Cloudy talks

Exploring accounts about cloud computing

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This text could not have been written in isolation. Instead, it has been written as part of a process that involved many other people to whom I now direct my gratitude. That said, I am the only person responsible for any faults and inadequacies that may very probably exist in this text.

Writing a dissertation has been a genuine challenge. For some years now, we have stuck together through “thick and thin”, this text and I. Drawing on the idea of “thick and thin”, in my final year of study I attended a ceramics course; this turned out to be well chosen. A space was created to make something intrinsically different. I was able to get away from my computer and my text, letting the thesis project fade away for some hours. Quickly, the analogy of turning clay into fine ceramics and turning ideas into a thesis became an important image to me. This metaphor of the clay and the potter is old. I would like to think of it as a process of co-construction; the clay’s texture and colour, together with the adeptness of the potter, affect the outcome. Furthermore, drying, glazing and burning processes add to the final results. This image feeds into the description of how the thesis was moulded, dried, burnt, glazed and burnt again. It took various shapes at different stages. Parts of it were shaped from ideas that, after “burning”, showed weaknesses and were therefore discarded. Those articles produced first took considerably more time to finalise than those constructed at the end. Thus, my craft gradually improved.

The person I owe by far the most for the finalisation of this thesis is Professor Jan Nolin, who spent numerous hours discussing everything from tricky philosophical issues to pure technicalities with equal parts optimism and enthusiasm. My second supervisor, Senior Lecturer Karen Nowé Hedvall, has always challenged different ideas with both candour and straightforwardness. Without their support, this project would probably never have taken place. Another essential prerequisite was the funding of the thesis project. I owe sincere gratitude to the R&D Board at the University of Borås that supplied these resources.

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always had very honest conversations about our successes and failures as PhD students that indeed have been of great value to me. I want to thank Åsa Söderlind, whose support in her role as Director of Studies of the doctoral programme was of much value to me along the whole process. Appreciations go to my fellow PhD students and colleagues at the Swedish School of Library and Information Science and at other departments at the University of Borås. My gratitude goes to Karin Ekström at the university library for her detective work in finding relevant documents during the initial stages of my research. I also want to thank "green readers" Nasrine Olson and Katriina Byström for close reading in the final stages of thesis writing. Thanks go to Frances Hultgren, for proofreading the articles, and to Eva Medin for proofreading the summary essay.

Additionally, thanks go to the external parties that helped me to carry out this thesis project. First, I am most grateful to the interview participants for letting me use their insights and experiences in this project. My gratitude to one specific IT procurement consultant is massive. With his help in finding a very interesting research object, it was possible to develop the research in a beneficial direction. Second, I want to thank the anonymous reviewers for all their constructive comments to improve the articles. Third, I direct my appreciation to Professor David Allen with colleagues, who warmly received two Borås PhD students at Leeds University Business School. Fourth, I want to thank the Sisterhood of Saint Francis at Klaradal convent, which with great love offered me a quiet space in their community that provided me with the possibility to focus on reading and writing.

With this enumeration it is easy to imagine the process of writing a thesis, including various actors' contributions. Another similar, but at the same time very different, process is taking place to make sense of cloud computing through various actors' accounts and language representations. The image of a cloud, as a phenomenon at a distance, seems rather innocent; but, as discussed in the thesis, critical effects can also be caused from a distance. That said, cloud computing also creates a multitude of opportunities. How these technologies will play out in the future is not only made possible by the technology as such, but by you and me. My final appreciation is, therefore, directed to the reader, who, after digesting this thesis, hopefully will have a slightly different understanding regarding the complexity that information technology brings when integrated in society. The involvement of various stakeholders is much needed in future developments of IT.

Part I – *Incipio*

Management and data storage in "clouds" have increasingly become taken for granted. Floppy discs and limited hard drive capacity are merely memories from a time when the computer became "personal" with the PC. Today, with cloud technology, computing is carried out remotely. Do we know where and how our data is stored and processed? Do we care? These topics are seldom discussed and are not the most pressing issues around the coffee table. This thesis will hopefully contribute to a multifaceted discussion on the implementation of new information technology in general and of cloud computing specifically.

Chapter 1. Introduction

In this research project, the social construction and legitimation of cloud computing is studied by investigating various actors' accounts in written and spoken texts. It explores several aspects of how language underpins the social construction and legitimation of cloud computing. Even though this thesis's focus is on talk about cloud computing, the results are relevant to accounts about various forms of information technology (IT). This thesis can, therefore, contribute to a multifaceted discussion on the implementation of new IT in general and of cloud computing specifically.

The thesis is situated within library and information science (LIS), a discipline within social science. Its theoretical base and argumentation build upon notions articulated by Berger and Luckmann (1966), known as "the social construction of reality" and upon conceptual metaphor theory by Lakoff and Johnson (2003).

Importantly, there is a distinction between investigating the technology itself or, as this thesis concerns, various accounts as social constructions, and implies a dual process of talk about technology, as both constructed and constructing. In this thesis, the emphasis is put on various accounts used to explain, persuade and attract people and organisations to employ cloud computing.

This research project focused on tensions, as social sciences most often tend to do. That said, all the numerous positive dimensions of cloud computing that are commonly narrated have not been the objects of this research. Cloud services are all about functional services. Cloud technology solves daily

problems, fills needs, or entertains. Cloud services do all this. They are exceedingly useful. With cloud technology access to computing, information, and processing of data is no longer limited, but open to cloud providers and their third parties. Thereby cloud technology brings new "IT realities" as information can easily be shared in ways that has not been possible through legacy systems, which were disconnected from the internet.

People create and use language to talk about new technology. The term "google", a verbal form used to describe search activity in general, or in Google's search engine specifically, has been created by people to communicate a common activity on the World Wide Web. Powerful actors within technology innovation, as well as people in general, create accounts of how to understand these technology innovations. These actors will have an interpretative prerogative regarding how to talk about them. This can be exemplified by an episode in Sweden in 2013. As people using Google's search engine were not able to find what they were looking for, the term "ogooglebar", or in English "ungoogleable", was created. The Language Council of Sweden had included the word in their lists, which Google did not approve (Arthur, 2013).

Cloud computing can be perceived as an abstract phenomenon that comprises a broad array of applications. The term "cloud" has positive connotations: clouds are situated high up in the sky and therefore they cannot be "down", or something bad (compare Lakoff & Johnson, 2003). As people do not fully grasp this technology and it may have unanticipated effects, attractive explanations of its value are needed for its implementation and use.

The research project, on which this thesis is based, included the writing of four peer-reviewed articles between 2011 and 2016. During this time period, cloud computing, as a relatively new concept understood as information processing capacity and storage over the internet, emerged. In 2013, US whistle-blower Edward Snowden revealed surveillance activities within the US National Security Agency, which evoked criticism about cloud computing as a problematic technology that afforded these activities. The research project captured the time when information processing and storage started to move from dedicated servers to more vaguely specified resources. It is thus well situated and timely as it studies accounts about cloud computing as an exotic phenomenon not yet domesticated, mundane or taken for granted, which new technology has a tendency to rapidly become (Haddon, 2006). The advent and on-going process of transition to cloud computing, at the time of the research project, offered an opportunity to explore the issues at stake.

Problem statement

Vinton Cerf, one of the developers of the internet, stated: "…the Internet can become anything we can imagine and program it to be. […] With such a

plasticity, it is how we think about the Internet that matters" (Cerf, 1996, p. ix). This account of the possibilities in the developments of these technologies is an example of how IT has been talked about in a visionary manner, similar to utopian talk about cloud computing. Actors, such as innovators of new IT, can shape both current and future technology through metaphors, as they are "mechanisms of real political hegemony" (Gunkel, 1998, unpaged). The power to create and spread metaphors will be with those actors that have the authority to "determine the understanding and status of a given technology" (Gunkel, 1998, unpaged).

To be able to talk about a new technology, like cloud computing, it is necessary to create and use a common language as foundation for explanations, sense-making or persuasion. This may be complicated due to technology's perceived ambiguity, understood both as neutral and as having agency. The widely and commonly used language to denote cloud computing, initially identified in this research project, was ambiguous talk about these technologies as both revolutionising and as a utility accomplished (*e.g.* Carr, 2008). To further the understanding of how cloud computing was communicated, this metaphorical talk could be explored in detail.

Those who control the talk and the developments of cloud technology will have positions of power. As of writing, cloud providers frequently talk about cloud technology in a number of different ways, such as ubiquitous computing and Internet of Things, communicating that individuals and organisations are to expect much more in the near future. Initially, these ideas and concepts are constructed in order to make it possible to talk about a new technology simultaneously as the artefacts are developed. Thereafter, technology becomes taken for granted and is both shaped by and shapes language. Thus, people's accounts, built on their interactions with existing technology, set the terms for emerging artefacts and the way that they talk about and relate to them.

Today, cloud technology has a certain presence within individuals' activities, *e.g.* in the form of smartphones and other mobile devices dependent on these technologies, remotely operated and scalable. Cloud computing affords extensive information processing and storage capacities compared to legacy systems. New business models are furthered by the possibilities of harvesting a wide range of peoples' behavioural information on the web to create algorithmic identities. In years to come, cloud providers can continuously add layers of new or changed functionality.

Given the complexity of the relationship between the way that people express themselves and the way that technology takes shape in people's lives, there is a need to unpack what are otherwise interwoven moments of co-construction (Wyatt, 2008). Technology is commonly not recognised as a social construct – nor is talk about technology commonly recognised as having a role in relation to technological developments. Cloud computing has technical properties that offer new opportunities. How people talk about them have

consequences for their future developments. This thesis scrutinises such talk to discuss its implications.

Research aim and questions

The thesis's aim is to discuss accounts about cloud computing to uncover implicit assumptions and implications for its social construction. The research questions are formulated as follows:

- How do various actors persuasively talk about (cloud) computing over time?
    - How has networked computing conceptually been understood as a utility?
    - How are cloud computing's affordances described by cloud users?
    - How can tensions between cloud users' and the cloud industries' utilisation of cloud technology be understood through various accounts?
    - What kind of persuasive talk is involved in the promulgation of cloud technology?
- What are the implications of persuasive accounts about cloud computing?

Different actors' accounts of cloud computing will be examined and discussed. A premise is that expressions of language in written and spoken texts both are constituted by and constitute how cloud technology is understood, imagined and legitimised in its integration into society at various levels. The term *account* is used when an actor makes a statement of the reasons, causes and motives for the development or use of cloud computing or other types of networked computing. In this thesis, accounts are understood in relation to various actors, as to their position and context. In focus are accounts used especially as persuasive devices, such as metaphors (see Chapter 2). The concept *social construction* is defined as the process of how language both constructs and is constructed by social realities. Language is not viewed as objective, but may be understood differently in various social settings, over time, by different actors. Thus, people construct meaning when they express their thoughts, beliefs and emotions.

The central term *cloud computing* is characterised by internet-based delivery of software, platform and infrastructure services, often described in terms of Software as a Service (SaaS), Platform as a Service (PaaS) and

Infrastructure as a Service (IaaS)[1] (Vaquero *et al.*, 2009). Occasionally, these are referred to as *cloud services* in the thesis. Cloud computing and related technologies are sometimes described as *cloud technologies*. This concept is broader and also involves devices. Sometimes, the broader concept *IT* is utilised to include every type of technology that involves the handling and management of information. *Networked computing* is widely defined here as all various modes and computer devices in which computers communicate with each other, sharing resources, such as processing power, disk storage, and network bandwidth.

Demarcations

The thesis is not engaged in the technology *per se*, but in accounts about cloud technology. More specifically it is devoted to the exploration of accounts about *public* clouds rather than private, community or hybrid clouds. Public clouds only uses virtual server instances, without any control of where information physically is stored or processed.[2]

The thesis's focus is on conducting an analysis of how people express themselves through various accounts. This is not achieved trough conversation analysis, discourse analysis, or similar approaches, but through the analysis of metaphors and language as constructing social realities. The empirical material was acquired and analysed between 2011 and 2016, within the time limits of the research project. Since much IT innovation is foremost concentrated to the US, the empirical material used for Article 1, 3 and 4 relates to various actors involved in computing's early developments and onwards is set in this geographical region. So are the developments of cloud computing, with its hub in Silicon Valley. The empirical materials of Article 2 and 3 also involve the Swedish context. This is motivated by the circumstance that Sweden is a country denoted as an early adopter of new IT (World Economic Forum, 2016). Discussions in Sweden may thus be important and formative for other countries as these technologies are globally spread.

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[1] SaaS consists of computer applications, or software, accessed via internet. PaaS, or software environments, allows the user to build own software in a predefined way, set by the provider, within an infrastructure environment, IaaS (physical online hardware). IaaS consists of servers, power supply, devices for cooling, management devices, high-speed connection to the internet etc., on which software and platforms run and where data can be processed and stored (Barnatt, 2010).

[2] Private cloud consists of dedicated servers, internally housed or housed by a provider, community cloud consists of shared infrastructure, and hybrid cloud is a combination of private and public servers (Mell & Grance, 2011).

The thesis's position within library and information science

Library and information science (LIS) is a disciplinary domain and an interdisciplinary area of research encompassing a variety of subfields and theoretical approaches. Within the department of the Swedish School of Library and Information Science (SSLIS) at the University of Borås, the following subfields form LIS:

- Cultural Policy Studies (CPS)
- Information Management (IM)
- Information Needs Seeking and Use (INSU)
- Knowledge Organisation (KO)
- Scholarly Communication (SC) (Nolin *et al.*, 2015)

LIS's identity has been under scrutiny in several research papers (*e.g.* Dillon, 2007; Nolin, 2007), as LIS networks, supports and learns from other disciplines and research fields. Even though the term "science" is included in the name, with connotations of positivism, "studies", related to critical theory (compare Snow, 1993) is also embraced. Some departments favour the label information science (IS). In this thesis, LIS and IS are viewed as synonymous (compare elaborated discussion in Hjørland, 2014).

This thesis's position within LIS can be described from at least two different perspectives (Figure 1): LIS's subfield information management (IM) and social constructionism, a meta-theory within LIS (further discussed in *Chapter 3. Theoretical frame*). Social constructionist studies have been carried out for at least 30 years within LIS according to Huotari and Davenport (2008). They embrace different research topics, including: accounts of information practices; analyses of the professional and scientific discourses of IS and IT; the design of digital libraries, visualisation systems for mapping literatures, perspectives and debates; the design of collaborative knowledge filtering and synthesis systems. They have "an intimate relationship with problems related to vocabularies, discourse and language" (Talja *et al.*, 2005, p. 91) and are concentrated on discourse about libraries and culture (*e.g.* Talja, 2001), information and information flows (*e.g.* Day, 2001), users' information behaviour (*e.g.* McKenzie, 2003; Savolainen, 1995; Tuominen, 2004), the library profession (*e.g.* Julien & Given, 2003), digital libraries (*e.g.* Tuominen *et al.*, 2003) and IT (*e.g.* Jacobs, 2001). Several texts have discussed the constructionist approach within information seeking and use (*e.g.* Talja & McKenzie, 2007; Tuominen & Savolainen, 1997). Other studies within LIS deal with communicative processes and knowledge production (*e.g.* Kristiansson, 2008). Digital libraries as boundary objects have been studied in a constructionist manner (*e.g.* Worrall, 2014).

IM is an interdisciplinary, heterogeneous research area (*e.g.* Huotari, 2006; Maceviciute & Wilson, 2005; Madsen, 2012; Maes, 2007; Nowé, 2005). IM mainly concerns the study of effective management of information processes within organisations such as identifying information needs, seeking, acquisition, organisation, storage, analysis, use and dissemination (Choo, 2002). Research within IM has a breadth of approaches within various disciplines such as LIS, computer science, information system research, organisation studies, business, etc. As a subfield within LIS, IM explores the interactions between people, information and technology within organisational contexts. Hjørland (2014) has further elaborated on IM's relation to LIS or IS.

IT is regarded as one important element of IM and theories used in these other research areas are utilised within LIS (compare Choo, 2002). The thesis involves the study of technology utilised for management of information. It explores cloud computing from a broader perspective than the organisational, involving the IT industry and societal dimensions. Its vantage point, therefore, is the entangled-ness of cloud computing in society.

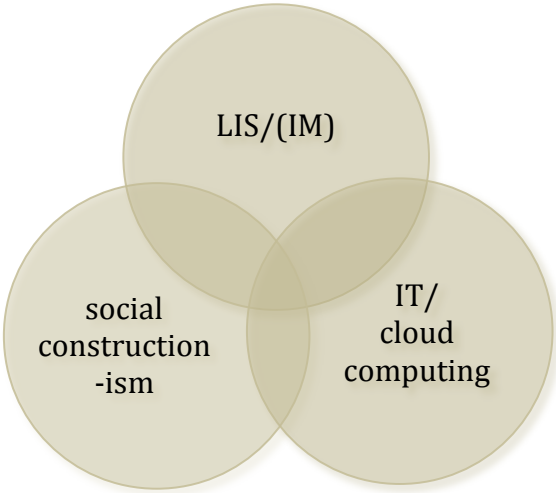

Figure 1. The thesis's research space. This illustration shows the thesis's research space and its different parts. The thesis's sphere of interest is positioned within the intersection of the three circles.

In the study of IM, technological solutions offer a vital area of inquiry, exceedingly central to organisations' overall management. The increasing digitisation of work within organisations also affects IM research. Businesses and industry face other types of problems due to the variety of IT systems implemented, together with the increased amounts of data and information content these systems create. The management of information in organisations is both complex and intrinsic to organisations. IT solutions for aggregating

information, such as enterprise content management (ECM), are numerous and a challenge for organisations to handle. Cloud computing is talked about as a solution to organisations' problems related to information management and therefore important to study, as it is pushed for by information system scholars (*e.g.* Willcocks *et al*., 2014) and the cloud industry.

From different aspects, constructivist IM research has dealt more explicitly with IT, or information systems. Various aspects that have been studied are, for instance, strategic information management (*e.g.* Dearstyne, 2004; Myburgh, 2002), effects on libraries (*e.g.* Raju *et al.*, 2007), implementation of technology (*e.g.* Davenport, 2000), and IT's impact on business performance and innovation (*e.g.* Johannessen *et al.*, 1999).

This thesis relates and contributes to IM as it involves critical discussions of what affects and constitutes the implementation and use of IT, such as cloud services, in organisations. Furthermore, it relates IT implementation and use to individuals, organisations and society at large, thus contributing to a broader understanding of information handling and management in society than what is usually accomplished within the IM field where explorations are most often limited to organisational environments. More specifically, the thesis scrutinises the legitimation of IT with asymmetrical affordances, involving tethered technology and privacy issues. IM research is mostly praxis-oriented, striving for the development of more efficient IT-organisation solutions to reach organisational goals. Contrarily, the thesis holds a critical perspective. The thesis contributes to IM with its retrospective perspective and attention to critical studies of privacy policies connected to IT services.

Reflections

Every study is more or less affected by the researcher's pre-understandings, or preconceived notions, about the research and its expected outcomes. It is every researcher's obligation to question how this context steers the different choices made. Being an information scientist and not, for instance, a computer scientist, even although I have some knowledge of computing and information systems, has affected my study and the various choices made. Both computer scientists and information scientists deal with the relationship between technology and users, yet their focus differs. Simply put, IM is more concerned with people than with technology.

My earlier profession as an archaeologist has also affected the study. Within archaeology, empirical material is uncovered with methods chosen due to previous knowledge, based on the findings' expected age and geographical data. Similarly, I have, during the adaptive process of the current project, "uncovered" empirical data through the iterative process between theoretical and empirical insights. As happens within archaeology, cultural remains can be

assumed to hold certain constructions and therefore a specific method is chosen for their uncovering. While digging, it occasionally becomes clear that initial assumptions were flawed and a new approach has to be taken. I experienced this necessity to change approach in the current research project. I began with distinct ideas about what kind of empirical material to collect, but along the way I had to reconcile these with the thought of finding new approaches. It was important to describe these meandering movements even though I had wished to be spared from them.

Retrospective aspects and experiences often have a tendency to be neglected or forgotten. Not only due to my previous professional area, archaeology, I am confident that understanding the present and the future is connected to understanding the past. This has also been important in the construction of this research project, involving aspects of *temporality* – past, present and future.

While undertaking this project, I have had time to contemplate the phenomenon that many non-IT professionals seem reluctant to talk about IT. In my experience, IT is not that much discussed in everyday work life by non-IT persons, except for when it does not function as expected or when people are very much impressed by the affordances of new technology. In everyday conversation, our communications about IT are limited by our underestimation of our own ideas' import in the context of limited knowledge about technology, despite the fact that we in many ways are steered by the technology we use. I consider IT as important in organisations' IM. IT is an essential part of the infrastructure of information processes and cannot be separated from what is happening in most organisations of the so-called "modern" realm. This discrepancy – IT's vital role in contrast to people's lack of involvement – contributed to the ideas behind this study.

This thesis project has included the critical study of cloud computing. This is not equal to a critical stand *against* technological development. Technology develops constantly and, thus, there are always choices to be made in innovation and implementation. My hope, therefore, is that people will continually be involved in negotiations concerning these new developments.

Outline of thesis

Using a vocabulary that is consistent with social sciences, this thesis is written for an audience that are familiar with such research traditions. That said, the intention is also that people outside social sciences can digest its content as it also includes condensed introductions to various theoretical and empirical concepts. The thesis is divided into four parts. Parts I-III constitute the summary essay that builds upon the findings presented in Part IV.

- Part I. *Incipio* represents a preparatory segment with texts that contextualise the research.
- Part II. *Exploro* represents an exploratory segment with texts that summarises the empirical work, built on the four articles in Part IV.
- Part III. *Concludo* represents a concluding segment that contains discussions and conclusions.
- Part IV. *Articuli* consists of four articles.

Part I consists of three chapters. Chapter 1. Introduction presents the thesis's starting point and motivation to focus on cloud computing accounts to understand how these construct social realities. This chapter also presents the aim and thesis demarcations. The thesis's position within LIS is described by defining its research space within information management (IM) as one of its subfields. The author's preunderstanding as an information scientist and its eventual consequences are also discussed.

In *Chapter 2. Background – talking about cloud computing* various contradicttory accounts of cloud computing within the IT press, in popular science and within research, are discussed. The purpose is to show various accounts of cloud computing, also reflecting different actors' struggles for interpretative prerogative.

In *Chapter 3. Theoretical frame* the thesis's ontological and epistemological base that social realities are not a given but socially constructed, are described. The study of accounts about cloud computing is theoretically framed by two theories: the social construction of reality by Berger and Luckmann (1966) and conceptual metaphor theory by Lakoff and Johnson (2003). The reader is introduced to research about how metaphors have been used to convey certain images and to gain interpretative prerogative. The cloud promulgators role, using persuasive devices, such as metaphors, is problematised. This frame lays the basis for how the findings are understood and discussed in *Chapter 7. Discussion.*

In Part II the findings of the articles, found in Part IV, are summarised. This part consists of three chapters. In *Chapter 4. Theoretical underpinnings* is described how the research project was inspired throughout the research process. While writing the articles, the social shaping of technology (SST) was perceived as the governing idea for the overall thesis in combination with the theories utilised. SST is a theory inspired by the social construction of reality by Berger and Luckmann (1966) concerned with the interrelatedness of people and technology. SST is briefly presented.

In *Chapter 5. Method*, the thesis's methodological approach is discussed in relation to the research process and the empirical material. The exploratory research approach is considered together with the different choices made along the research process. It describes how the empirical material was collected and

analysed. An analytical tool for the analysis of accounts is presented. This chapter ends with ethical considerations.

In *Chapter 6. Presentation of the articles* the four articles are summarised. Each article discusses one of the thesis's research questions. Article 1 is connected to the research question *How has networked computing conceptually been understood as a utility?* Article 2 is linked to the research question *How are cloud computing's affordances described by cloud users?* Article 3 relates to the research question *How can tensions between cloud users' and the cloud industries' utilisation of cloud technology be understood through various accounts?* Finally, Article 4 is tied to the research question *What kind of persuasive talk is involved in the promulgation of cloud technology?*

Together, the articles are the foundation upon which *Chapter 7. Discussion* is built. In this chapter, which constitutes Part III, the articles are discussed in relation to the thesis's aim: it is foremost concerned with the last research question *What are the implications of persuasive accounts about cloud computing?* The thesis closes with concluding remarks and ideas for future research. Apart from this summary essay, the thesis also comprises the four articles – Part IV.

Chapter 2. Background – talking about cloud computing

This chapter discusses how cloud computing has been talked about within popular science, research, governmental agencies and IT press. It does not aim to cover all accounts but to indicate, through various examples, their variation (additional examples are elaborated upon in Article 4). Accounts are related to the actors that use them and may differ between contexts and at various times. These can also involve territorial fights about interpretative prerogatives (compare with *Chapter 3. Theoretical frame: Metaphors as persuasive devices*). An additional purpose of this chapter is therefore to introduce the reader to contrasting talk of cloud computing. Even though this technology is not new (software over the internet has been utilised earlier), one could argue that the term "cloud computing" originated in around 2008. It is principally from this point on that popular science books, research articles and articles in the IT press appear. Over the last couple of years, these types of texts about cloud computing have increased dramatically.

Cloud computing can be seen as a technology that delivers computing in a range of modes. Thus, it is a relevant research object in a variety of practices, activities and settings. Consequently, cloud computing has been studied within a broad array of disciplines from various angles, with different perspectives. Research about cloud computing within social sciences has most often had a normative approach. It has been concentrated on legal and ethical dilemmas connected to privacy, laws and regulations, policy implications etc., such as sharing private data with third parties with the loss of privacy. These issues are often connected to the adoption of cloud computing (Bayramusta & Nasir, 2016).

Both journalists and researchers have communicated cloud technology as revolutionising. Several popular books, for example by Carr (2008), Barnatt (2010) and Zittrain (2008), have been widely distributed and influential in introducing and explaining this new phenomenon from various viewpoints. These books, which are frequently returned to in this text, explain cloud computing in a semi-popular mode, *i.e.* they appeal to both informed laypeople and researchers as they also include references.

Cloud computing has frequently been described as an agent of societal change. This type of talk is in line with a frequent theme that IT developments alter society. The metaphor "as revolutionary" is widely used to talk about new technology of various kinds and their impact on society (compare Winner, 1986). In "the big switch" metaphor, comparison of this societal change through cloud computing is made with the transition from decentralised to centralised

production of electricity (Carr, 2008). This is in many ways a striking and relevant comparison. A similar comparison of the effects of computers on societal change has been made with the change triggered by the steam engine, explained as a foundation of modern society (*e.g.* Simon, 1986).

Other utilities besides electricity have been used to talk about cloud computing, such as water. A Vodaphone manager stated that he was "a digital plumber" and "waterpipes are life, we are life" (World Economic Forum, 2015). Another example of this narrative is "computing power on tap" (Carr, 2008). Accounts refer to how the computer industry will shift in similar ways to the water industry. Explanations of how "the water industry switched from buckets and wells to indoor plumbing" (Taylor 1999, p. 23) with the consequence that well diggers lost their jobs, while plumbers' businesses prospered and people more frequently took a bath. The computer industry will shift in similar ways: "Instead of selling software in boxes, it is switching to renting applications by the hour over the internet" (Taylor 1999, p. 23).

Metaphors such as "the big switch" and "computing power on tap" signify convenience. "The big switch" draws on the easy, problem-free use of electricity – a switch that can be flipped and access to electrical light will be assured. Similarly, computing power will be conveniently accessible whenever needed. The metaphor "computing power on tap" refers to the water tap, (most often) easily turned on for access to unlimited, shared water supplies. Similarly, "the tap" just has to be turned on to get access to "powerful" computing. This is in line with Barnatt's (2010) vision that all software will be used "on tap" and continually updated, saving both time and trouble for users no longer in need of uploading new versions of various applications. These accounts indicate IT's transformative effects on society and on peoples' lives, while avoiding the complexity these technologies bring.

The accounts denote the alteration of the business models these technologies will bring – *i.e*. from of the shelf products, to IT services delivered over the internet. A common standpoint expressed in the IT press and by researchers is that cloud computing is viewed as the next step in the delivery of IT (*e.g.* Ponschock & Becker, 2011), or utility accomplished (*e.g.* Carr, 2008). Such accounts represent a somewhat deterministic understanding of how IT is accepted in society. Most often this talk identifies *shifts* rather than gradual developments of IT. Examples of such shifts are the transition from

- super computers to PC
- standalone computers to computing networks
- in-house to outsourced IT services

In this way, the abstract concept of cloud computing is made more concrete, as it is explained through these various shifts.

The most dramatic shift is probably cloud computing's business model, denoted "as a service" (SaaS, PaaS, IaaS), in congruence with utilities that are bought or leased as services rather than products. As a service, it is continuously updated and can be described as "permanent Beta". Users no longer have control of, and do not have to be aware of, updates as in previous praxis, when new versions of software was bought and installed as they were released. This may seem both convenient and disadvantageous. Even so, it is those who are solely positive that are in control of these services and their updates. They are also in control of how it is promulgated.

Not only cloud providers, but also IT managers are positive to the shift to cloud computing, now also communicated as "a paradigm" (Høegh, 2013) as a widely accepted technology within this professional community. This way of talking about cloud computing indicates how successful the IT industry has been in promoting their use of different rhetoric devices. Another persuasive device used both inside the IT industry and among IT academics is the description of cloud computing as "the new normal" (Willcocks *et al*., 2014).

The shift, from notions of products to notions of services, is abstract and may be difficult to grasp. Therefore, the IT industry needs new concepts to talk about this change in attractive and plausible means. An example of such a communicative device is to talk about cloud technology as "service-based" with four inherent properties: task-centric, dynamically scalable, has no set price, and is device-independent (Barnatt, 2010). Computing no longer consists of products that you buy and upgrade at your choice. Being service-based it is instead persuasively talked about as relieving customers from tedious updates and upgrading. It is promoted as offering different levels of utilisation with a focus on usability and ease of performing tasks. This talk is constructed by the technology savvy, drawing on their familiar role and purpose to look for problems to solve. In the following examples of its promotion, various persuasive devices are characteristic and make cloud computing more concrete, such as:

- Scalability: The customer has the ability to adapt quickly to the current needs of IT capacity, thereby also flexible in cost – the customer pays according to use.
- Ubiquitous computing: The customer can access and use resources from multiple types of devices from any geographical location with internet connection.
- End of acquiring software and hardware: Cloud computing eliminates the need for buying hardware or software, offering convenience through the integration of different services and resources (*e.g.* Buyya *et al.*, 2011).

Other ways of concretising an abstract phenomenon are to label it with a definition. To be widespread and useful it is reasonable to make these phenomena clear, and thereby understandable to various actors. There are frequently power struggles regarding the right to stipulate a definition. Involved in these struggles are standardising organisations, such as NIST[3], that want to have the interpretative prerogative in the explanations of cloud computing. In their definition of cloud computing, the service perspective is narrated as "convenient use":

> Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (Mell & Grance, 2011)

The reason to talk about cloud services as "minimal management efforts or service provider interaction", can be connected to another description of the property of cloud computing, described as "tethered" (Zittrain, 2008). Here, the term "tethered" describes cloud services as tied to certain providers and updated by them continuously. An issue of anxiety is, therefore, the lock-in effect, prohibiting users from swiftly changing service providers. A similar fear is what will happen with people's information if a service provider ceases to exist (Barnatt, 2010).

This narrative of "tetheredness" shows a struggle for interpretative prerogative in highlighting the delimiting abilities of the technology. As tethered, the technology affords relative stability since it is in the control of the cloud provider that easily can fix bugs and offer a better experience of functional technology, as attacks against hackers constantly need to be dealt with. Even though this property is talked about as affording effortless and "minimal management" of computing resources (Mell & Grance, 2011), the user, instead, does not know how or when the technology will change, as applications are constantly updated. There are no possibilities for users to change code, or tinker.

Still, despite these various ways to promote cloud technologies, they are not often discussed among a larger audience but seem to be opaque, abstract phenomena. This said, one metaphor – cloud computing as a utility – drew my attention, as it, as previously mentioned, was used to explain cloud computing (Carr, 2008). This instigated a study of the origin of this metaphor use (Article 4). In the close analysis of various texts that were written by IT scholars or

[3] The Computer Security Division at the Information Technology Laboratory (ITL) at The National Institute of Standards and Technology (NIST) in the U.S. Department of Commerce.

people within management and business, this metaphor for IT has been used over and over again since the late 50s, at the beginning of IT developments. From the 50s and onwards, innovators have pushed the utility metaphor and used it as an explanatory device. From the 70s onwards, it can be argued that the metaphor was used as a constitutive device (Article 1).

In the struggle for the interpretative prerogative of cloud computing accounts, voices have been raised against the metaphorical talk about cloud computing as utility, indicating asymmetry (*e.g.* Brynjolfsson *et al*., 2010), referring to the input-output idea of utilities. The criticism refer to this model as not applicable for information, since the processing of information in the cloud suggests both input and output – in which output may represent the organisation's core resources. Input in a public cloud is connected to sharing, the risk of losing or corrupting information Some fear that information can be transformed in different ways and that people cannot really know if they will access unaltered or, in some way, affected information. With cloud computing there are worries that cloud providers will own uploaded information (Barnatt, 2010).

Definitions of cloud computing are plentiful and varying. It could be argued that accounts that describe these technologies are used to make the concept more concrete. Accounts can also be used to make concepts even more abstract. In an explanation of cloud computing by Cohen – a person who was involved in the initiation of the concept "cloud" – this concept seems rather abstract. He talks about "the cloud" as "a metaphor for the internet as an operational environment where applications are utilized over the Internet rather than through more traditional means such as a desktop" (Cohen, 2012, p. 1). Similarly, Kushida *et al.* (2011) have visualised "a cloud ecosystem", including a multiplicity of reliant cloud stakeholders and technologies. Here, three dimensions of the cloud ecosystem were identified: the providers of different components of technology, the different types of architecture and different physical location of the technology used, facilitating different kind of services. This "ecology" depicts cloud computing and its implications for markets, organisations, society and individuals, where all the different elements are dependent on and affected by each other. This illustration attempts a visualisation of the complexity of cloud computing.

Considering the metaphor "cloud", it might at first seem to be a simple articulation of a rather complex phenomenon. However, "cloud" could denote a multitude of vague associations as to something intangible, loosely bounded, in constant change, impossible to predict. Building on assumptions like these, it is possible to distinguish accounts related to security and privacy issues of cloud computing. From such perspectives, the user may not really know when using software in the cloud or stored on the computer's hard drive, as there is really no apparent difference between stationary and cloud mode, when using cloud computing applications. This can contribute to substantial problems with the

uploading of sensitive information to cloud servers. Since the internet is built on notions of openness and not security, accounts of fear can easily become widely spread. As mentioned earlier, notions of fear were, for instance, associated with cloud computing following the revelations by Edward Snowden in 2013.

Summary

This chapter describes how cloud computing has been talked about in research, popular science and IT press. It does not aim to cover all accounts but to indicate, through various examples, their variation. The various accounts of cloud computing have been used to persuasively attract people to these technologies by using concrete, appealing explanations of this abstract phenomenon. Some examples of the struggle for interpretative prerogative are discussed.

An influential account of cloud computing is the notion of *utility*. This metaphor has been used to denote computing since the late 50s. Following this idea, cloud computing is not promulgated as products, but as *services*. This change is one of several *shifts* that explain the developments of computing. Lately, cloud computing is explicitly described with the very notion of a shift – a *paradigm*.

A struggle for *interpretative prerogative* is the presence of two alternate descriptions of cloud computing as having positive affordances by its several inherent properties, such as being task-centric, dynamically scalable, having no set price, and as device-independent, *or* as being problematic, or "tethered".

Chapter 3. Theoretical frame

This chapter presents the thesis's ontological and epistemological foundation – social constructionism – and theories that can be helpful in discussing the implications of accounts about cloud computing. The theories utilised are Berger and Luckmann's (1966) ideas on how language use both constructs and is constructed by reality, and Lakoff and Johnson's (2003) conceptual metaphor theory. This framework lays the ground for how the findings are understood and discussed in *Chapter 7. Discussion.*

It should be noted that from a constructionist viewpoint, the concept of "reality" is problematic. This may be the case even when used in the phrase "the social construction of reality" (Berger & Luckmann, 1966), with the implication that there actually would exist such a unified entity, instead of different realities. For the purposes of the current text, therefore, the notion "the social construction of realities" is used, in line with Hejl (1993).

Social constructionism

The thesis's ontological and epistemological foundation is social constructionism. Since the approach to knowledge as socially constructed rather than given has caused challenging debates, the motivation to conduct research within this tradition is the research project's focus on language. Social constructionism is a language-based theory grounded in the study of linguistic processes that studies language use, rhetoric and argumentation in discourses or conversations. It involves communication between people in constructing "social reality together by using language [in] the same conversation space" (Talja *et al.*, 2005, p. 89).

Social constructionism is understood as one of three meta-theories within LIS together with constructivism[4] and collectivism[5] (Talja *et al.*, 2005). It

[4] Constructivism has influences from Piaget (1959) and holds that knowledge creation is a cognitive activity that constructs mental models. Information cannot directly be translated into knowledge, but rather has to be constructed through human experience. Thus, constructivism and social constructionism have a similar approach to knowledge as constructed, not given, while research methods differ.

[5] Collectivism is influenced by Vygotsky (1978) and has similar approaches to knowledge creation as constructivism. Here, the emphasis is on the individual's social milieu in combination with cognitive processes instead of conversations.

differs from both of these strands by its study of knowledge production through conversations. Discourse analysis is often applied in these studies, influenced by works of philosophers like Foucault (1980), Gergen (1999) and Wittgenstein (1953). This research project does not utilise discourse analysis, but studies accounts as persuasive devices. Within LIS, there is little research that explores accounts of new technology. In this respect, by exploring accounts of cloud computing as persuasive devices, this thesis is different from earlier studies within LIS.

The basic idea of social constructionism is that meanings about realities are socially constructed and constructing through language and conversations (Talja *et al.*, 2005). Language is not viewed as objective, but may be understood differently in various social settings, over time and by different actors. Social constructionism originates from Wittgenstein's (1953) philosophy of language, where people, in expressing their thoughts, beliefs, and emotions, construct meaning. It is thus the language as representation of thoughts, beliefs and emotions that is the object of analysis. It adheres to the linguistic turn, or "the new literary forms" inspired by Derrida (1978).

It is a common misinterpretation that social constructionism, together with social constructivism, involve a denial that a world exists beyond people's ability to construct it.[6] Instead, the very argument is that understanding, or reconstruction, never can be objective reflections of the world (Grint & Woolgar, 1997). "The natures of things are not directly available to us without representations […] we do not have independent access to the way the world is" (Sismondo, 2004, p. 62). The familiar phenomenon of the chair can serve as an illustration. Most people in modern society agree that a certain object is a chair, due to its common properties. How can the chair, then, be understood as a phenomenon of social construction? Based on the arguments of social construction, the meaning of a chair is different for different people. For some, the chair is purely functional – for sitting on; for others, a certain chair can be viewed affectionately – "grandma" always sat in that chair; or the chair has symbolic value – a throne would be a good example. For a designer, the form, finish and construction would be the most interesting properties of a chair. For an artist, its expression would be in focus. If a chair were not comfortable, it would be neglected due to its dysfunction. If there were no available chairs at a restaurant, a hungry person would despair. A restaurant with many available chairs would be avoided, pointing possibly to a poor reputation of some kind. In these examples, the common agreement is that the object is a chair, but it can be talked about from their individual understandings. Thus, their accounts will vary. In studies of social construction, the focus is not on whether the

[6] Frequently debated during the Science Wars in the 1990s, starting with Sokal (1996).

commonly agreed-upon object, the chair, really has any physical substance or not. Instead, the interest is in what the chair means to people. The basic idea in social constructionism is that language constitutes meaning (Talja *et al.*, 2005). Another idea in social constructionism is that knowledge is always situated and dependent on position and situation. In this sense, language use and its meanings are never stable (Talja *et al.*, 2005).

There has been criticism against social constructionism. Mainly, claims suggest that the focus on solely language use neglects the exploration of other non-linguistic representations of the social (*e.g.* Cromby & Nightingale, 1999; Michael, 1996). There is some merit to this argument. Social constructionist studies are motivated by the argument that language is embedded in social expressions of materiality and therefore cannot be viewed as separate but as part of material representations. There have also been self-reflexive developments within the social constructivist group of researchers. Notably, Latour (2005) has argued that there are various problems with the "social" concept within social constructionism. The same problem can be identified in connection to the concept "technology". Both concepts are broad and can therefore be associated to a range of different activities and explanations. SST scholars occasionally simply refer to "constructionism", excluding the concept "social".

The social construction of realities

Through language, it is possible to objectify, classify and categorise people, experiences and objects, giving them meaning and making them easier to explain. By objectivating the shared experiences, language "makes them available to all within the linguistic community, thus becoming both the basis and the instrument of the collective stock of knowledge" (Berger & Luckmann, 1966, pp. 85-86). An assumption in this thesis is, therefore, that language objectifies cloud computing, constituting meanings of these technologies. Meanings about cloud computing also constitute social actions, such as talk. Language is the primary instrument that continually connects objective and subjective reality in an on-going process. New experiences are objectified by language and incorporated into what is already known. Thus, "the objectivated and objectified sedimentations are transmitted in the tradition of the collectivity in question" (Berger & Luckmann, 1966, p. 86), by the means of language.

Based on Berger and Luckmann's (1966) theory, the social construction of reality, language is both influenced by, and creates, realities. Consequently, it is not separate from other aspects of life. Language that underpins cloud computing is constructed by what is said in its promulgation and what it affords. Thus, talk about cloud computing is both affected by and affects meanings of these technologies. Language about cloud computing can be understood as intertwined constructions of equal importance to its implementation and use.

This on-going dialectic process of social construction is described as three interdependent "moments": *externalisation*, *objectification* and *internalisation* (Berger & Luckmann, 1966). In the following, these moments are elaborated upon with the example of the "technology as revolutionary" metaphor:

- *Externalisation*: The process by which people create their world or everyday life. Thus, people create social order through their activities. Cloud providers create cloud computing.
- *Objectification* is the process where people perceive the world, or everyday life, as ordered without the involvement of people, accounts about cloud technology, created by cloud providers, help to objectify and construct social realities – cloud computing is talked about as a revolution.
- *Internalisation*: People become "social products" when they socialise into that same reality, as they learn how the social order is legitimised. Accounts are therefore perceived as an unquestionable, objective reality. Consequently, it has become socially accepted and taken for granted that cloud computing is revolutionary. It is a socially constructed reality created by cloud providers and cloud users together.

Significantly, the model, with its three moments, breaks up the iterative movement involved in the construction of social realities and may inaccurately promote an understanding of certain causes and effects in a linear explanation. Instead, the three moments should be perceived as one constantly on-going process, as these opaque processes must still be understood as messy. This model is foremost illustrative. In the example above, as in the thesis, it is the cloud providers' persuasive talk that is explored as it is externalised, objectified and internalised.

Based on this model, it is suggested that accounts of cloud computing "as revolution" objectify these technologies. Language is one prerequisite for objectification, together with institutionalisation and legitimation.

Institutionalisation is here defined inclusively; it will appear when at least two persons or more agree that their actions – here the actions are represented by talk about cloud computing as revolution – are habitualised; this becomes entrenched over time as it previously has been repeated for every new IT that has preceded cloud computing.

Legitimation is defined as the process to make cloud computing "objectively available and subjectively plausible" (Berger & Luckmann, 1966, p. 110). Legitimation of the objectified social world appears with language as its basis and means, as meanings are embedded in language. Legitimation will, therefore, occur when a meaning of something is explained and justified as a given. Language becomes the "depository of a large aggregate of collective sedimentations" (Berger & Luckmann, 1966, p. 87) for both old and new

explanations, objectified and also disconnected from their origin. An example can be the talk about cloud computing as a revolution, legitimised as something that can further extensive change. This talk, among other examples discussed in this thesis, is suggested to make IT "objectively available and subjectively plausible" (Berger & Luckmann, 1966, p. 110). This metaphor, "as a revolution", can be described as a continuation of legitimation of new IT. How cloud technology's forerunners have been spoken of (see Article 1), and how cloud technology presently is talked about (see Article 4), can help understand their legitimisation.

During the thesis project cloud computing seems to have become increasingly pervasive, much less questioned and now gradually taken for granted. Thereby, one can argue that a process of legitimation has occurred. In this thesis, accounts are understood in relation to various actors, as to their position and context. It seems, therefore, highly relevant to ask what influence cloud promulgators have over the legitimisation of these technologies through their various persuasive devices. Based on this reasoning, the study of various accounts, representing meanings of cloud technology as these have to be interpreted and articulated by the human actors involved, is an approach to understand the process of its legitimation and how new realities are constructed.

Berger and Luckmann's (1966) model of the social construction of reality has been under scrutiny. Criticism has been raised against their use of the construction metaphor (*e.g.* Sismondo, 1993) with the argument that this metaphor implies one single intentional actor rather than an unintentional creation of new realities. It is difficult to see the point here. Berger and Luckmann (1966) state that it is people and their accounts of the world that construct the social reality. IT is not constructed in a void. As pointed out earlier, the plural form "realities" is used to avoid this confusion.

Berger and Luckmann's (1966) theory of social construction of reality is foremost connected to everyday life. A prerequisite to understanding everyday realities is language as it is affected by and affects everyday life and the people within it. Even if cloud computing is a technology that is included in many people's daily life, for example through the use of smartphones, in general people seem not usually to talk about cloud technology other than about its functional properties as they experience them. It is, therefore, especially interesting to explore accounts of cloud computing and what can be learnt from these.

Conceptual metaphor theory

This thesis utilises Lakoff and Johnson's (2003) conceptual metaphor theory, which has been influential and used within a variety of research fields. Their approach is very similar to Berger and Luckmann's (1966). More specifically,

Lakoff and Johnson (2003) study the language representations of metaphors as accounts to understanding, intrinsic to everyday life. They argue that people use a diversity of concepts to explain a phenomenon, as no single concept can fully be comprehensively explained on its own terms. Therefore, when describing a phenomenon, as it is difficult to use an exact phrase, metaphors can be utilised. It is interesting to compare their ideas with statements by Berger and Luckmann (1966), indicating a close relation. They reason that the common language, available to people for objectification of their experiences, is based upon everyday life. When people use the common language to interpret non-everyday life experiences, it keeps "pointing back" to everyday life experiences. Therefore, explanations of non-everyday experiences are "distorted" when people start to use common language to interpret them.

Language is perceived as objectifying the world by bridging the gap between already known everyday realities, or objects, and what is new or rare, thus making the world understandable according to a cohesive order. Similarly, the use of conceptual metaphors is more than a way of talking, or a matter of language use; it is based on experience. Even if most phenomena "can be *experienced* directly, none of them can be fully comprehended on their own terms. Instead, we must understand them in terms of other [kinds of] entities and experiences" (Lakoff & Johnson, 2003, p. 178). Thus, metaphors can conceptualise a phenomenon.

Lakoff and Johnson (2003) claim metaphors are intrinsic to everyday life, *i.e.* people live by them. They emphasise that metaphors exist richly in people's daily expressions. To prove their point, they give examples of some conceptual metaphors such as "argument" and "ideas": "argument as war" and "ideas as food". If argument is like war, then in a discussion it is sensible to state, "I won that argument!" (Lakoff & Johnson, 2003, p. 5). Or, if ideas are like food, then when developing ideas, it makes sense to state, "I just can't swallow that claim!" and "that's food for thought!" (Lakoff & Johnson, 2003, pp. 47-48). Similarly, people talk of "updating" one another on certain issues relating to images of how computers can be updated with new versions of software.

People tend to make diffuse phenomena more specific and tangible by the use of metaphors. Diffuse phenomena can include "human emotions, abstract concepts, mental activity, time, work, human institutions, social practices, etc., and even for physical objects that have no inherent boundaries or orientations" (Lakoff & Johnson, 2003, p. 178). Lakoff (1993) summarises the nature of metaphors in six arguments:

1. Metaphor is the main mechanism through which we comprehend abstract concepts and perform abstract reasoning. (p. 244)

In relation to my work focusing on cloud computing, metaphors are mechanisms to understand and discuss the abstract phenomena of IT. Similarly,

various metaphors describing cloud computing make it possible to comprehend that same technology and afford talk about this abstract concept.

2. Much subject matter, from the most mundane to the most abstruse scientific theories, can only be comprehended via metaphor. (Lakoff, 1993, p. 245)

This argument is related to the character of the subject matter. It is almost a necessity to use a metaphor to explain cloud computing. Without such explanations it would not be possible to comprehend these technologies, as they are abstract to most people not familiar with IT.

3. Metaphor is fundamentally conceptual, not linguistic, in nature. (Lakoff, 1993, p. 245)

Metaphors are based on experiences. Therefore, metaphors about cloud computing are related to experience of how previous IT has been experienced and explained.

4. Metaphorical language is a surface manifestation of conceptual metaphor. (Lakoff, 1993, p. 245)

How people talk about things and experiences may reveal how people conceptually understand something. Similarly, how people describe cloud computing may reveal how people conceptually understand these technologies.

5. Though much of our conceptual system is metaphorical, a significant part of it is nonmetaphorical. Metaphorical understanding is grounded in nonmetaphorical understanding. (Lakoff, 1993, p. 245)

We can understand phenomena, on their own terms, without the use of metaphors. Various technical properties of cloud computing are examples of phenomena that can be described without the use of metaphors and are therefore non-metaphorical. Still, these technical properties can be a basis for metaphorical understanding. For instance, the talk of cloud computing as fast and flexible is based on the technical properties that cloud computing comprises. This talk influences the metaphorical understanding of those technologies.

6. Metaphor allows us to understand a relatively abstract or inherently unstructured subject matter in terms of a more concrete, or at least more highly structured subject matter. (Lakoff, 1993, p. 245)

A metaphor can help to understand an abstract phenomenon as it can give it a clearer structure. Here, the metaphor “cloud” in cloud computing is helplessly misleading. It does not afford any understanding of the complexity of the phenomenon and does not give further insights into its technical properties. Rather, it mystifies and detaches the phenomenon from more concrete ways of

understanding. The description of cloud computing as constituted by SaaS, PaaS and IaaS is much more helpful to people knowledgeable about IT when it comes to concretisation and structure.

To explain a phenomenon by the use of certain metaphors will highlight some aspects while hiding others. To picture various aspects of a phenomenon will, therefore, require the use of inconsistent metaphors. People seem to need to continuously shift between metaphors: "The use of many metaphors that are inconsistent with one another seems necessary for us if we are to comprehend the details of our daily existence" (Lakoff and Johnson, 2003, p. 222). In the study of the cloud providers' argumentation (Article 4), diverse metaphors are used to convince their audience of the benefits in using their technology.

As discussed by Winner (1986), there is a lack of words to explain IT within IT's own vocabulary. Innovators and promulgators are concerned with finding persuasive language for the necessary acceptance of these new technologies. Building on Lakoff and Johnson (2003), concepts from other domains than IT are used in order to persuasively explain the value of future technology. Thus, new metaphors constantly emerge to make abstract entities more concrete and understandable. For Portmess and Tower (2015, p. 4) metaphor is "the *techné* of language – it allows language to reach beyond conventional use". As cloud talk mostly is concerned with future developments of these technologies, new ways to describe these developments are constantly needed.

In line with Berger and Luckmann's (1966) argumentation about language as socially constructing, metaphors are also utilised to explain and legitimise the objectified social world and create social order. Thus, metaphors are used to construct social realities just as much as metaphors are constructed by those same social realities. Metaphors can also be used in the struggle for interpretative prerogative, which will be discussed in the next section.

Metaphors as persuasive devices

Abstract ideas or new phenomena, such as cloud computing, are often difficult to communicate, but effective communication of these technologies is in the interest of cloud providers. Metaphors can be used to quickly communicate new concepts. In this section, therefore, studies that focus on metaphors' role as mechanisms of power that align with conceptual metaphor theory are reviewed, as elaborated above. More precisely, this text is focused on metaphors as vehicles to convey attractive and persuasive images in order to gain power. It focuses on metaphors' political role, investigating how metaphors are used as persuasive devices.

Those who control metaphors when it comes to their creation and use also have power (*e.g.* Portmess & Tower, 2015, Puschmann & Burgess, 2014).

"[T]he people who get to impose their metaphors on the culture get to define what we consider to be true" (Lakoff & Johnson, 2003, pp. 160-161). They can be chosen strategically and agency is connected to those who use them. Metaphors are not used in a void, but could, instead, be viewed as representations of political, social, and cultural norms and values (Leong *et al.*, 2009, p. 1274). People with power, such as political leaders, religious leaders, business leaders, advertisers and the media, have controlled how metaphors have been used (Lakoff & Johnson, 2003). Through this type of control, actors can "shape the discussion to their own advantage" (Larsson, 2012, p. 618). Metaphors can be used in social power struggles as strategic tools for communication. Metaphors are "connected to social power as well as the topic of social change versus stability" in struggles over dominant definitions (Hellsten, 2002, p. 47). The struggle for power to define metaphors of cloud computing reflects this power for change and stability.

Following Hellsten's (2002) argumentation about metaphors as reflecting change, they can also become vehicles for different actors "to help people think about the future" (Wyatt, 2004, p. 257). Actors' thoughts and intents can be revealed by the use of certain images (Wyatt, 2004). Thus, metaphors are used to transform visions to future realities. Put simply, social actors deploy certain metaphors to exercise agency and to shape the future (Wyatt, 2000; 2004). In Article 4, Google's, Apple's, Facebook's and Amazon's future visions of their cloud technology are communicated through several metaphors. Sometimes these companies have been referred to as GAFA and described as "dominating the ecosystem of connective media" (van Dijck 2013, p. 163). The metaphors here seem to be used as mechanisms of political hegemony. Metaphors not only may tell the innovator's design intentions but also the intensions of its future uses, revealing their perceptions and expectations of the technology (Wyatt, 2000). Thus, metaphors can have political power in shaping the future.

Metaphors can direct attention to technology as solution to societal or individual problem. Grounding metaphors for IT can imply value neutral tools that can function as "solutions" or "surgical instruments" to organisational problems (Hamilton, 2000). Different actors want to convince the audience that their "solution" is better than their competitors'. Thus, the way people talk about technology by using these metaphors "serves as a 'mindsetter' for our present society and for visions of the future" (Johansson, 1997, p. 213).

Various metaphors for cloud computing have been vital in the construction and negotiation of social realities. The utility metaphor is one among several that continuously has been used for various IT; likewise with cloud computing (Article 1). It has been used for making sense and has successively been taken for granted. As time passes, metaphors are inclined to become increasingly taken for granted: "[t]echnology disappears as a separate construct in everyday life because it is a transparent way of making sense of the world" (Markham, 2003, p. 12). In this sense, one could argue that IT has almost disappeared as a

separate construct in everyday life. Today, individuals' close relation with smartphones can illustrate this phenomenon.

Building on these arguments, metaphors are not neutral, but powerful devices and mechanisms of political hegemony that affect social realities. In line with Lakoff and Johnson (2003) and several other researchers' ideas, metaphors can be political in the sense that certain actors use them for special purposes. The one-sided focus (discussed in Article 4) – a rich apparatus of metaphors, holding up all the possibilities that this technology will bring – is no surprise, since every industry needs to create high expectations, dependable on market scores. Without customers, the cloud industry would be powerless. What is interesting in this thesis is how cloud technology, products and services, are promoted, *i.e.* what images of reality are produced.

Summary

In this chapter, the thesis's theoretical frame is presented, starting with an introduction of its ontological and epistemological underpinning, social constructionism, which understands knowledge as socially constructed rather than given. The motivation to conduct research within this tradition is the research project's focus on language involving communication between people in the construction of social realities.

Two theories are applied to study accounts of the promotion of cloud computing. These theories are the social construction of reality by Berger and Luckmann (1966) and conceptual metaphor theory by Lakoff and Johnson (2003). Berger and Luckmann's (1966) model of three interdependent moments is elaborated together with their understanding of institutionalisation and legitimation. Their argumentation is based on the assumption that social actions, such as talk, construct realities just as much as they are constructed by them.

Lakoff and Johnson (2003) discuss how phenomena are explained by the application of metaphors. They view metaphors as intrinsic to everyday life and that "we live by them". Metaphors are deeply intertwined in everyday expressions and in understandings of social realities, affecting how they these realities are perceived. They make some aspects visible while hiding others. Metaphors can thereby be used in struggles for the interpretative prerogative. It is argued that cloud providers, in order to construct realities use persuasive metaphors for cloud computing. Actors that can control metaphors are therefore powerful.

Part II – *Exploro*

This part is devoted to the thesis's empirical exploration. During the process of acquiring and analysing the empirical material, some theoretical ideas inspired the overall thesis project. These theories are briefly introduced in *Chapter 4. Theoretical underpinnings*. The empirical material has been the basis for four peer-reviewed articles. All methodological considerations could not be fully developed in the articles. The methodological endeavours connected to the empirical material and its analysis are, therefore, in detail presented in *Chapter 5. Method*. Finally, the articles are summarised in *Chapter 6. Presentation of the articles.*

Chapter 4. Theoretical underpinnings

This chapter aims to give a richer understanding of how the research project was theoretically focused throughout the process. As the thesis started to take form with the writing of the articles (*Chapter 6. Presentation of the articles*), theories that concerned the interrelatedness of people and technology – *i.e.* a socio-technical approach – were seen as fundamental. While exploring the empirical material, one of those theories, the social shaping of technology (SST), was seen as the governing idea for the overall thesis in combination with the theories that are utilised in *Chapter 3. Theoretical frame*. As the research project progressed, it became clear that the theoretical frame had to be narrowed down to focus solely on theories that could relate to the social construction focused on language rather than technology. Below, the broader perspective of SST is summarised.

The social shaping of technology

Similar to other strands of the socio-technical approaches, SST views technology as deeply intertwined with the social in its shaping, development, use and its implications. An often-repeated stance is that the social and the technological are inseparable and have to be studied as one unit. Consequently, technology is not fixed or absolute but constantly negotiated. This is in distinct contrast to the idea of technology as given. Bijker (2006) refers to this

deterministic view of technology as "the standard image". Within SST it is common to talk of such things as "blackboxed". One of my primary interests was to open the "black box" to uncover what has been taken for granted. SST is primarily concerned with the examination of social, institutional, economic and cultural shaping of:

- Technological innovations, concerning its direction and rate;
- The content of technological artefacts and practices; and
- The outcomes of technological change for different groups, for organisations and for society at large (Williams & Edge, 1996).

SST originates from Science and Technology Studies (STS). According to Sismondo (2004), STS has incorporated the concept "social construction" from Berger and Luckmann's (1966) theory of the social construction of reality (discussed in *Chapter 3. Theoretical frame*). SST's origin is within four different research traditions: the Sociology of Scientific Knowledge (SSK), the Sociology of Industrial Organisation, Critical Studies of Technology Policy and The Economics of Technological Change (Williams & Edge, 1996). Initially, the influence of the Sociology of Industrial Organisation SST was strong. This research strand focused on industrial transformation and technological change, and is among others represented by Braverman's (1974) and Noble's (1979) research. The Social Construction of Technology (SCOT) (*e.g.* Pinch & Bijker, 1987) and Actor Network Theory (ANT) (*e.g.* Latour, 1987) sometimes view SST as parallel or as an umbrella concept. All three are often referred to as constructivist studies of technology (Wajcman, 2002) in line with Talja *et al.*'s (2005) definition of constructivism. Both SCOT and ANT have developed their own specific methodologies and concepts.

Within SST, technologies are perceived as socially shaped "not just in their usage, but especially with respect to their design and technical content" (Wajcman, 2002, p. 351). SST research represents a variety of approaches that point to social changes within organisations or society at various levels. SST research can also involve dimensions of power (*e.g.* Winner, 1986). Frequently, though, this research focuses on micro-level practices (*e.g.* Mazmanian *et al.*, 2005), of groups, stakeholders or professionals. One of the most persistent foci has been on the construction of technological practices within organisations (*e.g.* Robey & Sahay, 2001; Yates, 2006). In their review, Leonardi and Barley (2010) have found at least five diverse approaches to the social construction of technology in different phases of implementation.

SST takes a stand against technological determinism. It rejects the view of technological development and use as a predestined trajectory, or as Bijker (2006) puts it – a "standard conception" of technology and its relation to society. Technological determinism holds that, firstly, technology has inherent capabilities to transform and develop society on its own premises. Secondly, it

embraces the idea that technological developments are the main cause of societal change, as well as a constant adaptation in society to the change new technology brings (Williams & Edge, 1996).

SST has occasionally been mistaken for only studying "the form of technology" (Williams & Edge, 1996, p. 868), without addressing its social consequences. Winner (1986) rejects that technology has inherent properties that shape reality regardless of social reality, but insists that technology in context is political and part of societal power structures. The most cited example is the system of Long Island, New York's, overpasses, which were deliberately built low, thus hindering lower-income inhabitants from travelling to the seaside by using public transportation as busses could not pass. As a consequence, only residents that afforded cars could conveniently reach the seashore. This argument, that technological properties can actually change people's behaviour, is strong and shows the complexity in the interplay between the technological and the social. In line with Winner (1993), this thesis adopts the view that technological developments are intertwined with multilayered social processes, such as talk. Winner (1993) states that the social constructivist approach is valuable and "…reveal[s] the spectrum of possible technological choices, alternatives, and branching points within patterns sometimes thought to be necessary" (p. 366). In social constructivist studies, contingency and choice are emphasised (Winner, 1993). Seemingly, the issue of determinism is rooted in simple notions of causes and effects that make little sense from a constructionist viewpoint. This thesis shows, instead, that these processes are much more complex and multifaceted, in line with arguments by Winner (1993).

As previously mentioned, in this thesis, these ideas about technology were not used for the analysis of the empirical material. Still, they have influenced the approach to study new technologies, such as cloud computing. They have given valuable insights into the processes of social construction that was useful when, at a later stage, the focus shifted to instead look at how language was socially constructed and constructing. The same iterative movement involving technology and people also includes their accounts of those technologies, as language is embedded in these processes. Likewise, the rejection of determinism, a focal point in SST, is valid for the social construction through language. Actors can choose how to talk about certain technologies even if IT vocabulary is limited. Consequently, actors such as cloud providers can choose certain persuasive strategies in their communicative rhetoric.

Chapter 5. Method

In this chapter, the methodological approach is discussed in relation to the research process and the empirical material. The exploratory research approach is elaborated upon as well as the different choices made along the way. This chapter also describes how the empirical material was collected and analysed. Furthermore, reflections on methodological problems and ethical issues are discussed.

An exploratory research approach

It is challenging to explore cloud computing given that it is a relatively new phenomenon and our understanding of it is in flux. Therefore, the research process did not start with a clearly defined research question. Instead, it was exploratory, flexible and open-minded in character. As a consequence, the research process moved iteratively between theoretical and empirical insights. Theory guided the research process just as much as the empirical material. Layder (1998) describes this back-and-forth movement in his adaptive theory, which "attempts to combine an emphasis on prior theoretical ideas and models which feed into and guide research while at the same time attending to the generation of theory from the ongoing analysis of data" (p. 19). The ontological and epistemological basis of the research project lies within social constructionism (Talja *et al.*, 2005). This position affects how the empirical material was understood as bound to certain contexts, thus reflecting its social construction. According to Talja *et al.* (2005), social constructionism has foremost been utilised as a meta-theory rather than as a methodological approach within information studies. In this research project, social constructionism has guided the methodological choice to use various accounts in written and spoken texts about cloud computing as empirical material.

Studying talk about cloud computing was challenging, foremost regarding difficulties to initially conceptualise the technology, due to its broad and heterogeneous character (summarised in *Chapter 1. Introduction* and *Chapter 2. Background – talking about cloud computing*). In a technology's initial stages of innovation, implementation, and use, some researchers state that there is often a lack of common agreement about or understanding of that technology (*e.g.* Bijker *et al.*, 1987). During a five-year project such as this, the involved technology develops and changes in unanticipated ways. This also concerns the ways various professionals and users talk about it. In order to cope with the complexity of studying accounts about a constantly transformative

phenomenon, certain guiding principles were developed. The purpose of these principles was to create a consistent approach when pursuing several disparate studies that all were intended to focus on the same emerging phenomenon. In a very concrete sense, these principles steered my research interest and the explorative research design.

The first guiding principle involved *temporality*: past, present and future. From the start, I was struck by the way that talk about new IT tends towards the futuristic, transformative and deterministic. I wanted to have a specific case devoted to the present, but also investigate talk about IT in the past. These different foci overlap as the past discussions probe the future, essentially attempting to describe the present situation. Finally, I wanted to study futuristic discussions of the present, *i.e.* of what people are supposed to expect in the near future. In a sense, the research project went full circle as the first article concerned future visions articulated in the past and the last article involved future visions articulated in the present. It is important to emphasise that future visions have the potential to construct events to come. Latour (1989) has argued that knowledge is fundamentally concerned with the practice of acting at a distance and therefore upholding power over remote places. Similarly to this, claims about what will or what should happen involve acting and exerting power at a distance in relation to the future.

The second guiding principle involved *actors*: cloud providers, computer scientists, IT professionals, business leaders and strategic staff in organisations that had implemented cloud services. This principle was aimed at finding actors involved in the innovation, promulgation and implementation of cloud computing. Consequently, accounts by IT professionals and people with strategic responsibilities for organisations' implementation of new technology, representing a variety of organisational contexts, were relevant sources for the understanding of the social construction of cloud computing. The intention was to acquire a broader understanding of the phenomenon studied by encompassing a variety of actors.

The third guiding principle involved the actors' contexts at various *organisational positions*. The intent was to collect accounts from various contexts, both supra- and intra- organisational. To study accounts from actors within, for example, one specific organisation would give insights into that particular organisation, its sector and its specific prerequisites. The intent was instead to broaden the enquiry to include actors at various positions in society and organisations. This approach was expected to enrich the data, adding dimensions to the exploration of the accounts that construct the understanding of cloud computing.

The fourth guiding principle involved *type of text*: written and spoken. This choice was partly based upon the first guiding principle in combination with the intent to collect a variety of empirical material allowing various types of data. For instance, it was expected that accounts in written academic texts

would differ widely from accounts in the spoken promulgation of cloud technology.

Consequently, the articles are based on different types of empirical material that combine the guiding principles in various ways (Table 1, below). Data was thus gathered with a variety of different qualitative research methods of which most are commonly used within LIS. This strategy, to mix different methods, affords exploration of the research object from a multifaceted approach, which, in turn, allows for a broader coverage of the phenomenon studied. Use of different methods creates diverse types of data. When brought together, a more complex picture emerges. In sum, the empirical material is limited to certain sources and consists of:

- Documents concerning one specific metaphor, networked computing "as utility", used by computer scientists and business leaders;
- Two different interview studies;
    - the first based on five interviews with IT procurement consultants;
    - the second on six interviews with strategic staff, responsible for thirty different schools within an educational organisation;
- Privacy policy documents from one specific cloud provider; and
- Video clips on YouTube with presentations by leaders within the cloud industry.

The number of interviews is rather limited, keeping in mind that the population with experiences of implementing cloud computing in organisations is much larger. The low numbers therefore reflect one of my challenges, which was finding organisations that were willing to participate in the study. However, based on the empirical material, as snapshots, I have discerned interesting phenomena worthy of a thorough dissection and discussion.

The research process

In 2011, a cloud-initiative was taken by an IT manager in a Swedish municipality, Salem, in which the manager introduced Google Apps to the overall organisation. The reasons for this transition were that the software would be free of charge and that the service was known to be "the best". Salem would become the first municipality in Sweden to implement the service (Salems kommun, 2011). The Swedish Data Inspection Board has since then assessed the use of Google Apps in several municipalities and issued considerable injunctions (Ricknäs, 2013). One issue was that Google's use of users' information was not transparent. Since then, there have been several amendments in the agreements with Google, but even so, its cloud services offer

opportunities yet conferring consequences difficult to fully understand and foresee. Inspired by this case, I wanted to study cloud technology implementation in organisations. In 2011, when my project started, I took two different initiatives to learn more about how people within the IT sector discussed cloud computing at the time. The purpose was to explore what was at stake and to find a relevant research direction. First, in spring 2011, I had a conversation with a representative of IDG[7] in Sweden. Second, I participated in a "cloud camp" arranged by The Internet Foundation in Sweden (iiS)[8] on 23 November 2011.

The initial idea, later abandoned, was to examine how IT managers identify, discuss and deal with the transition to cloud computing and its implications for IT professional's and IT department's roles within organisations. In search for how to formulate a research question based on this intent led to a research process that included five distinctive successive parts, understood as measures. The *first* measure of the research process focused on the concept of cloud computing. This led to the investigation of how developments of computing conceptually had been explained and a

- … document study was carried out, which contained documents that talked about computing or IT as a utility (Study 1).

In Study 1, documents reflecting the developments of computing that included a specific metaphor were collected. The intent was to explore how cloud computing was explained in comparison to earlier developments within computing. The study resulted in Article 1, *As a Utility – Metaphors of Information Technologies*. The inspiration to study the utility metaphor in relation to the development of cloud computing came from reading *The Big Switch* by Carr (2008). In this widely debated book, Carr discusses the transition to cloud computing using the image of utilities, such as electricity and water, to depict how computing resources will be commonly organised and shared. He exemplifies the transition to cloud computing by comparing it with the transition from private to centrally owned power stations, among other examples. The aim was to trace this metaphor usage retrospectively. This was also a way to examine how previous IT had been perceived and talked about by innovators and scholars.

The *second* measure of the research process was taken due to the aim to identify what was at stake in the transition to cloud computing among IT professionals and organisations. By studying IT procurement consultants'

[7] IDG http://www.idg.se/

[8] The Internet Foundation in Sweden's (iiS) webpage https://www.iis.se/english/

accounts of their perceptions of organisations' transition process to cloud computing, the research would be situated at an intra-organisational position. The interviewed IT procurement consultants worked for organisations, yet they were not a part of them. They thus functioned as links between providers and clients. They were also daily exposed to IT selection and implementation issues in different types of organisations, which affords an overview and knowledge of IT in organisations that is unique. Another reason to choose the group IT procurement consultants was their use of the annotation "organisation developer", which confirms the entangledness of organisations and IT. A pilot study was carried out, consisting of

- … interviews with IT procurement consultants working with the procurement of cloud computing (Study 2).

The aim of the study was to develop an understanding of how cloud computing was talked about by those who functioned as mediators between cloud producers and organisations implementing cloud technology. One reason for choosing IT procurement consultants was a desire to more broadly explore the phenomenon of cloud computing, instead of limiting the study to specific organisations. It was expected that the IT procurement consultants would have similar understanding of cloud computing and IT in organisations. Before the investigation, the group of consultants seemed to be a reasonably homogenous group, as they all worked with procurement of IT and cloud computing. Contrarily, the results showed rather that a variety of understandings existed. Even though there were only five respondents, their accounts varied broadly regarding the central issues of organisations' needs around cloud computing. There may be a range of explanations to this result: cloud technology had not yet been stabilised, the variety of choices in implementation and use, the consultants' different educational backgrounds, their various knowledge bases and experiences, the dependence on diverse structural influences (political, cultural, economical), lack of shared practice and knowledge, dissimilarities among organisations for which they supplied procurement services, etc.

The study was conducted at the time of the revelations of NSA's surveillance, *i.e.* activities as described by whistle-blower Edward Snowden (Greenwald, 2013), in collaboration with US-based corporations such as Google, Microsoft and Facebook. These revelations weakened the repute of cloud technology. The IT procurement consultants were aware of these questionable affordances of the technology and had concerns about the acceptability of cloud technology due to these unveilings. Slowly, the initial research intent to focus on IT professionals, which was a very diversified group who held both doubts about and beliefs in cloud technology, was instead replaced by the study of different accounts of cloud computing within and between different organisational groups.

The *third* measure was taken thanks to one of the interviewed IT procurement consultants, whom I later contacted (see mail, Appendix 7). A link was established with a Swedish educational organisation that had implemented Google Apps for Education (GAFE). This generated a connection to the educational sphere and the educational research field. GAFE was deemed relevant for the study for different reasons: GAFE is a typical example of apps developed by cloud providers for schools. GAFE is also an extreme case of cloud technology, as the border between the public sphere and business interests, and exploiting school pupils' information, is blurred. Furthermore, this particular educational organisation was an early adopter of cloud technology. This case may also have implications for organisations at large and for society in general. The empirical material hinges on

- … an interview study with strategic staff within the educational organisation (Study 3).

The strategic staff in this interview study were responsible for approximately thirty schools, represented by the IT teacher, IT director, Chief Information Officer (CIO), director of education and development, Content Management System Manager (CMS manager) and former Chief Executive Officer (CEO). The intent was to cover different organisational groups' accounts of cloud computing within an organisation that recently had implemented cloud technology. This study resulted in two articles: Article 2, *Pupils in the Clouds – Implementation of Google Apps for Education* and Article 3, *Information We Collect: Surveillance and Privacy in the Implementation of Google Apps for Education*.

The *fourth* measure of the research process was induced by the GAFE case study (Study 3), in which different tensions between the public and the cloud industries became clear due to their divergent interests. This led to further investigation of how pupils' information is actually used and accounts of what the cloud industry does with this information. The empirical data chosen were

- … Google policy documents found on its website (Study 4).

Article 3 also included Study 4, a document study of privacy policy texts. Google's policy texts are understood to be an account with the function of regulating how people interact with different types of technology. This study is the result of insights from Study 3, where a tension was identified between statements concerning pupils' privacy and the cloud provider's use of pupils' information in relation to the cloud service utilised.

The *fifth* and last measure of the research process was stimulated by the results from the critical analysis of Google policy documents and the ambition to involve accounts of future visions about cloud computing. This led to the

choice to study the cloud industry and its visions of the future. The chosen empirical data include

- … video clips on YouTube with presentations by GAFA leaders (Study 5).

Table 1. Overview of the studies. The studies in relation to guiding principles and articles within the research project.

Studies	*Guiding principles*				*Articles*
	Tempor-ality: Past, present and future	*Actors*: Computer scientists, IT professionals, business leaders and strategic staff	*Organisational positions*: Supra- and intra-organisational	*Type of text:* Written and spoken	
1 – document study on the utility metaphor	Past	computer scientists and business leaders	Supra-organisational	Written	1. *As a Utility*
2 – interview study with IT procurement consultants	Present/ Future	IT professionals	Intra-organisational	Spoken	–
3 – interview study with strategic educational staff	Present	Strategic staff	Intra-organisational	Spoken	2. *Pupils in the Clouds* 3. *Inform-ation We Collect*
4 – document study on Google policy documents	Present	Cloud industry	Supra-organisational	Written	3. *Inform-ation We Collect*
5 – document study on GAFA leaders	Future	Business leaders	Supra-organisational	Spoken	4. *GAFA Speaks*

Study 5 analysed video clips with spoken texts in the form of presentations by leaders within the cloud industry, as representatives of innovators, management

and IT professionals. This study evolved from a desire to include visions of cloud computing within the cloud industry. The study resulted in Article 4, *GAFA Speaks: Metaphors in the Promotion of Cloud Technology*. In Table 1, the different studies' relationship to the research project's guiding principles is shown.

Production and analysis of empirical material

In the following text comes a presentation of how the empirical material was gathered and analysed, based on the specific methodological issues of the different studies. For an overview, Table 2 summarises the different empirical material in relation to the different studies, which will be presented in the following text.

Study 1

The study was a conceptual examination of IT and its developments based on written documents. It covers retrospective, supra-organisational and written material by computer scientists and business leaders. The documents were contemporary, reflecting how the technology was explained at the time the document was written. Accounts of networked technology explained as utilities were explored with the aim to understand the social construction of cloud computing. The study was inspired by Carr (2008), who argues that cloud computing is "utility achieved", *i.e.* that it can be seen as a utility. The technique utilised for finding accounts was "pearl growing" (Ramer, 2005). A textual qualitative content analysis, inspired by Lundman and Hällgren Graneheim (2008) and Schreier (2012), was conducted. The analysis was based on accounts that included the metaphor "computing as utility" and the study was, in this sense, concept-driven (Kvale & Brinkmann, 2009). Using conceptual metaphor theory (Lakoff & Johnson, 2003), the utility metaphor was scrutinised.

Study 2

The study examined contemporary accounts of the implementation of cloud computing in organisations and covers intra-organisational positions and spoken texts, represented by interviews with IT professionals. Initially, I searched for respondents that procured cloud computing and that had contributed to discussions about these technologies in IT trade journals or that had been involved in policy related initiatives, such as white papers. To recruit additional respondents, I asked the interviewee to recommend persons that had the experience of procuring cloud computing. This approach resulted in a total of ten IT procurement consultants that were contacted. Five of these agreed to participate in the study. Their educational backgrounds were diverse; one lacked

higher education, one had dropped out from university studies, one had a Bachelor's degree, one had a Master's degree, and one respondent had a doctoral degree. In addition, their disciplinary backgrounds varied, representing economics, physics, IT and engineering. They were all male, operating in different parts of Sweden. The semi-structured interviews were conducted during May and June 2013, at the time for the NSA scandal. The interviews were carried out over the telephone and lasted 60-90 minutes. They were recorded and summarised, in most cases immediately after the interviews. The summaries were sent to the respondents to allow for correction and validation.

Study 3

The aim of the study was to understand why Google Apps for Education (GAFE) was implemented and how it was talked about. The empirical material covers present, intra-organisational positions and spoken texts with strategic staff. The selection of participants in the semi-structured qualitative interview study was based on the idea of covering a variety of strategic areas within the organisation, such as management, education and IT. The initial inquiry was mediated by one of the IT procurement consultants from Study 2. This provided contact with a person in the organisation who, in turn, approached people who were relevant in relation to their leading positions as well as to the requirements of the project. This led to interviews with four respondents. Moreover, in order to further broaden the diversity of perspectives, two others were contacted that held, or previously had held, leading positions in the organisation. The circumstance that the initial contact person had in turn approached most of the respondents should also be taken into consideration in relation to their accounts. The interviews were carried out face-to face, in a place chosen by the respondent, and were conducted as a semi-structured process, originating from formulated themes and questions (Appendix 6). The interviews lasted in average around 90 minutes. They were recorded and summarised. Summaries were sent to the respondents for correction and validation.

Study 4

This study of Google's privacy policy documents was steered by the objective to understand what Google says in its agreements about what they do with the user data they have access to. The empirical material covers written material, created by the cloud industry, representing a supra-organisational position. The study was inspired by Turow (2011), who argues that the purpose of privacy policies frequently is to mislead users as they convey a false sense of security. A premise was, therefore, that Google privacy policy documents were rhetorical in character and markedly different from purely informative policy documents. Google's web site was searched for documents concerning its privacy policies. The purpose was to collect and review all available and relevant policy documents provided by Google and not only those particularly concerned with

GAFE, as all Google services are intimately intertwined. Statements about Google's actions in relation to the words "information" and "data" were documented and thematically explored.

Table 2. Overview of the empirical material. The empirical material and analytical tools used in the five studies.

Study	*Data collecti-on year*	*Empirical material*	*Analytical tools*
1 – document study on the utility metaphor and computing	2011-12	Documents containing the metaphor of computing as utility found through pearl growing technique (Ramer, 2005)	Qualitative content analysis of quotes
2 – interview study with IT procurement consultants on cloud computing	2013	5 interviews with IT procurement consultants, (Appendix 1, 2 and 3)	Qualitative content analysis structured in themes
3 – interview study with strategic educational staff on GAFE	2014	6 interviews with strategic staff in an educational organisation, covering thirty schools (Appendix 4, 5 and 6)	Qualitative content analysis – coding and categorisation, inspired by Lundman and Hällgren Graneheim (2008) and Schreier (2012)
4 – document study on Google policy documents	2015	8 Google policy documents at Google website	Qualitative content analysis of Google rhetoric
5 – document study on presentations of cloud industry (GAFA) leaders on cloud technology	2015	13 video clips on YouTube	Qualitative content analysis of GAFA rhetoric – metaphor categories by Dahlbom & Janlert (1988)

Study 5

This study focused on future visions of GAFA through a content analysis of its leaders' rhetoric. It covers futurist, supra-organisational and spoken texts consisting of accounts of computing technology by business leaders within the cloud industry. GAFA was chosen due to their impact on the development of cloud technology. YouTube was searched for video clips where GAFA leaders promote their products and services. In these searches, video clips were also suggested by YouTube. Some of these were relevant to the study and were incorporated in the empirical material. The empirical material was limited to presentations from 2015 in order to collect the most recent material possible and it was analysed December 2015-March 2016. In total, 13 video clips on YouTube were identified as relevant in relation to the guiding principles (see Table 1). The accounts selected for analysis represented metaphorical utterances of cloud technologies. Wherever accounts concerning future visions of their services were identified, these were transcribed. The content analysis was based on a categorisation created by Dahlbom and Janlert (1988) of structural, functional and system metaphors.

An analytical tool for the analysis of accounts

This thesis's ontological and epistemological stance within social constructionism affects how the empirical material is understood as bound to certain contexts, reflecting its social construction. As indicated in Layder's (1998) adaptive theory, the process of analysis moves iteratively between the theoretical and empirical level. In this case, the analysis of the empirical material entailed a distancing, in which six premises were developed as an analytical tool inspired by social constructionism. These premises can also serve as a complement to other methodological approaches within LIS. The premises are articulated in the following sentences: What an account holds …

- … is deemed relevant for the actor creating the account.
- … is interesting in comparison with other accounts.
- … reveals what is not said.
- … may be contrary to actions.
- … may be rhetorical and used as a persuasive device.
- … can socially construct reality.

The *first* premise – what an account holds is deemed relevant for the actor creating the account – has been important in all the different articles. An account is related to the actor that creates it, although this may perhaps be affected by certain circumstances. What is deemed relevant for the actor may differ from time to time and between location to location. Therefore, the

account has to be considered in relation to the actor's context. This premise was helpful in the interpretation of all the accounts within the empirical material. It was especially informative for the interpretation of accounts in Article 1, where different actors make sense of the new technology by using metaphors; in Article 3, where one influential cloud provider informs users, through privacy policy texts, how interaction with their service is regulated; and in Article 4, where the most influential cloud providers use persuasive accounts in their marketing.

The *second* premise – what an account holds is interesting in comparison with other accounts – was informative for the overall understanding of all the different accounts collected during the research process. All articles compare various accounts from diverse actors on various grounds. They compare scholars' and managements' accounts on computing over time (Article 1), accounts from individuals with different strategic responsibilities within one organisation (Article 2 and 3), and accounts that represent different cloud providers (Article 4).

The *third* premise – what an account holds reveals what is not said – was important for understanding what was not told in the scrutiny of the different accounts. In Article 1 and 4, accounts of metaphors were used to enforce certain images while hiding others. Lakoff and Johnson (2003) have discussed this in their conceptual metaphor theory (*Chapter 3. Theoretical frame*). In Article 3, different rhetorical tactics in policy texts were revealed as hiding valuable information. One such tactic was the "by example" rhetorical device, which guides the reader to certain matters, while avoiding other more problematic issues. It can be expected in an interview situation that certain sensitive issues will be avoided, or not mentioned, even if the interviewer probes. This was a concern in the interpretation of the interview material used for Article 2 and 3.

The *fourth* premise – what an account holds may be contrary to actions – is inspired by Brunsson's (2002) work on hypocrisy, which is especially obvious in Article 3, where policy texts were used to mislead the user in how user information was utilised by the cloud provider. The *fifth* premise – what an account holds may be rhetorical and used as a persuasive device – is related to rhetorical devices and promulgation. In this thesis, there is a deep concern with the promulgation of IT and cloud computing in various types of written and spoken texts, foremost discussed in Article 1 and 4.

The *sixth* premise – what an account holds can socially construct reality – is relevant in all social constructionist research and is highly relevant in the interpretation of the overall empirical material. Berger and Luckmann's (1966) theory on the social construction of reality shows how accounts are both constructing and constructed by society, involving different actors that have power. This configuration can also explain how new technology is pushed, received and implemented. In Article 1, the utility metaphor is discussed as constructing realities in the development of networked computing.

Reflection on methodological problems

Given the diversity of methods utilised in this thesis, a wide array of practical problems involving the collection and analysis of empirical material have been encountered. In addition, the theoretical adherence to social constructionism led to an approach where empirical material frequently can be seen as co-constructed by the researcher and those actors studied, such as respondents' accounts in interviews. Accounts are seen as situated, constructed as useful or appropriate in certain contexts. From such a methodological vantage point, it becomes important to seek a diversity of sources. The problems involved have led to the construction of the guiding principles, previously presented in this chapter (*An exploratory research approach*). This approach has been chosen in order to be consistently transparent, to openly present considerations and choices made.

The ambition to seek many different sources and to investigate a variety of accounts over time has come at the cost of a large empirical study. Instead of building on one case and one large population, it was deemed to be of most value to take inventory of a multitude of viewpoints among actors with varying positions and contexts. The choice to study different types of sources has led to a combination of methods. This is also a reason to combine "naturally occurring data" (Peräkylä & Ruusuvuori, 2011), such as accounts within both oral and written documents, with researcher instigated data, such as accounts from interviews. As with all methods, there are fallacies, so also with the methods chosen for the various studies.

The document analyses carried out in Study 1 and 4 were challenging in many ways. There were problems relating to the selection and analysis of empirical material. Another delicate issue is the type of reading that has to be carried out. In dealing with these issues, it was important to aspire to a symmetrical processing in both choice of texts and in reading them. To be symmetrical in the reading of the material, it was necessary to follow an iterative process of returning to analysed texts, as new insights will continuously be acquired along the course. Similar features were also relevant to consider in the analysis of the video clips in Study 5, as this type of empirical material differs from written texts. One such difference is that it cannot be expected to have been formed through the same rigorous process as can be assumed of published written texts. A published document has a character of deliberateness as it is a product of an editorial process, involving critical scrutiny. Video clips, on the contrary, may be characterised by an amount of spontaneity not found in published texts. Thus, various forms of documents have various issues to attend to (Bloor, 1991).

Similarly, the interview method, carried out in Study 2 and 3, is not without weaknesses and can be criticised for various reasons. The most substantial criticism is that this method holds a power asymmetry between the

researcher and the interviewee, instead of “a pure and authentic interaction” (Kvale & Brinkmann, 2009, p. 18). It can be viewed as a negotiation (compare Gilbert, 1980). This power asymmetry concerns the interviewer’s position in relation to the interviewee regarding scientific competence, control of the interview situation, defining and posing questions, and deciding the interview’s route. The interview may even be “a manipulative dialogue” with a partly “hidden agenda” and “a monopoly of interpretation”. The interviewee can react with a counter-control, *i.e.* to navigate around the topic or keep back information (Kvale & Brinkmann, 2009, pp. 33-34). The asymmetrical interview situation therefore affects what is talked about and how.

Ethical considerations

This research follows the ethical principles recommended by the Swedish Research Council (Vetenskapsrådet, 2011). The five studies involved various ethical considerations. The different empirical materials that Study 1, 4 and 5 are comprised of were publicly available and do not involve the same ethical research concerns that Study 2 and 3 may imply. For Study 2, the participants were approached by e-mail, which informed them about the research project, its aim and information about my research interest, contact details to me and my advisors (Appendix 1). In advance, the respondents were sent an informed consent form (Appendix 2) by email, which informed them about their rights that the data would be treated confidentially, leaving out names and used only for the specific research purpose. Some of the respondents signed the form and sent it in return by email after the interview was completed, while some of the participants did not sign the form, but agreed on its premises orally. To the people involved in Study 3 the same information was sent as in Study 2 (Appendix 4). All respondents were offered confidentiality throughout the research process and in the final texts. A letter of consent (Appendix 5) had been sent to them in advance and was signed by all participants before the interviews started.

Summary

This research project has an exploratory and adaptive approach. The theories guided the research process just as much as the empirical material (Layder, 1998). This has also influenced the methodological approach, with its mix of different methods, such as semi-structured interviews and document studies. Four guiding principles came to steer the overall methodological approach of collecting a broad range of empirical material. The guiding principles embrace temporality, actors, organisational positions and type of text. The research process included five distinctive successive parts, understood as measures. The

first measure of the research process was to understand the concept of cloud computing, which led to the exploration of how developments of networked computing conceptually had been explained (Study 1). The *second* measure of the research process was taken in line with the aim of identifying what was at stake in the transition to cloud computing for IT professionals and organisations. This was achieved by studying IT procurement consultants' accounts of their perceptions of organisations' transition processes to cloud computing. A pilot study was carried out, consisting of interviews with IT procurement consultants working with the procurement of cloud (Study 2). The *third* measure was the establishment of a connection with a Swedish educational organisation that had implemented Google Apps for Education (GAFE). This generated a connection to the educational sphere and to the educational research field. GAFE was deemed relevant for the study as a typical example of a bundle of apps developed by cloud providers for schools. The empirical material consists of an interview study with strategic staff within the educational organisation (Study 3). The *fourth* measure was further investigation of how pupils' information is actually used and accounts of what the cloud industry does with this information. The empirical data chosen were Google policy documents found on its website (Study 4). The *fifth* measure was taken with the ambition of obtaining accounts of future visions of cloud computing. This led to the choice to study the cloud industry and its visions of the future. The empirical data were video clips on YouTube with presentations by GAFA leaders (Study 5). Data was gathered with a variety of different qualitative research methods. The empirical material is limited to certain sources and consists of:

- Documents concerning one specific metaphor, networked computing "as utility", used by computer scientists and business leaders;
- Two different interview studies;
    - the first based on five interviews with IT procurement consultants;
    - the second on six interviews with strategic staff, responsible for thirty different schools within an educational organisation;
- Privacy policy documents from one specific cloud provider; and
- Video clips on YouTube with presentations by leaders within the cloud industry.

The analysis of the empirical material entailed a distancing, in which six premises were developed as an analytical tool inspired by social constructionism. The premises are articulated in the following sentences: What an account holds

- … is deemed relevant for the actor creating the account.
- … is interesting in comparison with other accounts.
- … reveals what is not said.
- … may be contrary to actions.
- … may be rhetorical and used as a persuasive device.
- … can socially construct reality.

The five studies involved various methodological problems and ethical considerations. The methodological issues discussed here concerned the diverse characters of the analysed documents and problem of symmetrical analysis. The asymmetrical relation between the interviewer and the interviewee was also discussed. The different empirical materials that Study 1, 4 and 5 are comprised of were publicly available and do not involve the same ethical research concerns that Study 2 and 3 may imply.

Chapter 6. Presentation of the articles

In this chapter, the four peer-reviewed articles are summarised consecutively. Each article discusses one of the thesis's research questions. Article 1 is connected to the research question *How has networked computing conceptually been understood as a utility?* Article 2 is linked to the research question *How are cloud computing's affordances described by cloud users?* Article 3 relates to the research question *How can tensions between cloud users' and the cloud industries' utilisation of cloud technology be understood through various accounts?* Finally, Article 4 is tied to the research question *What kind of persuasive talk is involved in the promulgation of cloud technology?*

A common procedure regarding compilation theses was followed, in that supervisors become involved as co-authors. Such was the case in three of the four articles. Nevertheless, the contributions of my collaborators can be quantified to be less than 10% of the total work involved. Collaborative efforts were mostly focused on finalising the texts. I have been single author of Article 1 and first author of Articles 2, 3 and 4. The articles have been published in four different scientific journals. Article 1 was published in *Human IT*, which is a multi-disciplinary, scholarly journal, focusing on new research and discussion about digital media. Article 2 was published in *First Monday*, a peer–reviewed journal focused on the Internet. Article 3 was published in *European Educational Research Journal* (EERJ), a peer-reviewed journal focusing on "the changing landscape of education research across Europe", published by SAGE. Article 4 was published in *Journal of Documentation* (JDoc), an academic journal in library and information science, published by Emerald. Both EERJ and JDoc are indexed in Web of Science. The chosen publication strategy may indicate a progression in how the ambitions involved in article production developed during the research process. As it happened all articles were published 2016/17. This was not planned, but was rather due to the process for results to mature and the timelines necessary for editorial processing and publishing.

Article 1 – As a Utility – Metaphors of Information Technologies

Purpose: The starting point of this article was the usage of the utility metaphor in connection to accounts of cloud computing. One contemporary example is Carr's (2008) analogy of the transition to cloud computing as compared to the transition from local power supply to central power plants. Building on this

metaphor, the article explored what this image communicates and what it draws attention away from. The aim of the article was to make an inventory of the use of the utility metaphor in relation to the longitudinal development of networked computing and its implications for society.

Design/methodology/approach: A document study was carried out where documents that utilised the utility metaphor – *i.e.* textual sources that compared the use of ITs or networked computing with utilities, such as electricity, water, etc. – were scrutinised.

Findings: The utility metaphor was used to articulate new ways for people to relate to emerging forms of IT. Early use of the metaphor pointed to a successive general understanding among a substantial number of IT professionals that this was a useful way to communicate what networked computing could become. The study showed that the utility metaphor was used continuously to visualise networked computing, both by scholars and professionals, since the late 50s.

In the article, it was argued that the use of the utility metaphor to explain new computational technologies hid their politically and societally transformative aspects. These technologies were, instead, explained as neutral utilities. Several researchers have discussed the neutrality of technology. Heidegger (1954) argued that humanity tends to develop technology under the misconception of being in control. Technology was perceived as objects, or tools, to be used by people. This notion, of technology as far from being a neutral tool, has been criticised in diverse ways by different researchers. For example, Winner (1986) confronted this idea, arguing that artefacts are always produced in societal settings and therefore become intertwined with existing power structures. The production and distribution of new technology, therefore, tend to become vehicles for political agendas. Metaphors can also be vehicles for political agendas, as they convey certain images that highlight some aspects while downplaying others. Social actors deploy certain metaphors to exercise agency and to shape the future. Metaphors can communicate visions with the intent to make them become real.

The results of the study showed that the utility metaphor continuously was used in connection to the development of networked computing. The metaphor was tracked in various texts originating from the time when networked computing was developed, emerging in the 50s. Accounts of computing as utility were revisited over and over again as a core concept in advanced discussions and visions of its future developments. The metaphor communicated not only what computing could become, but also future societal conditions in which computing power would become ubiquitous. Early on, these discussions were isolated to a visionary elite, mostly consisting of computer scientists. Importantly, the use of the utility metaphor preceded the innovations

of these technologies. This understanding, of what social realities networked computing could bring, was helpful when to prepare for what was anticipated by the innovators. In this sense, the metaphor was useful in their aim to socially construct realities.

The first occurrence of the metaphor was Bauer's (1958) comparison of purchases between computer time and power or water from utility companies. He visualised computers that were developed to execute more than one task at a time – *i.e.* time-sharing. Time-sharing allowed for efficient use of computer power attending to numerous uses, as it enabled synchronised use, which eliminated the idle time of the computer. Time-sharing also facilitated later innovations of networked computing. *Time-sharing as utility* allowed for visionary discussions on the transformation of society, free from political and ideological frames. Increasingly, accounts during this time-period, from the end of the 50s to the end of the 60s, have traits of social engineering. Already in the 1960s, warnings were raised against the development of computing and its unforeseen societal consequences. Criticisms against the use of the utility metaphor were also voiced. Arguments were made that the analogy with electricity was simplifying, ignoring substantial differences. The most essential characteristic of electricity is, arguably, fixed content, while in computing any bit of information varies.

In the 70s, the utility metaphor was used in relation to the development of computer networks within and between organisations for sharing information resources. If the main part of the literature from the 50s and 60s was written by people with knowledge of the evolving technology – as they often were a part of this development – the literature from the following period was mostly produced from organisational, institutional, economical and societal perspectives. At the time, the utility metaphor became connected to notions of centralisation and standardisation, again emphasising similarities with electricity/water distribution and thus highlighting that the flow of information was akin to that of water "on tap". Building on such images, it became possible to question why organisations should have their own computer systems. A dominant futuristic idea was that centralised supercomputers would serve many users. The dissemination of the PC in the 1980s instantly outmoded such visions.

In the 90s, the internet and World Wide Web had their breakthrough and were by many perceived as the complete network. Users were linked together through nodes, in a distributed, decentralised network, instead of many small separated systems without interconnection. The utility metaphor then shifted from the comparison of computing with power as such, to the distribution of power – the power grid. Consequently, there was much more emphasis placed on information flow as electricity. At the same time, the emphasis was increasingly placed on aspects of water as utility, as the user could adjust the tap to the preferred flow. In both regards, the metaphor suggested that this flow

should be seen as a neutral resource. The emerging development and use of the internet, would push this effort one step further. At the end of the 90s, a new notion of computer network emerged; *utility computing* was portrayed as multifaceted, flexible, security-rich and scalable. During the 00s, this analogy was further elaborated. Through the emphasis on the computer grid as self-sufficing, the utility metaphor was pushed to its limits and was difficult to link with the straightforward notions of flow of water "on tap".

While leaving out this retrospective approach, Carr argued that cloud computing signified the "utility achieved" (Carr, 2008). Statements of cloud computing could be perceived as echoes from earlier time periods, with emphasis on functionality and economy. The argumentation was normative and lacked analytical discussions on issues such as societal and political consequences. The documents focused instead business models, efficient use of resources, and business opportunities. The cloud metaphor was loaded with positive connotations purposely intended to show that IT is a self-evident part of people's daily environment.

Important themes in constant tension in the texts analysed were the polarisation between centralisation and decentralisation, flexibility and control, commercial and non-commercial, and also between standardisation and specialisation. A common argument before the internet was that society and organisations, tied to their business models, needed to control, and therefore also centralise, IT systems. The notions of flexibility versus control were closely connected to standardisation versus specialisation, since standardisation allowed control, omitting flexibility, while specialisation represented the opposite relation.

The very principle of utilities is their standardised mode, well adapted to a special purpose, such as plumbing systems for irrigation and electrical grids for power supply. These systems are heavily controlled to function without friction. The consequence of constructing realities with this metaphor is that individuals and organisations cannot expect that possible IT needs, unfamiliar to the standard solution, are neglected by default. What individuals and organisations can expect from cloud technology, instead, are that these are adapted for specific purposes through their tetheredness (compare Zittrain, 2008) and therefore fully in the control of the cloud providers. New updates, regardless their usefulness for the user, will constantly be pushed by the cloud providers according to their intentions.

These results show that the metaphor has had different roles – sense-making, constitutive, restrictive, or as a tool of power. In the late 50s and during the 60s, the utility metaphor's main role was to help people make sense of the new technology. From the 70s and onward, the role of the utility metaphor was mainly constitutive. The metaphor emerged as a new way of perceiving computing as a service instead of a product. During more recent time periods, the utility metaphor has been taken for granted and has become a powerful

vehicle for those who with business interests in cloud technology. These visions of future computation as a utility, creating different useful services, have indeed led to realisation in the arrangements of cloud computing. This study, thus, gives examples of how one specific metaphor, the utility metaphor, has been involved in the social construction of socio-technical realities.

Specific contribution to the overall thesis project: This article offers a retrospective perspective of how computing has been talked about from the 50s by scrutinising the utilisation of a specific metaphor – the utility metaphor. Thus, it aims to give a background to the talk about cloud computing. Metaphors are often used to convey certain images and are therefore normative. The utility metaphor is normative and hides the complexity of IT while highlighting its utility. The metaphor also stresses IT as a neutral device. Innovators and business managers were influential in shaping images of new ITs as they most often had interpretative prerogative. Talking about computing as a utility furthered certain expectations at the expense of others. Since the 50s, the metaphor had different roles. Initially it was used to explain and make sense; later it was used to constitute new ITs. Various themes that occurred in the material also indicate how these technologies were talked about, during the time periods studied, as centralised versus decentralised, commercial versus non-commercial, affording control or flexibility, standardisation or specialisation. Based on these findings, talking about networked computing as utilities or as neutral tools, the next measure was to explore if this talk was contemporary. Would cloud computing be talked about as a neutral tool? This question led to the interview study, discussed in Article 2.

Article 2 – Pupils in the Clouds – Implementation of Google Apps for Education

Purpose: Google Apps for Education (GAFE) – a generic bundle of school IT tools – has in recent years been broadly introduced in Swedish schools (the national context of this study). The article investigated accounts of implementation and use of GAFE in the educational setting of one particular educational organisation. The article's aim was to discuss the complexities involved in GAFE implementation. In this study, schools were viewed as organisations that implement new forms of IT. As such, the study is connected to other investigations of organisations implementing new IT. It focused on educational organisations, but some results are valid for many other types of organisations.

Design/methodology/approach: The study was based on semi-structured interviews with strategically-placed staff members, both technical and non-

technical of a Swedish educational organisation, consisting of about thirty schools. The interview approach had its limitations, as it was difficult to take a full inventory of affordances without studying the everyday practices of a number of different people in the organisation. However, a point of departure was that what a person said gave insights into how the affordances of technology were understood. The concept of affordance as originally articulated by Gibson (1979), although as elaborated by Raudaskoski (2009), was used in the analysis of the accounts. Raudaskoski (2009) suggests two basic types of affordances – functionality and usability. The former indicates that individuals learn the basic functions of a technology. The latter indicates that individuals learn to use the functions to their own purposes.

Findings: In the interviews with strategic staff, GAFE was referred to as usable, *i.e.* facilitating the realisation of users' own ideas and catering for their needs in relation to educational issues. Affordances of functionality were most often referred to in relation to technological properties and information management, which were less central to teachers' professional competences. Constraints in the use of GAFE were perceived to lie within the organisation. Headmasters', superusers' and teachers' knowledge of and attitudes toward GAFE and its implementation were thought to affect use and also generate differences between schools in the organisation, as well as between individual teachers and pupils in the same school.

Despite legal risks in violating pupils' privacy, GAFE was implemented due to its functionality and was perceived successful in relation to the technological needs in education. The head of educational development seemed to perceive GAFE both as a neutral tool and as a tool that was forming social interactions. Teachers could tailor their use of the tool to meet new requirements in the curriculum, change the ways in which teaching was conducted, make learning processes visible, change how feedback was given, etc.

Interestingly, it seemed quite obvious to the IT professionals that technology would change educational practices. Most probably, the tethered platform (cf. Zittrain, 2008) of GAFE afforded unexpected generativity. The way education was practiced could affect the use of the technological tools, or – the other way around – technology use could revise teaching practices. Thus, education and tools formed a seamless ecology (Gibson, 1979), where affordances were perceived in connection to the wishes and interests of the teachers.

In some cases, internal power struggles would force attention away from overreaching societal, ethical and political issues involved in tethered appliances. An example of these power struggles occurred between the individual teacher's freedom to use the technology for his or her own purposes and the requirement to follow organisational guidelines. Interestingly, the IT

department that initiated the implementation of GAFE felt a loss of control over how it was used. In the interviews, elements of transformation regarding teacher control over pupils were addressed. However, this appeared not to be a relevant issue during implementation. This may appear surprising, as the possibility for increased teacher control would seem to be a quite obvious affordance of GAFE, *e.g*. when it comes to the function in the apps of seeing pupils' changes to their own texts. At the same time, a certain fascination was expressed regarding traceability of pupils' activities within GAFE, which could reveal their learning processes. Based on these new possibilities, one respondent argued that tests could be made superfluous. Generally, recognition of GAFE's negative affordances were lacking in the material. To discuss only the positive effects is an example of a *tunnel-vision affordance*, a concept introduced in the article, defined as the process of being seduced by affordances that enhance professional practice to such an extent users become blind to larger societal aspects or to features relating to power and control. Arguably, this conceptual contribution makes it possible to identify a fundamental dimension in the implementation of cloud-based technology.

It can be argued that the affordances discussed in the article are not specific to GAFE, although implementation takes on another dimension since it leaves the organisations with a powerful commercial actor, such as Google. Furthermore, GAFE is easily accepted, particularly as its affordances are multiple in comparisons with similar IT solutions. Google differs from other IT suppliers, with visions that greatly transcend the educational requirements of functional educational IT. Individuals commonly use these technologies at their leisure. The technology is broadly known and the brand is popular. The teachers did not push for GAFE, as it was seen as a technical concern rather than an educational. Technological properties affect how things are perceived, how things are done and how possibilities to do things are envisaged. Therefore, it would seem to be wise to have educational concerns guiding the implementation of new IT in schools, and not primarily economic and technical considerations. Privacy and legal concerns are additional challenges that emerge in relation to cloud services. GAFE can be viewed as a system for standardising human behaviour, as it includes a system of rules used by both teachers and pupils. In this sense, it is compatible with the function of schools to grade and rank pupils. GAFE thereby reinforces these structures in extending and strengthening the intertwining of power and knowledge. Through these processes, GAFE also removes agency from teachers and school boards.

Specific contribution to the overall thesis project: The article investigated how people with strategic positions within an educational organisation talked about the affordances of Google Apps for Education (GAFE). GAFE was implemented due to its functionality and was perceived successful in relation to the IT needs in education. The use of GAFE had a certain impact on educational

practices, but the teachers did not push its implementation. It was instead pushed by Google and IT professionals within the organisation. GAFE's back end affordances, *i.e.* processing of data, beyond the user interface, for commercial use, were not fully recognised. This created a tunnel-vision affordance that legitimated its implementation and use, despite known legal risks. Several tensions could be identified in the use of GAFE:

- Google *vs*. the school
- IT professionals *vs*. teachers
- Management *vs*. teachers
- Teachers *vs*. pupils
- Google *vs*. pupils

This article represents a case of how cloud computing was legitimised within the Swedish educational system. The use of Google's cloud technology, as domesticated and taken for granted, trains pupils to become Google users. Promotion of this kind of "Google citizenship" is a larger democratic issue. It might not be best dealt with by various schools' boards or, for that matter, municipalities. The case studied also has implications for other schools using the same or other kinds of cloud technology. Similarly, it has implications for organisations using these cloud services and, as well, induces certain implications of how these technologies are legitimised in society. After identifying the lack of critical scrutiny of what Google would actually do with data harvested from the Swedish public school system, it became essential to scrutinise what Google claims that it actually does. Such claims could then be compared to discussions at the educational organisation investigated. This was the focus for Article 3.

Article 3 – Information We Collect: Surveillance and Privacy in the Implementation of Google Apps for Education

Purpose: In this article, the educational cloud service Google Apps for Education (GAFE) and its utilisation was examined within one educational organisation, consisting of approximately thirty schools. The aim of this article was to discuss Google's business model in relation to accounts of GAFE's affordances (discussed in Article 2). It was argued that Google's business model tends to be concealed and becomes opaque in how user information is aggregated and sold to third parties.

Design/methodology/approach: The article consisted of two parts: a rhetorical analysis of eight Google policy documents and an interview study in a Swedish

educational organisation. The interview material analysed in this article was also utilised in Article 2.

Findings: GAFE can be seen as a typical artefact of the surveillance economy (Keen, 2015). Alternatively, it can be described in terms of the web 2.0 business model explained by O'Reilly (2009). Web 2.0 platforms provide services that are free for use while economic value is produced through the packaging of information generated at the proprietary platform. Basically, users are concerned with "sharing" at the front end of the application while the platform owners are concerned with "sharing" with third parties at the back end (O'Shaughnessy & Stadler, 2012; van Dijck, 2013). Front end properties represent the user's experience and use of the cloud services, while back end properties denote the cloud provider's activities with user information. Sharing at the back end is seldom transparent to users, which also came through in the interviews. The value to Google when it supplies these free-for-use services is that they feed into the major business activity of helping corporations target their advertising. Through the close reading of Google's privacy policy documents, an implicit demarcation between the two concepts (your) "data" and (collected) "information" was discerned. By making this implicit demarcation, Google disguised its business model for online marketing and, at the same time, imitated practices and ethics of a free public service institution. The interview study showed that GAFE was talked about as a positive and well-functioning device meeting most IT needs. Critical accounts mainly focused the legal and privacy aspects of using GAFE ((your) "data"), while surveillance of behaviour ((collected) "information"), were not recognised. Although teachers themselves could practice surveillance of pupil behaviour, it was not understood as an inherent typical practice of Google. The various accounts showed that the advantages of the services were evident to the users from a front end perspective, while back end strategies were relatively hidden.

In the Swedish school context, Google appeared to be committed only to saving pupils' data on a short-term basis. However, as became evident by its own policy documents, Google is less interested in exploiting this data and much more concerned with the monitoring of behaviour, *i.e.* to exploit the "collected" and "personal information", creating algorithmic identities of individual users. As this is the case, most professionals engaged in implementing Google services will have difficulties in grasping the most pressing issues of the surveillance involved. Gehl (2011) discusses this as the dynamics of *the proces*sor and *the archive*. The instant processing and the storage of information are central to the digital economy, based on sharing and ranking content. While users share at the front end they are involved in information processing that today's computers are not able to do, *i.e.* human processors. This processing affords new decontextualised data that can be stored and sold to third parties, such as advertisers. Given these complexities, a tool in

the form of a model, called *the Back End Selling Model* (Figure 2), was constructed to be used by researchers and professionals in order to understand the legal position of Google, as it appears through their policy documents. It is likely to be applicable to other platforms and corporations with the web 2.0 business model beyond Google.

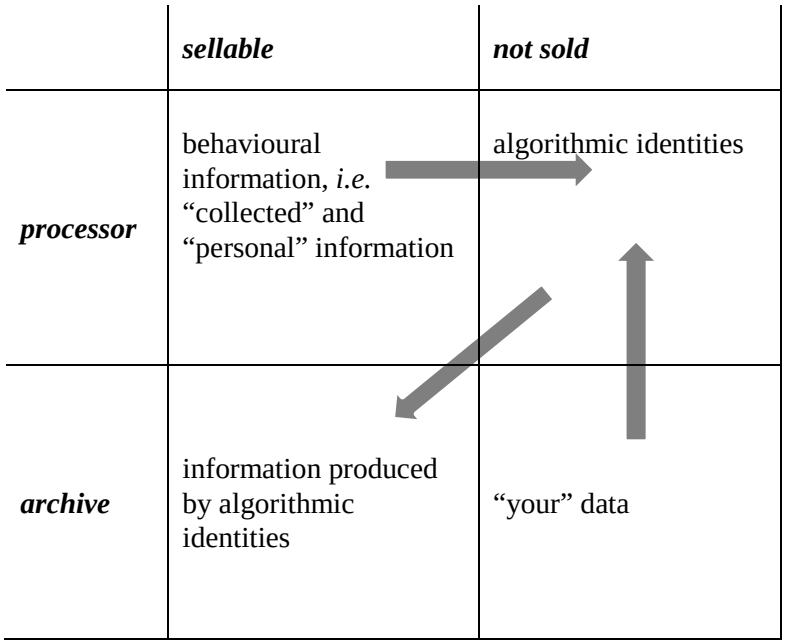

Figure 2. The Back End Selling Model, constructed by the authors. The horizontal dimension shows that the algorithmic identities are created from both the archive ("your" data), as well as from the processor (behavioural information), as the vertical and horizontal arrows show. Information/data from the algorithmic identities are further elaborated to fit third parties' interests (the diagonal arrow). The vertical dimension shows what information/data is sold and not, by Google.

Beyond the monitoring of behaviour – the "collected" and "personal" information – Google also has an interest in continuously processing "user data" in order to refine algorithmic identities. This is possible as, frequently, all the substantial tools will be under the control of Google: hardware (Chromebook), system (Google Chrome web browser) and search engine (Google Search). Furthermore, GAFE serves to accelerate routinized usage of a range of Google products, a phenomenon discussed in terms of "vertically integrated chains" (Couldry & van Dijck, 2015), *i.e.* that internet giants such as Google and Facebook position themselves as gatekeepers of all internet activities.

GAFE is not only a powerful tool for Google; it can also be a dynamic tool for teachers. Teachers are already tasked with the rating and ordering of pupils.

Naturally, GAFE becomes a facilitator for these kinds of surveillance practices. It becomes much easier to overview, sort and compare pupils with GAFE and similar applications in place. GAFE can be characterised as "governing software" similar to other recent applications such as Facebook for Educators, Make Things Do Stuff and Learning Futures. Such educational intermediaries serve to reconfigure what is seen as "social" in terms of networked identities. Human actors, teachers and pupils alike, are understood as programmable socially networked creatures (Williamson, 2015, p. 95). From this perspective, applications such as GAFE cannot be viewed as merely a technical tool but rather as something that codifies certain ways of thinking and acting.

Considering that Google's surveillance practices facilitate profit-making on pupils' algorithmic identities, it ought to be difficult for Swedish schools to implement GAFE. The implicit decision of the educational organisation to let Google use and sell pupils' information, thus enabling the creation of their algorithmic identities for advertising firms to exploit, was not addressed in the educational organisation investigated. This leads to a problematic situation. Pupils are left with no choice whether or not to use GAFE as school is compulsory and GAFE is the IT in use. The use of Google's cloud services in educational settings or other public organisations is arguably an issue requiring much further study given the rapid introduction of a powerful commercial application that furthers surveillance on public school systems and organisations all over the world.

Specific contribution to the overall thesis project: In this article the aim was to highlight dilemmas in viewing IT as neutral and shed light on the complexity of cloud computing's inherent properties in terms of front end and back end properties and the problems concerning asymmetric features in accounts about cloud services. Google privacy policy texts were scrutinised in relation to users' talk about Google's cloud services GAFE. To the user, Google's handling and processing of his or her information was not visible. Because people easily accept cloud computing as a neutral tool, it is relatively easy for cloud providers to get access to user's information for purposes not revealed to the user. This allows for the creation of the systematic coding of algorithmic identities to be used for various ends. Thus, most professionals engaged in implementing Google services will have difficulties in grasping the most pressing issues of the surveillance involved. The article contributes with a model, *the Back End Selling Model*, which depicts what Google does with users' information. The model could be used to question the legitimation of so-called free cloud services in the compulsory Swedish school system and other institutions worldwide.

As the studied educational organisation implemented GAFE, controversy was avoided although the technology supported privacy invasive functions. This was obtained through Google's accounts, directing understandings of these applications as free services and neutral tools. Google's implicit definitions of

"data" and "information" were misleading. The attention given to the concept of "your data" constantly led attention away from immense behavioural tracking, stated in other parts of the policy texts. Building on an understanding of cloud computing talk as persuasive and frequently misleading, it was relevant to study the current promotion of future technology. It seemed as if the major cloud providers developed a way to talk about their technology that could easily seduce users within organisations. In the cloud industry's creation of metaphors clarifying technology use, organisations were at a disadvantage. This interest led to the empirical material that was used for Article 4.

Article 4 - GAFA speaks: Metaphors in the promotion of cloud technology

Purpose: In this article, talk related to the promulgation of technology-rich futures through cloud computing was discussed. The aim was to critically scrutinise metaphorical devices utilised by leaders of the cloud industry as they argued for the extension of the pace and scope of cloud technology implementation. The study scrutinised visions of cloud technology by studying how it was promoted through persuasion.

Design/methodology/approach: Thirteen video clips from YouTube were analysed, containing presentations and talks delivered by leaders of Google, Apple, Facebook and Amazon – four of the most influential companies within the IT industry. Sometimes referred together as GAFA for their initial letters, they have been described as "dominating the ecosystem of connective media" (van Dijck, 2013, p. 163). With the help of conceptual metaphor theory, often-repeated metaphors for cloud technologies were analysed. Building on a typology developed by Dahlbom and Janlert (1988) and utilising the conceptual metaphor theory of Lakoff and Johnson (2003), various persuasive metaphorical devices were categorised according to structural, functional or system metaphors.

Four assumptions guided the study. First, GAFA has a fundamental interest in pushing visions of a future characterised by the strengthened presence of and dependence on cloud technology. Second, these visions need to be disseminated in the most popular media globally available to generate impact. YouTube was therefore targeted for the empirical data collection. Third, since technological visions are difficult to communicate to non-technological professionals, metaphors are used liberally. Indeed, building on the theoretical viewpoint of Lakoff and Johnson (2003), metaphors are used to make abstract phenomena more concrete. Fourth, metaphors of technology rich futures, put forward by corporations with a vested interest, should primarily be understood

as vehicles of persuasion. As such, metaphors in the current context are used to focus on understandings of future societal outcomes.

Findings: Numerous metaphors were utilised in order to describe and promote future practices related to cloud technology. These often-repeated metaphors revealed promoted and hidden properties through the scrutiny of their visions of an evolving cloud-based society. For example, "revolution" and "transformation" were used in order to describe how people move from an old world to a new. This was seen as unproblematic, involving purely fruitful outcomes. With cloud technology, a forced logic of access to computing and information processing is apparent. Access is no longer limited, but open to cloud providers and their third parties. People are commonly not aware of, or downplay, these back end properties of cloud technology, as was found in Article 3. The metaphors in GAFA rhetoric hid these negative effects of cloud technology. GAFA has power over how cloud services are promoted and therefore also the power over metaphors used to explain them in persuasive modes.

Cloud technology affords dimensions that legacy IT systems have not had, such as the ability to connect huge amounts of data from multiple sources, to aggregate and process this data, and furthermore, to do this in real time. On the whole, GAFA seems to be converging towards the same type of business model. They are not only gaining wealth through data analytics, based on algorithms used on data from a wide range of users' behavioural information on the web, as their profits lay in personalised marketing and artificial intelligence (Fuchs, 2012). Moreover, they gain excessive political influence by acting from a distance through their "connective media" (van Dijck, 2013) of "vertically integrated chains" (Couldry & van Dijck, 2015).

The overarching aim of GAFA appears to be disconnected from business models and instead concerned with the improvement of people's lives; making the world a better place. With some exceptions, metaphors were surprisingly similar, even though the rhetoric had slightly different foci or emphases, *i.e.* Facebook claimed a "people-first"-approach, while Amazon, instead, promoted "cloud-first". GAFA increasingly develop similar cloud services and explain these with similar metaphors. A movement of convergence could therefore be identified. It could be argued that GAFA constitute a filter bubble (compare Pariser, 2012), based on their common cultural origin in Silicon Valley (*e.g.* Keen, 2012).

The main thrust of the material studied seemed to be to communicate an image of revolutionising technology with purely positive dimensions. In some sense, this result is not surprising, given the investigational scope of gathering various forms of promotional material. Nonetheless, it is important to scrutinise these metaphors, as they are likely to be frequently used within a multitude of organisations in order to create legitimacy for this technology. Through their

metaphors, GAFA painted an image of a utopia, in which people and companies are in control of and become empowered by these new technologies, while repetitive and boring everyday life activities are transformed and automated.

Specific contribution to the overall thesis project: The article contributes to the discussion of the processes of legitimation of new technologies in society. It is argued that this is an area in increasing need of reflection and intervention from policymakers, organisational leaders, social scientists and IT promulgators. The aim was not to look ahead into the future, but to explore visionary talk of the future cloud technologies produced in Silicon Valley, affecting large parts of the world. The results indicated that cloud technology as utility is taken for granted and institutionalised (compare "utility achieved", Carr, 2008). The utility metaphor was no longer useful as a persuasive device and therefore not clearly expressed in its promulgation. Instead, cloud computing services and devices were described as powerful tools, life-changing and exciting. This talk about cloud technology is decisive and persuasive. As was the case with the utility metaphor, accounts were found that were simplifying, thus omitting complexities in its implementation and use. That said, the persuasive character of technology talk was expected. It is a repetition of how new IT has been promulgated as both revolutionary and life- enhancing, convincing people of new forms of necessary convenience, efficiency, and changes in their lives. The article scrutinised and unveiled various aspects of this utopian persuasive rhetoric of cloud technology, which have a tendency to become hidden or less visible in the presence of the metaphors of neutral technology. The contribution of the article to the overall thesis project was to highlight promotional talk within the IT industry to show its continuing struggle for interpretive prerogative.

Summary

This chapter contains a review of the four articles on which the thesis is built, with focus on various actors' accounts about cloud computing. In Article 1, the promulgation of new IT is discussed. From the 50s and until today's developments of cloud technologies, computer scientists and business leaders have deliberately used the utility metaphor to convey an image of IT as convenient, useful and neutral. In Article 2, accounts within the educational organisation implementing Google's cloud suite GAFE were investigated to examine if these technologies were understood as neutral utilities. Enforced by Google's persuasive talk of the services as free, GAFE was legitimised through its functional affordances. It was argued that the utility metaphor played a central role in how GAFE was understood, which furthered its legitimisation. In Article 3, explanations of GAFE's affordances within the educational

organisation in contrast to explanations of what Google claims in its privacy policy texts were discussed. Results showed that there was a lack of awareness of what Google does with pupils' data. The result also showed that it is difficult to unmask how these services are used for Google's business purposes. The privacy policy texts leave users misinformed as the texts are extremely ambiguous. Google thereby deliberately hides its business model in its communication with users through its privacy policy texts. In Article 4, the current promotion of future technology was discussed. It builds on the understanding of cloud computing talk as persuasive and frequently misleading, building on results from Article 3. In the article, various aspects of this utopian persuasive rhetoric of cloud technology, which have a tendency to become hidden or less visible in the presence of the metaphors of neutral technology, were scrutinised and unveiled.

This material lays the ground for the discussion of the legitimation of cloud computing. The articles were formed during the exploratory research process in an iterative movement between an analysis of empirical data and a distancing, approaching theory. The process has involved a mix of data-, theory- and question-driven research. With the intent to obtain a broader sense of the phenomenon studied, the articles together approach various angles of talk about cloud computing, using various types of empirical material. Thus, discussions on how networked computing, including cloud computing, has been explained by computer scientists and persuaded by innovators and business leaders within the IT industry is based on Article 1 and 4, using the example of GAFE in Article 2 and 3.

Metaphors are used deliberately to convey certain images to explain and persuade. Actors that shape those images and persuasive talk will have the interpretative prerogative in explaining future visions, legitimising these technologies. The overarching message from cloud providers today is that cloud technology will change peoples' lives in a positive direction. The utility metaphor is no longer used as a persuasive device. Instead, metaphors that convey changed life and immersive IT-realities are communicated by leaders within the cloud industry. In the next chapter, the articles' findings are discussed in relation to the research question *What are the implications of persuasive accounts about cloud computing?*

Part III – *Concludo*

This part returns to the thesis's aim with the intention to synthesise the articles and discuss the findings. The research question focused is *What are the implications of persuasive accounts about cloud computing?* This part consists of *Chapter 7. Discussion*. Initially, the chapter discusses the legitimation and institutionalisation of phenomena through language use in the form of explanations. Elaborated here are accounts in the form of metaphors, used as persuasive devices to convey certain images at the expense of others. The theoretical springboard for this discussion is Berger & Luckmann's (1966) understanding of how phenomena become legitimised and institutionalised. This text also draws on conceptual metaphor theory (Lakoff & Johnson, 2003) and metaphors' political role. The dominating explanation of cloud computing as a utility is elaborated. Hidden affordances (*i.e*. back end properties) of cloud computing are problematised, specifically in relation to the compulsory Swedish school, as a standard-forming institution. Implications of cloud computing explanations are discussed. The chapter ends with some concluding thoughts and ideas for future research.

Chapter 7. Discussion

To designate things means to objectify, classify, and categorise objects, experiences and people (Berger & Luckmann, 1966). Such processing is necessary to facilitate explanations, likewise for exotic technology in the making. People need language to talk about various phenomena, so also about cloud computing. No single concept can fully explain a phenomenon. This has partly to do with the numerous perspectives that it could be viewed from and partly because the words people use are constructs in their own right. Metaphors can communicate meaning when words appear insufficient. New phenomena can be explained by the use of metaphors as they can be related to already known concepts (Lakoff & Johnson, 2003).

Actors, studied in this thesis, used various concepts, entities and experiences to explain the abstract phenomenon of cloud computing (Article 1, 2, 3 and 4). The term "computing" is helpful in connecting the phenomenon to previous forms of computing. Contrary to this, the term "cloud" does not seem very supportive to the explanation of what this phenomenon represents.

Computing and wet, fluffy meteorological objects do not go well together. The combination of these terms does not instantaneously seem to fit the social order that people create through their on-going actions and talk. The "cloud" metaphor could therefore be helplessly misleading as it does not give any further insights into cloud computing's inherent structure other than its vague boundaries. It furthers the image of clouds as something positive, as it refers to a phenomenon that is situated high up in the sky. The explanation of cloud computing as constituted by SaaS, PaaS and IaaS might be much easier in giving a sense of structural meaning to some actors, as it illuminates the various types of services involved in these technologies. Actors that have some IT knowledge might find this explanation highly useful, while people that have no special interests in them instead may be bewildered. Thus, depending on the domain specific knowledge of various actors, different metaphors will be understood as useful.

Language both influences and is influenced by social realities. Thus, both written and spoken utterances about cloud computing affect and are affected by the meanings of such technologies. Legitimation will occur when a meaning of something is explained and justified as given. How then, has cloud computing been legitimised through talk? The way people have agreed to talk about cloud computing is discussed next.

Legitimising and institutionalising explanations

The utility metaphor has been a profoundly important metaphor, which has retrospectively shaped the understanding of IT (Article 1). This striking metaphor was first used to explain computing and later on it functioned as constitutive, to construct images of future technology. Thus, computing has continuously been negotiated as something that would make life easy and comfortable, consequently promoting the technology as such, as equally simple and convenient to use. To talk about computing as a "utility" or as "tools" implies understanding such technologies as something useful and as more or less neutral services to utilise as tools without any agency. IT as a utility can be seen as something separate from humans, a means to reach certain outcomes. In that sense the technology is inherently neutral, only responding to people's intentions.

Likewise cloud computing has been explained as a utility, together with other rhetoric devices underpinning this technology (discussed in Article 4). While the utility metaphor was initially identified as one of the most consistent and influential rhetorical devices over more than five decades, it was clearly absent in the future visions of cloud computing (highlighted in Article 4). This finding is in line with the understanding of cloud computing as "utility achieved" (*e.g.* Carr, 2008). The extension of the utility metaphor into images of

power, choice and a transformed life – as a revolution – was distinguishable in the speech of cloud leaders (Article 4). This appears to be a fundamental "big switch" in the way in which networked computing is currently talked about. The utility metaphor supplied an image of harmless and non-invasive computing "on tap", leading attention away from associations of IT as a complex phenomenon. Perhaps notions of neutral technology may be perceived as unexciting. Instead, metaphors such as "IT as revolution" or "cloud as life" construct images of technology that people cannot manage without. Metaphors of networked computing seem to have lifecycles tied to waves of technological innovation. A specific metaphor is used as long as it can add up to certain images or expectations. Some metaphors become mundane, while others are seldom used. Although metaphors can be tied to specific technologies, they can be born and used, to later fade and vanish while the technology itself becomes domesticated (compare Haddon, 2006) and more of an everyday object. Some metaphors are more pervasive and long-lived than others, as was the case with the utility metaphor that has connotations of common and public goods and of neutral technology. Significantly, metaphors did not originate from IT vocabulary, but from other source domains instead. This is in line with Winner (1986), who states that there is a lack of words to explain IT within its own vocabulary.

As new technology becomes mundane, the various explanations of these technologies become normalised and taken for granted. Thus, new technology is legitimatised. Institutionalisation will appear when at least two persons or more agree that their actions are habitualised. Both cloud computing and the language use around it becomes institutionalised. As an illustration of legitimation, cloud computing has been talked about as "the new normal" (*e.g.* Willcocks *et al.*, 2014). This implies that cloud services have become so intertwined with IT platforms that they are no longer possible to do without.

Everyday talk socially constructs realities. Language objectifies the world by bridging the gap between already known everyday realities, or objects, and what is new or rare, thus making the world understandable in a cohesive order. In the current study, it was expected that accounts in written academic texts would differ widely from accounts in the spoken promulgation of cloud technology. Such a difference was not encountered in the empirical material. Instead, persuasive talk about new technology, such as cloud computing, was surprisingly similar in different forms of communication among various actors.

Metaphors as vehicles for political agendas – actors' interpretative prerogative

Metaphors can be used to quickly communicate new concepts. They can also be used as vehicles to convey attractive and persuasive images to gain power. Metaphors can be strategically chosen and used in struggles for interpretative

prerogative. Thus, those who control metaphors of cloud computing exercise social power for change versus stability in struggles over dominant definitions.

Cloud technology was not invented in the new millennium, even if the term was new. Rather, it was a notion repeatedly returned to and reinvented in different forms by computer scientists in the 50s, 60s, 70s, 80s and 90s, together with business leaders. Many involved actors had visions early on of how future technology could be developed and they were determined to work in that direction. The utility metaphor would help them realise these visions. It is possible to argue that early use of the metaphor allowed for development and acceptance of related artefacts.

With connotations to widely accepted and convenient services, such as transportation or electricity, the utility metaphor could be seen as a powerful rhetorical device. Influential computer scientists pushed the utility metaphor in formative texts that were widely read by future generations of IT innovators. Once the metaphor had been developed as a way to talk about future computing, it became a standard narrative device. Thus, talk about computing as utility can be seen as involving surprisingly precise predictions concerning future IT. Today, people use cloud technology to communicate, to order goods, to transfer money etc., as predicted as early as in the 60s. Nonetheless, an alternative understanding to this development is that it is a matter of construction, not prediction. The construction, use and dissemination of a certain way to talk about technology have been important in shaping the everyday practices of today.

As metaphors highlight some aspects, while hiding others, the choice of metaphors may reveal how people consciously or unconsciously think, or conceptually understand, a phenomenon. Not only does the utility metaphor draw on images of convenience and ease, it also furthers images of neutral technology. The metaphor also implies public services to be used by everyone for their daily operations, facilitating various needs. By way of this explanation, these technologies were objectively available and subjectively plausible. The complexities that come with these technologies were considerably downplayed.

It is necessary for people to continuously shift between metaphors that are inconsistent with one another to comprehend the details of everyday practices. In this way, some metaphors are useful in certain situations but fall short in others. This is one understanding for the diversity of metaphors used by the cloud providers studied in this thesis. As they continuously shifted metaphors in their persuasive promulgation, they were attempting rich descriptions of future technology (Article 4). With cloud technology, persuasive talk about IT as a utility was strengthened. Partly, it had the same connotations as the utility metaphor, directing thoughts to easy use and simplicity, but concepts were renewed. Certainly, this can be understood as a “big switch”, *i.e.* talk about computing has shifted from persuasively talk about utilities to, instead, talk about cloud computing as “life-changing”, intrinsic to every part of people’s

lives. Thus, the talk no longer implies neutrality, but agency. It suggests that cloud computing can change everyday realities. Thereby, accounts about networked computing, such as cloud computing, no longer hide its agency, but openly proclaim it as something positive.

Through this study of various actors' accounts of cloud computing, it was possible to distinguish both the retrospective and the on-going construction of social realities. In the present context, language that underpins cloud computing is instrumentally constructed by cloud providers, whom not only produce these technologies but also the metaphors appropriate for their business purposes. Given this commercial context, metaphors are mainly constructed for their business potential, not for their explanatory power. Cloud providers can, thus, strategically choose metaphors to their own advantage. They can use metaphors that direct human thought to certain images to avoid unwanted understandings.

"Tunnel-vision affordances"

Cloud services like Google Apps for Education (GAFE), are pushed by the cloud industry, constructing new understandings of what can be expected from these technologies. This, crucially, involves the construction of language that legitimates the public sector worldwide to partner with US-based multinational corporations such as Google. Usually, an IT service for professional use is selected within a competitive framework, but GAFE was persuasively communicated as free (for an interesting elaboration on free software and its developments, see *e.g*. Bergquist *et al*. 2011). IT without apparent monetary costs is appealing for the Swedish school system, as most public sector institutions are stressed by tight economic restrictions. When costs are, seemingly, eliminated, no public procurement is taking place, which has consequences of some importance. This appears to be an important incentive in need of research. It will not be further elaborated upon in this thesis.

Cloud computing, in the form of free services such as GAFE, has been successively taken for granted after being accepted for its affordances. The Swedish school has legitimised and institutionalised these types of cloud services. It is institutionalised both by private and public Swedish organisations. To explain GAFE as a free utility was a rhetorical device used by both cloud industry and the school to legitimise this cloud service. Notions of "utility" and "public service" seemed to be disconnected from issues of economy and power. In its privacy policy texts, Google includes statements that are not in accordance with what it actually does, concerning collecting and processing pupils' information. Google uses abstract terms "information" and "data" to explain what these services afford. These terms are ambiguous in themselves, but people have some conception of what they might mean. Its actions are thereby easily hidden through these ambiguous terms. Through the rhetoric in these

texts, Google disguises how it collects, processes and uses users' information (Article 3). People tend to make diffuse phenomena more specific and tangible through the use of metaphors. Google, instead, actually makes their privacy policies more diffuse. The acceptance and legitimisation of GAFE, despite these diffuse explanations, created a "tunnel-vision affordance", defined as "the process of being seduced by affordances that enhance professional practice to such an extent the user becomes blind to larger societal aspects or to features relating to power and control" (Article 2).

Schools as standard-forming institutions

Schools not only transfer knowledge and skills, but also serve as important standard-forming institutions. What the school teaches and how it is taught impacts every new generation. Furthermore, schools are affecting and affected by each other in a constant negotiation about their role. GAFE is a global phenomenon and there is likelihood for substantial similarities in its implementation. However, there are also local differences in school policies and cultural aspects. Therefore, the empirical study, referred to in Article 2 and 3, needs to be followed by investigations of other schools. This said, there are bound to be substantial similarities as Google presents generic policy notions to schools all over the world. The study was an investigation of how GAFE became a part of everyday schoolwork. Once the cloud-based practices become domesticated, it is difficult to reconstruct what actually happened when Google's cloud services were implemented. Regardless of these limitations, it can be suggested that the findings from this particular case offer some general insights. The educational organisation investigated is not the first school in Sweden to implement GAFE, but one of several others. The findings from this specific case inform how GAFE, at the time of investigation, was talked about within the educational realm in Sweden. Through the use of GAFE, schools are actors that socially construct, legitimise and institutionalise new social realities.

Further dimensions of cloud technology as tethered

Zittrain (2008) has criticised cloud technology by describing it as tethered. This concept is useful to understand new user practices involved in cloud technology. As computing resources, such as software and hardware, are utilised as cloud services, there is a disruption of the rights that users traditionally have held. With the promise of easy management, users pay with lost control of these resources. Revising and updating software need not be synchronised with the evolving needs of the user. Instead, cloud providers have full control over successive updates. Dominating actors in the cloud industry, such as Google, pioneered in offering free services of web 2.0 business models, in which users

of a service were not necessarily seen as paying customers. Rather, it became more important to maximise the number of users and to, thereafter, commoditise behavioural data.

A few actors within the cloud industry, such as Google, uphold "vertically integrated chains", where one corporation can act as a gatekeeper of all internet activities (Couldry & van Dijck, 2015). Nonetheless, the activities of one of these actors tend to affect the system of "connective media" (van Dijck, 2013). Innovations by one actor are frequently imitated by the others and various tethered applications therefore tend to relate to their users in similar ways. Given this setting, one could contemplate that transformations within these tethered systems of connective media become more influential for development than changes of user needs. The concept of "cloud" holds different connotations. People are encouraged to think of their fluffiness and limitlessness. However, perhaps the most vital feature of clouds in this context is that they are positioned far beyond people. These systems increasingly enable powerful acting and remote control from a distance (Latour, 1989). The tetheredness of cloud services makes people bound to every change that the distanced cloud providers make. This does not follow the usual patterns of exchanging goods or services for money, where the customer can choose to buy something or not. In this way, additions or revisions of functionality have been separated from economic transactions. With cloud services, people "lease" rather than buy software; they have left the control of future developments to the cloud providers. Cloud providers will thus have the power to develop tethered technology according to their premises, business models, and visions about future use of IT.

It can be argued that the Swedish public school, through the legitimisation of GAFE, enforces pupils' acceptance of, presence in, and use of Google's vertically integrated chains. Pupils and their caregivers may easily accept this as Google is popular and a well-known brand with services widely used privately and in work contexts (Google Apps at Work). Google's various cloud services have, here, been used as an illustration of a vertically integrated chain, as a great amount of applications are intimately intertwined as well regarding its privacy policies. 1 March 2012, Google unified 60 out of 70 policy documents connected to its cloud services. It was argued that regulators requested this (Google, 2012) and that it would be easier for users, as the same rules and requirements for all Google services would be applied. This process significantly strengthens the vertically integrated chain, allowing Google symmetrical processing of user data across its various applications.

Implications of cloudy talks

All the positive affordances that cloud services bring are repeated over and over again, often with the same arguments, by both the educational organisation and cloud providers (Article 2 and 4). These front end affordances, which make the cloud services useful, are legitimised, while back end properties are mostly neglected or dismissed (Article 3). In the interviews with strategic staff, both IT professionals and pedagogues expressed a fascination over the visibility GAFE afforded regarding pupils' individual work processes. At the same time, interestingly, there was a lack of recognition of teachers' control over pupils through GAFE. The educational organisation's possible control over teachers' performance afforded by GAFE was equally unrecognised. This is not a surprise as all parties involved are substantially invested in these services. Furthermore, the legitimation only involved GAFE's front end properties, while its back end properties were not. These were not focused on in the negotiations of how cloud computing should be explained or understood. They were not involved in the on-going dialectic social construction of realities, understood in this thesis through three interdependent movements: externalisation, objectification and internalisation.

GAFE was promoted as a free cloud service, but the school paid with pupils' information. This was another back end property that was not intentionally legitimised by the school. The educational organisation acknowledged Google's use of pupils' information, but accounts were limited due to the fear that pupils' individual school assignments could be connected to their personal identification. Furthermore, what the educational organisation understood as collecting, processing and using user information, were only connected to the school tasks that pupils uploaded on GAFE. As these understandings shaped their acceptance of GAFE, these properties were easy to dismiss. From such a perspective, Google was not seen as interested in this type of information and, even so, this information was not seen as sensitive. In the agreements between Google and the schools, only the length of time before Google would erase this type of material was targeted (Article 2). It has been shown that individual information practices are unique (Narayanan & Shmatikov, 2010). Almost any information can be personally identifiable. It seemed that the school was unaware of the feature of GAFE to track and harvest a wide range of individual behaviours on the web. This is a problem, as possibilities for re-identification may accelerate in the near future.

Teachers and pupils were the ones affected by these technologies in their everyday teaching and learning activities. Importantly, the teachers did not initiate the process of GAFE's implementation. It could be argued that teachers did not acknowledge the role of educational IT as something different than a neutral utility – a tool to use, not affecting how teaching would be executed. The technology was pushed by the cloud industry together with the IT staff

within the educational organisation, supposedly starting in the Swedish context with the IT manager in Salem municipality (Salems kommun, 2011).

The metaphors used to convey cloud computing seem to be deliberately chosen by the cloud providers, covering the complexities these technologies bring. From the origins of computing, the use of the utility metaphor hid its politically and societally transformative aspects. With the innovation of smartphones and other mobile entities, computing power was no longer far away from people, and the narrative of computing as utility has faded. Cloud computing is instead explained as a life changer, or something that you cannot live without (Article 4). When the technology is intertwined with the very act of living, it has transcended the status of being just a neutral tool. The metaphor instead indicated that technology was built into people's lives. It became promoted as intrinsic to life itself, involved in the very identity of people.

With a combination of the use of various connective media, tied to the same cloud provider, such as Google, a complete picture of a person's behaviour on the web is attained. Via information processing, Google is able to create algorithmic identities that further its business models. With cloud providers' efforts to disguise these back end properties, cloud services seem subjectively plausible due to cloud services' front end affordances.

Concluding thoughts

Through their cloud services, without close involvement, Google, Apple, Facebook and Amazon (GAFA) can powerfully act from a distance through remote control and thereby affect individuals, businesses and society at large. Due to rising awareness among some cloud users, "opt out" choices can be made for certain functions in cloud services or apps. Once the service is in place, pupils do not have this choice of opting out of GAFE, as the Swedish school, like many other schools all over the world, is compulsory. In this sense, young people are forced to use certain connective media. People cannot easily choose not to be involved with IT, and in many cases, would not want to. Society at large, organisations and individuals all over the world are now, more than ever before, connected to the internet. In this way, IT will continue to reshape the way societies and individuals communicate – the way people relate to each other and to themselves. Such transformations should be issues for political decision-making. Cloud services' back end properties have not really been the target of regulation. Much needed, therefore, is a common language to talk both about front and back end properties. People may have read privacy policy agreements, but these policies are seldom opaque, as discussed in Article 3. They are therefore not well-functioning instruments for policy-setting, but may rather strengthen the power asymmetry between users and cloud providers.

Seemingly, policymakers have been scarcely involved in the development of internet based technology, such as cloud computing? An important reason may be related to the widespread understanding of IT as neutral, or not a concern for the public sphere (compare Winner, 1977). With the promulgation of cloud technology as life changing, there is a possibility that this will change. Instead of accepting IT uncritically, it ought be discussed and negotiated, involving various users, developers and policymakers that ideally would result in technology that is ethically and politically under constant scrutiny. Occasionally, the use of technological innovations leads to unwished consequences due to lack of early involvement from policymakers. As long as policymakers, and others that are dependent on IT, regard technological development as politically neutral, implications of these technologies may not be considered in relation to established structures in society and organisations. This research project shows that there is a need to conceptually discuss the tensions involved in new IT. "[T]echnology is a choice [and] choices have effects" (Van House, 2004, p. 73).

This research project was timely. During the five-year period this project has been taking place, cloud computing has been increasingly discussed outside IT realms, which was indeed advantageous. Still, there were challenges as this technology and the accounts surrounding it were in constant transformation. The fluent character of the phenomenon studied affected the choice of writing a compilation thesis, as new insights could be put to print while these were still fresh.

This thesis depicts aspects of a continuum of technological innovation and implementation processes. In relation to previous research, the attention in this thesis to scrutinise persuasive talk about cloud computing is original. Furthermore, this project contributes with the understanding of IT as embedded in a broader cultural setting than what is usually studied within library and information science and information management.

A critical issue for future research relates to cloud computing's implications for various types of public and private organisations' management of information. Of special interest is the exploration of cloud services promoted as free that are commonly used to carry out various types of generic work tasks, often without formal approval or knowledge within the organisation and the consequences of this use. Another important issue to explore is the implications of the lack of procurement in the implementation of so-called free cloud services, as they do not involve direct monetary transactions between the actors involved. Although Google and GAFE have been focused on in this thesis, further research is also needed regarding the surveillance practices of other web 2.0 business models. Given the interrelatedness of connective media, it could be expected that practices similar to that of Google's are to be found in a range of internet-based corporations.

Sammanfattning (Swedish summary)

Avhandlingens syfte är att analysera hur språk legitimerar molntjänster och undersöka vilka konsekvenser en sådan legitimering kan få. Vikt läggs vid att synliggöra olika förklaringar av molntjänster och antaganden som tagits för givna. Trots att avhandlingen huvudsakligen behandlar molntjänster är resultaten relevanta också för andra former av IT, såväl obsolet, nutida, som framtida. Avhandlingen är situerad inom biblioteks- och informationsvetenskap (BoI) och använder Berger och Luckmanns (1966) teori om hur verkligheter konstrueras socialt samt Lakoff och Johnsons (2003) metaforteori. Med detta sociologiska perspektiv handlar forskningsprojektet mindre om molntjänster som sådana och mer om hur olika aktörer pratar om denna teknik. Språk objektifierar världen och överbryggar gapet mellan det som redan är känt och det som är nytt eller ovanligt. På så sätt kan människor förstå världen i en sammanhängande ordning. Därigenom legitimeras olika fenomen genom språket. Legitimering sker när något förklaras som självklart och har tagits för givet. Olika aktörers utsagor fokuseras därför i analysen.

För att kunna prata om ny teknik, som t.ex. molntjänster, är det nödvändigt att skapa och använda ett gemensamt språk och därigenom möjliggöra en grund för en ömsesidig förståelse av fenomenet. Detta kan vara komplicerat på grund av att teknik kan uppfattas som något tvetydigt – både som något neutralt och något som kan förändra. Det här blir extra tydligt när ny teknik ska förklaras, vilken ännu inte manifesterats i vardagen. Hur har då molntjänster blivit legitimerade genom olika utsagor? När forskningsprojektet inleddes var molntjänster inte tagna för givet. Den pågående processen att skapa en gemensam förståelse och ett gemensamt språk för att prata om denna teknik, erbjöd möjligheter att undersöka hur olika aktörer pratade om molntjänster och konsekvenserna av hur de förklarades.

En utgångspunkt för undersökningen var att uttalanden om teknik kan förstås som både socialt konstruerade och socialt konstruerande. En antagande var därför att språkuttryck i skrivna och talade texter både definieras av och formar hur molntjänster förstås, föreställs och gestaltas när de integreras på olika samhällsnivåer. Att studera språkliga uttryck som beskriver molntjänster är utmanande. Under ett femårigt projekt som detta, utvecklas och förändras tekniken på oväntade sätt. För att kunna hantera komplexiteten att studera

berättelser om ett föränderligt fenomen, utvecklades sex vägledande premisser, inspirerade av social-konstruktionism. Vad en utsaga rymmer...

- ... anses vara relevant för den aktör som skapar utsagan.
- ... är intressant i jämförelse med andra utsagor.
- ... avslöjar vad som inte sägs.
- ... kan vara motstridigt i förhållande till handling.
- ... kan vara retoriskt och kan användas för att övertyga.
- …konstruerar verkligheten.

För att kunna hantera det komplexa i att studera utsagor om ett föränderligt fenomen, utvecklades ett antal vägledande principer. Syftet var att skapa en konsekvent strategi i studiet av flera olikartade fall. I en mycket konkret mening styrde dessa principer forskningsintresset och den explorativa forsknings-designen. Den första vägledande principen berörde *tempus*: dåtid, nutid och framtid. Den andra vägledande principen berörde *aktörer*. Den tredje vägledande principen berörde aktörernas sammanhang på olika *organisatoriska nivåer*. Den fjärde vägledande principen berörde *texttyp*: skriftlig och muntlig. Avhandlingen bygger på olika typer av empiriskt material som på varierande sätt kombinerar de vägledande principerna. Sammanfattningsvis består det empiriska materialet av olika typer av dokument, och semi-konstruerade intervjuer.

Avhandlingen bygger på resultaten från fyra artiklar. I artikel 1 diskuteras hur datorer och nätverksteknik har förklarats från 50-talet och framåt. Användningen av en specifik metafor – utility-metaforen – undersöks. Syftet är att ge en bakgrund till hur beskrivningar av molntjänster har formats genom tidigare förklaringar av datorer och IT. Artikel 2 undersöker hur personal med strategiskt ansvar inom en skolorganisation talar om en genomförd implementering av molntjänster, Google Apps for Education (GAFE). Artikeln fokuserar på utsagor om den befintliga situationen och användningen av denna molntjänst. I Artikel 3 analyseras asymmetrin mellan Google och skolan genom användningen av GAFE. Detta görs genom begreppen ”front end” och ”back end”, där ”front end” representerar användarnas erfarenhet och användning, medan ”back end” betecknar molnleverantörens nyttjande av användarnas information genom sin affärsmodell. Användarnas uttalanden om sina upplevelser av GAFE ställs mot Googles vaga utsagor i sina policydokument om personlig integritet. I artikel 4 analyseras visioner av framtida molntjänster genom att studera hur affärsledare inom molnindustrin använder olika metaforer för att marknadsföra dessa.

Det har visat sig att enskilda individers informationsbeteende är så unikt att all information från användares internetloggar är personligt identifierbar. Genom att kombinera olika sammanlänkade medier, kopplade till samma molntjänst-leverantör, erhålls en komplett bild av en användares webb-

beteende. På detta sätt skapas algoritmiska identiteter som molntjänst-aktörers affärsmodeller är baserade på. Tack vare molntjänsters användbarhet och molntjänst-leverantörers ansträngningar att dölja vad som sker ”back end” framstår tjänsterna inte bara som tänkbara utan också som attraktiva för användare.

Respondenterna (Artikel 2 och 3) kände till Googles nyttjande av användarinformation för egna syften – t.ex. att de utnyttjar algoritmiska identiteter i annonssyfte – men ett viktigt argument för att legitimera implementeringen av GAFE är att elevernas information inte uppfattas som särskilt känslig av skolorganisationen. Molntjänster ifrågasätts inte generellt som tänkbara övervakningsinstrument. Det är snarare deras ”front end”-möjligheter som identifieras och diskuteras av användare. Även om ”back end”-egenskaperna delvis är kända, uppfattas de av dem som implementerar tekniken som oundvikliga och bagatelliseras därför. En anledning till att ignorera deras negativa konsekvenser är att skolor och andra publika verksamheter i Sverige i betydande grad styrs av ekonomiska incitament. Om en molntjänst marknadsförs som kostnadsfri, uppfattas detta som en stor fördel av användare som är hänvisade till hård ekonomisk styrning. Genom att kommunicera att molntjänster är gratis, flyttar Google uppmärksamheten bort från sin affärsmodell. I avhandlingen diskuteras och ifrågasätts denna strategi. Med molnteknik är tillgång till datorkraft, data och dess processande inte längre begränsad; tillgången till användarnas information är öppen för molnleverantörer och deras parter. Information kan enkelt spridas på ett sätt som inte tidigare har varit möjligt. Information och data kan inte bara användas och omvandlas, utan kan delas obegränsat och användas för en mängd olika ändamål både av användare och av molnleverantörer. Molntekniken ger därmed nya ”IT realiteter”.

Datavetare och företagsledare hade tidigt visioner om hur framtidens teknik skulle kunna utvecklas och de var fast beslutna att arbeta i den riktningen. De valde medvetet utility-metaforen för att förklara dessa visioner. Metaforen användes upprepade gånger i olika former under 50-, 60-, 70-, 80- och 90-talen (Artikel 1). Utsagor om datorer som utility kan ses som förvånansvärt exakta förutsägelser om framtiden. Människor använder idag molnteknik för att kommunicera, beställa varor, överföra pengar osv., vilket förutspåddes så tidigt som på 60-talet. En alternativ förståelse av denna exakta förutsägelse är att de förklaringar som gavs blev bärare av idéer som så småningom blev legitimerade, institutionaliserade och tagna för givna. Det går därmed att argumentera för att en tidig användning av metaforen möjliggjorde utveckling och acceptans för tekniken, i enlighet med Berger och Luckmann’s (1966) idéer att språkbruket konstruerar verkligheten. Att förklara datorer och IT i redan välkända termer, med konnotationer till allmänt accepterade och praktiska tjänster, såsom exempelvis kommunal vattenförsörjning och elleveranser, med alla deras fördelar, kan ses som ett kraftfullt retoriskt drag.

Inflytelserika datavetare spred utility-metaforen i tongivande texter som lästes på bred front av framtida generationers IT-utvecklare. Genom de fyra dominerande internetaktörerna Googles, Apples, Facebooks och Amazons marknadsföring av molntjänster var det möjligt att urskilja användning av metaforer som inkluderade föreställningar om makt, personligt val, en förändrad verklighet och att tekniken är inbyggd i människors liv (Artikel 4). I forskningslitteratur omnämns dessa ibland som GAFA och beskrivs som "dominating the ecosystem of connective media" (van Dijck 2013, p. 163).) Med innovationer som smartphones och andra mobila enheter var inte längre datorkraft långt från människor, vilket innebar att utility-metaforen inte längre var lika effektiv som förklaring. När tekniken är sammanflätad med livet självt har den överskridit status av neutralt verktyg. Gemensamt för samtliga metaforer som har använts för att förklara datorer och IT är att de döljer den komplexitet som implementering av molntjänster för med sig. GAFA kontrollerar varsitt sammanlänkat system av webbläsare, operativsystem, mjuk- och hårdvaror (jämför Couldry & van Dijck 2015). Genom dessa system kan dessa dominerande internet-aktörer agera kraftfullt på avstånd utan synlig inblandning och på så sätt möjliggöra kontroll av användare. Det förefaller därför mycket relevant att ställa frågan om vilket inflytande GAFA har över sina användare, såväl över enskilda, organisationer som samhället i stort.

Molntjänster innebär åtskilliga möjligheter. Under den period då avhandlingsarbetet pågått har molntjänster blivit alltmer vanligt förekommande och de verkar vara mycket mindre ifrågasatta nu jämfört med för fem år sedan, då forskningsprojektet startade. Samhället, organisationer och privatpersoner över hela världen är nu i större utsträckning än någonsin tidigare anslutna till internet. Därigenom fortsätter IT att omforma de sätt som samhällen och individer kommunicerar, hur människor relaterar till varandra och till sig själva. Förhoppningen är därför att avhandlingen kan bidra till en mer mångfacetterad diskussion kring införandet av ny teknik i allmänhet och av molnbaserade IT-tjänster i synnerhet.

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Appendices

Appendix 1. Invitation to participate, Study 2

Hello, Borås 2013-04-24

The reason I am contacting you is that I am performing a study on IT and cloud services in organisations' information management. I am investigating how IT professionals look at these services, how the services are perceived, and how IT professionals reason and act in relation to the implementation of these services. Upon closer investigation of the persons who may be relevant to interview, I have identified you as one of several procurement consultants with experience and specialisation based on my research questions.

The research is conducted at the University of Borås, at the Swedish School of Library and Information Science, as part of my PhD studies. What drives my interest is how information is managed in organisations and the perception of information as a resource. In my thesis, I will perform several studies and the study in question is the second one. In he first study I looked at how IT developments align with metaphors used to describe the future services/systems. In this second study, I would like to focus on IT professionals and their views on the development of IT and cloud services in organisations.

Therefore, I would like to invite you to participate in the study by answering a few questions in the form of an interview, which may last between 1 and 1.5 hour. The interview will also be recorded for my own documentation. After the interview, a summary is sent to you, so that any misconceptions about what was said can be corrected. As the study is designed, it is entirely dependent on qualitative interviews and therefore, your participation is very much appreciated. If you have any questions regarding your participation, which will be treated as confidential, please feel free to contact me (see contact information below), or my supervisors, Karen Nowé Hedvall karen.nowe@hb.se, or Jan Nolin jan.nolin@hb.se.

Within a few days, I will contact you by telephone to arrange an interview. Please respond to this email if you are not interested in participating in the study.

With kind regards,
Maria Lindh
maria.lindh@hb.se

Appendix 2. Consent form, Study 2

This interview is part of a research project concerning IT professionals conception of cloud computing. The purpose of the study is to seek an enhanced understanding of perceptions among IT professionals in connection to implementation of new technology. I am also interested to scrutinise the consequences for the role of IT professionals due to change, caused by this implementation. I am interviewing people with different responsibilities and roles related to IT in organisations, to collect a variety of expressions, perspectives, and perceptions.

The study is a part of my thesis work, which is carried out at the Swedish School of Library and Information Science, the University of Borås. The thesis project runs from 2011 to 2016. The research is funded by the University of Borås.

Your participation in the study will be in the form of an interview. During this interview, I will ask questions about cloud computing, in relation to your work role, your own thoughts, experiences and opinions. The interview is expected to last between 60–90 minutes. If you have any further questions after this interview, please contact me as responsible for the study:

Maria Lindh, doctoral student,
Swedish School of Library and Information Science (SSLIS), University of Borås,
e-mail: maria.lindh@hb.se
address: Swedish School of Library and Information Science,
University of Borås, Allégatan 1, 501 90 Borås

If you wish to receive additional information and references, you are also welcome to contact my supervisors at the Swedish School of Library and Information Science:

Prof. Jan Nolin e-mail: jan.nolin@hb.se,
Sen. lect. Karen Nowé Hedvall e-mail: karen.nowe@hb.se

This study follows the guidelines set up by the Swedish Research Council (Vetenskapsrådet), which means that you as participant are assured the following rights:

- Your participation is completely voluntary and you have the right to terminate your participation without negative consequences at any point during the study.
- You have the right to decide for yourself the conditions under which you participate.
- Data is treated confidentially.

- The collected data will only be used for the research purposes stated in this document.

Excerpts from these data may be included in the thesis and other related research reports and presentations, but your name or other individual traits will not be included in any of these. The result of the research project will become an official publication (a doctoral thesis). You can decide for yourself if you wish to read through and correct any possible errors in the summary of your interview, and if you wish to receive a copy of the published thesis.

- o Yes, I would like a *summary* of the interview with possibilities to suggest adjustments and corrections of possible faults or misunderstandings.
- o No, I do not wish to receive a *summary* of the interview
- o Yes, I would like to receive an electronic link to the *article*
- o Yes, I would like to receive an electronic link to the *thesis*
- o No, I do not wish to receive *any electronic links* to any publication

Please sign two copies of this form to confirm that you have read and agreed to them. One copy is for your own archive. Thank you for participating in this study, your contribution is valuable.

Date and signature:

Please text your name:

Appendix 3. Interview schedule, Study 2

Your background

1. Education?
2. Experience in the IT industry? Other industries?
3. Your work today? Your clients? Public/private? Big/small?

Your approach to cloud services' role in organisation's information management

(definition of Cloud services =SaaS, IaaS, PaaS) Based on your own experience, I would like to ask a few questions about how you believe that cloud services will be used in organisations in the future:

4. What opportunities/barriers/consequences for organisations do you see with cloud computing in general? What consequences can cloud services have on organisations' information management in general?
5. Is it desirable to have a more integrated/specialised approach to, and knowledge of, IT generally in organisations? Why? Why not? (If more integrated: how could this be achieved, in that case?)

All organisations have unique/equal services? Cloud services are often standardised. How do you perceive that? How does it affect your organisation's activities?

So little focus on organisation and technology in interaction, more focus on how the technology works. Your thoughts on this?

Your views on the Big Switch metaphor

There exists a perception of cloud services as easy to apply and use. They are cheap and easily available. The move to cloud computing is often compared with the transition from local to central power plants.

6. How do you view this comparison?

Can convenience outweigh risks?

Do you see any alternative images/metaphors/comparisons?

Your views on IT's role in organisations

Based on your experience,

7. What role do you think that IT should have in organisations?
8. What is the role of IT in organisations?

Your views on the development of various IT professionals' roles/tasks

Based on your own experience, I would like to ask you a few questions about how you think the development of various IT professions will look like:

9. What skills are required for IT management today?
10. What various professions will have responsibility for IT issues in organisations in the future? Economists, business developers or IT-savvy technicians, IT strategists, consultants, other? Why?
11. How do you understand the role of the CIO? Which category is recruited as CIO?
12. How do you perceive IT managers' role in the future?
13. How do you perceive the IT professionals' role in the future?
14. How do you perceive the system developer's role in the future?
15. How do you perceive your own role – and your professional category's role in the management of IT in organisations in general?
16. What opportunities do procurement consultants have in influencing how IT is managed in organisations?
17. How do you perceive the role of the IT function in the future?
18. Is it more common now than previously for organisations to establish their own IT department, instead of outsourcing? Do you see any such tendency?

Anything you want to add?
Do you have suggestions for people to contact for interview?

Thank you for your participation!

Appendix 4. Invitation to participate, Study 3

The reason I am contacting you is that I have got to know that you are working in an organisation/business that has introduced cloud services. I intend to investigate the perceptions of IT and cloud services in organisations; how services are perceived and how representatives of different functions reason and act in relation to the introduction of these services. My intention is to interview people from three organisations who have been involved in the introduction of cloud services.

The research is conducted at the University of Borås, at the Swedish School of Library and Information Science, as part of my PhD studies. What drives my interest is how information is managed in organisations and their preconditions. In my thesis, I conduct several studies and the study in question is the third. In this study, I am interviewing people from different units/functions within an organisation involved in the introduction of cloud services. In the first study I looked at how IT developments aligned with metaphors used to describe future services/systems. In the second study, I examined procurement consultants' views on the development of IT and cloud services in organisations.

I am interested in carrying out interviews, approximately 1.5 hours long, with three to five people from different functions/departments/units within the organisation. The interviews will be recorded for my own documentation. After the interview, a summary will be sent to the respondents, so that any misconceptions about what was said can be corrected. As the study is designed, it is entirely dependent on qualitative interviews and, therefore, you and your colleagues' involvement is very much appreciated. If you have any questions regarding yours and your organisation's participation, which will be treated confidentially, please feel free to contact me. Results from the study will be published in an international scientific journal. Examples of questions that will be asked are: Can you describe the process that led to the introduction of cloud service(s)? What discussions do you remember as important and why? What added value has the process created and how do these values differ from the expectations you initially had?

If you have any questions, please feel free to contact me (see contact information below), alternatively to one of my supervisors, Karen Nowé Hedvall karen.nowe@hb.se, or Jan Nolin jan.nolin@hb.se. Within a few days I will contact you by telephone to arrange and interview. Please respond to this email if you and your organisation are not interested in participating in the study.

With kind regards, Maria Lindh maria.lindh@hb.se

Appendix 5. Consent form, Study 3

This interview is part of a research project concerning perceptions of cloud computing. The purpose of the study is to seek an enhanced understanding of perceptions in connection to implementation of new technology. I am interviewing people with different responsibilities and functions in organisations, to collect a variety of expressions, perspectives, and perceptions. The study is a part of my thesis work, which is carried out at the Swedish School of Library and Information Science, the University of Borås. The thesis project runs from 2011 to 2016. The University of Borås funds the research.

Your participation in the study will be in the form of an interview. During this interview, I will ask questions about cloud computing, in relation to your work role, your own thoughts, experiences and opinions. The interview is expected to last approximately 90 minutes. If you have any further questions after this interview, please contact me as responsible for the study: Maria Lindh, Swedish School of Library and Information Science (SSLIS), University of Borås, e-mail: maria.lindh@hb.se Address: Swedish School of Library and Information Science, University of Borås, Allégatan 1, 501 90 Borås

If you wish to receive additional information and references, you are also welcome to contact my supervisors at the Swedish School of Library and Information Science: Prof. Jan Nolin, e-mail: jan.nolin@hb.se and Sen. lect. Karen Nowé Hedvall, e-mail: karen.nowe@hb.se

This study follows the guidelines set up by the Swedish Research Council (Vetenskapsrådet), which means that you as participant are assured the following rights:

- Your participation is completely voluntary and you have the right to terminate your participation without negative consequences at any point during the study.
- You have the right to decide for yourself the conditions under which you participate.
- Dare is treated confidentially.
- The collected data will only be used for the research purposes stated in this document.

Excerpts from these data may be included in the thesis and other related research reports and presentations, but your name or other individual traits will not be included in any of these. The result of the research project will become an official publication (a doctoral thesis). You can decide for yourself if you wish to read through and correct any possible errors in the summary of your interview, and if you wish to receive a copy of the published thesis.

- o Yes, I would like a *summary* of the interview with possibilities to suggest adjustments and corrections of possible faults or misunderstandings.
- o No, I do not wish to receive a *summary* of the interview
- o Yes, I would like to receive an electronic link to the *article*
- o Yes, I would like to receive an electronic link to the *thesis*
- o No, I do not wish to receive *any electronic links* to any publication

Please sign two copies of this form to confirm that you have read and agreed to them. One copy is for your own archive. Thank you for participating in this study, your contribution is valuable.

Date and signature:
Please text your name:

Appendix 6. Interview schedule, Study 3

Your organisation (can be skipped)
What does the organisational structure look like?
What are the different functions/departments of the organisation?
Your role in the organisation?

Cloud services (can be skipped)
What kind of cloud services are used? Saas, PaaS, IaaS?
Are they on public or private cloud servers?
On what scale are cloud services used in the organisation? For all functions/departments?

Can you describe the process that led to the introduction of cloud services?
Who participated in the process?
What functions/departments were involved in its implementation?
Which reasons/arguments were used to introduce cloud services?
How long was the process from the initial discussions to the implementation and use? Did it proceed according to expectations, or were there any delays? If so, what were the reasons? Was any external party involved? Consultant, other? At what stages? How did this affect the process?
Will further changes/adjustments have to be made for any reason, or has the process been completed?

Did you observe if there were completely and/or partially different perceptions and expectations regarding the implementation of cloud services between the organisation's various functions/departments?
If so, how were these different perceptions and expectations managed during the process?
What were the different options?
Have different groups, such as teachers and pupils, had the opportunity to have an influence?
What discussions do you remember as important and why?
How has the organisation incorporated the technology?
Have there been any differences in how information is managed in your organisation? Have work processes been adapted to the technology?
Has the organisation been able to affect the cloud services in any way?
What advantages/disadvantages/surprises do cloud services offer to your organisation, according to you?

Appendix 7. Mail to contributing IT procurement consultants in Study 2

Hello,

We had contact last spring, when I interviewed you about your view of cloud services in organisations. In total five interviews with procurement consultants were conducted. I have edited the material and intend to publish the results in an international research journal after completing one more interview study. In relation to this second round of planned interviews, I am contacting you to get tips on organisations that have implemented cloud services. I'm specifically interested in getting tips on organisations that worked with the implementation and execution in the form of a project group, where participants from different parts of the organisation have been represented – for example from the business side, the IT department, the marketing department, the R&D department or similar – with more or less regular meetings involving discussions about implementation and execution. I intend to keep the identity of the organisation confidential.

I hope that the results of how organisations work with the implementation and understanding of cloud services can provide insights into the complex process of implementation and use of IT in organisations. I would be extremely grateful for your advice on the appropriate project teams to approach and a contact person for these.

With kind regards,
Maria Lindh

Part IV – *Articuli*

1. Lindh, M. (2016), “As a utility: metaphors of information technologies”, *Human IT*, *13*(2), 47-80. Available at https://humanit.hb.se/article/view/418
2. Lindh, M., Nolin, J., & Nowé Hedvall, K. (2016). Pupils in the clouds: Implementation of Google Apps for Education. *First Monday*, *21*(4). Available at http://dx.doi.org/10.5210/fm.v21i4.6185
3. Lindh, M., & Nolin, J. (2016). Information We Collect: Surveillance and Privacy in the Implementation of Google Apps for Education. *European Educational Research Journal*, *15*(6), 644-663.
4. Lindh, M. & Nolin, J. (2017). GAFA Speaks: Metaphors in the Promotion of Cloud Technology. *Journal of Documentation*, *73*(1), 1-22.