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# ”Making Pepper smart somehow”

A qualitative case study on how sensemaking, enactment and boundaries take part in the ongoing construction of Pepper, a humanoid robot

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A qualitative case study on sensemaking, enactment and boundaries take part in the ongoing construction of Pepper, a humanoid robot.

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**Abstract**

This qualitative study addresses the recursive, continuous and iterative nature of sensemaking in organizations, in relation to new technology. By adopting an ANT-inspired approach to our case study, we have collected stories from the field and allowed for the theoretical framework of sensemaking to emerge abductively. Presenting the humanoid Pepper as the focal point of our case study, we display how this technological object enables for the construction (enactment, crossing, moving) of boundaries, which in turn enable and constrain sensemaking. This study presents composite boundaries in relation to the construction of Pepper; boundaries between discontinuous sensemaking, boundaries between social groups within the company as well as boundaries based on relationships of asymmetric information. Concluding remarks illustrate how Pepper is constructed by organizational members, as well as how Pepper plays an important part in the construction of IBM’s context.

Keywords: sensemaking, technology, robot, enactment, constructs, boundaries.

## Introduction

The 21th century is entering a new frontier in the (r)evolution of computing in the form of cognitive systems (Kelly & Hamm, 2013). Cognitive computing is a concept built on the science of artificial intelligence (AI) and signal processing (Dautenhahn, 2007). Such systems enable human beings to create and build machines that are capable of more than finding patterns, calculate and order data; they are able to sense, learn, reason and interact (Kelly & Hamm, 2013). Nevertheless, these are the future aspirations of this technology. The state of the art is a narrow intelligence, where such machines must be supplied with information and are not yet autonomously self-learning (ibid). However, when combined with a robotic shell, cognitive computing enables for more sophisticated robots than ever before. Robotics are currently expanding from traditional use in e.g. manufacturing into diverse fields (Mutlu & Forlizzi, 2008; Aitkenhead & McDonald, 2006; Coradeschi et al., 2006) such as healthcare as medical assistants (Mutlu & Forlizzi, 2008; Lanfranco et al. 2004). Simultaneously, AI has become a buzzword of recent times where firms such as Apple, Amazon, Facebook, Google, and Microsoft are partnering in developing more user-friendly and available standards for this technology (TechCrunch, 2017; Forbes 2017).

Another player in the AI race is IBM and their AI system Watson. Watson is able to read 800 million pages per second and detect patterns normally overlooked by human beings (IBM, 2017a; Forbes, 2016). Thus, cognitive computing enables machines to perform routine tasks that facilitate human professionals. Furthermore, this technology enables for AI robots to interact and socialize in a humanlike manner (IBM, 2017b). This is exactly what IBM is aiming for with their newest addition to cognitive computing. The focal point of this case study is Pepper, a humanoid AI-robot owned by IBM Sweden. Pepper is connected to the Watson AI-system, and functions as a Watson ambassador at the IBM Client Center. The robot is marketed as an autonomous, interactive and intelligent robot able to perceive emotion and adapt behaviour in accordance to the mood of humans around him (IBM, 2017b). Pepper is said to identify basic emotions such as joy and sadness and interact with humans in a natural and intuitive manner (ibid). However, Pepper's cognitive system is currently limited by a narrow AI, meaning that the robot requires programming and script in order to function. Orlikowski and Scott (2008) criticize the fact that not enough research attention has been given to the fusion of technology and work in organizations. When published, the authors stated that 95 percent of management research neglect technology's role in organizational life. The same argument was made by Zamutto et al. (2007) , stating that "[I]t does not make sense to study the dynamics of human behaviour within organizations without taking into account how information technologies might affect it" (p. 760). This problem is further complicated by the fact that technology tends to be forced upon organizations by either top management or controlling institutions (Orlikowski, 1992). The social impact of technology in organizations has since been developed by e.g. Leonardi (2011) and Orlikowski and Scott (2015). The studies in the following section depict the implications of advanced technology in organizations.

Previous research predicts an inevitable change in the business landscape with the substantial increase of robots assisting in real world tasks (e.g. Fong et al, 2003; Hinds, Roberts & Jones, 2004; Lee et al, 2012). This change shifts away from typical imagery of

robots serving as emotionless machines and instead entities that ‘‘can create social and emotional connections with their human partners’’ (Cabibihan, Williams, and Simmons 2014, p. 311). Lee et al. (2012) and Mutlu and Forlizzi (2008) study the introduction of robots in organizational life, focusing on how robots have the ability to influence members to the point where routines and behaviours are altered. Lee et al (2012) demonstrated how a social and humanoid robot affected the working environment, focusing on organizational routine and sensemaking. The authors created the Snackbot, which functioned as a delivery service robot where employees could order snacks via a computer program. The results unveiled ripple effects in the organization, where the robot came to be recognized as a co-worker. The ability to interact and sustain dialogue with employees was an important part of this study. Thus, the authors scripted Snackbot's dialogue in advance in order for it to seem more lifelike. The study showed that employees started interacting and conversing with and about Snackbot, establishing an emotional connection to it. For instance, they felt sympathetic when the robot broke down and could not perform its duty. The study also demonstrated how this new social dynamic proved beneficial for the organization, and identified Snackbot as a boundary object that the participants easily relate to, thus creating an opportunity to socialize in conversation (ibid). Mutlu and Forlizzi (2008) demonstrate similar tendencies in their comparative investigation of the hospital delivery robot that aided nurses during their shifts by for example collecting laundry from hospital units. The authors interviewed two different groups of nurses, one on the postpartum unit, and one on the oncological ward where many patients had terminal diagnosis. The different groups demonstrated contrasting interpretations and reactions to the delivery-bot: the postpartum unit described the robot in a positive manner as they welcomed it into their routines and referred to it as a friend, whereas the oncological unit perceived it as an annoyance, called it stupid and reportedly kicked it. The research conducted by Lee et al (2012) and Mutlu and Forlizzi (2008) focus on sensemaking and structuration, respectively, building on theoretical arguments by Orlikowski (2000), Giddens (1979), Weick (1979; 1995) and Bourdieu (1978). However, the former field study fails to recognize the link between sensemaking and its physical dimension of enactment (Weick, 1979; Orlikowski, 2000). Mutlu and Forlizzi (2008) connect sensemaking of technology to structuration (Giddens, 1979) but neglect the connection to enactment in favour of practices. Moreover, neither Lee et al (2012) nor Mutlu and Forlizzi (2008) acknowledge the full extent of the relationship between human and robot. They acknowledge the social and technological entanglement by recognising that humans are affected by a robots' presence, yet do not consider how the sense made by individuals spreads in the organization, thus contributing to the construction of a non-human object.

Whereas the studies mentioned above incorporate robots into a broader perspective of technology, the following examples depict aspects specifically related to sensemaking of robotics. Researchers within the field of robotics rely heavily on the concept of anthropomorphism in relation to robots (Dautenhahn, 2007; Bartneck et al, 2009; Salem et al., 2013). The term entails applying human characteristics to something non-human, such as technology (ibid). In turn, this affects how humans make sense of technology and act accordingly, thus linking to sensemaking and enactment without being explicit. A related concept in the field of robotics is the Valley of the Uncanny (Mori, 1970), which explains

the important part of aesthetics and movement in relation to how humans make sense of robots. Mori (1970) established a link between sensemaking and robotics before sociology- and management research shifted attention towards the role of technology in organizations (Mori, MacDorman and Karegi, 2012; Szeliski, 2010). Gaining little attention after its initial release, the study has been picked up in more recent times (Dautenhahn, 2007; Parke & Waters, 2008, Szeliski, 2010; Salem et al., 2013). According to Mori (1970), roboticists should not attempt at creating overly life-like robots. The reason for this is that the more life-like a robot is, the more eerie and revolting it is perceived as by humans, which might lead to a loss in affinity. Reeves and Nass (1978) follow this line of argument by stating that not only does the concept of anthropomorphism sets standards for technological design, it also introduces a level of expectation to the equation. The authors state that because human beings tend to anthropomorphize non-human objects, they tend to expect a certain level of human behaviour in return. This indicates a symmetrical relationship between human and robot. The concepts discussed by the above mentioned authors have been proved and established, but have yet to be ethnographically explored in the fields of management and organizations.

The humanoid robot Pepper is an example of a new technology introduced to an organizational context. We argue that Pepper can be classified as an alien creature at IBM, and find it interesting to investigate the merge of technology and social aspects. Weick (1990) argues that technology is in a constant state of becoming; not only is it constantly advancing, it is also continuously shaped by different contexts and perceptions (ibid). Technology is, in other words, continuously constructed by its users. In that sense, new technology brings an inherent risk of trying to simplify underlying complexities to facilitate understanding. Based on this, we are interested in how sensemaking and enactment influence the constant construction and reconstruction of this new technology.

The purpose of this research is to investigate how Pepper is made sense of and enacted by the organizational members at IBM. Furthermore, this paper aims to explain how enactment leads to the ongoing construction of Pepper. Due to the fact that the way in which we make sense in organizations is of great importance when studying new technology, this case study collected stories from the field and drew upon the theoretical framework of sensemaking as a tool for analysis. By this means, this paper seeks to extend previous research on sensemaking and enactment in relation to technology, thus transcending the cognitive process into a physical dimension.

## Theoretical framework: Sensemaking, organizations and technology

Sensemaking is both a conscious and unconscious process in the sense that all individuals interpret their world differently (Weick, 2012). As human beings, we rationalize retrospectively in order to justify certain behaviour, thus simplifying our complex surroundings (Weick, Sutcliffe & Obstfeld, 2005). Sensemaking is a central concept in organizational life because it is the main site where meanings materialize, which inform and constrain action (ibid). These actions are in turn what Weick (1995) refers to as enactments: written or spoken manifestations of sense that has been made. Originally, Weick (1995) depict sensemaking as made up of seven properties (identification, retrospection, enactment,

social activity, ongoingness, extracting cues and plausibility over accuracy), which are intertwined and interrelated in the process. However, it is important to note that these properties are in no way deterministic in regards to the outcome of the sensemaking process. The following chapter presents Weick's (1979; 1990; 1995; 2012) framework on sensemaking, followed by organizational sensemaking of technology and the role of boundaries in sensemaking. Scholars commenting on Weick's framework are included throughout this section. Most prominent is Orlikowski (1992; 2000; Orlikowski & Scott, 2008; 2015), whose research merges the framework of sensemaking with technology.

Weick (2011) argues that there is too much focus on organization as a concept, when focus instead should be on organizing as a social activity. As the current business landscape is an ever-changing field where new innovations emerge continuously, efforts should be directed to make certain that technology is introduced and organized accordingly. Sensemaking is the process of how sense is made, and represents the retrospective account for how each person experiences and identifies their world (Weick, 1995; 2011). It involves the process of continuously developing plausible images that rationalize and simplify complexities (Weick, Sutcliffe & Obstfeld 2005). Thereby, sensemaking need only be plausible, not accurate, in order to make sense (Weick, 1995). In a complex world plausible stories are in fact preferred over accurate ones (ibid). When mentioning sensemaking, the notion of dominant stories is inevitable. These are shared stories that may become fixed concepts with a broad influence (Weick, 2011). Such concepts are translated into for example organizations and enacted. Here, the understanding of organizational life is dominated by narratives, which may or may not represent the reality (Faraj, Watts & Kwon, 2004). Thus, the way in which we make sense of organizational life is both a cause and an effect of dominant stories. Such stories are neither good nor bad; they are simply a part of how sense is made in organizations. In this storytelling, the stories are trying to capture, label, define and categorize events that take place in the organization (Weick, 2011; Schein, 2010). In other words, storytelling is a tool to make sense of the continuous "flux", defined by Weick as organizations' constant state of change and becoming, or a mean to create order from disorder (Weick, Sutcliffe & Obstfeld 2005; Weick, 2011; Schein, 2010). Dominant stories can also be seen as justifications that discursively introduce legitimacy and stability into social action (Weick, 2012). It is a process of narrative rationality, the ongoing retrospective development of plausible images, or dominant stories, that rationalize practices and behaviours (Weick, 1990). Such retrospection may provide a sense of meaning and stability (Schein, 2010). According to Schein (2010), disorder breeds anxiety, wherein organizational members will work hard to simplify their surroundings. This process is described as extracting cues from our environments, which makes us able to simplify and thus ease our understanding (Weick, 1995). As stated much earlier by Berger & Luckmann (1967), this constitutes sensemaking as a process of social construction.

Weick argues that the most essential prerequisite for sensemaking is a good story; "something that is fun to construct" (Weick, 1995, pp. 60-61). Davenport and Prusak (1998) extend Weick's (1979; 1995; 2012) notion of sensemaking, stating that human beings learn best from stories and narratives. Sensemaking emphasizes how individuals and society create each other (Davenport & Prusak, 1998). All organizations are social constructions, or so-called 'convenient fictions' that are talked into existence by its members (Hatch &

Cunliffe, 2013). This entails that when human beings make sense and enact that sense, they construct. Thus, the organization is a result of a collective search for meaning, by constructing truths and beliefs (ibid). With that said, sensemaking is no quest for absolute truth, but rather concerned with organizing experiences that construct sense. This is related to the notion of sensegiving, as explained by Gioia and Chittipeddi (1991). Illustrated from the perspective of a manager, sensegiving is described as an attempt to govern other individuals' construction of meaning and sensemaking, thus steering towards a more desired definition of organizational reality (ibid). Furthermore, sensegiving can be used as a management tool to construct a corporate identity, preserve an image or stabilize in times of change (Maitlis, 2005). Thus, sensegiving as a management tools may revolve around constructing a plausible, attractive story that appeals to the organizational audience, implying that sensemaking is both retrospective and prospective.

Weick has extended his framework on sensemaking to include that of technology (Weick, 1979; 1990; 1995). In regards to sensemaking of new technology, such equivoques "require ongoing structuring and sensemaking if they are to be managed" (Weick, 1990., p. 790). To describe something as equivocal entails that there are more than one plausible interpretation, which may cause confusion (ibid). A scholar influenced by Weick's theory of sensemaking is Orlikowski (1992; 2000; Orlikowski & Scott, 2008). In the same way that Weick encourages organizations to pay more attention to structuration rather than structure, Orlikowski (1992) presents a theory illustrating the structuration model of technology, deriving from Giddens (1979) earlier model of structuration. Orlikowski (1992) regards enactment as an expression of agency, hence contributing to the Giddens' (1979) model of structuration. She further argues that technology is both physically and socially constructed (Orlikowski, 1992). The former regards the specific context in which the technology is designed, whereas the latter regards the instance when agents ascribe meaning to the technology when using it in their context. Nevertheless, these opposing constructs constitute the duality of technology: designers, in charge of the physical construct, and users, in charge of the social construct, make sense of the technology in their separate contexts. Moreover, this separation in sensemaking between designers and users of technology is what Orlikowski refers to as interpretive flexibility (ibid). Thus, users make sense of how the technology could be used in different ways, and enact accordingly. This is in line with Weick's (1990) equivocal perspective on technology. Designers, on the other hand, inscribe visions and meaning to technology, thus attempting to predetermine settings, roles, interpretations and actions. Furthermore, technology tends to loose its connection to the agents that have constructed it; it becomes reified and institutionalized in its new context (Orlikowski, 2000). Because of the interpretive flexibility technology is an emergent structure that is continuously shaped by users (ibid). Orlikowski (1992) argues that attempts at excluding the interpretive flexibility entails a risk of producing non-users. A non-user is someone who does not identify with the ascribed meaning or sense, which may end in excluding oneself or being excluded. Nevertheless, the structurational relationship between designers and users cannot be seen as independent; one cannot exist without the other.

Another crucial factor in the sensemaking process that both enables and constrains it is the concept of boundaries. Orlikowski's (1992) model uses the concept of discontinuity as an explanatory factor as to why users and designers make different sense, linked to that of

interpretive flexibility. In her later works (2002) attention shifts to boundaries; a boundary can be concretized as an invisible line marking the limit between one thing and another (Espinosa et al., 2003). Boundaries can be tangible such as geographical boundaries between countries or regions (Watson-Manheim, Chudoba and Crowston, 2012), but intangible boundaries such as political, historical or social boundaries are no less evident (Espinosa et al., 2003; Orlikowski, 2002). Hernes (2004) argue that organizational boundaries are composite, meaning that organizations operate within several co-existing boundaries simultaneously. Such social boundaries are reflected in organizational cultures, where boundaries constitute the outer limit of accepted behaviour (ibid). Hence, the boundary properties of an organization reflect its unique context and substance. Social boundaries may manifest themselves in the form of social groups within the organization, as results of asymmetric distribution of resources, information and/or opportunities (Lamont & Molnár, 2002). Such social boundaries can result in patterns of e.g. social exclusion or class segregation (ibid). Hernes (2004) further argues that organizational changes are results of boundaries being created, moved, crossed or enacted (ibid). For instance, organizational boundaries are dynamic and emergent in the sense that they are constantly recreated by its members through enactment.

Based on the bounded establishment of different social contexts, there are objects that inhabit these intersecting worlds: boundary objects (Lamont & Molnár, 2002). These objects are sufficiently robust to maintain a coherent interpretation, yet also fluid enough to create separate understandings within different social boundaries (Star & Griesemer, 1989). Moreover, drawing upon Gieryn (1983), boundary work has been defined as work which discursively maintains or shifts conceptions of boundaries between individuals and groups (Lindberg, Walter & Raviola, 2017). For instance, one type of boundary work aims at safeguarding against competitors by controlling resources and protecting occupational autonomy and prestige (Zietsma & Lawrence, 2010). Rather than static, boundaries are in a constant state of becoming, constantly constructed and reconstructed (Weick, 1979; Hernes, 2004). As a result this may create or reinforce discontinuity (Watson-Manheim et al., 2012). Weick (1995) argues that even our sensemaking processes are bounded, meaning that there are limits to the ways in which we are able make sense. Therefore, boundaries and discontinuities can be argued as socially constructed platforms for how organizational members make sense of their world.

## Method

In order to fulfil our chosen purpose, we chose a qualitative method for our study. This allowed us to focus on everyday actions and behaviours, which is in line with Silverman's (2013) and Bryman & Bell's (2015) arguments on qualitative research enabling the study of real behaviour. We have constructed an abductive case study focusing on a single case, methodologically inspired by principles from actor-network theory. There are three different sources of empirical material that together constitute our data collection: interviews, observations and secondary sources. The latter is inspired by netnography. The nature of our analysis is inspired by abductive reasoning and grounded theory. The following chapter clarifies our point of departure, research design, data collection, analysis and limitations.

**Research design**

Our methodological departure is based on a set of principles that we value as researchers. Firstly, we believe in ridding ourselves of associations and presumptions before entering the field of research. This further entails acknowledging that differences occur during a process rather than being predetermined. Secondly, we argue that humans and non-human agents are both capable of agency, and should thus be described and researched in the same terms. The third principle guiding this research revolves around entering the field without prior knowledge and rather letting the field of research guide our direction. These three principles were inspired by Callon's (1984) principles of free association, generalized symmetry and agnosticism. Thus, we acknowledge that the social world in ever changing and in a constant state of becoming, which constitutes the ontological nature of our study. This ties in with our epistemological point of departure, which is abductive in the sense that we acknowledge that no absolute truth can ever be produced or generalized. Our ontological- and epistemological perspectives allowed us as researchers to investigate a social phenomenon with an open mind without forcing theoretical assumptions on the material. As researchers we can never enter the mind of someone else, thus our qualitative study is, at best, an attempt at recollecting the experiences, thoughts and reflections of others (Seale, 1999).

Our research design consists of case study, deemed a popular "go to" in qualitative research (Bryman & Bell, 2015). With this approach we aim to enlighten unique characteristics of a phenomenon in a set context (Bryman & Bell, 2015; Jacobsen, 2002). Eisenhardt (1989) further this argumentation and point to that case studies are suitable for early phases in exploratory research, as researchers investigate a phenomenon in its natural environment. This thesis aims at conducting a case study showing one example of the introduction of new technology in a firm, and how sensemaking is enacted in organizational context**.** Thus, this case is a manifestation of a larger phenomenon: how organizational members make sense of technology. Additionally, the specific technology in this case study is idiosyncratic to the context in which we study it. As we were interested in investigating the latest and upcoming technological devices and developments incorporated by organizations we sought for companies implementing robots in their everyday work life. More specifically, we wanted to research a more sophisticated robot socially involved with organizational members. We established contact with IBM representatives at a MeetUp in Gothenburg, at a time when we were still undecided regarding our field of research. IBM offered an opportunity to study Pepper, their AI robot. We were already familiar with Pepper, having read about it and watched clips online as part of our initial research, and accepted their offer.

**Data collection**

Our empirical material consists of primary and secondary sources. Our primary data consists of empirical material collected from interviews and observations. Furthermore, we have collected two kinds of secondary data: one part that is inspired by netnography (Kozinets, 2002), as well as academic articles and reports. Together, these data sources are inspired by triangulation (Yin, 1994; Bryman & Bell, 2003).

Primary data was collected through interviews (Appendix A), which Bryman & Bell (2015) argue is the most frequently used method for qualitative research. Prior to interviews

with selected IBM representatives, two interviews were conducted with professors in robotics at Chalmers Technical University. The motivation for these interviews was to establish a technical understanding and vocabulary as well as to discuss relevant literature and trends within the field of robotics and AI. After establishing contact with IBM we searched actively among their employees and managed to gather a variety of people involved with the robot on a daily basis. Crucial was that the selected representatives were picked in accordance to, and in order to ensure, that the research topic was matched with competence, experience and knowledge. The list of interviewed IBM representatives ranges from top managers to app developers in both Stockholm and Gothenburg (Appendix A). The result amounts to a total of 16 interviews, 14 of which were conducted with 10 selected representatives from IBM as well as two consulting interviews with professors in robotics.

Following Alvesson and Sköldberg's (2009) argument on the benefits of open structured interviews, we chose a semi-structured approach to all interviews. The interviews were performed face-to-face, which encouraged interviewee participation and enabled for follow-up questions (Bryman & Bell, 2015; Blumberg et al., 2011). Although known to be time consuming, primary data collection enables a specific setting and context for the research question (Jacobsen, 2002). Eriksson and Kovalainen (2015) highlight the importance of developing interview questions, however, our semi-structured guide rather consisted of rough themes. We were interested in exploring themes such as the relationship between human and robot, the Pepper project and its goals, as well as the robot's development. These themes were conversation starters that allowed the interviewees to share their stories. Hence, this deliberately open structure aimed at entering the field open-mindedly and free of assumptions (Alvesson & Skjöldberg, 2009) in accordance with our research principle of free association and agnosticism. This allowed us to focus on the interviewees' narratives and understandings of this new technology. We made it clear that we were interested in their narratives in relation to Pepper, regardless of how trivial they may seem to the interviewees.

The majority of our interviews were conducted face-to-face, aside from two interviews conducted via Skype. Most of the face-to-face interviews were done in groups, composed of at least two interviewees at a time. This was either due to that the interviewees worked as a team, or simply out of convenience. Whilst conducting the group interviews we as researchers tried to be as flexible as possible, in order to ensure that every interviewee could speak their mind. Thus, the interviewees were able to talk amongst themselves rather than to answer specific questions. This process proved better suited for the interviewees as it created a safe and non-artificial environment allowing conversations and narratives to emerge. Our second source of primary data was observations conducted during the visit at IBM. Silverman (2013) argues that observations may add value because researchers may not observe one act in the same manner, thus aiding in unveiling behaviours and understandings. Moreover, the observations allowed us to detect social processes and behaviour in their natural context (ibid). This method complemented the transcribed interviews as the notes taken triggered recollection of events that could not be recorded. Examples of observations made were notes on facial expressions, gesticulations, accentuations and movements. In addition to interviews and observations we were inspired by methodological triangulation in research (Yin, 1994). This entails using more than one

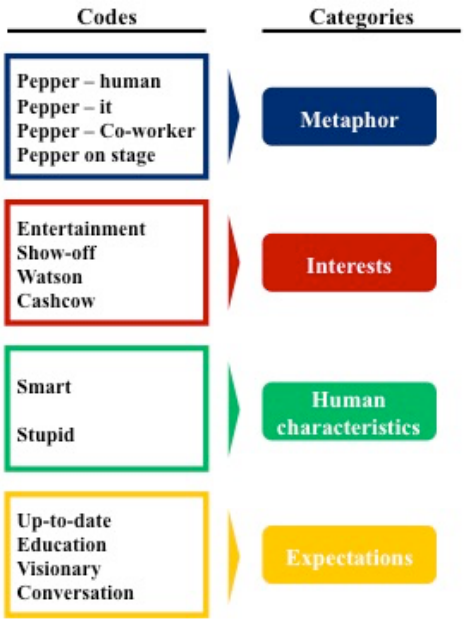
method in the study of a social phenomenon (Bryman & Bell, 2003). Originally, triangulation may be associated with complementing qualitative and quantitative methods order to crosscheck findings and building confidence in the result (Webb et al 1966; Deacon, Bryman & Fenton, 1998; Bryman & Bell, 2003). This inspiration from a multi-method work aims at capturing different dimensions, perspectives and interests, thus alleviating ambiguities found in one perspective (Bryman & Bell, 2003; Silverman, 2013). Thus, secondary data was collected to triangulate the perspectives gathered from the interviews, observations with secondary data. Our secondary data consists of academic articles from relevant journals such as Organization Science, Journal of Management, and International Journal of Advanced Robotics Systems. Google Scholar and the Gothenburg University database (GUNDA) were used when researching relevant materials, where combinations of the following keywords were used as search words: "sensemaking", "sensemaking and technology", "robots", "organization".

Further, adding another layer of secondary sources was inspired by what research calls netnography, where researchers explore material through for example chat forums, thus providing researchers with symbolism and meanings without the obtrusive nature of interviews (Kozinets, 2002). For us this step meant researching videos of Pepper at public appearances such as symposiums or exhibitions and searching through the stream of comments in these. We also extended the search to include news articles, blogs and forums to gain further insight. The data used is compiled in a table (Appendix B). Conclusively, these three data sources, inspired by triangulation, aims at creating a more thorough understanding of how sense is enacted in the construction of Pepper, which is in line with the purpose of this thesis.

**Data analysis**

Our method of analysis is inspired by both grounded theory and abductive reasoning (Strauss & Corbin, 1998). Grounded theory emphasizes the practice of coding closely to the empirical material while keeping the research question or purpose loosely defined, where theory, method and empirical material treated as interrelated rather than distinct. After all interviews had been transcribed in detail, we began coding the material (Table 1). The first round of coding consisted of extracting non-theoretically attached keyword. These were later grouped into larger, more coherent and interrelated categories. However, we were still open for new codes and categories. In line with grounded theory we kept adapting our research purpose in accordance with the material (Strauss & Corbin, 1998). This iterative approach was aligned with our focus as it allowed us to stay true to the interviewees' own language. Language and ways of speech can be interpreted as a manifestation of sensemaking, where the interviews make sense of a phenomenon while making sense (Attewell, 1974). Despite the challenge of transcribing this specific material, where indexical language and contexts had to be taken into account, it proved valuable when analysing the empirical material. This iterative work continued as more interviews were conducted. These categories were later used in the analysis as a bridge between empirical material and theory, where the categories took on new form as tensions.

Table 1. Examples of some codes and categories were:




Rather than forcing our material to fit a certain theory or concept, the theoretical framework of sensemaking emerged naturally during the process of analysing data. As sensemaking is defined as a continuous and ongoing process (Weick, 2012), corresponding with our ontological perspective, the fit between method and theoretical framework was deemed advantageous. Thus, the theoretical framework of sensemaking functioned as a lens for analysis, which constitutes the abductive nature of our study (Bryman & Bell, 2015; Alvesson & Sköldberg, 2009).

**Criteria of quality**

There are some factors that must be addressed as they may have an impact on the findings of this research. Firstly this research was conducted in a Swedish setting, implying that findings cannot be attributed to organizations outside of Sweden. However, this study focuses on how sense is made and enacted, thus impacting construction, which is not generalizable anyhow, as each person makes their own sense of their own world (Weick, 2011). Following an abductive reasoning, we acknowledge that our results cannot be generalized, seeing as the amount of data will never suffice for general conclusions (Bryman & Bell, 2015; Saunders, Lewis & Thornhill, 2012). Thus, our concluding arguments will at best be a plausible prediction. Moreover, all interviews were conducted in Swedish, which meant translating the data to English. This proved a challenge as the stories needed to keep their specific tone, identity and meaning whilst being translated. In an effort to mitigate this potential dilemma every section of data used was translated in unison in order to make sure that the same nuances of language was kept intact. This was central to us as errors in translation could lead to errors in judgement. Another important reflection is that this research is primarily concerned with collecting stories from the field. Thus, as researchers we enabled sensemaking to be enacted by the participants, yet the process of sensemaking

was also used in order to analyse this data. Thus, our results are both enabled and constrained by our own involvement in the recollections of others.

By choosing to conduct a case study this meant that we needed to enter the everyday world of the interviewees in order for the interviews and observations to take place in the everyday setting. This implies that ethical considerations become highly important to account for. Here, the interviewees all gave their full consent to us both and were offered anonymity. Adding, they were always able to quit the interviews if not feeling comfortable or being disturbed in their working life. None of the participants insisted on anonymity, yet we chose to give them acronyms based on personal preference rather than on request.

## Case setting

Hitherto associated with mainframes and hardware, centennial IT-company IBM made a shift towards software and services after financial struggles in the early 1990s (Applegate, Austin & Collins, 2009). Stories from their past exemplify static, risk averse behaviour where opportunities were left non-capitalized, unlike the more recent establishments in the IT sector (such as Google and Apple), who are more agile in their approach to investing and entering experimental fields (ibid). In more recent times IBM has become an international service and cloud-driven company, entering the competitive arena of AI and robotics. IBM's AI system Watson is one of their main focus areas, belonging to their cloud service. Watson is a commercial cognitive AI-system meant to be used in for instance health care, tax preparations and customer service and marketing (IBM, 2017b). Watson is IBM's biggest investment in cognitive computing, and the goal is to obtain 10 billion in revenue within ten years (Ante, 2014, Jan 9). A small but not insignificant part of this investment is the combination of Watson and Pepper, a humanoid robot developed by Japanese robotics company SoftBank Robotics. In Japan, the Pepper robot can be bought at regular electronics stores for at-home use, and they are commonly used as service robots in hotels, etc. (Ante, 2014, Jan 9). IBM bought Pepper July 2016, and the robot is currently based at their Client Center in Stockholm. In order for the purchase to be legitimized internally at IBM, the company had to attribute something to Pepper for it to be more than a mere "wow-factor". Therefore, IBM decided to combine Pepper with their AI system, Watson, making this the first combination of Pepper and Watson in the Nordic countries. The project of "making Pepper smart somehow" landed with a programmer is in charge of IBM's cloud platform. Thus, she alone was given the task of installing Watson's different applications in Pepper.

Prior to combining Watson with Pepper, the robot is capable of simple one-way interactions, with standardized sentences as a basic setting, such as "hello" and "how are you". In order for Pepper to use Watson, the AI has to be broken down into smaller applications that can be integrated into Pepper. Once an application is installed, Pepper can be "trained", i.e. programmed to be interactive and intelligent. One such app enables Pepper to process unstructured data and translate it into text. Another app, Watson Conversation, enables for the AI to understand and sustain a dialogue. However, this app is still not compatible with Pepper. The state of the art is a robot with narrow AI that is dependent on programming, and can only learn by proxy through its programmer. This entails that the robot is not autonomous nor self learning on its own, seeing as it relies on specific

commands in order to fulfil its purpose; to act as a social, interactive and intelligent robot.

## Analysis

Our first meeting with IBM's representatives took place some weeks prior to meeting Pepper "in the flesh". Their recollections of Pepper painted a picture of the robot as something, or rather *someone*, humanlike in terms of its capabilities. "We're trying to get him to come to Gothenburg, but he is very busy", uttered an employee. Later on, at IBM's offices in Kista, we were met with the same way of addressing Pepper; "Pepper is still asleep", the Partner Manager said as he guided us down the hall to the Client Center. Then Pepper entered the room, transported by an assistant, with its arms hanging loosely by its side and its head tilted forward. Our image of Pepper as an autonomous entity with a mind of its own was altered. In hindsight, this alteration occurred as we were placed in the epicentre of tensions. These tensions evolved from categories created in data processing and guided the analysis of the empirical material, which was later combined with secondary data. The three tensions discovered during our research were Human versus Robot, Commercial interests versus Development and "Up-to-date" versus "Visionary". Each tension is presented and analysed in order and ends with a conceptual analysis. These tensions represent the manifestations of sensemaking enacted and together constitute the ongoingness of Pepper as a construct.

### Human vs. Robot

This tension was the most prominent in the early stages of research. Our interviews showed that members of the organization struggled with defining exactly what Pepper is as well as its role at the company, seeing as the robot is unable to do so itself.
The main discussion revolves around whether Pepper is a human or a robot.

> The goal is to have everyone regard Pepper as a co-worker.
> [...] he is even getting his own employee number and everything.
> (Partner Manager, interview)

The partner manager expresses a willingness to identify Pepper as a human, and in extension a co-worker. Thus, he applies Pepper with human characteristics not only by referring to Pepper as a he, but also by juxtaposing the robot and other staff. However, not everyone at IBM agrees with this, as illustrated below by the partner managers subordinate.

> It is a robot, you are supposed to be able to ask the same
> stupid question eight times and still get the same exact answer.
> (App developer 1, interview)

The app developer's opinion exemplifies the notion of Pepper's inanimateness, depicting how expectations of what a robot is and how it is supposed to behave differs from that of a human. If a human were to respond repeatedly with "the exact same answer", it would probably be regarded as strange and deviating human behaviour. These recollections by the

partner manager and the app developer exemplify how the use of language is important when defining Pepper, and thus a crucial factor in this tension. On one side of the spectrum Pepper is referred to as "he" or "Pepper", and on the other side as "it" or "the robot". Whereas the latter is passive, the former definition gives Pepper human characteristics, personality and affinity. However, the definition of Pepper is under constant construction; it is in no way set in stone. The partner manager shared a story of how he initially made sense of Pepper as a girl, before changing his mind: "I think he resembles my sons more than my little girl". This depiction makes Pepper seem humanlike, and the language used to describe the robot and its actions show how employees continuously interpret its state of being. Thus, the partner manager is simplifying the complexity of Pepper in order to ease his understanding by retrospectively making sense of the robot in juxtaposition to something he is already familiar with; his children.

Someone who plays a particularly important role in Pepper's life is the programmer. The programmer mostly identifies Pepper as strictly a robot, but tends to apply Pepper with human characteristics, thus creating a paradox. For example, she mostly refers to Pepper as "it", or "the robot", but also uses third person pronouns when complaining "he does not have a damn clue". At the beginning of the project, she acknowledges feeling uncomfortable around the robot.

> Imagine me alone in a room, weeks on end. Wherever I went, this robot kept following me around. Looking and sort of staring at you. [...] It's an odd feeling, it feels like someone is constantly surveilling me, and at the same time it's like… I am the one who decides what it [Pepper] can and cannot do. I can make it [Pepper] stop.
> (Programmer, interview)

The programmer explains how being around Pepper is like being under surveillance - "it's an odd feeling" -, although she is aware of the fact that she is in control of the robot. When asked how the project is progressing she states that she is now "filing for divorce". Thus, Pepper becomes an inanimate object with human characteristics - someone rather than something that she acknowledges as human. Over the course of time, however, the programmer established a professional distance to the robot. Pepper greets us at IBM's offices, and presents the programmer by stating "This is my boss. She is the one who programmes me. Be nice to her, or else…". Although humorous, this statement reifies the hierarchical distance between Pepper and the programmer. After all, she is the one in charge of everything Pepper is able to say or do. Or as she states, she can "make it stop". Whether she is aware of this or not, the way in which she programmes Pepper is directly linked to Pepper's overall construction in the company; she enacts her sensemaking of Pepper though programming him to have a certain personality. In turn, this enables for other members of the organization to supply Pepper with meaning, thus contributing to the robot's continuous construction.

***Conceptual analysis***

This tension illustrates the importance of language in the process of enactment. The

employees at IBM express their ongoing sensemaking of Pepper through their use of language, where for instance human characteristics are applied. In turn, language is an anchor in the ongoing construction of Pepper as humans make sense while telling that sense. (Weick, 1995).

As discussed by Weick (1990; 1995) sensemaking is both individual and collective.. Seeing as employees create different constructs of who and what Pepper is through their use of language, this establishes a boundary between whether Pepper is made sense of as a human or a robot. As a result, the process of sensemaking and enactment within specific boundaries constitutes the constant becoming, and the distinctive constructs, of Pepper (Weick, 1979). However, there might be a special relationship between the individuality and collectivity of sensemaking in a corporate context. Gioia and Chittipeddi (1991) describe how sensegiving can be used as a management tool in order to convince employees of a preferred sense. Following this argument, IBM might be incentivized to streamline a collective story that appeals to those outside the company itself, where the narrative is focused on Pepper's humanity. Thus, by using anthropomorphic language in regards to Pepper, both at the office and in public, IBM signals the sense that Pepper is in fact humanlike. Linking to Orlikowski's (1992) notion about undermining interpretive flexibility this means that sensegiving carries a risk of producing non-users whose sensemaking differs from the preferred and collective sense. By inhibiting users from establishing their own sense of technology through interpretive flexibility, users might end up rejecting the technology (ibid). When influencing others with a preferred sense of how Pepper *should* be made sense of, as a humanlike robot, this establishes a boundary between right and wrong sensemaking.

Here we would like to bring attention to the role of the programmer in Pepper's overall construction. Out of all of the employees, she is the clearest example of both a designer and a user (Orlikowski, 1992). On one hand she is in charge Pepper's material construction through programming, which enables for the robot to function. On the other hand, she ascribes Pepper with a personality, which influences how other employees make sense of the robot. As illustrated in this tension, the enacted sensemaking is illustrated though the employees' use of anthropomorphic language. In that sense, she is a creator and designer of boundaries in regards to Pepper's construction, but she is also crossing boundaries as a user of the technology. Her enacted sensemaking of Pepper is neither in line with the preferred sense of a humanlike robot nor the opposing construct of a generic robot. Thus, by not conforming to the preferred sense she is challenging the established boundaries at IBM.

**Commercial interests vs. Development**

Building on the previous section, another tension is that of the commercial interests regarding Pepper contrasting those of development interests. In order to elaborate on this specific tension it is important to bring attention to the project's origin. Since the project's initiation the programmer has been the employee solely responsible for Pepper's development.

> [After the initial training in France] I had to, like, familiarize myself with the material [...]. Now I am responsible for making Pepper "smart somehow", and that was my direction from top management. I mean, I can always call the team in France, but they're way over there and they can't always answer my questions.
> (The programmer, interview)

The programmer explains how the decision to acquire Pepper was made by top management at IBM, with the rather vague aspiration of making the robot "smart somehow". The programmer, whose regular activities are concerned with cloud service development, expressed that being chosen to manage Pepper was a great honour, albeit inconvenient. After all, training Pepper turned out to be a full time job in itself. Adding to this, her nearest aid is "the team in France" which makes Project Pepper a lonesome experience. This sparked our curiosity as to why this new and supposedly important project was not given more priority. When we questioned why IBM does not recruit a larger project team, app developer 1 clarified that Pepper is in fact not a main priority at the company and that it is actually "a question of what is in IBM's commercial interests". His colleague elaborated on this, and introduced Watson, the main AI system, to the equation.

> […] At the end of the day it comes down to Watson. Because we're not selling the robot, we are selling the Watson system. That's what we want the customer to buy. So if they want Pepper too, that would be a bonus, but all we want to do is develop applications where we use Watson and benefit from its capabilities. But IBM's research on how to combine Watson and Pepper is not extensive. And at the moment, Pepper does not fit into the main focus areas of IBM, and no client wants it [Pepper].
> (App developer 2, interview)

App developer 2 explains that Pepper is currently not a main focus area for the company - "it comes down to Watson [...] that's what we want the customer to buy". Seeing as Watson's system has to broken down in applications and synchronized with Pepper, combined with the fact that no client wants to buy Pepper at the moment, there is no incentive to prioritize its development. Based on these statements, we came to the conclusion that Watson is the one running the show. Thereby we can deduct that the robot is restrained by a tension between the commercial interest in Watson and further development of Pepper's technology. As explained by a technology executive manager in Gothenburg, Pepper is simply an interface to display Watson. However, in more recent times, Pepper has been displayed on stage at events and conventions, where both audience and viewers through other media have been mesmerized by its abilities.

> Pepper was shown on stage in August, and this YouTube-clip of him is shown everywhere [...]. That was the first time [clients] started thinking, like, okay, a robot, what could we do with that.
> (App developer 2, interview)

As illustrated above, clients are now starting to pay attention to Pepper's prospects due to the robot being "shown on stage" and subsequent media momentum (Appendix B). This further complicates the tension between interests, seeing as the public display of Pepper is a misrepresentation. On IBM's website, Pepper is portrayed as an "autonomous talking humanoid robot who perceives emotions, and adapts his behaviour to the mood of the humans around him [...] making his interactions with humans incredibly natural and intuitive" (IBM, 2017a). What IBM fails to convey is that this scenario is based on the premise that Pepper is programmed accordingly and has the ability to process unstructured data. IBM's construct of Pepper, and the sense they want to give, is a future idea of Pepper. When meeting important clients or speaking at events, Pepper is pre-programmed according to each circumstance.

> At Business Connect [an IBM event], I had to turn off all sensory applications, because otherwise it [Pepper] would sense all the different faces in the crowd and just go around in circles. [...] At such events, everything is scripted.
> (The programmer, interview)

As explained by the programmer, the Pepper that is shown to the public is a scripted, tweaked version of the robot, where "all sensory applications" are "turned off", and "everything is scripted". At a trade show in Las Vegas in 2016, Pepper once again appeared on stage (Mcleod, 2016, January 10). The robot portrays an admirable and adorable image, making the audience react to it emotionally. Thus, creating an image that the robot is acting out of autonomy, when it is in fact scripted to answer the moderator's questions. Judging from the faces in the audience, as well as the comment section where doomsday-plots and sci-fi references are tossed around (ibid; Appendix B), the audience has no idea that the performance is an act. Such performances are not accurate portrayals of Pepper's current state. Rather it is a scripted version of a future state where Pepper is able to improvise and carry on a conversation like a human, although currently unable to create and sustain a dialogue. In that sense, the public portrayal of Pepper is similar to that of an actor. There is an existing tension between commercial interests and the current state, which raises the question of whether such "performances" are beneficial or not in terms of managing expectations, or simply a construction of a great sales pitch. This construct of Pepper is a result of IBM's sensegiving where they aim at presenting a preferable image of Pepper. Hence, the public display of Pepper represent the sensegiving enacted; a physical embodiment of a constructed reality where Pepper is a super smart robot. The technology executive from Gothenburg does not see a problem with presenting an unrealistic construct to the public eye.

> Well… that may be, the audience has one understanding and those who work with it [Pepper] have another. And what is being done is that we are trying to adapt the script to each situation that this Pepper-thing is being used in.
> (Technology executive, interview)

This is uttered with an air of nonchalance to the fact that not everyone is aware that a robot like Pepper needs to be scripted in order to function. The fact that "the audience has one understanding" that differs from Pepper's true state of art indicates a level of asymmetrical information. However, the technology executive does not care if this portrayal of Pepper is misleading as long as the audience makes sense in accordance to IBM's interests. Thus, the current interest is to make the construct of Pepper seem and appear more futuristic and intelligent than it actually is. Not to mention that the "audience" is in fact potential buyers. This argument is also touched upon by Chamath Palihapitiya, CEO of technology and innovation company Social Capital (Wojcik, 2017). Palihapitiya states bluntly that the Watson technology, which includes Pepper, is "a joke", aimed at taking advantage of those less knowledgeable on AI and cognitive technology (ibid). Once again we refer back to our first encounter with Pepper: had we instead "met" Pepper when it was programmed to behave in a certain way, as it does at events, we would have made different sense of him. Now, on the other hand, we have experienced both wishful sensegiving from IBM's top management as well as a first hand encounter of what goes on behind-the-scenes. This makes us able to see the separate constructs of Pepper as what they are: one is carefully crafted by the company whereas the other is hidden from the public eye.

***Conceptual analysis***

Based on the previous arguments, we state that the public display of Pepper is a scripted version of future aspirations; a constructed reality or convenient fiction (Weick, 1995; 2009; Hatch & Cunliffe, 2013). Building on arguments made in the previous tension on the dominant story of Pepper, this tension exemplifies how it lies in IBM's commercial interests to convince its "audience", external stakeholders, of the convenient fiction that Pepper is an intelligent robot. As Weick argues (1995), dominant stories are neither good nor bad; they are simply ways of simplifying surrounding complexities. In extension, dominant stories may also be seen as a means to give sense, as they afford others with finished constructs. However, taking advantage of asymmetric information as a means to communicate their dominant story gives birth to ethical concerns. Meaning that, if outsiders make sense of Pepper based on the mesmerizing displays on stage where it communicates in a human like manner, an issue arises when the fact that the robot requires programming and script in order to exceed its actual intelligence is left out. Thus, there is an existing discontinuity within this tension (Orlikowski, 1992; 2002).

We argue that the construct of Pepper functions as a justification used by IBM to strengthen and/or maintain their market position. This attempt at protecting their occupation from competitors can be seen as IBM performing boundary work (Zietsma & Lawrence, 2010). More specifically, this boundary work is aimed at enhancing and protecting the already established boundary between IBM and their external context. This is in line with Weick's (2012) reasoning on the discursive nature of justifications as means to offer legitimacy and stability to social action. As a result, this tension displays composite boundaries at work (Hernes, 2004). As discussed by Watson-Manheim et al. (2012), boundaries can both create and reinforce discontinuous ways of making sense. The constructed display of Pepper establishes a boundary between IBM and its customers, which is reified with every public performance. This boundary is in turn what constitutes and

contributes to the differences in sensemaking of Pepper and puts IBM in a position to give sense, seeing as they are in control of what information they share with the public (Zietsma & Lawrence, 2010). Thus, the media and other stakeholder are left as passive recipients of information related to Pepper. Furthermore, there is an existing tension between the commercial interest in Watson and the development of Pepper. Watson can be seen as a justification for Pepper, affording the robot legitimacy (Weick, 2012). Thus, as a technology Watson creates a boundary that is both enabling and restraining in regards to Pepper's ongoing construction. There is a hierarchical boundary established by IBM as they focus their development on Watson, signalling to their organization and external context that this is their main priority. In that sense, there are also social repercussions of this boundary as it affects how people understand Pepper in relation to Watson. Nevertheless, this boundary represents a relation of dependence between Watson and Pepper. Watson enables for Pepper's existence, and the future development of the robot is entirely dependant on its AI system.

"**Up-to-date" vs. "Visionary"**

This last tension depicts the different levels of knowledge within IBM. In our research, some interviewees categorized themselves as "up-to-date" as they were familiar with the limitations of the technology behind Pepper. These were often irritated by the robot and referred to it as stupid. The "visionaries", on the other hand, were blissfully ignorant of the limitations and technology behind Pepper, often referring to the robot as cute and entertaining. These contrasting expectations within IBM regarding Pepper's abilities guide their sensemaking process. The programmer opened our eyes to these contrasts during our first meeting:

> The most common misconception is that people [employees, visitors, etc.] misunderstand Pepper's abilities [....]. Because we are trying to connect Watson [to Pepper], people believe that you can ask it anything [and it will answer accordingly], but it doesn't work that way. The cognitive system means nothing without a human helping it to get started.
> (The programmer, interview)

The programmer explains how "people" misunderstand the meaning of a cognitive system - "[it] means nothing without a human helping it to get started". Furthermore, employees and other visitors expect Pepper to behave in a cognitive manner, which includes the ability to reason, think and speak for itself. Currently, Pepper has yet to grasp the concept of how to build a conversation, due to its limited technology. Pepper cannot understand a question with an index to a previous question, which is crucial in order to sustain a dialogue. Thus, we argue that whether or not an employee understands the limitations of Pepper's technology determines their expectations of it. The app developers illustrated this further:

> Some of the people here [at IBM] are enthusiastic and talk about the robot as if it was able to… They're visionaries!
> (App developer 2, interview)

> What you need to understand is that some of the older people at IBM haven't studied at a university. It became clear to me after working here a while [...] You sort of expect a manager to know all the stuff you know, but if you're not educated then you can't understand what computer programming actually is, or what defines it, or what enables robots to speak, or what the limitations on the technology are today. So in that sense, the ones who have less knowledge on the topic, the visionaries, expect more from the technology than someone who is up to date on robotics research. Because if you are [up-to-date], then you have a better understanding of what it [Pepper] is capable of.
> (App developer 1, interview)

Here, app developer 1 states his understanding of the different levels of knowledge within the high tech company. He explains how he expected his colleagues, especially his managers, to have the same level of technological knowledge as himself - "to know all the stuff that you know". One explanation for this may be a lack of relevant education and knowledge - "if you're not educated then you can't understand what computer programming actually is" -, which in his words means that an uneducated person would expect more from the technology than those who are "up-to-date". Furthermore, he clearly belongs to the group of people who are, in his words, "up-to-date", and refers to the opposing group as "visionaries" in accordance with app developer 2. However, the term visionary is used to distance the knowledgeable from those less knowledgeable, insinuating that their group is superior to the "visionaries". Thus, they define a boundary between social groups within IBM. A business development manager tells the story of how this knowledge gap can play out in practice:

> There are these older gentlemen at the office, they are the smartest guys, and they've been around forever [...]. They think they can have a normal conversation with him. These guys cannot understand that Pepper's ability to understand conversation is not equal to their own.
> (Business Development Leader, interview)

As explained, some employees - even "the smartest guys" - expect Pepper to understand and react in the same way that a human being would - "they think they can have a normal conversation with him". Thus, we argue that the "smartest guys" also belong to the "visionaries" based on their expectations of Pepper's abilities. Combined with the previous recollection by the app developers, we are able to distinguish the "up-to-date's" understanding as well as the "visionaries'" contrasting understanding. The paradoxical nature of these understandings display how the different sensemaking processes are enacted based on different levels of knowledge. The same tendencies are also confirmed by our collection of secondary data (Appendix B). In a video clip, Pepper is visiting the Financial Times office (Financial Times, 2016), and upon entering a room to meet the editors and managers Pepper malfunctions, making the whole room break out in laughter. The same happens when Pepper reacts to the wrong trigger words, thus answering the wrong question.

In these cases, Pepper's malfunctions are made sense of as mischievous, autonomous and funny with intent. We argue that the employees from the Financial Times display the same tendencies as the "visionaries" at IBM, due to their lack of relevant knowledge. These opposing views can also be seen in media representations. Tabloids and newspapers, which adapt their content to fit the average reader, tend to either focus on the prospects of robots taking over the labour market or the amazing new possibilities that robots bring to society (Appendix B). Either way, robots like Pepper are displayed as super intelligent machines (Liberatore, 2016, Jan 8; Flores, 2016, Sept 4; Sandstén Vikberg, 2016, Dec 4;). Thus, what the general media does is to simplify the complex technology in order to facilitate the understanding of their readers, reifying the construct of Pepper as a smart, autonomous robot. On the other hand, more scientific media goes more into detail and scrutiny, in accordance to the level of knowledge in their readers who are more "up-to-date" (Nguyen, 2016, Jan 7; Hornyak, 2015, July 30; Crowe, 2016, January 7). This ties in with the discussion in the previous tension on whether external clients are buying into the construction of Pepper as a super smart robot. If people within the company itself do not grasp the technology of Pepper, this reifies the construction even further. And, as stated by app developer 1, the level of knowledge on Pepper's technology in turn determines what they expect of the robot. Interesting to note is how app developer 1 uses the term "better understanding" when describing those who are "up-to-date", as this implies that the more you understand the technology, the better sense you make of it. Yet in reality, the same app developer tells a different story:

> In the beginning I thought it [Pepper] was really smart, but the more you hang out with it the more you hate it… you really don't like it. But it is sort of like the programmer puts it… you become like a couple - you like some aspects of it and you hate others [laughs]. (App developer 1, interview)

This describes an experience of the app developer's underwhelming sensation once he obtained a "better understanding" of Pepper. It exemplifies how sensemaking and enactment are ongoing processes, and how he makes sense of actions and understandings in retrospect - "In the beginning I thought it was really smart" but "the more you hang out with it the more you hate it". We argue that the two main understandings create opposing constructs of Pepper. The "visionaries" live in a future state where Pepper is a super smart robot, due to their lack of knowledge, whereas the "up-to-date's" are driven by their frustration of today's state of the art, combined with having to balance the preferred sense that is in IBM's commercial interest. These constructs are based on the expectations and knowledge of people within the company, but they are also contributing to further reification of the constructs.

***Conceptual analysis***

This tension illustrates several boundaries participating in Pepper's construction (Hernes, 2004, Weick, 2012). The different levels of knowledge are partly based on educational backgrounds, which create boundaries between different kinds of sensemaking (Lamont and

Molnár, 2002). Another identified boundary is the social boundary between the "up-to-date" and "visionary" groups, which can be argued as a subsequent social boundary of the level of education (ibid). Thus, the level of education creates one platform for sensemaking, whereas the distinct social groups further this discontinuous way of making sense. In other words, how these two social groups make sense of Pepper is what establishes the boundary between them (Lamont & Molnár, 2002; Hernes, 2004).

Furthermore, not only are IBM's employees contributing to the construction of Pepper, they are also simultaneously constructing their own context in which Pepper exists. In that sense, the context is talked into existence by its members (Weick, Sutcliffe & Obstfeld, 2005). This makes us question whether IBM really is a high tech company, or whether Pepper is simply a justification for their context (Zietsma & Lawrence, 2010; Weick 2012). Constructing Pepper as a smart, high tech robot affects how the organizational members make sense of their own organization and enact their sense accordingly. Thus, we argue that Pepper reifies the construction of IBM as a high tech company and the social boundaries of their context (Hernes, 2004). This creates a paradox when "visionaries" who lack the relevant education are doing a better job at conveying the construct of Pepper than those who are "up-to-date" on the technology. Who would have thought that a lack of IT-knowledge could be beneficial for a so-called high tech company?

## Concluding remarks

The purpose of this thesis was to investigate how organizational members at IBM contribute in the ongoing construction of Pepper. Thus, we have identified three tensions relating to its construction. The first tension, Human vs. Robot, regards whether Pepper is considered a human or a robot. The second, Commercial interests vs. Development, depicts the conflicting constructs of Pepper and how the robot's abilities are presented internally and externally. Lastly, how different levels of knowledge among the employees lead to different expectations of Pepper are discussed in the third tension, "Up-to-date" vs. "Visionary". The three tensions display how sensemaking is manifested in enactments, which in turn creates different constructions (Weick, 1995). These constructions of Pepper further create or reify social boundaries that subsequently enable and restrain constructs (Hernes, 2004; Lamont & Molnár). The one constant in this iterative process is that change is overall present. Our study is a display of how the organizational members are continuously constructing and reconstructing the humanoid robot as well as their own context through sensemaking and enactment. Aside from continuous, the construction of Pepper is also iterative, recursive and bounded.

Firstly, we address the organization's ongoing construction of Pepper. This construction is visible in all three tensions, and illustrates the importance of anthropomorphic language, sensegiving and social boundaries. Our results show that some "visionary" members of the organization anthropomorphise Pepper into an animate object envisioning the future prospects of an autonomous, self-learning robot with human like abilities, whilst "up-to-date" members express frustration with the current state of the art. These different constructions create a paradox: the more "up-to-date" a person is, the more stupid Pepper becomes, and the less "up-to-date" a person is, the smarter Pepper seems. The

dominant story within the company describes Pepper as a intelligent, human-like robot. This is how the "visionaries" make sense of the robot, and is also the collective sense IBM wants to give. This sensegiving establishes a boundary between different constructs. In other words, by attempting to convey a preferred sense, IBM constructs a boundary between right and wrong sensemaking. According to the "right", preferred sense, a member of the organization is supposed to make sense of Pepper as a social, human-like and intelligent robot, whereas an external stakeholder is supposed to regard Pepper as an intelligent and impressive product. As this study has shown, the most impressive quality about Pepper is that it can be programmed to seem impressive. The relationship of asymmetric information, both within the company and external to it, establishes social boundaries between groups, leading to asymmetrical constructions of Pepper; these boundaries are continuously reified because of and due to the differences in sensemaking (Zietsma & Lawrence, 2010; Star & Griesemer, 1989; Weick, 1979).

Secondly, the construction of Pepper is recursive in nature, as the robot is not only being constructed by its context but also constructing it. Whereas the first and second tension show how Pepper is constructed by the organizational members, the third tension unveils how Pepper is constructing their corporate context. Many of IBM's top employees lack understanding of Pepper's technology, thereby overestimating its AI and cognitive capabilities. We argue that the construction of Pepper as a cutting edge technology is recursive in the sense that it justifies and confirms IBM's image as a high tech company. This means that there is an initiative to make the construct of Pepper seem more high tech than it is, since this constructed image enacts the socially constructed identity of IBM. As a result of their boundary work, they are not only reifying their position on the market but also their organizational context.

Further, we argue that Pepper functions as a boundary object: it unites and simultaneously divides the different interests, sensemaking and constructs within and around the organization. Thus, the boundary object is both a reflection of the social boundaries and accepted ways of making sense as well as a creator of such boundaries (Lamont & Molnár, 2002). The equivocal nature of this technology entails that there are a plethora of plausible ways to make sense of it, meaning that boundaries will be crossed (Weick, 1990; Hernes, 2004). The underlying paradox of artificial intelligence is that a machine can only act intelligently when programmed specifically to do so. The programmer is the one responsible for Pepper's development, and by extension the one establishing boundaries for how others make sense of the robot. This implies that she is a designer steering technological development, and thereby others sensemaking, yet also a user making sense individually. This puts her in a Promethean position at the core of Pepper's construction, which, in extension, contributes to the ongoing construction of IBM.

This study offers an illustration of the circular nature of the relationships between technology, construction and boundaries within an idiosyncratic context. Furthermore, it elucidates how Pepper as a technological boundary object enables for the creation, enactment and crossing of boundaries (Lamont & Molnár, 2002), which in turn enable and/or constrain sensemaking (Weick, 2012; Hernes, 2004). Our study illustrates how the members of the organization make sense retrospectively - they change their minds about who and what Pepper is, yet they can never erase previously made sense. Thus, enactment is

an ongoing, recursive and circular process; constantly evolving but always rooted in the past. Human beings cannot help but to make sense, and the enactment is how we construct our society and its boundaries. As organizational members we simplify our surrounding complexities and choose plausible stories over accurate ones. In that sense, the more complex understanding is acquired, the harder it is to stay within the boundaries of dominant stories and constructed realities. Once the construct of Pepper is constructed, it cannot easily be disassembled, only talked into a slightly different existence.

*Implications and further research*

A central implication of this research is that the organization at hand does not seem to reflect on how adapting new technology will impact the organizational context and its members. Due to the complexities and equivocal nature of new technologies there is a need to establish basic understandings and knowledge in order to avoid the spread of misconceptions spreading the organization. These implications could easily be applied to other organizations, regardless of industry. In order to substantiate the relevance of our results, additional research on sensemaking and enactment of advanced, autonomous technology is needed. As technology slowly enters the realm of autonomy and self-learning, this might challenge already established theoretical frameworks related to management and organizations. For instance, once technologies such as Pepper are capable of mood adaptations and dialogue in human-like manners, this raises new and existing questions in regards to how organizations are affected. Furthermore, we as researchers would encourage other scholars to further explore the relationship between technology and social boundaries in organizations. As differences in sensemaking have been found in regards to how employees within the organization perceive and enact technology, future studies may focus on the implications of such social groups. Lastly, we encourage the fields of management- and business research to extend their discursive fields to include aspects from other disciplines such as psychology, philosophy and behavioural science to a larger extent than before, in order to create a holistic angle on organizational behaviour. How organizational members make sense of their surroundings and enact that sense is what shapes and upholds organizational life, and should therefore not be neglected. We argue that this is especially beneficial when studying humanoid robots in an organizational context, due to their equivocal nature and the human tendency of anthropomorphism.

# Appendix A

| Interviewees | Role | No. of interviews | Duration |
|---|---|---|---|
| The Programmer and Manager for cloud services | IBM Stockholm. Pepper's programmer, "his boss" | 1 | 90 minutes |
| Partner Manager, Business Development IBM Client Center Nordic | IBM Stockholm. The programmer and app developers' boss. | 1 | 90 minutes |
| Business development and Transformation leader | IBM Stockholm. Associate of Partner Manager. | 2 | 90 minutes |
| App developer 1<br>University Relationship Coordinator | IBM Stockholm. Newly recruited employee from Uppsala University. Works together with App developer 2 on researching Pepper's possible future use | 2 | 90 minutes (30 in person during first visit, plus 60 minutes after via Skype) |
| App developer 2 | IBM Stockholm. Newly recruited employee from Uppsala University. | 2 | 90 minutes (30 during first visit, plus 60 minutes via Skype) |
| Communications manager | IBM Stockholm.<br>Communications Manager | 1 | 60 minutes |
| Technology Executive, ISV and Developer Relations | IBM Gothenburg. Manager of cloud services | 2 | 90 minutes |
| Technical Solutions Architect, Public Sector CTO Team IBM Europe & CTO Mobility IBM Nordic | IBM Gothenburg. Cognitive computing | 1 | 60 minutes |
| App Developer 3 | IBM Gothenburg.<br>App developer | 1 | 60 minutes |
| Client Manager | IBM Gothenburg.<br>Client manager | 1 | 60 minutes |
| Assistant Professor 1 | PhD Electrical Engineering<br>Assistant Professor at<br>Biomedical Signals and Systems. | 1 | 90 minutes |
| Assistant Professor 2 | PhD Electrical and Computer Engineering. Assistant Professor at Mechatronics,<br>Signals and Systems. | 1 | 90 minutes |

# Appendix B

| Category | Media | Author | Title | Date | Findings |
|---|---|---|---|---|---|
| News article | Wall Street Journal | Ante, Spencer | IBM Set to Expand Watson's Reach | **14-01-09** | Financial perspective on the investment of Watson. Watson is argued to be an important step in the evolution of cognitive computing. |
| Blog | PC World | Hornyak, Tim | Armed with Watson smarts, Pepper aspires to be a robot salesman | **15-07-30** | Explains how Pepper will get an upgrade by being connected to Watson.<br>This combination will take Pepper to new heights: from selling to amplifying the customer interactions.<br>Acknowledges that there are difficulties with the technology - but Watson allows for larger pools of data to be accessed.<br>Jokes about how employing Pepper is cheaper than a human. |
| News article | Tech Radar | Nguyen, Chen | IBM's Watson gives Pepper bot its smarts | **16-01-07** | Article is directed to another type of reader - someone more knowledgeable of IT developments.<br>Explains how the Watson-Pepper combo can make sense of hidden data and work as a digital assistants.<br>"Watson-powered Pepper" - implies knowledge of technology. |
| News article | Daily Mail | Liberatore, Stacy | Pepper to get a MEGABRAIN: Home robot set to use IBM's Watson supercomputer | **16-01-08** | Pepper presented as a "super robot", and a means to extend the possibilities of cognitive computing.<br>Pepper is a "step in the right direction".<br>Part of the article is devoted to "is your job threatened by robots?"<br>Visionary perspective on Pepper. |
| Video | Youtube | Mcleod, Jonah | CES 2016 Pepper the Robot | **16-01-16** | Pepper is scripted to answer the MC's questions in a cute and childlike manner (e.g. giggling).<br>Creating a show displaying the different apps making the audience believe is autonomy.<br>Comment section reveals how audience and viewers are unaware that the performance is scripted and discuss doomsday plots of machines taking over the world.<br>Visionary perspective on Pepper |
| Video | Youtube | Financial Times | Pepper the 'emotional' robot visits the FT | **16-05-03** | Org. members find Pepper endearing. Malfunction interpreted as intentional, react with laughter. Visionary perspective.<br>Does not understand that the robot is scripted Adorable and "like a child". The moderator does, however, problematize in a more "up-to-date" manner. |

| | | | | | |
|---|---|---|---|---|---|
| News article | Dagens Nyheter | Flores, Juan | Datahjärnan Watson klådde läkarna - hittade rätt diagnos | **16-09-04** | Focuses on Watson Health, and how AI technology is beneficial within this sector. Incorrectly states that Pepper has been used in hospitals. Furthermore, Pepper is referred to as a social and interactive robot, and a "she". |
| News article | Forbes | Greenwald, Michelle | Way Beyond Jeopardy: 5 Marketing Uses of IBM Watson | **16-09-20** | Addresses ways to leverage Watson intelligence and creating APIs for Watson to support its cognitive capabilities.<br>Advises how businesses can use Watson for marketing messages and tactics. |
| Blog | IBM | Hoffert, Johan | Pepper Robot | **16-11-08** | Describe Pepper as autonomous and intuitive.<br>Presenting a future image of Pepper.<br>Neglecting programming requirements. A great sales pitch. |
| News article | Dagens Nyheter | Sandstén Vikberg, Julia | Den mänskliga roboten intar Sverige | **16-12-04** | Pepper presented in a human-like manner.<br>Little connection to Watson.<br>No mention of Pepper's limited technology.<br>Sci-fi references.<br>Visionary perspective |
| Web page | IBM | IBM | Watson | **(u.d.)** | IBM's official Watson page. States that Watson "can understand all forms of data, interact naturally with people, and learn and reason, at scale". Further exploration of Watson APIs is possible via this page. |
| Blog | Tech Crunch | Dillet, Romain | Apple joins Amazon, Facebook, Google, IBM and Microsoft in AI initiative | **17-01-27** | The AI initiative has merged together big-shot companies in an alliance to develop AI principles together. Almost wanting to create the Silicon valley of AI to not miss out on this new opportunity. |
| News article | CNBC | Wojcik, Natalia | IBM's Watson 'is a joke' says Social Capital CEO Palihapitiya | **17-05-09** | The CEO states that Watson is a joke, and that IBM's marketing takes advantage of those with less knowledge on AI and cognitive technology, fooling them to believe that Watson can do more than it actually can. |

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