than expected…everything is more complicated in this environment. When there are also men, it is much more relaxed." (Karen, BfL) D. "The lab was under defection caused by maternity leave, towards the end of last year. And specifically some people "disappeared", because they changed job or because they are home for maternity leave. Those were the people working in the RESET project, which has been financed by the EC, it started one year ago and there is need for results, so I have been thrown into this projects and I started in January." (Grace, BfL)

Aggregate dimension: Discursive arrangements on creating gender differences

Second order themes and first order codes	Supporting evidence
Creating gender differences A. Discourses on gender differences at work B. Gender disadvantages at work and impact on career prospects	A. "For sure men are messier, at work. Whereas us, women, are more organized and in this job is fundamental. For example if you have to deal with many test tubes and you don't have a mental scheme […] Also because once it happened that I was working with a man here and he didn't know from which test tube he started from, but at the end he is also more open. Because if I distract from my scheme, then I panic. Whereas him, he had his mental scheme and he could find his way around easily." (Debora, BfL) B. "It collides with family. I would have a child when I know I can dedicate some time to him, to be able to see him grow. This does not mena to be with him 24/24, I would take him to nursery. But if you want to reach a certain career level, at the moment this collides with family. Therefore the rest is absent. At the moment I don't think of having a baby, I don't think of getting married, because now I am thinking of this job. I just graduated and I am trying to gain a position." (Claire, BfL)

Aggregate dimension: Managing time

Second order themes and first order codes	Supporting evidence
A. Managing time in organizational life B. Time for blue-sky research and reality of work life C. Time for work and time for family D. Struggling in managing family and work	A. "When I joined there was still much of the blue-sky research, doing anything that you could think of, even outside your main activities there was a 10% time. But this notion of 10% time was difficult, because if you are focused on delivering something of value, you tend to suck all your time and you don'; have, it's difficult, to take a break of a day every two weeks to do something else." (John, Techie) B. "I never distinguished Techie working time and my personal things. From my standpoint of view I am working all the time constantly, no weekend nor evening. If a problem emerges, I tend to work constantly. […] I am still cooking for him, and send kids to school, but don't have much time for things. […] I could do family things in my Techie time, I get a phone call from my son: I missed my school bus…it happens quite often. Also during the weekend and evening I sit and do work. I don't count 9 to 5. If I do something at work. If I count I work more than 8 hours a day." (Olivia, Techie) C. "I have children. It has been very hard; you do lots of travelling, etc... When the children are very small, you have deadlines...you stay up late. It's hard and stressful." (Julia, senior researcher in Techie Labs) D. "It is hard, it is like this everywhere, it is hard to conciliate your private life and work, it is indeed very hard. Especially when you have little children, and then when your children grow up things become slightly better to manage. My mom always told me: you should have taken more care of your children. You always feel this…you divide yourself between work and family, and you have this sense of guilt from one side and from the other. I think it is normal for a woman. But you know…then here it is not a job that you can do part-time, you do not have much free time. In the sense that

	you don’t need to be sharp with your work time, here you don’t have fixed working hours. If you have scheduled your experiment and it lasts more than expected, you stay here. Or if you have deadlines, you stay here longer. At the end you need to conciliate work and family without neglecting either of them. Sometimes you wonder if you had another type of job, which is more manual, for which you stay there and then you end it there. Whereas here you cannot, it means you always have to think. Maybe you are in bed and you happen to think about the experiment: I should do it this way, maybe, or have a meeting for that. It is like this. You don’t leave work when you go home, you take it with you, maybe not physically, in the sense that you don’t bring things to read with you, but honestly you cannot detach yourself from it. What it is hard is to detach completely, to “pull the plug out”. Honestly, I am happy to have done this choice, even if it is not easy. Maybe I have some regrets, because I never had the time to follow properly my kids while growing up…” (Valery, Head of Laboratory in BfL)