SPECULATIVE RELATIONS: DATA AND DIGITALIZATION WORK IN THE DANISH PUBLIC-PRIVATE TECH SECTOR

MICHAEL HOCKENHULL

IT University of Copenhagen

Speculative Relations:
Data and Digitalization Work in the Danish Public-Private Tech Sector

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Michael Hockenhull
michh@itu.dk
Technologies in Practice
Department of Business IT

IT University of Copenhagen
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Supervisor: Marisa Leavitt Cohn, IT University of Copenhagen

Committee: Baki Cakici, Nanna Bonde Thylstrup, Alex Wilkie

Abstract

The data revolution is here, and society is being fundamentally transformed by digitalization. Or so the story goes. Digital technologies and data may have tangibly changed society, but the revolution has been in hype, hot air, and buzzwords. As Big Tech consolidates and monopolizes, speculation runs rampant on the next big disruption. Denmark is at the forefront of public sector digitalization, and its industries are knowledge-intensive and innovative. Professionals from both the public and private sectors mingle to figure out how to seize the data moment. This dissertation seeks to study how such speculation on, with, and about data is related to the ongoing work of digitalization in both the private and public sectors of Denmark – which the dissertation names digitalization work. In order to conduct this study, it draws on a range of disparate research traditions including STS, technofeminist studies, e-Government studies, CSCW, Speculative Design, and Critical Data Studies. They enable an interdisciplinary engagement which identifies what the dissertation calls *speculative relations* between data and digitalization work. It does so by taking a relational and ethnographic approach which 'follows' data as a sociomaterial actor, from the collapse of a public-private big data infrastructure project, through a gyre of tech events filled with hype, to an innovation project in a public sector organization. Through its relational approach, the dissertation is able to trace how data is connected through speculation to the actual work of digitalization. Furthermore, by developing a *speculative ethnography*, the dissertation not only studies but also engages with speculation as an opportunity for different futures. It does so by exploring its own role in speculation on data, through reflexive enrollment in the field and design practices. In its three research papers, the dissertation redescribes and conceptualizes the role played by speculation on data in digitalization work. The papers identify specific speculative relations by developing concepts such as 'hot air' and 'speculative data work,' and describe how figures such as 'digital humanists' are speculated about. Together, these studies describe how speculation on data precedes digitalization work, and pervades the work practices, infrastructures, and relations to labor such work consists of. The papers also explore how these relations can be intervened in through designing alternative infrastructures and developing more situated critiques. The dissertation thereby contributes original knowledge to the empirical understanding of speculation, data, and how digitalization takes place, and makes a theoretical contribution by bringing research on speculation into contact with research of data, digitalization and work. The dissertation thereby argues for the importance of paying attention to speculation, if we are to understand the actual changes that data and digitalization are causing.

Resumé

Datarevolutionen er ankommet, og samfundet er igennem digitalisering ved at blive grundlæggende forandret. Siges det, i hvert fald. Digitale teknologier og data har måske ændret samfundet, men den virkelige revolution har bestået i hype, varm luft og *buzzwords*. Mens såkaldt Big Tech konsoliderer og monopoliserer sig, spekuleres der i hvad den næste store *disruption* kommer til at være. Danmark ligger i fronten af digitalisering af den offentlige sektor, og landets industrier er videnstunge og innovative. Medarbejdere fra både den offentlige og den private sektor mødes for at finde ud af hvordan dataens tidsalder skal gribes an. Denne afhandling undersøger, hvordan spekulation på, med og om data er relateret til det igangværende arbejde med digitalisering i både den private og offentlige sektor i Danmark – hvad afhandlingen kalder digitaliseringsarbejde. For at udføre denne undersøgelse trækkes der på en række distinkte forskningstraditioner heriblandt STS, teknofeministiske studier, e-Government studier, CSCW, Speculative Design og Critical Data Studies. Forskningen, der repræsenteres i disse traditioner, muliggør et interdisciplinært projekt, som identificerer hvad afhandlingen kalder *spekulative relationer* mellem data og digitaliseringsarbejde. Projektet når frem til dette ved at anvende en relationel og etnografisk tilgang, der 'følger' data som en sociomateriel aktør fra kollapset af et offentligt-privat big data infrastrukturprojekt gennem en gyre af *tech*-events fyldt med hype til et innovationsprojekt i en offentlig organisation. Ved hjælp af dens relationelle tilgang kan afhandlingen spore, hvordan data står i relation til det faktisk arbejde med at digitalisere igennem spekulation. Ved at udvikle en spekulativ etnografi studerer afhandlingen ikke blot spekulation, den engagerer sig også med fænomenet som en anledning til forskellige fremtider. Den gør dette ved at udforske afhandlingens egen rolle i spekulation om data igennem dens refleksive indrullering i felten og designpraksisser. I dens tre forskningsartikler genbeskriver og begrebsliggør afhandlingen den rolle, spekulation spiller mellem data og digitaliseringsarbejde. Artiklerne identificerer specifikke spekulative relationer ved at udvikle begreber som 'hot air' og 'speculative data work,' og ved at beskrive, hvordan der spekuleres om figurer som 'digitale humanister.' Samlet set beskriver disse studier, hvordan spekulation om data går forud for digitaliseringsarbejde, men også hvordan den gennemsyrer selve praksisserne, infrastrukturerne og forholdet til arbejdsstyrken, der udgør digitaliseringen. Artiklerne udforsker også, hvordan disse relationer kan interveneres i, gennem design af alternative infrastrukturer og udviklingen af mere situerede kritiker. Afhandlingen bidrager dermed med original viden til den empiriske forståelse af spekulation og data, samt hvordan digitalisering sker i praksis, og den udgør et teoretisk bidrag ved at forbinde forskning om spekulation med forskning om data, digitalisering og arbejde.

Afhandlingen udgør dermed et argument for vigtigheden af at tage spekulation alvorligt, hvis vi skal forstå de faktiske forandringer, der forårsages af data og digitalisering.

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It is also all too often the case that intellectual work is presented as severed from the practical but essential relations that make it possible. I would therefore like to extend a thank you to the people of the PhD School, Facilities Management and IT Department at ITU. I have always found you to be kind and supportive, indulging only the best of speculations.

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Research Papers

The dissertation contains three research papers:

1. Hockenhull, M. & Cohn, M. Leavitt. Accepted for publication. Hot Air & corporate sociotechnical imaginaries: Performing and translating digital futures in the Danish tech scene. *New Media & Society*.

2. Hockenhull, M. & Cohn, M. Leavitt. In review. Speculative Data Work & Dashboards: Designing Alternative Data Visions. *CSCW 2020*.

3. Hockenhull, M. Manuscript. The "Digital Humanist": Figurations of Danish public sector digitalization work.

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PART I

"To oppose something is to maintain it.

They say here 'all roads lead to Mishnory.' To be sure, if you turn your back on Mishnory and walk away from it, you are still on the Mishnory road. To oppose vulgarity is inevitably to be vulgar. You must go somewhere else; you must have another goal; then you walk a different road."

- Ursula K. Le Guin, *The Left Hand of Darkness*

FOREWORD

Recently, the United Nations Special Rapporteur on Extreme Poverty and Human Rights, Philip Alston, remarked in his report to the UN General Assembly on the topic of digital welfare states:

> "The Special Rapporteur has learned of situations in which crucial decisions to go digital have been taken by government ministers without consultation, or even by departmental officials without any significant policy discussions taking place, on the grounds that the move is essentially an administrative matter, rather than one involving a potentially game-changing approach to a large swathe of official policy." (Alston, 2019, p. 20)

One of the central motivations of the research presented here is the sense that increased digitalization and use of data within the public sector is driven by an almost automatic technocratism. Another is the simultaneous tsunami of futurist promises made by tech-evangelists and Big Tech corporations. Together, these two tendencies suggest a kind of digital capitalist realism, where the only things that are certain are death, digitalized taxes, and network-effects based monopoly enterprise. To try to understand the dynamics of these phenomena, this dissertation consists of an ethnography of data and digitalization work in the overlapping aspects of the public and private sectors in Denmark engaged with 'tech.' It describes one of these dynamics as that of ubiquitous speculation, what is calls *speculative relations*.

To develop these insights, the dissertation draws on many brilliant intellectuals, but particularly on Donna Haraway. Haraway has a rich repertoire of reflections on speculation. She writes on and speculates with cyborgs, monsters, worlding, oddkin, and more, providing a non-modernist vocabulary for talking about the creation of different worlds, but also of the always-already messy relations of human-machine coexistence. She provides the dissertation with the ability to think about what data, digitalization, and the welfare state might look like in the alternative age of the Cthulucene, which she invites us to speculatively fabulate on.

As she points out, "situated technical projects and their people" (D. J. Haraway, 2016, p. 3) should be embraced and not viewed as an enemy. In many ways, the Danish welfare state is a cold modernist apparatus of human-faced capitalism, which sees as any other state, and proceeds in regulating behavior, collecting taxes, redistributing wealth, upholding colonial legacies, exporting injustices, yet being the frame in which people and their (odd)kin dream, work, love, lose, play backgammon, die, and are remembered and mourned. The digital and its speculative relations are to this big mess yet another modernistic layer of futurism,

fear, hope, and investment, composed by digital transformation processes, data, glowing servers, algorithmic governance, and many other dreams besides.

The dissertation is in Haraway's words a *becoming-with* the Danish digital economy, a *speculative ethnography* from and of it, wrapped up and carried along in its gyre of messy unfolding and the perhaps birth of a digital nation-state. It is also a very human account, filled with people, discourses, and imaginations. Perhaps to make oddkin with(in) a digital economy is far from the kind of kin-making which Haraway advocates. Whether it is possible or desirable is, however, an academic question – for it is increasingly looking as if it will be *necessary*.

1. Introduction: From data marketplaces to gyres of speculative relations

This dissertation is a redescription of data and digitalization work in Denmark, and how these phenomena are part of a wider tendency and network. It provides studies of 'tech' events, organizations, and partnerships that straddle the boundaries of the public and private sectors. The main argument of the dissertation is that digitalization and increasing use of data is related to, interlaced with, and reliant on speculation in various forms. Speculation is a word which has mostly negative associations, being tied to unsavory practices within finance and property markets, or baseless conjecture. Yet, at the same time, speculation can characterize a type of thinking which is free and open to new possibilities. The present dissertation is an ethnographic study, which charts its way through the messy interrelations of data, digitalization work and the public-private tech sector while bringing to the forefront how these two aspects of speculation play out, intersect, and might be intervened into. As such, it is a *speculative ethnography*, meaning that it attempts to make use of, match, and transform the many *speculative relations* that interlace and make up the objects of study.

In common discourse, data is a technical topic, gaining relevance in society as the 'raw' material or 'oil' fueling the digital economy (Toonders, 2014) and alleged epistemological upheavals (C. Anderson, 2008). Digitalization, on the other hand, is the designation of a broad impersonal process by which processes, organizations, and even societies become more digital, including through the use of data. The dissertation's object of study is both data and what is here called *digitalization work*. As the literature on data itself both exhibits and points out (Kitchin & Lauriault, 2018), data cannot be properly understood without reference to the wider assemblages of standards (Millerand et al., 2013), work practices (Bopp et al., 2017; Møller et al., 2020), infrastructures (Bowker et al., 2010; Pickren, 2018), imaginaries (Beer, 2018; Tupasela et al., 2020), and economic systems (Birch et al., 2020; Fourcade & Kluttz, 2020; Prainsack, 2020) they are part of.

The present research began as a study of an infrastructure for data in the form of a big data[1] marketplace. In the effort to develop an empirically based description of data, the research has come to encompass also how data is part of an ongoing process of digitalization, in particular what is here called *digitalization work*. Digitalization has itself been studied in the context of the public sector as a policy of modernizing the state (Greve, 2015; Schou & Hjelholt, 2019a), affecting forms of work (Plesner et al., 2018; Pors, 2015b), welfare provisioning (Lyneborg,

[1] There is no set convention with regards to the capitalization of this phrase. The dissertation attempts to use lower-case throughout, except where authors specifically capitalize to make a point.

2019), contact with citizens (Jørgensen & Schou, 2020; Lindgren et al., 2019), and citizenship itself (Schou, 2018). In the private sector, digital transformation and datafication (Flyverbom & Murray, 2018) through business intelligence (Verma & Voida, 2016) and big data (Mayer-Schönberger & Cukier, 2013) similarly have brought changes, ushering in the so-called 'data-driven' organization (Lee et al., 2015; Morrison, 2015). While the effects of digitalization are often discussed, studies of the work done to make digitalization happen are rarer. The dissertation calls *digitalization work* that which goes before and makes data and digitalization possible, drawing from research that describes clerical (Møller, 2018; Møller et al., 2020), practical (Ribes & Jackson, 2013), interpretive (Elsden et al., 2016), and infrastructural (Pipek & Wulf, 2009) work.

The research has taken place in Denmark, one of the most digitalized societies in the world. Its public sector consistently ranks highly in terms of digitalization (European Commission, 2017, 2018, 2019; United Nations, 2019), internet connectivity is well-developed (European Commission, 2020), its companies seek to adopt new digital technologies (Danmarks Statistik, 2018), and its population is often characterized as being well-educated and tech-savvy. Often perceived in the world press as a 'socialist' country, it is more accurate to consider Denmark a capitalist competition state (Dehlholm & Pedersen, 2018; Genschel & Seelkopf, 2015; O. K. Pedersen, 2011), which uses relatively generous welfare benefits (Bengtsson et al., 2015), free education, and a 'flexicurity' (Bredgaard et al., 2006) system to ensure both social cohesion and the success of its export-oriented economy. Digitalization in this context means efficiency for the public sector and productivity and new goods for the private sector. Data and digitalization work are therefore topics of massive interest, investment and, as this dissertation aims to show, speculation in both the public and private sectors. The research is situated in what it calls the public-private tech sector, a composite of companies, cluster organizations, public-private partnerships, universities, and municipalities.

The dissertation consists of three papers which take up different empirical cases and objects of study: tech events and their sociotechnical imaginaries, data work and dashboards in a public sector organization, and an innovation project on the future of work. The dissertation suggests the term *speculative relations* to point to the many ways speculation occurs within these cases: through narratives, sociomaterial performances of hype, data work, infrastructures and various figurations, *and* how speculation acts as a relation which connects and ties them together. This concept contributes to making sense of increasing digitalization and the growing importance of the digital economy by showing and conceptualizing how speculation plays a central role in these tendencies. The concept builds on, supports, and extends an analysis of these phenomena as both sociomaterial and

discursive-symbolic, manifested in data centers, digital (labor) economies, big data analysis technologies, algorithms, imaginaries of data deluges, revolutions, and moments. The dissertation is thereby an interdisciplinary work which brings together speculative research, constructivist studies of technology, and research on digitalization and work.

To figure (out), understand, analyze and intervene into speculative relations, the dissertation draws on works from numerous authors that have worked on the themes of relations and speculation. For relations, the work of Marilyn Strathern (Lebner, 2016, 2017; Strathern, 1996, 2014), Actor-Network Theory (ANT) and post-ANT (Callon, 1984; Gad & Jensen, 2009; Latour, 1987, 2005; Law, 1987) inform the fundamental approach and thinking. For speculation, Sheila Jasanoff and Sang-Hyun Kim (Jasanoff & Kim, 2015), Donna Haraway (D. J. Haraway, 2016), Wilkie et al. (Wilkie et al., 2017), Orit Halpern (Halpern, 2014), Dunne and Raby (Dunne & Raby, 2013), and James Auger (Auger, 2013) provide work that allows for theorizing speculation as imaginaries to be described and intervened in. The works of these authors inform both the theoretical and methodological dimensions of the research.

In addition to these resources, the empirical work of the dissertation has been particularly informed by the following methodological approaches and concepts: The notion of the 'gyre' (Zabusky, 2002) was central in making sense of what is normally conceived of as a 'field' or 'site'. This concept became instrumental to make sense of and keep in focus the multitude of relations making up data, and the specific role of speculation with regards to it. Ethnography and elements of the extensive body of work discussing this method, especially with regards to constructivist STS, have furthermore been the central qualitative methods for conducting the study and analyses.

Through the interplay of these ideas of relation, speculation, and the empirical (understood as the flows and eddies of a gyre), the dissertation represents the first steps towards a *speculative ethnography* of data understood as speculative relation. The bulk of the dissertation work is represented in three research papers, which perform redescriptions of data and digitalization work as speculative relations. These redescriptions are in themselves speculative, conscious to this quality, and purposefully attempting to take it seriously by harnessing speculation for different futures.

The following sub-sections will explain the trajectory of the research, detailing how the empirical engagements that form the basis for the dissertation came about. Then the research questions and initial findings will be described. Finally, the structure of the dissertation will be laid out.

1.1 Trajectory of the research project

While the dissertation consists of three research papers, each studying specific parts and aspects of data and digitalization in Denmark, the story of the research project itself is important in order to understand them in their entirety. Not only does this story provide context for the individual papers, but it also explains the arrival at speculation and speculative relations as the wider conceptual engagement of the dissertation.

Initially, the research project of which this dissertation is the product was focused on study of a new digital infrastructure in Copenhagen, Denmark, called the City Data Exchange (CDE). It was the result of a public-private partnership between the multinational company Hitachi and several public sector organizations from the Copenhagen region. The CDE was a data marketplace, intended to promote greater exchange of data between all actors, with a goal to stimulate green growth by supporting more efficient transport use, energy consumption, and new apps/business models. It was unclear exactly how this would be accomplished, but central actors believed that early relationship-building, the construction of the infrastructure itself, and the development of consumer-oriented CO2-footprint apps would combine to create a both commercial and ecological success.

The research project was planned as a study of the CDE, using a mixed-method approach to trace how the infrastructure and its data would create new connections amongst actors. While the CDE was acclaimed at its launch, it quickly became clear that its business model was unsuccessful and unsustainable, attracting few paying customers and hosting very limited datasets both in volume and amount. It was shut down a little over a year after it launched. Due to the early failure of the project and unresponsiveness from the CDE's side, the research project was redesigned.

Already in the preliminary work on the CDE, the discourses around the project and technology in general had been of interest. The many events, workshops, and conferences where the CDE was presented were filled with presentations and promises that seemed to outstrip the reality of the project. The research shifted focus to these events. The CDE as a project sat at an intersection of networks, communities, and technologies: green technology, smart cities, cluster organizations, big data, urbanism, industrial lobby organizations, open data, data visualization, internet-of-things, innovation hubs, universities, mobilities, and technology exports, to name some. The research continued to trace these connections ethnographically, noting how hype and hot air was both prevalent and productive. Furthermore, the researcher was repeatedly enrolled by actors via meetings and various other engagements to act as an expert, teacher, or

collaborator. Any illusions of being positioned outside of the hype and hot air were quickly dashed.

These empirical phenomena were connected to one another, but in a dizzying array of partial and continuously unfolding connections. Therefore, rather than conceptualize them and the empirical encounters with them as particular sites or fields, the term 'gyre' was used instead as it better captured this heterogenous flow of international technology projects, presentations, and organizations. This gyre, its hype-filled tech events and their popularity with otherwise serious professionals, is the topic of the dissertation's first research paper. It explores the performative aspects of this 'hot air,' examining its sociomaterial manifestations and its role in articulating sociotechnical imaginaries via these events.

Informed by constructivist research agendas such as ANT and post-ANT, the research project then shifted to study how these articulated imaginaries within the gyre were translated into actual technologies, practices, and work through digitalization efforts. An innovative pilot project within a Danish municipality became a new case study. In this project, so-called digital humanists would be employed in a dual effort to enhance the skills of a professional group overrepresented in unemployment statistics (academics with humanities degrees) and further the digitalization process of the municipality's department, the Culture, Arts, and Recreational Department (CARD)[2]. Once again, the researcher was enrolled as an expert, both as a dialogue partner about the project and as an academic expert on the topic of 'data'. Access to studying the project was partly obtained in exchange for involvement and assisting in training the digital humanists. Studying this project and its organizational context forms the basis for the second and third papers, focusing on the infrastructures and speculative nature of data work, and on the figurations of digitalization work, respectively, and putting forth various attempts at intervening in them.

The trajectory of the research project has thus been one of being cast or flung from an initial research design to developing a very different study than originally envisioned. Issues of access and research not going as planned is of course a very common feature of the kind of ethnographic work represented by this dissertation. However, the particular trajectory of this project perhaps differentiates itself by choosing to embrace and follow the gyre of speculative relations within and between data, digitalization work, its technologies and its imaginaries. This embrace has resulted in a study of these relations and speculative practices as well

[2] The name of the organization is a pseudonym.

as an exercise in co-speculation through enrolment in events, teaching classes, as an expert, and via design prototypes.

1.2 Research question

The present dissertation is ultimately attempting to answer questions pertaining to data and digitalization work. The following section describes the origins of these questions and then describes precisely what the research questions that have motivated this study are.

Data, digitalization, and work are all topics which have been researched extensively in the disciplines and approaches of STS, HCI, CSCW, and Critical Data Studies. These communities and their diverse work have contributed immensely to our understanding of various technologies, scientific processes, and social phenomena. However, it is the contention of this dissertation that the many research efforts taking place within them represent a partially siloed approach to the topics at stake. This is both to be expected and in keeping with the nature of disciplinary formations and epistemological traditions, but it risks missing the wider picture and interrelatedness of these various technologies and processes.

The research represented in this dissertation has been heavily informed by these disciplines. As part of the overarching research project *Data as Relation: Governance in the Age of Big Data*[3], STS research was fundamental in shaping the design and outlook of the dissertation. This project sought to study how data-intensification was affecting the Danish public sector using an STS perspective attentive to relations and the construction of sociotechnical phenomena.

Following the spirit of this overarching project, the dissertation has sought to study data to discover what societal processes, institutions, and relations it was affecting. This has carried the dissertation from the study of a new public-private partnership and big data infrastructure, through a speculative ethnography of the gyre of tech, from hot air and imaginaries to studying a cohort of wage-subsidized 'digital humanists' in a municipal department. It would be incorrect (and perhaps also problematic if it were the case!) to say that the research questions have not shifted and been affected by these changing conditions and objects of study.

Initially then, the research questions informing the dissertation focused on how data and smart city big data infrastructures were co-constructed in the Danish context. Following the implosion of that research object, this shifted to focus on the heterogeneity of where and how data was discussed, both within the 'ruins' of the empirical field and within STS research. Particularly, the way in which speculation, in the form of hype, projections, and imaginaries, became of interest in the

[3] Project website: https://dar.itu.dk/

empirical context. The research question shifted to focus on how such speculative accounts of data were bound up with practices, material infrastructures, and organizational changes, framing them as assemblages. Seeking to ground how such assemblages were translated into actual organizations, the study conducted its workplace ethnography and encountered the practical digitalization work which data is a part of.

The present dissertation is a result of these changing objects, questions, and the work resulting from researching them. The research question motivating the study in its final form is therefore both a layered accretion of the previous questions, and a distinct, novel one. The question this dissertation answers is:

> What role does speculation in, through, and about data play in the ongoing digitalization work of the Danish public and private sectors?

The dissertation answers this question through taking a relational approach and developing a speculative ethnography of data and digitalization work. On this basis, it provides an engagement with as well as redescriptions of data and digitalization work in the messy context of interrelation between the Danish public and private sectors. The next section will outline the findings this approach has produced.

1.3 Initial findings

The full findings of the dissertation are embodied in the three research papers produced, but also synthesized in relation to the overall theoretical ideas of the dissertation, in section six of this kappa. That section also outlines topics for future research that follow from the conclusions. The following sub-section briefly summarizes these findings.

- The dissertation finds that the role played by speculation in, through, and about data to digitalization work is one that can be conceptualized as *speculative relations*. The dissertation posits that these relations are distinct ways in which data is related to digitalization work.
    - The papers of the dissertation exemplify what is meant by speculative relations by performing redescriptions of the empirical cases and conceptualizing specific such relations.
        - Paper 1 finds that between sociotechnical imaginaries of data and tech and the digitalization work undertaken by actors from the Danish public and private sectors, hype is performative through 'hot air,' a kind of speculative relation.

        - Paper 2 finds that between data and infrastructures such as dashboards and the digitalization work aimed at becoming a data-driven organization, there is particular 'speculative data work.'
        - Paper 3 finds that between data sources and practices in a public sector organization and the actual configuration of work to map them, there are certain speculative 'figurations' of digitalization.
    - This concept offers a contribution for understanding particular relations of data and digitalization work but can also be extended further to other cases in which speculation is rife.
- The dissertation develops a *speculative ethnography* as a response to the prevalence of speculation in the empirical encounters, finding that it represents a helpful way of studying and engaging speculation.
    - Paper 1 develops the concept of 'hot air' in an effort to take hype seriously, and understand why actors attend events that, by their own admission, are filled with hyperbole.
    - In paper 2, a 'speculative dashboard' is prototyped as a way of engaging with and channeling speculation. It is developed together with professionals working in organizations oriented towards digitalization.
    - The dissertation offers the notion of a speculative ethnography as a situated response to speculation, which not only studies and takes speculation seriously, but also treats it as an opportunity for transformation and the opening of new possibilities.
- Finally, the dissertation finds that data, digitalization work, and other tech phenomena in empirical encounters in the Danish context tend to be 'hyper-relational.' This means that 'tech,' whether it be data, digitalization, smart cities, or blockchain technology seems to be empirically related to a multiplicity of other technologies and actors through discourse, imaginaries, and material connections.
    - On this basis, the dissertation reiterates the claims made in Critical Data Studies to develop a more cohesive account and critique of big data (Dalton & Thatcher, 2014), but to extend it further to encompass other parts of tech.
    - Additionally, based on the third paper of the dissertation, it is suggested that more studies of the political economy which forms the

backdrop for this kind of 'hyper-relational tech' be developed, following already existing examples (Prainsack, 2020; Srnicek, 2017; Zuboff, 2019). It is, however, stressed that this needs to be part of a larger research agenda which includes the kind of situated and ethnographic study represented for instance by STS research.

1.4 Structure of the dissertation

In order to answer the research questions and reach the above conclusions, the dissertation is structured in the following manner. In section 2 the overall context for the dissertation work will be provided. This section, entitled "Context: The Danish Public-Private Tech Sector," focuses on the recent history of the Danish welfare state with a focus on its digitalization, the overall trend of technological developments, and the emergence of so-called Big Tech. The particular arrangement of Private-Public Partnerships, cluster organizations and the tech sector in Denmark will also be included. The Danish tech sector is here described as a composite of public and private organizations engaged in a variety of digitalization and technology efforts.

The third section, entitled "Theory: Ideas to think ideas with," describes the central theoretical resources of the dissertation through the notion of two broad 'ideas;' *relation* and *speculation*. Drawing on diverse but related bodies of work, the section elaborates on how these notions are informed by the empirical work and interpreted into, 'ideas to think ideas with.' These ideas are used to make sense of data and digitalization work as encountered through the fieldwork.

The fourth section is entitled, "Methodology: Speculating through Gyres." It discusses methodology, describing the constructivist approach entailed by STS research, which the dissertation positions itself in relation to. It then proceeds to outline the notion of the 'gyre,' a central concept for understanding the fieldwork conducted, before describing in greater detail the various qualitative methods utilized, foremost of which is the ethnographic method. The section then discusses the broad category of speculative methods which broadly match the intellectual resources described in section 3, "Theory: Ideas to think ideas with," but focus on their methodological consequences. Finally, the section presents a combination of these various ideas and proposes the notion of a *speculative ethnography* as a distinct methodological description of the empirical approach and work.

Section 5, "State of the Art: Data, Digitalization, and Work," reviews the state-of-the-art literature on data and digitalization work, delimited to the studies of data within STS, CSCW, HCI, Critical Data Studies and a select other set of literatures.

The sixth section of the dissertation describes the main findings of the dissertation and sets out some topics of future research on the basis of this.

The seventh section provides an introduction to the three research papers which make up the dissertation's main scientific contribution and detailing their state of publication. The full papers are presented in Part II of the dissertation.

A brief afterword follows section 7, coupling the themes presented in the foreword and the introduction to the findings.

2. Context: The Danish Public-Private Tech Sector

This section briefly outlines the context for the study, focusing on the Danish welfare state and its recent political trajectories, which include the wide-ranging digitalization policies, technological changes, and their implementation. The goal of the section is as stated to contextualize the rest of the study, providing a backdrop against which the studies of changing relations can be understood. It also includes a section encircling what is meant by the 'Danish tech sector'.

2.1 The Danish welfare state and its digitalization

The Danish Welfare State was mainly developed, similarly to many other European welfare states, in the aftermath of the 2nd world war. However, its origins reach much further back in some respects, to initial intellectual discussions in Denmark of the meaning and importance of welfare as a central social goal (Kjældgaard, 2017), and to initial Social Democratic reformism in the 1930s and 40s (Christiansen & Petersen, 2001). In accordance with global tendencies, the 'conservative revolution' of the 1970s also affected Denmark and saw the rise of New Public Management discourses and regimes within the Danish state. This gave rise to a Danish version of the so-called 'competition state' (Genschel & Seelkopf, 2015), the analysis of which in Denmark was performed most iconically by the scholar Ove Kaj Pedersen (O. K. Pedersen, 2011).

The wider societal backdrop against which research for the present dissertation has been carried out is thus a country that can be characterized as a competition state with comparatively strong and universal welfare provisions (Dehlholm & Pedersen, 2018). In extension of this particular political configuration, the Danish state has since the mid-1990s been in a process of constant digitalization, in a certain sense culminating in the making mandatory of digital post for communications between State and citizen in 2014 (Schou & Hjelholt, 2019a). Despite multiple scandals around procurement and development of IT systems for the public sector (Larsen, 2017; Sandal, 2015; Steinmark, 2000), Denmark has consistently ranked in the top of both EU (European Commission, 2017, 2018, 2019) and United Nations' e-Government benchmarks (United Nations, 2019).

The term 'digitalization' covers a vast range of activities and changes, whether it applies to the public or the private sector. It would be wrong to understand digitalization as a monolithic process that has a given essence, and it should instead be understood as a term that refers to a range of related but distinct changes. As the term implies, however, that relatedness has to do with the 'making digital,' i.e. the conversion of certain artefacts, services, processes, and work practices from an analogue format to a digital one.

In relation to the public sector, it has centrally referred to the providing of services to citizens via the internet and related digital means. The research of this field is generally referred to as the study of e-Government, which has been speculating on and studying what digital government might mean since the early 2000s (Chadwick & May, 2003; Layne & Lee, 2001). Studies of the use of IT-systems within public administration of course predates the 2000s (Danziger & Andersen, 2002), but the development of e-Government and related terms such as "Digital-Era Governance" (Dunleavy et al., 2006) marked an expectation of more fundamental change. Early e-Government work has been critiqued for its development of speculative, normative, and linear models (Coursey & Norris, 2008) and the positivist tendencies in its research approach (Heeks & Bailur, 2007).

More empirically grounded studies have, however, been conducted, both within e-Government and in other disciplines such as CSCW, HCI, STS, and the Public Administration field, developing an account of the many but concrete ways in which digitalization is being performed. These studies, particularly in the Danish context, have looked at how citizens encounter digital services (Madsen, 2015), how work on the front-line (Jørgensen & Schou, 2020; Pors, 2015a) and elsewhere in the public sector is transformed (Plesner et al., 2018), how it can be better supported (Boulus-Rødje, 2018), how adoption of social media affects government (C. Wang & Medaglia, 2017), and how the State itself is reworked through exchanges with Big Tech (Maguire & Winthereik, 2019) and the development of new governance space (Schou & Hjelholt, 2019b).

As stated, this research describes a wide range of changes that can be broadly subsumed under the category of digitalization, and given its varying epistemological starting points, also reaches a number of different conclusions. Broadly speaking, however, these empirical studies describe a situation which supports, or is at least compatible with, the research on policy documents and strategies within the Danish context, establishing a historical drift from ideals of digitalization as equally efficiency-oriented and democracy-promoting to an increasingly narrow focus on economization and efficiency (Jæger & Löfgren, 2010; Schou & Hjelholt, 2019a).

Thus, the present dissertation is situated within a context of a Danish society where public sector digitalization has been extensive and is widely regarded as a policy success. The aforementioned research contains both criticisms and disagreements with this assessment, but also more neutral accounts that aim to nuance our understanding of the changes wrought, but that generally agree with the necessity and manner of digitalization undertaken.

2.2 Rise of (Big) Tech

The rise of e-Government and the digitalization of the public sector obviously has not happened within a vacuum. Viewing these developments within a broader perspective, they are concomitant with the rise of the so-called "Information Age" prophesied by figures such as Manuel Castells (Castells, 2010c, 2010b, 2010a). However, many features of contemporary society were not predicted by the initial thinkers of the IT society. In particular, the rise and importance of actors such as Microsoft, Facebook, Amazon, and other Big Tech companies and their use of the network effects of IT to establish a new kind of platform (Srnicek, 2017) or surveillance capitalism (Zuboff, 2019), were not foreseen. A more detailed account of the predictions and realities of the history of information technology, and how it has shaped the modern world, is far beyond the scope of this dissertation. It is, however, important to describe certain aspects of the wider history in closer detail, in order to be able to understand the intersection between public and private sectors under study here, and crucially, the way in which data is reshaping relations.

In her important work on cybernetics, Orit Halpern has detailed how the modern sensibilities concerning IT systems and control, and how the aesthetic sense of data being beautiful, were shaped over the course of the post-war period (Halpern, 2014). This fascination with data has been borne out in recent history with the infamous claim of ushering in the 'end of theory' due to a data deluge (C. Anderson, 2008), the data revolution (Kitchin, 2014), or what has come to be known as big data (Mayer-Schönberger & Cukier, 2013; Stapleton, 2011). Data has now come to be a, if not *the*, central commodity of the digital economy in the eyes of technology commentators (Toonders, 2014), powering the aforementioned platform and surveillance capitalism. Data is extracted from individuals or sensors and is used to automate processes, analyze behaviors and trends and generate predictions – to improve the efficiency of systems, implement agendas, or simply to generate revenue through complicated variances of what amounts to ad-sales. The emergence of novel technologies such as the internet-of-things, artificial, or machine intelligence and 3D-printers have given rise to essentialist sociotechnical imaginaries of the future (Schiølin, 2019) such as notions of a 4th industrial revolution (Schwab, 2016). Self-driving cars and Smart Cities have both been pronounced the next big things, and as solutions to the pressing emergencies of the climate crisis, housing shortages, and urban crime (Sadowski & Bendor, 2018).

In the Danish context, Big Tech was initially hailed in much the same way as the rest of the world as a positive: Facebook was quickly adopted, and Denmark actually had its own cohort of tech developers and entrepreneurs who travelled to Silicon Valley, started successful companies, or made contributions to tech. Skype

was for instance developed by a Danish-Swedish duo. Denmark has also had a history of producing contributions to computer science, including influential contributions to programming languages such as C++ (Mygind, 2019).

However, a tech sector as such has never appeared, and instead Danish society has slowly seen the rise of tech influence and ideas by import. Recent critical journalism and research has highlighted how digitalization discourse affects education (Balslev, 2018), how Google institutes itself in schools with free laptops and how multiple Big Tech firms bypass democratic oversight of their plans to build data centers in Denmark (Bernsen, 2019), as well as how public sector actors unwittingly cement the market monopoly of big tech by using products such as Google Analytics on government websites (Hasselbalch & Tranberg, 2016).

Politically, as the next sub-section also explores, the response and engagement with Big Tech have been a mix of general positivity, pragmatic interaction, and downright resistance. While Facebook, Instagram, and Google are hugely popular services, Uber was de facto made illegal in Denmark through strong lobbying by unions (Thelen, 2018). Conversely, Denmark was the first country in the world to create a formal agreement with Airbnb, where the tech company would share information on their uses with the Danish tax authorities (Skatteministeriet, 2019). Denmark also made headlines in 2017 by establishing the office of the first 'Tech Ambassador' (Satariano, 2019) to Silicon Valley (with an office in Silicon Valley, Copenhagen, and Beijing), and has a series of Innovation Centres in eight foreign cities (Shanghai, New Delhi, Boston, Munich, Seoul, Tel Aviv, Silicon Valley, and São Paulo). These institutions serve the purpose of either interfacing with Big Tech through so-called TechPlomacy (Ekman & Wædegaard, 2020) or supporting Danish export and innovation efforts.

Big Tech is thus a factor in the promotion of the importance of data and ongoing digitalization work in Denmark. As the first paper of the dissertation explores, corporate sociotechnical imaginaries of data, digitalization, smart cities, and more fill the kind of events that were studied in this dissertation. Big Tech thus plays a central role in how data is speculated on with regards to digitalization work, even if it's power and influence in Danish society is less significant than other places in the world.

2.3 Public-private partnerships and the Danish tech sector

This section provides a brief characterization of public-private partnerships and the Danish tech sector, understood as a composite or overlap of public and private sector activities. This provides context for understanding the interrelated gyre between international tech, the Danish tech sector and the public sector.

Concomitant with the rise of tech as a policy-affecting force and the history of digitalization efforts, it is important to understand simultaneous shifts in the approach to government through the emergence of 'governance' approaches and the importance of Public-Private Partnerships (PPP). This was another ideal which became prominent in the late 2010s alongside e-Government and Digital-Era Governance (Greve, 2015), although it has a longer history as a neoliberal policy instrument (D. Harvey, 2011, p. 76).

PPPs are a governance approach intended to provide a semi-decentralized structure for achieving policy goals through the active involvement of the private sector. PPPs have been a mixed success in Denmark (Kristiansen, 2009; Petersen, 2011), yet is still a part of the policy toolkit which the City Data Exchange described earlier demonstrates. This was a partnership in which public sector actors such as the Region of Copenhagen and Municipality of Copenhagen together with the green-tech cluster organization CLEAN, tendered the construction of new infrastructure to a private organization, Hitachi. Industry-specific clusters (Kristensen & Laursen, 1999) or 'resource areas' (Drejer et al., 1997) and the formation of cluster organizations are themselves a separate policy tool of which CLEAN is an example.

Developing a data infrastructure such as the CDE through a PPP was a paradigmatic case of the promise of this governance approach: the public sector provided a relatively meagre investment of actual funds (Rising & Clausen, 2015) for the private partner, with the latter benefiting from the opportunity to build the infrastructure and potential long-term income from operating the infrastructure. On paper, this arrangement contributes to a win-win situation in which the public sector and public at large gain an infrastructure that would otherwise have been costly to develop, and the private sector gains income from this infrastructure.

The case of the CDE showcases how the lines between public and private sector are blurred in the Danish tech-sector, and why the context for this dissertation is best understood as a public-private composite. The facilitating cluster organization CLEAN is itself constructed as a public-private or 'triple-helix' structure (CLEAN, 2017), in which both its board of directors and membership is made up of private, public, and research sector organizations. Furthermore, the individual in charge of the initial tender process of what would become the CDE would first transition to be its CEO, and after its failure founded his own Smart City-oriented consultancy firm. While anecdotal, this showcases the porous relationship between actors and the way that they themselves move through the gyre of tech.

Whether in the shape of a formal PPP, or just through tenders and consultancy on specific systems, the public and private sectors are intimately entwined with regards to tech and digitalization in a Danish context. The emergence of a national electronic ID, the NemID, was for instance facilitated through a public-private collaboration process (Medaglia et al., 2017) between the public sector and banking sector.

The Danish tech sector is therefore understood here as a public-private composite of companies and industries working directly with IT and technology but is given a much wider and weaker definition given that uptake of digitalization within Danish companies is very high. Rather than define the sector based on statistical categories of industry, this dissertation suggests a topic- and project-based approach. Broadly understood, those who work with technology are part of the tech sector.

Denmark is a small but exceptionally rich country, and this wealth derives partially from its colonial history (Asp et al., 2017), industrialization, and part in the post-world war 2 economic boom, and at present from an export-oriented economy, which is based on a mixture of agriculture, pharmaceuticals, shipping, and green energy clusters. Additionally, the combination of a generous welfare state and low levels of corruption (Johnston, 2013) have given rise to a well-educated and productive population as well as an efficient public sector apparatus, even being declared the best country for business by Forbes in 2015 (Badenhausen, 2015). Furthermore, Denmark has a strong labor union tradition and features tripartite negotiations between unions, private corporations, and the state to manage many aspects of the economy. This ensures high salary levels for most workers as well.

The Danish economy is thus dependent on highly skilled and productive workers as well as the development of high-quality products and services to ensure that exports can remain competitive and be maintained. Companies such as the windmill producer Vestas (Dyrekilde, 2017), the pharmaceutical company Novo Nordisk (Sindbæk, 2019), the shipping company Maersk, pump producer Grundfos, and well-known giants such as Carlsberg and LEGO all rely on such workers and are constantly developing their technological acumen. Several of these companies either participated in or were used as examples of successful digital transformation in the events that form the basis for paper 1 of this dissertation.

While there are specific sectors of Danish industry defined with regards to technology by official statistical indexes, such as IT-service companies (software production, consultancy, systems management) or industrial production of electronics (hearing aids, robotics, sensor-devices, etc.), which might be said to be a

tech sector in a proper sense, this picture is complicated by the increasing digitalization of and investment in advanced technologies in other sectors of industry and corporate activity. This increased digitalization is one of the reasons that Denmark consistently performs well on the EU's DESI ranking, which uses metrics such as connectivity, prevalence of e-commerce, website, it-competences, and online advertising.

Unlike the USA, Denmark has no Silicon Valley to speak of. Rather than being known by a specific name or centered in a specific sector or geography (though Copenhagen is prominent, as it is in the Danish economy in general), 'tech' is per the above observations diffused through the private sector in a large variety and selection of actors. Industrial heavy-weights such as the pump-producing Grundfos seek to transform themselves by establishing a "Digital Transformation Office" (Jessen, 2019), corporate innovation labs develop start-ups such as the digital payments platform MobilePay (Staykova & Damsgaard, 2018), genuine 'garage' startups like SOUNDBOKS take off and follow the beaten path by being admitted to accelerators such as Y Combinator (Farmbrough, 2017), and private-public clusters, such as the green-tech organization CLEAN, facilitate creations of partnerships such as the CDE mentioned above.

In the public sector, actors on both a national, regional, and local/municipal level are engaged in digitalization through a variety of means. As described earlier, public sector digitalization has been supported by national strategies for over 20 years, whilst actors such as the National Association of Municipalities (KL) hire consultants to analyze the perspectives of big data and artificial intelligence for their members (DareDisrupt, 2018; KL, 2018), governments establish Disruption and Dataethics Councils (Finansministeriet, 2019; Regeringen & Beskæftigelsesministeriet, 2017) and regional actors enter into public-private partnerships. While 'tech' in the public sector mostly has meant digitalization of public services and the construction of various infrastructures such as NemID, the sector is a participant in enabling and supporting wider involvement with technology through active industrial, educational, and research policy, for instance enticing actual Big Tech to construct data centers in the country (Maguire & Winthereik, 2019).

While there are of course very distinct logics and dynamics at play in the public and private sectors respectively, which deserve their own scrutiny, the empirical work of the dissertation has taken place within the context of the messiness of where they overlap. Rather than observe or suggest a neat separation between the spheres of smart city, green tech, big data, or private or public sectors, the empirical work has threaded through events that have involved actors partially of these overlapping areas. Events have involved industry associations, unions,

grass-root activists, academics, consultants, and public sector employees – primarily from Denmark, but also from abroad. Together, they make up the composite public-private tech sector, a part of the dynamic gyre which this dissertation explores.

3. Theory: Ideas to think ideas with

In order to answer its research questions, the dissertation uses two central concepts or ideas: *relation* and *speculation*. These ideas are partly predispositions that inform the approach to the topic of study, and they are derived from encounters with the field, further refined through reflection and engagement with existing theoretical resources. They are, echoing Donna Haraway, who in turn was quoting Marilyn Strathern, the "ideas one uses to think other ideas (with)" (D. J. Haraway, 2016, p. 12; Strathern, 1992b, p. 10) and their origin, inflection, and connection matter for thinking through data and its role in digitalization work.

It is important to note, that while the topic of study is how speculation on data relates to digitalization work, this section of the dissertation focuses on describing its ideas in relation to data. This is the case because, as has been described, data was the starting point for the dissertation work. However, the ideas presented here also apply to digitalization work as an object of study, which the section also demonstrates.

3.1 Ideas and speculative relations

The idea of *relation* here refers to the relational approaches of Marilyn Strathern and post-ANT. The idea of *speculation* refers to the work on speculation by Donna Haraway, Orit Halpern and within speculative design and speculative research. The following section will introduce them and discuss their interrelation, briefly developing the notion of *speculative relations*. Later sections will then go into more detail with the theoretical resources that make up *relation* and *speculation*, respectively.

Relation

Relation is the idea underlying the notion of taking a relational approach in research, or the notion of a relational ontology. In the present dissertation, relation derives from the work of so-called post-ANT scholarship, and notably, that of Marilyn Strathern. The idea of relation here denotes that phenomena, including things such as data but also so-called 'immaterial' things such as concepts or theories, are composed of and understood by their relations. The basis for the present dissertation is a relational approach, meaning concretely that to study for instance data means finding, following, and describing the relations of data. One of the insights of ANT scholarship is that such relations can be to any manner of actor. Thus, studying data and digitalization work through relations means discovering empirically how these 'objects' are related to a myriad of other actors.

In practice, this has meant starting not from a particular theoretical definition of data but finding where data was being talked about and worked with in the world.

This approach quickly led to the discovery that when the term data was invoked, it was further related to many other concepts and actors: marketplaces, business models, storage, cluster organizations, formats, sensors, municipalities, regions, prices, privacy, companies, smart cities, living labs, universities, and so on. A relational approach suggests that one tries to follow these other connections as well, although the dizzying array of potential leads makes this a nontrivial task. Discernment is required to determine which relations are essential in tracing the network pace ANT or delivering a good description. In the particular case of the present dissertation, a choice was made to not immediately 'cut the network' (Strathern, 1996) but instead go along with the gyre (Zabusky, 2002) of the many relations of data, and in particular to those of digitalization work.

Relational thinking suggests that universal categories are a construction, created through local translations and work, and thus any network is essentially unique and situated. Studying data in the Danish context is not the same as studying it elsewhere, or at a different point in time. Thinking data through the idea of relation means also understanding the reflexivity of this proposition, which implies that data is not only related to other things, but is itself also a relation. We can distinguish between the relational approach, which was the point of departure for researching data, and thinking data as relation, which helps us understand the findings of this research.

If data both is composed of relations and itself makes up relations between other phenomena, such as digitalization, it becomes important to understand what these 'others' are as well as the quality of the relations. The dissertation advances one other central idea drawn from the empirical research, in order to make sense of these questions: that of *speculation*.

Speculation

The *idea* of speculation develops from the empirical encounter with speculative thinking about the possibilities engendered by data. During the course of the fieldwork, data was articulated as a catalyst of macrolevel societal change, discussed in relation to the creation of particular infrastructures of calculation and visualization, and as a key topic to master in relation to individual career opportunities. Speculation became a central theme for making sense of these empirical findings.

We must think data as a phenomenon both related to speculative activity in various arenas and composed of it. Data is often invoked as a revolution (Mayer-Schönberger & Cukier, 2013) or deluge (C. Anderson, 2008) which is then used as the basis for speculating about what changes this will bring to society, business environments, or individual lives. Such an analysis posits data as a neutral or

technical phenomenon, which others mobilize to speculate with or about. However, speculation also composes data, in that data is itself a means through which people speculate about other trends and phenomena. Furthermore, the rise of data as a discursively powerful symbol is itself intrinsically linked to systems of material, economic and financial speculation. The latter statement refers to how the rise in data as a resource for exploitation through big data analysis and other means is tied to a much wider web of speculation in the value of web platforms (Srnicek, 2017), rare minerals mining (Halpern, 2017a), and advertising revenue (Bechmann, 2013), which makes up much of the so-called digital economy.

To enable this *thinking*, the dissertation draws on a range of thinkers of the speculative. Centrally, Donna Haraway's invoking of SF/speculative fabulation provides a generative story for describing the possibilities inherent in the tendency to speculate. Following a different genealogy of research and not invoking speculation per se, Sheila Jasanoff and Sang-Hyun Kim's notion of sociotechnical imaginaries (Jasanoff & Kim, 2015) provides a concept of the raw material from which speculation draws and engages. Orit Halpern describes the importance of speculative thinking to modern extractivist capitalism, but situates speculation as a site for engagement (Halpern, 2017a, 2017b). She has also delved deeper into the original couplings of data with aesthetics, control, and reason (Halpern, 2014), which also continue to undergird such speculative engagements.

Researchers and designers working with what has come to be known as speculative design (Auger, 2013; Dunne & Raby, 2013), highlight the importance of using speculation as a creative force for articulating critique of the present by instantiating how it might be otherwise. Finally, speculative research (Wilkie et al., 2017) outlines how research itself must not shy away from engaging the speculative, despite its negative connotations and the risk of co-option. Here, speculative research is differentiated from the kind of speculation which seeks to determine the future through deterministic or probabilistic models. Speculative research is instead based on pragmatist philosophy and interested in all those 'black swan' (Taleb, 2008) futures which are not calculable, but which underscore the fundamental unpredictability of reality.

These various intellectual resources are not necessarily completely homogenous with one another. However, they provide different points of purchase for articulating the idea of speculation in order to think data with. Fundamentally, Jasanoff and Kim's work alongside Halpern's, describes the way in which speculation is tied to and draws from particular imaginaries of the sociotechnical and to data, respectively. The work of speculative designers and speculative researchers describes different paths for working with the tendency of speculation, as well as how to engage with it and use it constructively. Donna Haraway's work

explores the conditions of possibility, the fundament upon which such engagements are possible. Speculation as an idea in this dissertation, thus has two main modes: that of denoting a description of actual practices and that of providing an opening for different ones.

As a description, speculation helps narrow and qualify data as relational. In particular, it describes some of the *qualities* of the relations that data makes up and is connected to. This means pointing to the various ways in which data is related to other phenomena through speculation, such as when companies invest in data analytics or visualization in part because of speculative beliefs about the future, or when data is the source of anxiety, unease, and speculation about changes to work and downsizing. Data is related to these things – analytics programs, work practices – through speculation. Simultaneously, data is itself speculation in the sense that it is a cooked representation of reality, translated through so many passages. Data *is* speculation, for instance, in the way it acts as a representation of cultural activity in the CARD[4] organization (Paper 3). The next section will develop these ideas and describe the dissertation's contribution of *speculative relations*.

Speculative Relations

The ideas combined here – a relational approach and a theorization of the speculative qualities and opportunities for engagement with these qualities – are the result of a situated engagement. They are a set of ideas that enable thinking through how data and digitalization work are connected. In the specific Danish context investigated in this dissertation, data is dynamically related to digitalization work through speculation: speculation underwrites investment in data (Paper 1), data and its infrastructures are the source and object of speculation within organizations (Paper 2), and speculation charts the horizons of new figures of digitalization, labor and work (Paper 3).

Note that understanding data and digitalization work through these primary two ideas does not mean that other concepts or empirical facets are irrelevant. Indeed, data is relationally formed by specific imaginaries, infrastructures, tools, technical standards, institutions, work, and a host of other relevant terms. The strength of the relational approach is to trace and understand data as a phenomenon emergent from this set of relations. However, the idea of speculation has made it possible to go further and highlight the quality of these relations that is pertinent to the specific, situated Danish context.

[4] This is an anonymized acronym, used in the paper. It stands for Cultural, Arts and Recreational Department.

Having outlined the central ideas that the dissertation makes use of, and how they relate to one another, the following sections will develop deeper accounts of the respective approaches and authors being drawn upon.

3.2 Relation

The dissertation takes a relational approach to studying data. This means specifically that the approach is informed by certain other articulations of the importance of relations; namely the work of Marilyn Strathern and that associated with Actor-Network Theory (ANT), especially as influenced by Strathern and articulated as 'post-ANT.' These are distinct but connected bodies of work that provide an understanding of research focusing on relations as a central site of investigation. Strathern practices anthropology and ethnography with the goal of providing a "good description" (Borić, 2010, p. 281) by attending to relations. What this means will be made more clear below, but the assumptions made are that relations of all manner of kind are real, that creating such 'good descriptions' is not easy due to our individual and cultural differences in language and hence metaphysical disposition, and that to achieve descriptions of relations requires the creative engagement of yet other relations. Post-ANT, on the other hand, originates as a radical material-semiotic approach which insists that meaning and the nature of entities, whether physical or conceptual, depend on their relations. ANT articulates this as actors and networks and suggests that all actors engage in relations of translations with others, and that the stability of certain categories or actors is a result of such struggle rather than its foundation. Post-ANT draws on Strathern, Annemarie Mol, and others to underscore the multiplicity and partiality of any network, including ANT itself.

From these two understandings of research focused on relations, the dissertation draws its own approach which highlights understanding *data* as relation. More precisely, data is ontologically a complex and dynamic network of relations, to be understood through empirical encounter and ethnographic description. The precise manner of this encounter and description is dependent on the concrete set of relations in which data is couched, and so cannot be predetermined, only constructed as an ongoing process. The following section will describe in greater detail the relational approaches of ANT and Strathern's work.

ANT and Post-ANT

Actor-Network Theory or ANT, is the name of a sociological or social science research agenda which can generally be described as assuming a relational and flat ontology (Latour, 1993a) and taking a material-semiotic approach in which all categories and differences are constructed by actors, including the researcher themselves. ANT is canonically said to have been founded by Michel Callon and

his work on the sociology of translations (Callon, 1984), Bruno Latour's study of the interrelated nature of scientific and technological work in action (Latour, 1987), and John Law's study of technological achievements as heterogenous networks (Law, 1987).

ANT prescribed an empirical research agenda which consisted of "tracing the network" (Latour, 2005, p. 103) and "following actors" (Callon, 1984, p. 201), in order to determine how actors and actants composed and determined the meaning of certain phenomena, developing its own vocabulary of ANT-specific terms such as "immutable mobiles"(Latour, 1986, p. 7), "centres of calculation" (Latour, 1987, pp. 232, 239) and "black boxes" (Callon, 1986, p. xvi). One of its most central and controversial suggestions, however, was to extend the principle of general symmetry, advocated by the Strong Programme (Bloor, 1999b), to non-human actors. Taking the full consequences of its relational and flat ontology meant that ANT-proponents could not attribute abilities such as agency to certain beings and not to others a priori. Rather, ANT suggested that if properly understood, even non-human beings such as rocks, clams, and technologies should be considered actors with agency. This sparked a heated controversy between the Strong Programme as represented by David Bloor and ANT, with Latour as its proxy (Bloor, 1999a, 1999b; Latour, 1999).

As an intellectual approach, ANT has risen to extreme prominence within the world of the social sciences (Sismondo, 2010, p. 87), but it has also received a number of criticisms and developed as an intellectual project. Law and Hassard's work *Actor network theory and after* (Law & Hassard, 1999) was released partly in response to these critiques and partly as a process of evaluating and reassessing the notion of ANT in general. Now, more than twenty years later, ANT is still a commonly used research approach, although it has in many ways continued to mutate and exist as a single or as multiple post-ANTs (Gad & Jensen, 2009).

This description suggests that post-ANT is a research approach which should be characterized as neither wholly theoretical nor as a method, but as an approach to doing research. This approach insists on radical symmetry and empiricism, reflexivity with regards to understanding the researcher and their approach as an involved yet mutable part of the world, and on any reality being a fluid (Laet & Mol, 2016) and continuous performative achievement (MacKenzie et al., 2008) rather than something 'out there' waiting to be discovered. This means, furthermore, that taking an approach informed by ANT implies that the concrete instantiation of the approach not only may, but also will most likely will be different than those that have gone before. There is no one definitive ANT method or theory, and no strict guidelines one must conform to.

The following study is heavily influenced by the ideas of ANT and post-ANT, but in extension of the mutability of the approach, it also relies on several other ideas that have become a part of the dissertation's method assemblage.

Strathern on relations

The legacy and nature of ANT is a very complex matter, but there is little doubt that it suggests what can be called a relational approach to thinking about the constitution of reality. Another formative actor in promoting intellectual attention to relations is the social anthropologist Marilyn Strathern. Strathern was trained in British social anthropology and her work is heavily informed by feminist scholarship, Marxist anthropology, and structuralism (Viveiros de Castro et al., 2017, p. 43).

Her career began with a classically anthropological study of the role of women in Papua New Guinea (Strathern, 1995), work which she has herself retroactively critiqued and engaged with (Strathern, 2001). Her latter career has turned to focus in particular on relations through the analysis of 'kinship' in English society (Strathern, 1992a), and through bringing into focus how relations are both simultaneously phenomena, concepts, and aspects of concepts (Strathern, 2014, 2020). Strathern has furthermore engaged with a wide variety of topics from audit cultures (Strathern, 2003) to intellectual property regimes (Strathern, 1999) to in vitro fertilization (Strathem, 1995).

The dissertation is in particular informed by Ashley Lebner's interpretation of Strathern and her foregrounding of the notion that Strathern's primary contribution and focus is that of doing ethnography which aims to produce "good descriptions" (Borić, 2010, p. 281) and also is engaged in 'redescribing relations' (Lebner, 2017). These descriptions of Strathern's work can seem vague or banal, and Strathern does not use them in a conceptually overdetermined or even consistent manner. Indeed, as Lebner points out, and as is implied by the notion of producing a good description, Strathern's goal is not to develop a particular theory or concept. Instead, it is precisely to make descriptions or *re*descriptions, given that anthropology via ethnography is occupied with providing second-order descriptions of other peoples' experiences. Finally, relations are perhaps the most central element of Strathern's work. She traces the rise of this term to the scientific revolution and its migration into use to describe forms of social kinship. Relations are central to Strathern, because they form the basis of how knowledge is formed, both in its context-specific formation in western science (and hence anthropology), but also in general. Relations are unavoidable, and what is essential is therefore to investigate and account for how relations are encountered, made, enacted, and indeed, related to.

Lebner herself provides a redescription of Strathern's career and work which foregrounds the notion of 'redescription' and fleshes this out by discussing the role that displacement, analogy, relations, and politics play. These terms are themselves also in relation to or relations of the work. The argument Lebner makes is that Strathern's project has been to do redescription by *displacing* dominant (Western) understandings or concepts of cultural phenomena, such as 'society' or 'gender,' drawing out alternative understandings by way of *analogy* instead. Analogy is contrasted with the traditional comparative method in anthropology, as being a way of, "studying the relations between relations" (Lebner, 2016, p. 133) without importing the metaphysics of scale that comparison implies. Said differently, comparison assumes certain units of analysis, such as the individual, which analogy does not. *Relations*, as described above, are central to Strathern's work and are what are subject to the approach of analogy, rather than comparison. Relations between ourselves and others, between concepts and terms, are what ethnography is not only occupied with describing, but also that which make possible the ability of description in the first place. Thus, displacement and analogy happen in the service of being able to foreground, describe, and ultimately redescribe relations. Finally, Lebner relates how *politics* is a part of Strathern's project in multiple ways: through redescription of dominant and problematic categories and through using description by analogy to foreground how people, practices and terms are related and in turn relate to one another.

In a similar manner to post-ANT, Strathern's work is not really the promotion of a 'theory' despite it here being discussed under that rubric. Instead, as discussed above, it constitutes an approach to anthropology as ethnography with a focus on (re-)description. Simultaneously, this work is of course very reflexive, sophisticated, and complex and is included here as informing the *idea* of relation. Strathern, as redescribed through Lebner, and again redescribed here, is crucial in helping to understand what relations are and how they can be approached. In particular, Strathern's work has brought into focus how data is composed of relations and itself acts as relations between other phenomena and actors, and the importance of doing ethnography through providing good descriptions and active redescriptions. In essence, the notion of *speculative relations* is a redescription of data and its relations to digitalization work, which the dissertation presents as a contribution. The three papers making up the dissertation each contain attempts at providing good or adequate descriptions of ethnographic encounters and redescriptions that in various ways displace dominant conceptions and create alternatives. Paper 1 does this with hype, paper 2 with speculation & infrastructures and paper 3 with figures of digitalization.

3.3 Speculation

This section seeks to describe and put into conversation a variety of theoretical resources under the heading of speculation. It describes the work on sociotechnical imaginaries set out by Sheila Jasanoff and Sang-Hyun Kim, which builds on previous work with imaginaries but importantly extends it to consider sociotechnical objects and infrastructures. It then discusses Donna Haraway's writings on speculation as SF, Orit Halpern's work on data, aesthetics, and speculative futures, and then theoretical dimensions of what is broadly called speculative research.

Some of this work will also be discussed in the later section on methodology. This distinction between theoretical and methodological dimensions is to some extent a construction of the dissertation: the style and approach of Donna Haraway can for instance be said to eschew it. For the purposes of making sense of the various contributions of these resources to the study at hand, however, the distinction is used.

Sociotechnical Imaginaries

The notion that the imaginary plays an important role in social processes has a long history in the social sciences. Benedict Anderson (B. Anderson, 2016), Cornelius Castoriadis (Castoriadis, 1998) and Charles Taylor (Taylor, 2004) are all renowned scholars whose contributions helped cement this notion as central for understanding the social dynamics of nationalism, communities, and as a part of historical development itself. However, whilst these were landmark works, they tended to focus on traditional social science topics, to the exclusion of those subjects of science and technology which interest the STS community.

Sheila Jasanoff and Sang-Hyun Kim have sought to remedy this state of affairs, by drawing on the previous work on imaginaries but focusing it on sociotechnical affairs. They have suggested the concept of *sociotechnical imaginaries* to denote the way in which sociotechnical projects such as space programs, railroads, or nuclear energy (Jasanoff & Kim, 2009) are often embedded with and dependent upon the imagination.

Sociotechnical imaginaries has hence become a distinct topic of study and a literature in its own right, marked in part by Jasanoff and Kim's edited volume *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Jasanoff & Kim, 2015) where Jasanoff refines the formulation of what studies of sociotechnical imaginaries consist of. She defines them as, "collectively held, institutionally stabilized and publicly performed visions of desirable futures, animated by shared understandings of form of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff & Kim, 2015, p. 4). Jasanoff explicitly situates the project of studying sociotechnical

imaginaries as a bridge between insights from landmark STS works and traditions (e.g. (D. Haraway, 1992; Latour, 1986; Shapin & Schaffer, 1985)) with the work of social and political theorists mentioned above (B. Anderson, 2016; Castoriadis, 1998; Taylor, 2004), thus putting, "together the normativity of the imagination with the materiality of networks" (Jasanoff & Kim, 2015, p. 19). While Jasanoff suggests that many methods may be useful to studying sociotechnical imaginaries, she foregrounds interpretive and comparative approaches as the most central, especially if the latter is cross-national (Jasanoff & Kim, 2015, p. 24). In terms of empirical material, discourse, legal decisions, and policy documents are given primacy.

Sociotechnical imaginaries is thus an appealing analytical concept to this dissertation, since it connects technological developments to the realm of the imaginary, and arguably, the speculative. The conceptual lens supplied has also been used to study a range of topics relevant to this dissertation such as innovation (S. Pfotenhauer & Jasanoff, 2017; S. M. Pfotenhauer & Juhl, 2017), big data (Ruppert, 2018), smart cities (Sadowski & Bendor, 2018), data activism (Lehtiniemi & Ruckenstein, 2019), and the fourth industrial revolution (Schiølin, 2019). Additionally, there is a range of work that does not specifically identify as studies of sociotechnical imaginaries, but which are also studies of imaginaries of technology (Beer, 2018; Bucher, 2017; Tupasela et al., 2020; Williamson, 2018).

For the first paper of the dissertation, sociotechnical imaginaries was a helpful framework for understanding and situating the analysis of the performative work done at various tech events. It was simultaneously a framework that sat uneasily with the subject matter, given that the sociotechnical imaginaries literature is focuses on nation state imaginaries and pays little attention to corporate imaginaries (Sadowski & Bendor, 2018). Furthermore, the empirical context of the work did not appear to allow for an identification of a singular sociotechnical imaginary. Instead, the analysis found that the events were a sociomaterial performance of 'hot air' drawing from a messy patchwork of imaginaries identified in the existing literature. Sociotechnical imaginaries can thus be characterized as related to the idea of speculation as a kind of raw material which speculative activity draws from and engages with in various ways. However, the dissertation departs from focus in the sociotechnical imaginaries literature on nation-state and document-oriented comparative study, in favor of ethnographic engagement with both practices and speculation itself.

Haraway on Speculation

Donna Haraway's work on speculation has a long history and is hard to pin down to a single specific concept or work. Whether it is her landmark text on cyborgs (D. J. Haraway, 1991), her work on monsters (D. J. Haraway, 1992) or

companion species (D. J. Haraway, 2003, 2008), a speculative and imaginative quality has always pervaded her work. Her recent thinking however foregrounds the notion of speculation – along with a number of other terms – through the cipher she calls SF (D. J. Haraway, 2013, 2016).

The initials of SF are a shorthand and stand for a variety of interrelated terms of which speculative fabulation, speculative feminism and speculative fiction are some that mark the most direct invocation of the term speculation. However, it also stands for, according to Haraway, science fiction, science fact, science fantasy, and string figures, that bear some relation to speculation. Especially science fiction and fantasy are of course associated with speculative accounts of other worlds.

SF however is not merely play with words or concepts, although the notion of string figures is to some extent a metaphor. Haraway's work is based off of her training as a biologist, and ever since her early work with primates (D. Haraway, 1992), she has seen concepts and ideas as powerful and non-neutral lenses through which understandings of nature are shaped. As a material-semioticist, she understands such concepts as expressions of the material relations of the surrounding society, whether it be repressive patriarchy or biological mass extinction. The notion of string figures illustrates this point for Haraway with regards to SF: it is a form of knowledge which exists primarily as a material and social enactment with others. Said more simply, string figures are practices, particular to local cultures which are done together, transferred from one participant to another in an active relation along with stories about what the figures represent and do.

Haraway draws these lessons from string figures through their history within First Nations/Navajo practices and extends the point as a metaphor for the kind of knowledge practices which are needed. SF as speculative fabulation is this kind of knowledge practice, one which understands reality as something which is constantly being brought into being, and which therefore takes seriously that knowledge production is reliant on others and itself produces reality. It is therefore of utmost importance which, "ideas one thinks ideas with" (D. J. Haraway, 2016, p. 12).

Halpern on Speculation

Orit Halpern's 2014 book *Beautiful Data* (Halpern, 2014) is an extensive study of the history of cybernetics and its relation to modern aesthetics and logics of data-oriented technologies such as the smart city. Delving into the writings of Norbert Weiner and other cyberneticists, Halpern describes how thoughts about the interrelation of communication and information have come to dominate and inform our understanding and indeed vision of the world.

Halpern has later focused specifically on speculation in her works on derivatives trading and extractive mining practices (Halpern, 2017a) and on the role of the concept of resilience within climate crisis discourse (Halpern, 2017b). In these pieces, Halpern outlines how speculation has become a dominant mode through which the future is understood and created through commodity markets and financial speculation. She emphasizes the way in which such speculations are not devoid from physical products and human action, but rather underline their deep interaction, integration and indebtedness.

Taken together Halpern's work presents a compelling argument for the historical developments within science and technology which have led to a particular aesthetics of data and vision coming to prominence which forms a rich soil for speculation as an activity. It is, according to Halpern, the integrated circuits of communication, command and control that undergird our present instantiations of information technology and enable high-speed speculative trading.

For the present work, Halpern's ideas provide a central backdrop for understanding the wide prevalence of fascination with data and why it represents such a siren's call for constant speculation and investment. By outlining the historical, contingent rise of data as a topic of both beauty and control, and furthermore describing the coterminous existence of rampant financial speculation with hopeful speculation, Halpern makes clear why data sits at the nexus of these relations.

Speculative Research

Alex Wilkie, Martin Savransky, and Marsha Rosengarten provide in the edited volume entitled *Speculative Research: The Lure of Possible Futures* (Wilkie et al., 2017) a different engagement with speculation. As the name implies, the volume is concerned with speculation as a mode of research and the topic of futures. The volume is composed of a collection of contributions which range from more theoretical engagements to methodological considerations of speculation and are informed by a common basis of constructivist, process, and pragmatist philosophy. Central to the framing of the volume are the works of Alfred North Whitehead, William James, John Dewey, and Isabelle Stengers, but its contributors discuss a range of other authors. Contributions by Michael Halewood (Halewood, 2017) and Joe Deville (Deville, 2017) engage specifically with Donna Haraway and Marilyn Strathern, who are also central to this dissertation, but discussing these interesting pieces in depth is beyond the scope of this dissertation – although Halewood's assertion that Haraway's work on cyborgs is an example of "successful speculation" (Halewood, 2017, p. 61), and his suggestion of her work as a kind of situated speculation is very much aligned with the interpretation given above.

As an edited collection of works, *Speculative Research* contains many different perspectives and articulations of what such a project might be. For the present dissertation, the central points of contact are how the editors situate the overall project of "reclaiming speculation" (Wilkie et al., 2017, p. 5), the methodological reflections on how to appropriately do research that both acts as an example of and responds to speculation, and finally the notion of 'lures.' The subsequent section on the dissertation's overall methodology will discuss the two latter points. The following will instead briefly outline the intellectual heritage of speculative research and its focus on reclaiming speculation.

The notion of reclaiming speculation derives from a philosophically informed analysis which identifies two separate kinds of speculation. One is negatively associated with practices such as financial speculation and high frequency trading, but also in extension with more supposedly 'neutral' or innocent phenomena such as evidence-based regimes of probabilities, forecasting, and analytics. The other is a, "sense of the possible that concerns, but does not owe its existence to, the ways in which the actual determines the distribution of what is probably, either statistically or algorithmically" (Wilkie et al., 2017, p. 7). This understanding of speculation draws from a range of intellectual resources which emphasize, as the quote illustrates, that the future or the possible is never determined entirely by what is currently understood or known. Even as predictive algorithms increase their range of inputs and technical sophistication, the underlying observation made by thinkers such as William James and John Dewey, is that the possible always outstrips any space of prediction based on the actual (Savransky, 2017).

Reclaiming speculation is a process or activity which itself is theorized with reference to the work of Philippe Pignarre and Isabelle Stengers (Wilkie et al., 2017, p. 22), as a non-trivial matter which requires level-headed assessment and taking stock of the histories of what one wishes to reclaim. The volume does this work in particular through dialogue with pragmatist thinkers (Savransky, 2017), existential phenomenologies (Diprose, 2017), and the process philosophy of Alfred North Whitehead, interpreted by Pignarre and Stengers and exemplified in Haraway (Halewood, 2017) , as mentioned above. This impressive arrangement of thinkers makes possible the reclamation of speculation and speculative thought in varied ways, in keeping with their respective intellectual traditions.

From speculative research, the dissertation draws this insistence on reclaiming speculation as possibilities beyond what is probable, calculable, or contained within the world, and doing so in a manner that is cognizant of the concrete history of speculation.

Speculation: Imaginaries, fabulation, and futures

The idea of speculation outlined above, composed of the research on sociotechnical imaginaries, Haraway on speculative fabulation, Halpern on aesthetics and speculation, and speculative research, provide the dissertation with two distinct legs to understand this data and digitalization work. Speculation is either a kind of 'material' or backdrop to data and digitalization work, or it is a 'practice' which pervades data and digitalization work but might present a different possibility.

Sociotechnical imaginaries can be understood to describe a kind of backdrop or 'material' which both makes up speculation, and with which speculation engages. As the first paper of the dissertation explores, hype theorized as 'hot air' acts to articulate and translate such imaginaries of data and digitalization into local contexts. Sociotechnical imaginaries are in this instance speculative in the sense that they are ideas about future sociotechnical realities but are also the subject of speculative sociomaterial thinking as they are articulated through 'hot air.'

Halpern's work also acts as a backdrop. Her work both describes the history of cybernetically-informed reason and aesthetics, which speculation around data operates on the basis of, and explores how it is endemic in global capitalism such as evidenced by the connections between rare-earth mineral mining, digital sensors, and financial speculation. In papers 2 and 3, her work is used to contextualize this kind of globalized speculation to data.

On the other hand, speculative research theorizes the mode or 'practice' of speculation and how to engage with it. While more will be said about this in the next section on methodology, the insistence on reclaiming speculation as a way of thinking about differently possible worlds is central to how the dissertation has developed its orientation to speculation and *speculative ethnography*. Paper 2 in particular uses this understanding of speculation to develop the notion of 'speculative data work' and suggest 'speculative dashboards.'

Haraway's SF and use of figures is also such a mode, describing a kind of world-making which creatively uses speculation to open up new possible worlds. Furthermore, her concrete work with fabulation through figures such as the cyborg have been instrumental in helping the dissertation think speculation differently. For paper 2, Haraway's work has also helped develop the notion of 'speculative data work' and 'speculative dashboards,' and in paper 3, her work on figures helped inform the analysis of particular figures of digitalization at play there.

4. Methodology: Speculating through Gyres

The methodology of this dissertation is one centered on qualitative methods, following from the previously developed theoretical reflections on relational and speculative approaches and informed by further constructivist and critical epistemological reflection. The dissertation's methodology sits at an intersection of reflections on the relational approach, ethnography as a method, the field site as a 'gyre,' and a disparate group of research approaches which are gathered under the heading of *speculative methods*. Methodology is here understood to be the structured and theoretical exploration of the production of knowledge, through messy (Law, 2004) engagement with an empirical field.

The following section of the dissertation will first introduce the general backdrop of methodological reflections within STS, before focusing and reviewing literature relevant to qualitative methods and ethnography, the construction of the field and the notion of the gyre and speculative methods, respectively. A final section will outline the idea of a 'speculative ethnography,' which it will be argued this dissertation represents the first steps towards. The section on qualitative research will provide concrete details of the fieldwork, interviews, and other pertinent information which form the empirical foundations for the dissertation.

4.1 STS and Constructivist Research

Science and Technology Studies (STS) is a broad moniker for a diverse range of intellectual approaches that seek to study and understand, as the name implies, science and technology. STS stand in contrast to a number of other schools of thought such as logical positivism (Ayer, 1978) or falsificationism (Popper, 2008) with regards to science and continental (Lemmens et al., 2017; Stiegler, 2016; Zwier et al., 2017) or Marxist (Feenberg, 2005) approaches with regards to technology or technoscience. STS views these as phenomena to be studied empirically rather than determined philosophically or conceptually, and to do so in the context of them being primarily *social* activities.

STS has many antecedents, though most accounts refer to the work of Robert K. Merton (Merton, 1974) and Thomas Kuhn (Kuhn, 1996) as founding inspirational figures for their respective contributions of being symmetrical in attention to both scientific success and failures, and of highlighting how scientific progress does not unfold in a rational linear manner, but according to social shifts in whole paradigms. Much has happened since Merton and Kuhn, and STS has seen the rise of its own internal periods, divisions, and approaches such as the Strong Programme (Barnes & Bloor, 1982; Bloor, 1991), SCOT (Bijker et al., 2012), laboratory studies (Latour & Woolgar, 1979), controversy studies (Collins, 1981; Epstein, 1995; Pinch, 1981), Actor-Network Theory (Callon, 1984), feminist

epistemologies (D. Haraway, 1988; Traweek, 1995), Post-ANT (Gad & Jensen, 2009; Law & Hassard, 1999), infrastructure studies (P. Harvey et al., 2017; Star, 2016) and, to some extent, digital methods (Flyverbom & Murray, 2018; Geiger & Ribes, 2011; Latour & Venturini, 2010; Marres, 2015).

Methodologically, STS has featured and drawn on a diverse range of approaches, including the archival-historical (Shapin & Schaffer, 1985), ethnomethodological (Garfinkel, 1984), discourse analysis, interviews, and ethnographic research (Bruun Jensen, 2015), particularly the use of participant-observation. Central to the present research has been the methodological approaches entailed by the ANT approach (Latour, 2005), along with the reflections on method developed by John Law in his 2004 work, *After Method*: *Mess in Social Science Research* (Law, 2004).

As developed earlier in the dissertation, ANT and post-ANT provides an approach to a topic of study which tries to maintain as few pre-conceived notions as possible with regards to the constitutions of the topic, and to 'follow the actors' in order to trace the contours of how society, nature, technology, and science as categories and specific phenomena are constructed through their relations and stabilizing work. Through the work of feminist studies of technoscience, this picture has been further complicated to underscore how any such methodologies and accounts are provisional views of phenomena which are essentially multiple and complex.

Law draws on insights from a number of landmark STS studies to reflect on methods in social science research in general. Law purposefully uses the term 'method' rather than methodology and is clear that the book is not a method 'recipe book' providing descriptions to be copied in order to produce objective knowledge or truth. Law rather highlights the messiness of methods, showing how accounts of knowledge production in the social sciences are often sanitized and post-rationalized, and makes the argument that any research activity does not simply produce knowledge about a given reality, but is part of constituting the very reality it studies.

This dissertation takes up a similar constructivist view, informed by post-ANT and Law's work. The methodological reflection is thus that the provenance of phenomena cannot be determined beforehand, but must be determined through empirical study using methods which are messy. Furthermore, such determination is actually partially a constructive engagement with the field, which is itself multiple. Any methodological engagement is therefore a construction of one of many potential accounts of the phenomenon in question.

Having outlined the broad methodological considerations of the study, the following section will further develop the notion of 'the gyre' and recount how the empirical research was constructed.

4.2 The Gyre: From infrastructure to gyre

Based on the *Data as Relation* research project, the dissertation initially set out to study the development of a regional data infrastructure, the City Data Exchange. Informed by recent discussions and developments within STS on social science methods (Law, 2004; Ruppert, 2013; Savage, 2013), and particularly the rise of digital methods (Rogers, 2009), the dissertation was initially designed as a quali-quantitative study (Latour & Venturini, 2010) of this data infrastructure, combining a 'traditional' workplace ethnography with 'novel' digital methods. The goal of this initial study was to better understand both the construction of an infrastructure such as the CDE, how relations between it and actors using it were built, and how data was the central aspect of these relations. However, as described earlier, the CDE faced immediate difficulties, and the study was never actually launched in this shape.

The collapse or disappearance of the CDE as a viable field site, meant that a new one needed to be selected. Informed by Actor-Network Theory sensibilities which suggest that researchers follow the actors (Latour, 2005), the dissertation proceeded to seek out contact with actors close to the CDE, to follow their newsletters and attend the events they hosted. In particular, the Danish cleantech cluster organization CLEAN provided a point of departure, as it had been central to the creation of the CDE in the first place. Attending these events and maintaining online co-presence (Beaulieu, 2010) provided insight into a vast network of institutions, actors, and relations centered initially on topics of data and the smart city, but quickly ballooning to encompass Danish technology and expertise export activity, the Internet-of-Things, public sector digitalization, data-driven organizations, big data and more. Rather than helping find a new bounded field-site (Candea, 2007), following the actors only expanded the range of questions about where data was to be found. This initial searching phase of the fieldwork revealed relations between actors, institutions, technologies, and discourses, demonstrating complexity (Law & Mol, 2002) which was not easily reducible.

Traditional responses within qualitative research to the complexities of modern, globalized societies has been the development of multi-sited ethnographies (Marcus, 1995), of post-modernist infused grounded theory in the form of situational analysis (Clarke, 2005), constructivist approaches with flat ontologies such as ANT and its sociology of translation (Callon, 1984), and the use of networks as a model for designing field sites (Burrell, 2009).

These approaches, however, did not match the sense that not only was the situation complex, the very object of study in the form of 'data' appeared immensely unstable. Discourses and imaginaries of data and other technologies were presented as interconnected in a manner that gave rise to questions of whether data could even be understood as a distinct topic of inquiry. For instance, conferences dedicated to the topic of data gave way to discussions about algorithms, analytics, national economics, and smart cities. How to make sense of this highly fungible nature of the discourse, and where to study it?

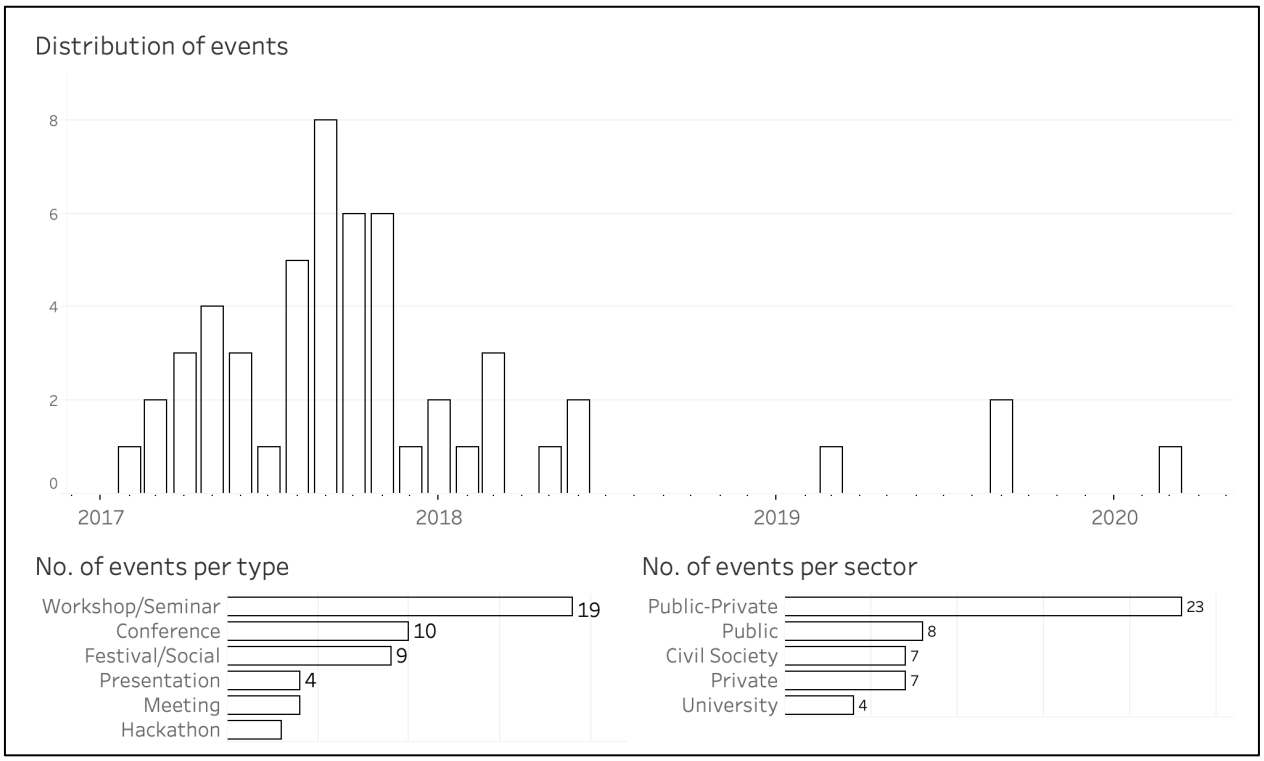
As mentioned, a concept which became central in making sense of this situation was Stacia Zabusky's development of 'the gyre' as an alternative to field sites (Zabusky, 2002). Developed in response to studying the transnational processes of Big Science in the European Space Agency (ESA), Zabusky drew on lines from William Butler Yeats' famous poem *The Second Coming* to illustrate her experience with fieldwork: "Turning and turning in the widening gyre / the falcon cannot hear the falconer; Things fall apart; the centre cannot hold; Mere anarchy is loosed upon the world" (Yeats, 1996, p. 186). The gyre accounts for these experiences, suggesting a spatial metaphor of neither bounded nor multi-sited fields, but instead of unravelling arcs, flows, and energies without definite centers from which to understand them. This concept allowed Zabusky to describe a situation in which the gyres of the ESA were constantly being reconfigured for herself as researcher, but also for and by her informants, who moved from one institution, project, or location to the next in dizzying trajectories. As Zabusky says:

> "Doing ethnography of the transnational, then, required not just identifying a ''site'' in the sense of a social field where I could settle down to do fieldwork; doing ethnography of the transnational meant instead being poised for movement, sensitive to flows and trajectories, to instability and reconstruction, to disruptions and re-orientations." (Zabusky, 2002, p. 129)

The gyre presented itself as a relevant concept for understanding the field, its complexity, and the unease which the perceived instability of the nominal object of study, data, produced in the researcher. This was a similar kind of gyre to that of European space science: the transnational processes and imaginaries of modern information technology as they were rapidly developing and deploying themselves. The gyre as a concept therefore denotes the overarching methodological frame for the dissertation's empirical work. Rather than construct a site, multi-site, or trace a network, the fieldwork is conceptualized as a journey within certain eddies of the Danish tech scene, itself part of the wider gyre of transnational tech development. The gyre bypasses the idea of definitive social fields or sites in order to better enable the description of the fluidity of a research situation in which many things are in flux at once.

The particular journey within the gyre of this dissertation consisted of two distinct phases: the first phase deals with the empirical engagements with multiple events, workshops, courses, and conferences in the Danish tech scene, and focuses on the overall discourse and imaginaries developed there. In total 30+ events were attended over the course of 1.5 years. Importantly, the ethnography featured several events of which the author either organized or was an active participant. Part of the ethnography was also being enrolled as an expert or actor in the gyre, by other actors. See figure 1 below for a summary of the type and number of events, and which sector they took place in. See also table 3 in the appendix for a full overview of event names, dates, etc. The second phase follows how this gyre affects a particular organization. The organization was a department of a municipality in the Copenhagen region, the Culture, Arts and Recreational Department (CARD). Here, a workplace ethnography was conducted for six months. The logic of this journey was that while the initial part of the journey made it possible to understand the discourse and imaginaries around data in the tech scene, it was necessary to move to an actual organizational context in order to make sense of how such discourses and imaginaries were translated to actual practice. The next sub-section of the dissertation will provide details on the various qualitative research methods used, including participant-observation and interviews. See also Appendix B for details on interviews conducted.

Figure 1: Overview of events



It was certainly possible to have chosen to delimit or construct a field site according to conventional approaches, choosing one of the many organizations or projects encountered. The gyre represents a methodological choice of 'staying with the trouble' for as long as possible, to go along with the gyre of the Danish tech scene. This was motivated by an intuition that it was important to understand the instability of data. Through this focus on the trouble which data posed, the research produced insights into the sociotechnical imaginaries of data, as represented in the dissertation's first research paper. It became clear that the instability and 'hot air' associated with data and the various other technologies and trends it was related to, was productive and performative of their uptake. However, in order to better understand how such productive dynamics took place, it was necessary to follow the gyre into a more local site.

Summarily, the gyre is a concept which differs from other approaches to the notion of a 'field' in ethnographic research. Instead of delineating phenomena to geographical, organizational, or even conceptual boundaries, the gyre is relevant to conceptualize topics of study where multiple facets are in flux. Engaging with the empirical as gyre was salient for making sense of the empirical instability of data and the trouble it promoted, and enabled an oblique perspective of the many complex relations which data was mobilized in and with. Eventually, the empirical work and analytical insights generated by understanding the field as part of this dynamic gyre, motivated moving the fieldwork into a more traditional workplace ethnography and to connect data to digitalization work. However, this workplace field site can also be understood as being part of a gyre. The digitalization work around and with data in the CARD organization, also seemed to be the result of multiple and unstable flows and particularly prone to speculative relations of various kinds.

Having now accounted for the way in which the research was constructed as and through the gyre of data, the next section will dive into the specific aspects of the qualitative methods employed and the details of the actual research.

4.3 Qualitative research: Ethnography, participant-observation and interviews

The overall method of this dissertation can be described as ethnography, which is a broad term covering both a disciplinary history, an epistemological approach to empirical work, and a set of techniques conventionally associated with it. The following section will describe what is understood by ethnography for the purposes of this dissertation, and then it will proceed to describe the various techniques of participant-observation, interviews, coding and more, and give specific details of the empirical work conducted.

Ethnography is one of central methods for doing STS research. While it originates within anthropology, and some argue it is not a method per se (Dave Randall, 2018; David Randall et al., 2007), it has long since been taken up by numerous other disciplines. It is hard to say anything unifying about the ethnographic method within STS, and it might be more precise to say that there are multiple ethnographies practiced within it (Bruun Jensen, 2015). The present study understands ethnography as the practice of creating "thick description" (Geertz, 1973, pp. 9–10), meaning descriptions that do not just describe certain social or cultural behaviors, but also the meanings behind them.

Another similar, but slightly different articulation of this notion is provided by Marilyn Strathern, who views ethnography as an attempt to provide a good description (Borić, 2010) of a phenomenon, rather than create grand theory or complicated analyses (albeit that Strathern's own descriptions are not exactly simple). Such a thick or good description consists in being particular to the phenomenon being studied, which requires care and attention being put into the means by which it is produced. For Strathern this does not just mean being very attentive to detail or using the most airtight or rigorous theory, but taking care that the concepts one uses are "a solution to a problem" (Borić, 2010, p. 281). Said in a different manner, this means that concepts should not be shoe-horned into an empirical setting, but should be appropriate to the specific dynamics at hand. The present research does this by creating descriptions which take speculation seriously through being attentive to its empirical manifestations. It uses and develops concepts which are grounded in these empirical descriptions, thereby seeking to 'solve' the problem of speculation through good description or redescription.

Special attention has therefore been paid in this dissertation, to the use of ethnography in meetings and conferences, and the particular affordances of studying in these contexts (Høyer Leivestad & Nyqvist, 2017; Mead & Byers, 2015; Sandler & Thedvall, 2017; Schwartzman, 1989). However, as Geertz points out, "The locus of study is not the object of study. Anthropologists don't study villages (tribes, towns, neighborhoods…) they study *in* villages." (Geertz, 1973, p. 22). Similarly, this is a study that has taken place in a range of conferences, workshops, seminars, and other events as well as a municipality department, but it is an ethnographic study of data as a relational and speculative phenomenon.

Data and digitalization, of course, are normally considered a technical subject, outside of the purview of the social sciences. The contributions of STS research, and ANT in particular, have been to underscore the importance of studying the social dimensions of science and technology, and indeed to not assume in advance what constitutes nature and culture (Latour, 1993b). These insights have concretely been developed by paying attention to so-called non-human actors. ANT approaches

any phenomenon with this open attitude towards 'who' is an actor, and the task of the researcher thus becomes tracing the network of interconnecting actors and actants in order to construct an understanding of the phenomenon (Callon, 1984). Combining these insights, the dissertation has sought to use the various techniques of ethnography and an STS/ANT approach to create a 'good description' of data and digitalization work, including the non-human actors.

Ethnographers make use of a number of techniques in order to perform research: determining and constructing field sites, doing participant-observation, interviewing people, writing up experiences as fieldnotes, and coding and analyzing the various empirical material these activities produce. Increasingly, they also try to establish co-presence (Beaulieu, 2010), work with digital traces (Geiger & Ribes, 2011) and technologies (Pink et al., 2015) on the internet (Hine, 2015). The status of ethnography as method, its broad use and various forms, is beyond the scope of this dissertation, but see Atkinson, (Atkinson, 2001), Fortun (Fortun, 2012), and Randall (Dave Randall, 2018).

Participant-observation is the traditional hallmark of an ethnography, hailing back to Bronislaw Malinowski's pioneering anthropology of the Trobriand Islands (Malinowski, 1932), characterized by the ideal of going 'to' a group of people and observing their social reality by participating in it. However, this view of participant-observation as ethnography per excellence is contested as interviews also offer unique insights (Hockey & Forsey, 2012), or alternatively should be considered a kind of participant-observation in their own right (Rubow, 2010).

Interviews are perhaps the most ubiquitous method of knowledge generation within the social sciences, and certainly one which is much discussed (Skinner, 2012). Their ubiquity leads some to claim that we essentially live in an 'interview society' the interview has become such a common cultural format, and that this requires extra attention be paid when conducting interviews (ibid.).

As part of the empirical work that forms the basis for this dissertation, 14 formal interviews (see Table 4 in Appendix B for details) were carried out and a number of informal conversations took place in situations of participant-observation at conferences and in workplaces. Of the formal interviews, one took place through written correspondence (e-mail) while the remaining ten were semi-structured interviews, conducted and recorded face to face, and later transcribed for analysis. See table 1 below for an overview of types of empirical materials.

Finally, a large part of the empirical material collected consists of PowerPoint slides, photos, documents, flyers and other promotional materials, conference programs, e-mail correspondences, and other miscellaneous artefacts. These have

been analyzed in the respective papers using coding approaches informed by semiotic clustering (Feldman, 1995) and grounded theory (Clarke, 2005).

Table 1: Types of empirical material

Kind	Description	Purpose	Used in paper:		
			1	2	3
Ethnographic field-notes	Hand-written or digital notes taken in connection with ethnographic activity such as attending events, meetings, or as part of the dissertation's workplace ethnography. Composed of a combination of observations, sketches, jots, reflections and memos.	Used as objects of analysis and as background information.	X	X	X
Power-point slides	Slide shows from presentations or meetings given at events or in the workplace, disturbed publicly or via e-mail lists to attendants.	Used as objects of analysis and as background information.	X	X	X
Photographs	Photographs taken by the author of ethnographic events, relevant commercials or information in the public sphere or of artefacts collected physically.	Used as background information and in articles in order to illustrate points made in text.	X	X	
Interviews	Interviews conducted with actors relevant to the dissertation, either in person, via online call or writing. See Appendix B for more details on interview approach, length, format, etc.	Used as objects of analysis and as background information.	X	X	X
Documents	A wide range of documents, ranging from agendas, meeting notes, promotional materials, event handbooks, rapports, white papers, e-mails, intranet-posts, etc.	Used either as objects of analysis or as background information.	X	X	X
Videos	Promotional videos published by actors relevant to the dissertation via YouTube or similar publicly accessible platforms	Used as background information.	X		
Newsletters	Newsletters distributed via e-mail containing information about events, links to articles and other relevant pieces of information.	Used as background information.	X		
News and magazine articles	Articles collected from newsletters, sent from informants or through general news consumption that were related to data, Big Tech, digitalization and similar topics.	Used as background information.	X	X	X
Misc.	Paraphernalia from events and conferences such as stickers, keychains, nametags, t-shirts, badges, chewing gum, oddly shaped brochures and other miscellaneous items.	Used as background information.	X		

4.4 Speculative methods: fabulation, research, and design

Having discussed the methodological aspects of this dissertation with regards to STS research, construction of the gyre, and the qualitative ethnographic research approach, the following section will review the methodological aspect of speculative methods. This aspect encompasses a broad range of theoretical and

methodological resources: SF/speculative fabulation, speculative research, and speculative design. Donna Haraway's notion of SF, in particular its formulation as speculative fabulation (D. J. Haraway, 2011, 2016), has methodological implications for how speculation can have 'worlding' effects. Recent work on speculative research (Wilkie et al., 2017) foregrounds the development of 'speculative lures' and research which engages researchers and their informants to consider alternatively possible futures. Finally and most 'methodological' in the conventional sense, speculative design (Auger, 2013) is itself a fairly dissembled set of design practices and ideas that focus on actively embracing the speculative aspect of design to provoke consideration of how things might be different.

Donna Haraway's notion SF in its form of speculative fabulation, provides the fundamental inspiration for the dissertation's approach to speculation. First set out in a brief essay as a "flawed trope and a serious joke" (D. J. Haraway, 2013, p. 12), Haraway creatively uses the 'SF' initials as a shorthand for a variety of connected but disparate practice-concepts: connecting science fiction, speculative fabulation, string figures, 'so far' and more. These different connected terms point to the material and feminist practices of imagining a different possible world, not as a utopia, but as a pluralist recuperation and becoming-with of the existing world, what Haraway calls Terrapolis.

In *Staying with the Trouble,* Haraway develops these earlier brief notes on SF by drawing on a heterodox set of ideas and sets out interrelated biological and mythological metaphors – or to use Haraway's own terminology, string figures – such as the Chthulucene, sympoesis, and kin-making. While the distinction between theory and methodology is next to completely arbitrary with regards to a project such as Haraway's, it is still possible to tease out some methodological considerations from her work. Given that these ideas are not just interrelated, but also bound up in temporary and local practices – string figures – any reformulation of them will inevitably change them. That is, however, partially the point.

SF means for this dissertation recognizing that it is entangled in the making of string figures with the speculative practices of the world and actively engaging in this as speculative fabulation. Methodologically, this has meant the acceptance of and engagement with speculation as a mode of knowledge production, through participation in data sprints, hackathons, being enrolled as a 'data expert,' and by going along with the gyre of data relations. SF both inspires the idea of a *speculative ethnography* developed below and informs how it must be a situated response to the empirical situation encountered. The speculative ethnography of this dissertation is thus a string figure made together with the public-private tech sector, its data and their digitalization work. By developing this particular ethnography, the

dissertation creates a kind of world- or kin-making through its redescription of the speculative relations of data and digitalization work.

Speculative research

Speculative research is an as-of-yet still emerging and experimental research approach which draws on constructivist and pragmatist philosophies and epistemologies such as the work of William James, Alfred North Whitehead, and Isabelle Stengers, in order to reflexively engage with speculation as a way of exploring, articulating and opening up alternative futures. In order to do so, its proponents develop a number of conceptual and methodological techniques to make such work possible and to potentially 'lure' others into the same endeavor. Speculative research works with the methodological assumption that methods must be specific to the empirical situations they are crafted for, and must be responsive to change as unpredictable futures unfold through the meeting of research and reality: "(…) speculative techniques are indexical and respond to the demands and requirements of a particular empirical situation – a situation that is never indifferent to the research technologies that are deployed to interrogate it" (Wilkie et al., 2017, p. 114).

Important to the present dissertation is the articulation within speculative research of the very real risk of having its speculative practices recuperated by more predictive or probabilistic modes of attempting to determine the future. This mode of probabilistic thinking, especially when it is put in the service of perverse financial goals is what is commonly associated with 'negative' accounts of speculation. Speculative research outlines the importance of not ceding speculation to this kind of thinking and the practices known from financial speculation, but instead insists on the importance of trying to think the 'black swans' and other futures that might be possible. In this way, speculative research shares a similar approach to that of Dunne and Raby's notion of 'preferable futures,' discussed below (Dunne & Raby, 2013).

Methodologically, the dissertation takes two main points from speculative research: the importance of the specificity of methods in relation to the particular empirical situation being studied, and the idea of taking seriously the 'lure' of speculation and to use and craft such lures purposefully in order to imagine different futures.

Speculative Design

Design is a field which is mostly associated with the development of objects or solutions for a range of functional or aesthetic parameters. Design has come to be especially associated with the development of products, but is also associated with particular kinds of intellectual activity and problem-solving (Lilly Irani, 2018;

Vinsel, 2017). Speculative design, on the other hand, is one of a number of 'critical design' practices (Malpass, 2013) which differs from these traditional design activities. Instead of designing to create objects for consumption or solutions, speculative design is concerned with using design as a way of cultivating collective deliberation about what is called "preferable futures" (Dunne & Raby, 2013, p. 4), or the potential negative future paths of technologies or paths that could have been taken instead (Auger, 2013).

While critics have pointed to speculative design being both limited and privileged in its particular speculations (Oliveira & Martins, 2014), and not nearly as radical as proponents would like to believe (Wong & Khovanskaya, 2018), it has nonetheless been a popular alternative design approach which has produced diverse projects exploring relations between design, technology and civics (DiSalvo et al., 2016), potential bionic communication devices (Auger, 2013), anxiety about networks and always-on connectivity (Pierce & DiSalvo, 2018), methods of co-design and situated engagement (Desjardins et al., 2019) and as a method for thinking about the future role of data within social situations such as weddings (Elsden et al., 2017).

For the present work, speculative design provides a resource for and concrete articulation of the work performed in the second paper making up the dissertation. Here a speculative design artefact is proposed in the form of a 'speculative dashboard,' which is both a speculation on how dashboards might function differently, and an artefact designed to encourage different speculation with and around data.

Summary

In summary, speculative methods as understood here draw their main inspiration from Donna Haraway's work and her articulation of SF/speculative fabulation as interrelated and interdependent (feminist), provisional-material (string figures), knowledge-making that is connected to possible futures (so far). Methodologically, this has meant participation in speculation as a necessary if difficult way of constructing the field. As the next section will explore, SF suggests a speculative ethnography in order to understand the speculative relations of data. From speculative research, the dissertation has drawn the similar but more particular methodological lessons of the potential of creating the 'lures' of speculation and the importance of methods specific to the empirical situation. Speculative design has informed the concretization of these insights into a design object with both the potential to act as a lure for speculation and an actual speculation on how data infrastructures, such as the dashboard, might be designed differently.

4.5 Towards a speculative ethnography

The previous sub-sections have outlined the various methodological resources that have informed the empirical work of this dissertation. Centrally, the long line of work which can be called STS has provided a basic constructivist approach to thinking about science and technology. In particular, post-ANT has been instructive, through its insistence on the importance of following the actors, whilst not privileging human over non-human actors. Adding to this mix of epistemological and methodological reflections, the many discussions about the nature of ethnographic work and conceptions of where this work takes place, such as a field or in a gyre, have been central to delimiting the extent and object of the dissertation. Finally, a diverse set of thinkers and practices have been combined under the heading of speculative methods, which has informed particular methodological interventions and provided a further development of constructivist themes within STS.

Taken together, the methodological approach of this dissertation might be characterised as *speculative ethnography*. The following sub-section develops and outlines this term. Provisionally, we can say that it refers to doing ethnography which is focused on the becoming-with and worlding (D. J. Haraway, 2016) of this ethnography alongside speculation as an object of study. Furthermore, Wilkie describes the practice of speculation as follows:

> "[S]peculative thought [is] a practice of designing and constructing adequate concepts and 'devices' that actively 'relate knowledge production to the question it tries to answer' (Stengers 2008:92) and in so doing, the researcher, researched, research device and question become-with one another (…)" (Wilkie, 2018, p. 348)

If this is the case then a speculative ethnography is one in which ethnography is this 'research device,' and any such ethnography must relate to the question it tries to answer.

Obviously, ethnographers will tell you that this is exactly what ethnography already does and is exceptional at – to paraphrase Clifford Geertz, ethnography is the study of the meaning of the wink (Geertz, 1973, p. 9), on its own cultural terms. Said differently, ethnography has been about the task of attempting to understand culture, and by doing so through a relation to and acknowledgement that culture is the very medium that ethnography itself operates within. So, in what way is the adjective 'speculative' not simply superfluous when applied to ethnography?

The point of speculative ethnography is not to deny this characteristic of ethnography, but to develop and accent a particular kind of ethnography in order to match an empirical moment of ubiquitous speculation. A speculative ethnography is one which is not just informed by constructivist thinkers who take speculation seriously on a conceptual level, but also takes the empirical proliferation of speculative discourses and practices seriously as phenomena to think with and against.

The speculative ethnography exemplified by the present study is one which can be characterised by the following traits:

- It assumes a constructivist and relational ontology, in which all actors and practices, including speculative ones such as hype, are potentially real. Their reality depends on their local, empirical enactment.
- It studies, engages with, and partakes in the speculative practices of the field, in order to make use of their cultural predominance.
- It uses messy (Law, 2004), inventive (Lury & Wakeford, 2012) and differently sensitive methods in order to co-construct and transform speculation *through* engagements with its practices.
- Its goal is twofold: to study and understand speculation as a phenomenon, and to transform (Fortun, 2012) the kind of speculation done and the futures imagined and ultimately constructed.

Speculative ethnography is one particular ethnography designed in the course of and for the purposes of this research. It is a response to local circumstances, but this does not mean that it cannot be generalized to intervene elsewhere (Winthereik & Verran, 2012). The present research represents only an initial step in developing the notion of speculative ethnography into such a useful generalization. With speculation seemingly a ubiquitous quality of modern-day political discourse, finance, technological development, and many other fields of society, it may, however, be that speculative ethnography is part of a necessary response to make sense of and intervene in the many challenges such ubiquity poses.

5. State of the Art: Data, Digitalization, and Work

The following section describes current state-of-the-art research on the topic of data, digitalization, and work. These are of course three terms with broad histories and bodies of scholarship behind them. The present dissertation cannot hope to do justice to or provide a background of their full complexity.

Instead, the following section presents a more delimited account of research on these topics. Brief accounts of the histories of the concepts within relevant disciplines are offered, but the focus is on the research which this dissertation seeks to be in dialogue with. The section will proceed by discussing work on data, digitalization and work, before turning to outlining how the present dissertation stands in relation to this research. Emphasis has been placed on research on data, as it had been the guiding thread of the dissertation.

5.1 Data

Data is an extremely broad term, the ascendance of which within the popular press is marked by a number of broadly cited works such as books on big data (Mayer-Schönberger & Cukier, 2013), data as the new oil (Toonders, 2014), and Chris Anderson's piece on the 'data deluge' and supposed 'end of theory' (C. Anderson, 2008).

This popularity has also meant a matching deluge of scholarship on the topic. Data has been characterised as a revolution (Kitchin, 2014) of small (Kitchin & Lauriault, 2015), big (Boellstorff, 2013), 'Big' (Chen et al., 2012), open (Gray, 2014), thick (Thompson, 2019; T. Wang, 2013), beautiful (Halpern, 2014), and haunted (Blackman, 2019).

Data as a subject of study has been approached through critical studies (Iliadis & Russo, 2016), citizenship and politics (Ruppert et al., 2017), activism (Lehtiniemi & Ruckenstein, 2019), imaginaries (Beer, 2018; Ruppert, 2018), visualization (Engebretsen & Kennedy, 2020; Friendly, 2008), governance (Brous et al., 2016), and more. It is studied in the context of smart cities (Löfgren & Webster, 2020), self-tracking (Lupton et al., 2018), capital (Sadowski, 2019), data science (Schembera & Durán, 2020; Slota et al., 2020), public policy (Meyer et al., 2017), predictive analytics (G. Rieder & Voelker, 2020), law (Cool, 2019), political economy (Mian & Rosenthal, 2016; Prainsack, 2020), and many, many other topics besides.

The following section gives an account of the state-of-the-art research on data by first briefly discussing some historical precedents for these studies in the fields of STS and HCI. It then describes some key conceptualizations of data in the research and finally discusses the emerging field of Critical Data Studies.

It should be noted that data is in many studies distinguished from big data, with the latter referring to the collection of vast quantities of data and the epistemological, methodological, transformational, and ethical concerns and questions this gives rise to. However, in the present review, big data studies are considered a sub-set of research on data. Big data is not distinct from studies of for example health or mobility data in having specific affordances. Given that the focus is on describing the broad trends within research disciplines, these distinctions are given less prominence.

STS & HCI

Geoffrey Bowker's work on the histories of databases and information storage infrastructures (Bowker, 2008; Bowker et al., 2010), Bowker and Susan Leigh-Star's work on classification (Bowker & Star, 1999), and Star's work on infrastructure (Star, 2016) can all be seen as laying important foundations for later work on data. They have been central to both STS and HCI in preparing a focus on the interrelations of data with its infrastructures (Baker & Bowker, 2007), practices (Baker et al., 2005) and processes of classification and standards (Millerand et al., 2013).

The growth of data as a topic of societal relevance and also interest to STS scholars is in some senses represented by Kate Crawford and danah boyd's influential text, "Six Provocations for Big Data"[5] (boyd & Crawford, 2011, 2012). These 'provocations' outlined a number of the epistemological and ethical issues associated in particular with big data. Rather than a grounded empirical engagement, Crawford and boyd's piece was a call to study the political ramifications and practical enactments of (big) data. Simultaneously, HCI researchers such as Janet Vertesi and Paul Dourish were foregrounding the importance of data in the context of science, focusing on space science research teams and the value of data (Vertesi & Dourish, 2011).

Within STS, the growth of digital devices and data produced by them gave rise to methodological reflections (Ruppert et al., 2013) and ideas of socializing big data, in the sense of tracing the 'social lives' of data itself (Ruppert et al., 2015). Elsewhere, the rising quantities of accessible data or digital traces revived the idea of quali-quantitative methods in the intersection of STS – in particular drawing on its history of controversy studies (Epstein, 1995; Martin, 1988; Pinch, 1981), digital methods (Rogers, 2009), and ANT (Latour & Venturini, 2010). While focused on practices of visualization and mapping (Marres, 2015; Venturini, 2010), these efforts

[5] This text was first circulated as a manuscript for a presentation, and was later published in modified form under the title "Critical Questions for Big Data." Here both versions are cited, but reference is made to the original title since its notion of 'provocations' has become influential.

largely relied on access to data from the APIs (Application Programming Interfaces) of platforms such as Facebook and Twitter (Borra & Rieder, 2014; B. Rieder, 2013).

These conceptions and engagements with data and the social life of methods around it were central to the initial research design of the dissertation. While the resulting research has been very different, these conceptions of data have still formed a kind of 'unthought' of the project. In particular, work with data and digital methods in the form of 'data sprints' (Munk et al., 2019) and 'hackathons' (L. Irani, 2015) were part of the way the speculative ethnography developed. Through discussing these methods and ways of working with data with informants, the author was invited to act as an expert, adviser, or consultant.

Recent work on data within STS includes multiple pieces of work on data in knowledge production (Bonde Thylstrup et al., 2019), grounded studies of data's role in organisational value chains (Flyverbom & Madsen, 2015), engagements with the various political articulations of data (Beraldo & Milan, 2019; Ruppert et al., 2017), the sociotechnical imaginaries of data (Ruppert, 2018; Schiølin, 2019), and studies that use the close link between visual metaphors and data as a point of departure for interrogating the materiality, practices, and performances constituting it as a phenomenon (Agostinho, 2019; Beer, 2018; Currie, 2020). Parts of this work are described in greater detail below, based on their relevance to the dissertation. Work on data dashboards (Bartlett & Tkacz, 2017; Mattern, 2014, 2015; Mertia, 2017; Peer, 2019; Solanki, 2019) are also central to the dissertation, especially paper 3, and have partially been interpreted through the pioneering work on infrastructures by Bowker and Susan Leigh-Star described above.

Conceptualizing data

Where the previous sub-section has accounted for how data has been approached as a topic of study within STS and HCI specifically, the following section outlines some key conceptualizations of data that are both state-of-the-art research and key to the dissertation's project of studying data and digitalization work.

In the important work, *Raw Data is an Oxymoron* (Gitelman, 2013), Lisa Gitelman assembles a series of contributions inspired by science studies and its history of critiquing the production of knowledge, to turn this same approach to the notion of data. They range from outlining the etymological origins and common practices of the term data before it became associated with facts (Rosenberg, 2013), to the way in which data in long-term ecological research requires intense work and cultivation to become useful (Ribes & Jackson, 2013). The volume draws its name from a comment made by Geoffrey Bowker in his work on the history of databases

(Bowker, 2008), suggesting that the expression 'raw data' is both an oxymoron and a bad idea.

A landmark work in the study of data, and in terms of underscoring data as a topic of academic inquiry, Rob Kitchin's 2014 book *The Data Revolution* (Kitchin, 2014) provides a comprehensive introduction to data as a topic of inquiry, discussing it both in terms of ontology and epistemology, and on a more practical level. It also lucidly discusses both big data, open data, and the differing contexts in which these may appear, such as governments and corporations. Kitchin draws from a wide range of intellectual resources, including STS, to deliver a comprehensive view on data.

The same year as Kitchin's work was released, Orit Halpern's *Beautiful Data* also came out 7/11/20 4:17:00 AM, which, however, took a much different approach to the topic. Where Kitchin's work contains historical narratives, it is essentially a comprehensive introduction and overview of the topic of data. Halpern instead performs a deeply historical and dense philosophical analysis, which connects contemporary fascinations with data to the history of cybernetics. In particular, she examines the Songdo smart city project in South Korea, excavating the complex history of how its corporate conception as a space of automated and integrated sensors derives from the reinterpretation of rationality, vision, and space by figures such as Norbert Weiner and Buckminster Fuller.

The work represented by Kitchin, Halpern, and in the volume edited by Gitelman, forms a backdrop for the three papers of the dissertation. Especially Halpern's work, as has been discussed earlier, represents an engagement with speculation as well as with data, and is an inspiration for the dissertation. Gitelman's edited volume, and particularly the contributions of Rosenberg, Ribes and Jackson, and Bowker have also been central to informing the dissertation's approach to data as something to be historicized and critically appraised based on how it is constructed locally.

More recently, Lisa Blackman has undertaken a similarly ambitious project in her work *Haunted data: affect, transmedia, weird science* (Blackman, 2019). Blackman conducts a hauntological analysis of data, drawing together strands of Derrida's work on the archive, psychological research into social contagion and ghosts, scientific controversies, futurism, and other 'weird sciences.' Data has also often been analyzed as digital traces (Hepp et al., 2018; Latour & Venturini, 2010), a frame taken up and explored by Nanna Bonde Thylstrup in recent work (Thylstrup, 2019). Thylstrup critically engages with the implied metaphors of 'trace' and related terms such as leaking or leaving data. On this basis, she examines big data knowledge production through theories of waste and Blackman's work

mentioned above, describing how such knowledge production is haunted by the toxic traces of datasets used, even when they are attempted to be cleaned.

The papers of the dissertation do not engage with the discussions of digital traces or the ways in which data can be said to be haunted per Blackman. This research represents conceptualizations of data which are, however, relevant to the dissertation's overall argument about the speculative relations between data and digitalization work. The ways in which Blackman shows data to be haunted correspond to some extent to the argument made here about the prevalence of speculation in, about, and with data. Digital traces, likewise, represent a particular conception of data, which particularly in Thylstrup's analysis, emphasizes important points about how data is not just not 'raw,' but indeed at times toxic.

Studying data in a setting related to health and wellness, Brittany Fiore-Gartland and Gina Neff have suggested the concept of 'valences' to make sense of how data is portrayed in discourse, enacted in practice, and how the difference between these two invariably lead to tensions of perception (Fiore-Gartland & Neff, 2015). Fiore-Gartland and Neff identify six valences that are distinct to health data, but the concept has been helpful in the second paper of the dissertation to make sense of the valence of data in relation to what is termed speculative data work.

Another impactful conception of data is that of the proposed opposite of big data; 'thick data' (T. Wang, 2013). Developed as a riff on Clifford Geertz's concept of 'thick description' (Geertz, 1973), this concept is a defense of qualitative approaches to knowledge creation in the face of big data. While thick data is not data in the sense that is generally being discussed here, it is relevant as a kind of state-of-the-art research which is still in circulation as opposition to big data (Thompson, 2019). Thick data as a kind of engagement with data as a societal trend is one of the topics discussed in the dissertation's third paper. Here, the notion of digital humanists as an attempt at promoting thick data is discussed. Having now discussed a number of important conceptualizations of data, the next section turns to examine Critical Data Studies.

Critical Data Studies

Critical Data Studies (CDS) is a still-emerging field of research, which springs primarily from geography (Dalton & Thatcher, 2014) and has sought to take up the sort of provocations for big data made by boyd and Crawford mentioned earlier (boyd & Crawford, 2012). It has done so by suggesting the need for a, "systemic approach to data criticisms" (Dalton & Thatcher, 2014). In practice, this has meant engaging empirically with both data, big data, data science, and their infrastructures in an effort to perform a critical and systemic engagement with data as a topic of study.

Proponents of CDS have done this work through a number of different theoretical frames and empirical engagements. Central to these concepts has been the development of the notion of data or digital assemblages, which Kitchin and Lauriault base on readings of Michel Foucault and Ian Hacking (Kitchin & Lauriault, 2014, 2018)[6]. A data assemblage, according to Kitchin and Lauriault, is a, "complex socio-technical system, composed of many apparatuses and elements that are thoroughly entwined, whose central concern is the production of a data" (Kitchin & Lauriault, 2018, p. 11) and which works through certain processes that they term looping effects and engines, following Hacking.

Most recently, CDS has been connected to the topic of data ethics (Richterich, 2018), visualization techniques and political ecology (McCarthy & Thatcher, 2019), sexual identities and gender demographics (Ruberg & Ruelos, 2020) as well as use of algorithmic profiling in an Australian unemployment system (Allhutter et al., 2020) and continues to provide resources for discussing the "infrastructures of computing" (Pickren, 2018). These studies themselves draw on a number of other traditions such as queer studies, critical geography, and science and technology studies, and in this way, CDS is a thoroughly interdisciplinary field that contributes to and draws from other sources.

What distinguishes CDS from other studies of data is not so much its use of a critical approach, but more its attempt to develop a cohesive framework for this approach. However, whilst it is far too early to pass judgement on this aspiration, there are not many signs of this cohesion yet. Many studies seem to point to CDS without having sustained engagements with some of the original ideas outlined by Kitchin and Lauriault. See, however, (Siles et al., 2020). On the other hand, the broad provocations outlined by Dalton and Thatcher do seem to inform them, and the term does continue to draw researchers who acknowledge the influence and importance of this work.

The research in this dissertation is symptomatic of these two tendencies, being both informed by similar critical perspectives and aspirations, but failing to engage substantially with CDS. Due to the wide interdisciplinary approach taken, the CDS literature seemed to not be able to capture the speculative dynamics pursued by the dissertation. As the next section on findings and future research outlines, this was in retrospect perhaps a mistake and the need for a cohesive critical approach bears repeating.

[6] This text by Kitchin & Lauriault was made public in 2014, and fully published in 2018. The original circulation is here referenced to bring attention to this history, as it is relevant for the founding of CDS.

5.2 Digitalization

Digitalization, as has been discussed earlier, has been studied in terms of the policy of digitalization (Greve, 2015). It refers here to the process of digitalizing (Schou & Hjelholt, 2019a) the state apparatus. A different but similar notion is that of digital transformation (Lindgren & van Veenstra, 2018; Mergel et al., 2019; Pittaway & Montazemi, 2020; Scupola, 2018), which is used both to refer to the transformation of *government* through digitalization of public services and in the broader sense of *transformation* represented by digitalization itself.

Concepts such as datastructuring (Flyverbom & Murray, 2018) and datafication (Couldry & Yu, 2018; Dourish & Cruz, 2018) are not focused on specific organizations such as those of the public sector, and instead, describe how data is playing an increasing role in social processes such as knowledge production or even the social conditions of childhood itself (Mascheroni, 2018).

Liam Heaphy's work on 'data ratcheting' (Heaphy, 2019), on the other hand, provides a specific study of organizational change in the context of public transport. He details how data slowly becomes more prevalent, and how the organization's mode of operation changes accordingly. Similarly, Flyverbom and Madsen, although focusing on value and algorithmic knowledge production, have demonstrated how data is meticulously sorted in organizations to produce certain effects (Flyverbom & Madsen, 2015).

Following from these disparate strands of research, digitalization is here understood as an umbrella term for the various processes of digitalization, datastructuring, and datafication that are taking place in different contexts. These different terms have their own important specificities, however, for the purpose of this dissertation they point in similar ways to how organizations of all sizes are being affected by data and digital technologies. The dissertation connects this research to that of work, discussed in the next section, to suggest that digitalization work is a particular such process. Other studies, such as that on how 'prospecting' is conducted to pave the way for analysis in data science (Slota et al., 2020), describes something similar to what is here meant by digitalization work. Although describing a general phenomenon, the paper makes clear the kind of pre-work which has to happen to enable analysis and work with data, similarly to how Flyverbom and Madsen describe the sorting of data.

State-of-the-art research on digitalization as outlined here draws together some very different studies to suggest that they represent an overarching phenomenon: the overarching process of making procedures digital and increasing use of data, whether in local settings and organizations or on a more general level. As constructivist approaches such as ANT teach, this kind of process does not,

however, just occur – which is why the next section explores central research on the topic of work.

5.3 Work

Work and labor are often distinguished with reference to the Marxist concepts of alienated labor versus necessary or 'anthropological' work (Fuchs & Sevignani, 2013). The following account does not adopt this frame, citing current studies on both digital labor and data work, especially within the discipline of Computer Supported Cooperative Work (CSCW).

Critical studies of work and its conditions were in part pioneered by Henry Braverman (Braverman, 1998), who detailed the worsening quality of jobs in the United State in the 1960s and 70s. Later studies of work span a broad range of ideas, attempting to typologize it through concepts such as 'knowledge work' (Pyöriä, 2005) or situate it within broad social changes, such as growing intimacy (Gregg, 2011), rising precarity (Styhre, 2017), and new arrangements such as the 'sharing' or 'gig economy' (MacDonald & Giazitzoglu, 2019; Ravenelle, 2019).

In relation to information technologies, Shoshana Zuboff was one of the first people to study IT's effects of work (Zuboff, 1988). Zuboff analyzed so-called 'smart machines' as having both *automating* and *informating* capacities, suggesting that IT could lead to universal access to the information produced and more flat hierarchies in the workplace. Zuboff contends that power, enacted through authority, would determine whether that would be the case.

Recent work also explores how power is related to work, through the study of marginalization in digital labor (Gregg & Andrijasevic, 2019), shifting commodification of domestic labor (Huws, 2019), the rise and proliferation of micro-tasking (Lilly Irani, 2015), and the complicated relation of different kinds of labor such as design versus more menial kinds of digital work (Lilly Irani & Silberman, 2016). Such work continues to nuance our understanding of how, for instance, platforms architecture labor (Postigo, 2016) , constituting platformization of it (Huws et al., 2019), or how artificial intelligence relies on differing kinds of work than just that of developers (Tubaro et al., 2020). This scholarship on digital labor calls attention to the dynamics of power and gendered, racialized, and colonial dynamics at play in digital labor.

CSCW is the study, as the name implies, of how computer systems can support cooperative work. It is connected to other disciplines such as participatory design, HCI, and STS, but maintains its own vocabulary and particular interest with how work is undertaken and completed. Constructed over the last thirty years (Schmidt & Bannon, 2013), CSCW grew out of HCI as a response to what was perceived to be

excessive focus on the individual within the study and design of computer systems. The CSCW agenda came to focus on work of various sorts through the studies of articulation work (Schmidt & Bannon, 1992; Suchman, 1996), coordinative practices (Schmidt & Wagner, 2004), and the design of systems or mechanisms to support these (Cabitza & Simone, 2013; Schmidt & Simone, 1996).

In the public sector, attention to how work is being transformed is recent. It is somewhat informed by the above perspectives on power and marginalization on the one hand, and more technical attention to the design of supporting work on the other. Ursula Plesner, Line Jusesten, and Cecilie Glerup have called for increased focus in organization studies on how work in the public sector is being affected (Plesner et al., 2018). Anja Pors has studied how the Danish welfare bureaucracy has changed from servicing to supporting citizens' IT needs (Pors, 2015b), and Jannick Schou and Bastian Jørgensen have detailed the ongoing invisible work by frontline workers to ensure that citizens are helped when digitalization reforms otherwise adversely prevent this (Jørgensen & Schou, 2020).

Within HCI and CSCW, studies have focused in the Danish context on how welfare work might be supported better (Boulus-Rødje, 2018). Of particular relevance to the dissertation, 'data work' has become a distinct topic of research (Bopp et al., 2017; Fischer et al., 2017; Meng et al., 2019; Møller et al., 2020). This body of work has seized on data and the emerging notion of the 'data-driven' as an object of work to be studied empirically in varying contexts, from non-profits (Bopp et al., 2017) to hospitals (Bonde et al., 2019; Møller et al., 2020), and has discussed the work involved in collaborating around (Meng et al., 2019), appropriating (Elsden et al., 2016), and making data accountable (Fischer et al., 2017).

The state of the art of research on work is in extension of the above, understood as the research which engages with how work and labor in varying ways take place or center on data and new digital technologies. It highlights the dynamics of marginalization, the transformation of work, and the emergence of various kinds of data work. The next section synthesizes the various strands of the state-of-the-art research on data, digitalization and work in relation to the dissertation. It will describe the notion of *digitalization work*, its relation to how data has been conceptualized, and the dissertation's papers and findings.

5.4 Conceptualizing and contributing to the study of data and digitalization work

The previous sub-sections have described the current state-of-the-art research on data, digitalization and work, accounting for both some disciplinary and more thematic aspects of this literature. Given the massive scope of scholarship on these phenomena that has and continues to be produced at a rapid pace, the review has

focused on those disciplines and topics that are relevant and adjacent to the thesis. The state-of-the-art research described draws from STS, CSCW, HCI, and CDS and covers a wide range of topics and conceptual resources. The following will summarize how the dissertation relates, contributes, and contrasts with this research.

Research on data has been described with particular focus on different conceptualizations of data. What is meant by this is that the various works cited as important and state-of-the-art research which in various ways develops our understanding of data. Bowker, Gitelman, Kitchin, Halpern, Blackman, Thylstrup, Fiore-Gartland and Neff, and Wang all complicate and extend the phenomenon of data by various concepts.

For the research in this dissertation, this work has informed both overall approaches and understandings of data. Halpern's work, for instance, on data, aesthetics, and reason runs through all three papers and ties data to speculation. Fiore-Gartland and Neff's work plays a central role for paper 2, which extends the analysis of data valences to the Danish public sector and relates it to 'speculative data work.' Other work, such as Blackman's, offers a compelling alternative or compliment to the idea of data having speculative relations. Thick data per Wang acts as a foil in paper 3, against which a call for more political economy perspectives on digitalization is developed.

The dissertation and this review have not provided a definition of data, and indeed has avoided taking up a particular definition. The research has not focused on small, big, open, or thick data, nor has it engaged with digital traces. This has followed from the relational approach detailed earlier. 'Data' has been an actor to be followed and all of these various inflections of data have been articulated by actors at various points in time. The dissertation contributes an account of how speculation in, about, and with data, conceptualized as speculative relations, is part of constructing data.

Critical Data Studies has emerged as an attempt to provide a more unified approach to data but remains peripheral to the large amount of research being produced. Even research which does invoke the mantle of CDS rarely develops a sustained engagement with it as any kind of definitive conceptual approach. As the section on findings and future research argues, this call should, however, be repeated and heeded.

Digitalization refers to processes of increasing use of data, digital technologies and shifts in organizational forms and practices as a result of this. In this account, this has been linked to research describing processes such as datafication, digital

transformation, data ratcheting, data structuring, and, somewhat circularly, digitalization. The various concepts tie together data and ongoing processes of change. Together with the research on work, these processes are conceptualized as digitalization work. The present study is a contribution to research on digitalization by outlining the role speculation plays. In particular, paper 2 and 3 describe various processes of digitalization.

The scholarship of work relevant to the dissertation is in particular that on data work within CSCW and HCI and the studies of digital labor and marginalization. The dissertation's second paper builds on and contributes to the studies of data work by conceptualizing speculative data work in a public sector organization. The grounded studies of various kinds of digital labor contribute to the third paper, which also provides a study of precarious labor in the shape of the wage-subsidized workers hired to do the digitalization work discussed in that paper.

Digitalization work then refers to the cross-over of these two previous concepts. Some studies have always been described as occupying this space, including some of the work on public sector digitalization in Denmark (Jørgensen & Schou, 2020) and the studies of prospecting to enable data science (Slota et al., 2020). This work is central to the conceptualization of digitalization work in the third paper and to the overall contribution made by the dissertation.

For the overall dissertation, digitalization work is central to being able to specify the varied kinds of work in which data is being speculated on. Digitalization work is concretely articulated in paper 3, but an argument can be made that the development of a data-driven organization in paper 2 represents a kind of digitalization work. Similarly, the articulation of sociotechnical imaginaries and performativity of hype can be considered a kind of pre-stage to digitalization work. The main contribution of the dissertation is the concept of speculative relations. However, these relations are formed *between* data and ongoing digitalization work.

As has been argued here, this dissertation builds on, contributes to, and in some cases contrasts with this state-of-the-art research. It draws on conceptualizations of data and puts forward *speculative relations* as its own conceptualization of how speculation in, about, and with data is related to the ongoing work of digitalization – and it builds on and contributes to accounts of this digitalization work through performing redescriptions and through concepts such as 'speculative data work.' Having established the state-of-the-art research, which the dissertation stands in relation to, the next section will describe the findings of the dissertation, and present suggestions for future research.

6. Findings & Future research

As detailed earlier, the research question this dissertation answers is: what role does speculation in, through, and about data play in the ongoing digitalization work of the Danish public and private sectors? The kappa has now outlined the contextual, theoretical and methodological perspectives, and the state-of-the-art research, which has informed the research, and which it contributes to. This section will detail the main findings of the dissertation, in the form of the findings of the three research papers and the overall findings and contributions. The section ends by outlining what potential future research this points to.

- The three papers that make up the main contribution of the dissertation contain a number of distinct findings, which can be summarized as follows:
    - Paper 1 finds that hype at tech events is productive through its sociomaterial performance of corporate sociotechnical imaginaries. Naming these dynamics 'hot air,' the paper argues that more attention should be paid to hype and how it helps translate such imaginaries into local contexts.
    - Paper 2 examines data work in a Danish municipality and identifies 'speculative data work' as a particular type of this work. It finds speculation to be pervasive in shaping the validity, affect, and valences of data work. It also discusses the relation of this to data infrastructures, in particular the dashboard. On this basis, it discusses the prototyping of 'speculative dashboards' as an exercise in speculative design to develop alternative 'lures' for this kind of thinking and work.
    - Paper 3 examines an innovation project within this same municipality, examining how digitalization, labor, and work are figured, configured, and experienced by its practitioners. The paper finds that the project's attempts to speculatively 'do digitalization differently' fail in practice, due to pre-existing organizational practices and labor categories. It discusses this in relation to humanist and social science engagement with digitalization, arguing that analyses of its political economy are necessary to create meaningful change.

The research papers thus represent an approach which has identified and followed the relations of data, dashboards, and digitalization work at events and in organizations in the Danish private and public sectors. Through redescription of these relations, they have foregrounded the role played by speculation in the form of hype, sociotechnical imaginaries, data work, and (con-)figurations. Furthermore,

they have in various ways engaged with or outlined how such speculative relations may be studied, engaged with, designed for, and contextualized through speculative fabulation, design, and lures.

While each paper has its own specific findings, they together provide insights and thematic commonalities beyond their individual contributions. These form the dissertation's overall findings. These collective insights and themes derive from situating the empirical material and the papers' findings as part of a larger ethnography that answers the research question. The central results and findings of the dissertation are that:

- **Speculative relations:** The notion of speculative relations, which is a contribution of the dissertation, captures and conceptualizes the way in which different forms of speculation pervades how data and digitalization work are constituted relationally, in what has been called the Danish public-private tech sector.
    - This is exemplified by how the role of data in various kinds of digitalization work – such as sociotechnical imaginaries, the creation of a data-driven organization, and the practical configuration of labor with digitalization – has been speculated on through 'hot air,' 'speculative data work,' and speculative figurations such as the 'digital humanist.'
    - These concepts denote speculative relations and how they pervade and co-constitute data and digitalization work.
    - The concept of speculative relations offers a contribution in the form of a concept which can be used to name, study, and redescribe not just relations between data and digitalization work, but potentially describe the role played by speculation in general.
- **Speculative ethnography:** A kind of speculative ethnography is a fruitful and perhaps necessary way to meet, understand, and engage these speculative relations. Such a speculative ethnography is a particular and situated intervention, which co-produces new and potentially different speculative relations together with informants.
    - A speculative ethnography assumes a constructivist and relational ontology, in which all actors and practices, including speculative ones such as hype, are potentially real depending on their local, empirical enactment.

    - It studies, engages with and partakes in the speculative practices of the field through messy and inventive means in order to make use of their cultural predominance.
    - It aims to both study speculation as a phenomenon, and to transform the kind of speculation done, futures imagined, and ultimately realities constructed.
    - Speculative ethnography offers an inspiration for crafting another ethnography in response to a field, site, or gyre in which speculation is salient.

- **Hyper-relationality of data and digitalization work:** Data and digitalization work are in the context of Denmark and its public-private 'tech' sector messy and heterogenous phenomena, which can be characterized as hyper-related. The sociomateriality, practices, social relations, infrastructures, standards, sociotechnical imaginaries, and more which are related to and make up data and digitalization work, far outstrip what the present dissertation, and to some extent the current state-of-the-art literature, can account for.
    - Such an assertion is not in itself surprising, as reality will always supersede any representation of it. However, the particular finding of the dissertation in relation to this more general point is that data and digitalization work, at least in the Danish context, are hyper-related empirically.
    - Hyper-related, for lack of a better term, denotes the way that both discourse, imaginaries, and the material connections of data and digitalization work in the empirical research was linked to other phenomena such as self-driving cars, 3D printing, smart cities, smart contracts, augmented or virtual reality, drones, blockchain, digital doubles, internet-of-things, automation, algorithms, artificial intelligence, machine learning, the 4th industrial revolution, disruption, business models, machine-vision, and more.
    - The literature that has been discussed earlier to some extent represents and describes this immense plethora of concepts, buzzwords, and technologies. However, only Critical Data Studies comes close to suggesting and advocating for a broad and cohesive theoretical account of this based on data.
    - The third paper of the dissertation suggests that one approach to overcome this is to focus more on accounting for the political economy

behind this multiplicity. However, it will require both critical appraisals of political economy and situated ethnographic work of the kind represented by the empirical social sciences, such as STS and CDS, to arrive at an adequate understanding of these tech phenomena.

Future Research

The dissertation, in summary, makes three central findings, two of which also coincide with conceptual and methodological contributions: 1. speculative relations; 2. a speculative ethnography; and 3. the hyper-relation of tech in Denmark. Many kinds and directions of research can follow from these findings due to the interdisciplinary nature of the research project. The following suggestions for future research are therefore far from exhaustive. The suggestions are:

- The individual concepts of 'hot air,' 'speculative data work,' and 'speculative relations' can be explored and developed further. While these concepts are based on situated engagements in the speculative ethnography of the paper, they contain generalizable aspects. The concepts point to phenomena which are either poorly described such as understanding how hype is performative, or it is conjectured, growing in prevalence, such as how speculation precedes and pervades data work or how speculation ties together data and digitalization work.

- The speculative design project of a 'speculative dashboard' developed in paper 3 should be prototyped further. This prototyping work could take a range of forms, dependent on the context it is developed for. However, it is strongly recommended that forms of co-speculation or participatory design be part of this work.

- The notion of a speculative ethnography could also be developed further, leaning on already existing literature on action research and interventionist research. This would help develop an ethnography that is less reactive than what the one described in the present research. On the other hand, the benefit of a speculative ethnography as it is described here is that it does not overdetermine the speculation it encounters.

- The notion of the gyre as an alternative to social fields or field sites should be developed further. It was crucial to the present research, but Zabusky's conception of it could benefit from more theoretical engagement and adaption to fit other transnational processes.

- The notion of digitalization work developed here is in need of stronger conceptualization and empirical study. It has in the present research been

synthesized from several other strands of literature and represents a particular form of work which is often missed in favor of studying the processes or the effects of digitalization. Digitalization work suggests that there is a gap of research that describes the work to achieve digitalization, which warrants further research.

- As iterated several times above, the call from Dalton and Thatcher to go beyond piecemeal studies and criticisms of (big) data (Dalton & Thatcher, 2014) is a necessary and important one. It deserves more attention to tie together the disparate research on data. As the third main finding suggests, this needs to reach beyond simply data to understand the broader relations which these trends and technologies are situated in and composed of.
- Finally, the study of the political economy of data, digitalization work, and their speculative relations should be researched further. This conclusion is drawn both from paper 3 and the aforementioned finding of hyper-relationality.
    - In paper 3, this follows from empirical research. It details an attempt to enact digitalization in a manner informed by critical scholarship and orientations to humanistic competencies and finds that this fails in part due to an inability to navigate the organizational reality it is done within.
    - The above 'hyper-relationality' alternatively suggests that any one situated study of data or algorithms or 3D-printing will find it difficult to encompass the multiplicity of relations it is situated within.
    - Both of these are empirical points, or they are at least extrapolations based in empirical research. The suggested course of future research is to pursue whether attention to the political economy might prove fruitful for navigating and grounding these hyper-relational networks. Such approaches have already been partially developed in studies of platform capitalism (Srnicek, 2017), surveillance capitalism (Zuboff, 2019), and the political economy of data (Prainsack, 2020). The task of future research is to extend this work, but also to connect it to the ongoing situated and ethnographic studies of data, digitalization, and other 'tech.' It is in the combination of such perspectives that properly effectful analyses and critiques of tech, and all that that entails, can be developed.

7. Overview of Research Papers

Part 2 of the dissertation contains three research papers in various states of publication. They are arranged in the dissertation in chronological fashion, according to when the fieldwork they are based on was conducted, as well as their state of publication. Table 2 below also contains an overview of the papers, their object of study, the speculative relations and engagements they describe, and status. One paper is accepted for publication, another is in its second round of review following major revisions, and the third is finished but not submitted.

Table 2: Overview of research papers

No.	Title	Object of study	Speculative relation	Engagement	Status
1	Hot Air & corporate sociotechnical imaginaries: Performing and translating digital futures in the Danish tech scene	The sociomateriality of hype at events in the Danish tech scene	The performative dynamics of hype. The paper conceptualizes this as 'hot air.'	n/a[7]	Accepted
2	Speculative Data Work and Dashboards: Designing Alternative Data Visions	Use of data and analytics dashboards in a Danish public sector organization	The different ways speculation precedes and pervades both data work and infrastructures. The paper conceptualizes this as 'speculative data work.'	Prototypes a 'speculative dashboard' to explore how an infrastructure for alternative data visions	In review
3	The "Digital Humanist": Figurations of Danish public sector digitalization work	An innovation project in a Danish public sector organization	The creation of new figurations of the relation between digitalization and labor, in a speculative attempt to 'do digitalization differently.' Conceptualized using Suchman and Haraway's work.	Based in the analysis of the case, discusses the efficacy of current strategies of critique and education around data	Manu-script

Paper 1 – Hot Air & corporate sociotechnical imaginaries: Performing and translating digital futures in the Danish tech scene

The first paper is based on the ethnographic work of studying tech events such as workshops, seminars, meetings, and conferences. It is accepted for publication and is forthcoming as part of a special issue in the journal *New Media & Society*. The special issue has the following provisional title: '"We are on a mission". Exploring

[7] While not discussed in the paper, this part of the fieldwork did involve engagement via participation, contribution to, and organization of events. Here enrolments as an 'expert' was balanced with attempts to ground or critique hype, in favour of different kinds of speculation.

the role of future imaginaries in the making and governing of digital technology' and is set to be published in 2020.

The paper studies the hype in the sociomaterial performance of corporate sociotechnical imaginaries in the Danish context. It is situated as an ethnography of the gyre of events in both the public and private sector, making up a Danish 'tech scene.' The study is framed against the literature on sociotechnical imaginaries (Jasanoff & Kim, 2009, 2015), which it draws from to describe the many overlapping imaginaries at play in the Danish tech scene. It also contributes to the literature by adding a study of particular corporate sociotechnical imaginaries, which is otherwise lacking in the literature (Sadowski & Bendor, 2018). It was partially motivated from the empirical experience of pervasive hype within tech events about these imaginaries and an interest in understanding their appeal and effects. In this sense, the paper treats the events and hype as material-semiotic actors (Jensen & Lauritsen, 2005). To achieve this, the paper conceptualizes this hype as 'hot air,' describing the dual nature of hype as both vacuous and productive of effects. It emphasizes how critique of hype is itself part of its effect, as critique allows actors to disavow certain aspects of the sociotechnical imaginaries while others are appropriated. The paper suggests that hype, understood as 'hot air,' helps translate corporate sociotechnical imaginaries into the Danish context.

Paper 2 – Speculative Data Work and Dashboards: Designing Alternative Data Visions

The second paper is based in the workplace ethnography of a Danish public sector organization, conducted in the second phase of the fieldwork. It is submitted to the CSCW 2020, The 23rd ACM Conference on Computer-Supported Cooperative Work and Social Computing. The paper is currently in second review following major revisions.

This paper studies the data work of the organization and its relation to data infrastructures such as analytics dashboards and the organizational push to become data-driven. The paper draws on a broad range of research on computer-supported cooperative work, dashboards, data work, speculation, and speculative design. Combining the insights from this research, the paper suggests 'speculative data work' as a distinct kind of data work (Møller et al., 2020). It also prototypes a 'speculative dashboard' as a lure (Wilkie et al., 2017) for this tendency to speculate, suggesting it might be a way to create alternative data visions.

The paper provides an analysis of data in the organization, describing what kinds of data work take place, and how the validity, affect, and valences of data are enacted in three different parts of the organization. Through this analysis, the paper shows that practices around and attitudes to data differ in these three units, but that speculation is a common theme. The paper specifies how employees speculate

on data in relation to hype and futures, anxieties of cutbacks, or to notions of accumulation, control and efficiency, depending on their role in the organization. The paper argues that these differing kinds of speculation constitute 'speculative data work' in the way they pre-empt and pervade what data is and how it is infrastructured in the organization. The paper relates this to the specific infrastructure of data analytics dashboards, in the shape of Microsoft Power BI. It discusses these dashboards, and how they were perceived amongst employees in the organization, finding it to be a centralized instrument oriented towards knowledge and creating results. Dashboards were in this way sites of certain kinds of speculative data work. They were central to the speculative visions of the organization as 'data-driven' (Bopp et al., 2017) and did little to assuage the speculation about cutbacks also associated with data. Taking inspiration from speculative design (Auger, 2013; Dunne & Raby, 2013), the paper describes prototyping a 'speculative dashboard' together with a different set of professionals working with data and digitalization. The speculative dashboard is designed to allow for co-speculation on not just digital data, but also on heterogenous kinds of data that capture the dynamics of the organization better.

Paper 3 – The "Digital Humanist": Figurations of Danish public sector digitalization work

The third paper is also based on the workplace ethnography, but focuses on a different aspect of the material. It is a finished manuscript, but has yet to be submitted for publication.

The paper focuses on an innovation project in the Danish public sector organization and studies how this project attempted to figure the relation between labor and digitalization differently. It draws on Donna Haraway and Lucy Suchman's work on figuration and configuration (D. J. Haraway, 2013; Suchman, 2012), research on labor and work, and is situated against the ongoing critiques of Big Tech and the promotion of humanistic involvement in digitalization (Hartley, 2017). The paper provides a contribution to studies of digitalization and digital labor and to the ongoing debates and critiques of Big Tech and digitalization. It does so by providing a grounded description of what it calls digitalization work, the notion of the 'digital humanist,' and by reflecting on how this work and figure complicate how critiques of digitalization are made.

The paper outlines the context of the Danish public sector and labor market and draws attention to how digitalization and labor policy and public discourse condition the innovation project. These policies and discourses position graduates with a degree in the humanities poorly on the labor market, while pushing public sector organization to save costs through digitalization. The paper then describes how actors behind the innovation project attempted to do digitalization differently by developing figures such as 'the employee of the future' and the 'digital

humanist.' These figures are analyzed as a speculative response to both the humanistic and intellectual critiques of digitalization and attempt to reduce unemployment amongst humanists by engaging them in digitalization work through wage-subsidies. The paper compares these figurations to how the digitalization work was actually configured and experienced.

Through analysis of project documents, ethnographic material, and interviews, the paper analyses the contrast between the figurations of work and how it is configured and experienced. The digitalization work, it is found, does indeed rely on kinds of humanistic knowledge work (Pyöriä, 2005) as it requires skills in organizing, conducting, and analyzing a qualitative mapping of data sources and prospects. This kind of 'prospecting' (Slota et al., 2020) work is, however, supplemented with the relational work of navigating office politics. The project employees experience themselves as being poorly integrated in the organization and unsure of the effect of the work. The paper discusses this disconnect between the humanistic contribution of reflexivity and 'thick data' (T. Wang, 2013) and the actual effect of such competencies in the digital economy. On this basis, the paper suggests that studies of and education in analyzing the political economy of both Big Tech and digitalization is necessary.

Afterword

This dissertation sought to study data and has in particular investigated how speculation connects data and digitalization work in Denmark. The foreword of the dissertation invoked fear of bureaucratic technocraticsm around digitalization, and the tsunami of promises made in the name of tech. It also invoked the work of Donna Haraway and her rich worlds of speculative fabulation on alternative worlds. The dissertation was posed as a matter of becoming-with the Danish digital economy through its speculative ethnography. The question was raised as to whether digitalization of the dry, social-democratic welfare state of Denmark could be home to the kind of kin-making which Haraway so seductively describes. It was also suggested that this question is largely rhetorical, as we are increasingly left without a say in the matter. Data and digitalization are here to stay.

The three research papers which make up the dissertation and this kappa represent various answers to this question. They have taken the form of studying, conceptualizing, and engaging with speculation on, with, and about data as it relates to the ongoing Danish digitalization work. As answers they are academic, uneasy, yet hopeful. The work represented here approaches speculation, data and digitalization work by providing redescriptions and coining concepts. It identifies pervasive speculation and an almost overwhelming connection of hype, discourse, buzzwords, technologies, and infrastructures. It engages with this through conceptualization but also through its speculative engagement. This engagement consists in actively taking on the role of 'expert,' building speculative design prototypes and coordinating events. In this sense, it does represent a kind of becoming-with, whether as intended by Haraway or not.

The findings point to the need for more research, and to specific forms of that research. They suggest that more studies of the speculative character or relations of technology, especially as 'tech,' data and digitalization work are needed. While the present dissertation makes empirical and theoretical contributions to our understanding, the relations between speculation and tech as an object of study are hardly exhausted by these. They also point to the need for more situated and ethnographic work which can help trace the 'hyper-relationality' of these technologies. Importantly there is also a need for more studies of the political economy with which they are entangled, in order to be able to compliment more situated accounts, and provide effective critique. More studies are, of course, no magic bullet. Yet, any theory of or action for change must understand the terrain it operates within.

Speculation in, about, and with data is a central part of digitalization work through its various *speculative relations*. The continued work to digitalize society,

and the role of data within it, however, need not be yoked to extractive, monopolistic, and austere neoliberal state-capitalism. We must ourselves both understand these relations and make speculations of our own, if we are to make kin of data and digitalization.

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APPENDIX A: TECH EVENTS

Table 3: Overview of events

Name	Date	Sector	Role	Type	Topic	Organizers	Note
Smart Copenhagen Gå-Hjem-Møde	01/03/2017	Public-Private	Attendee	Workshop/ Seminar	Smart Cities	CLEAN	
Huset-KBH Datasprint	02/03/2017	Public	Organizer, Participant	Datasprint/ Hackathon	Datasprint	Huset-KBH	
Meeting w. CLEAN	05/04/2017	Public-Private	Participant	Meeting	Smart Cities, Big Data, CDE, CleanTech	CLEAN	
CLEAN Housewarming Event	20/04/2017	Public-Private	Attendee	Festival/ Social	CleanTech	CLEAN	
Smart Copenhagen Gå-Hjem-Møde II	26/04/2017	Public-Private	Attendee	Workshop/ Seminar	Smart Cities	CLEAN	
Sådan kan digitaliseringen skabe bedre produkter og leverancer I det byggede miljø	17/05/2017	Public-Private	Attendee	Workshop/ Seminar	Digitalization, Built Environment	BloxHub, The Alexandra Institute	
Copenhagen Data Exchange – den nye danske databørs for BIG DATA!	29/05/2017	Private	Attendee	Presentation	CDE, Big Data	IDA	
Indian Smart Cities: A unique Danish export opportunity – Business Seminar	08/06/2017	Public-Private	Attendee	Workshop/ Seminar	Smart Cities, CleanTech, Exports	Bloxhub, Asia House, Innovation Centre Denmark, Quercus Group	
Urban Solutions: Connecting Danish Suppliers with the World	12/06/2017	Public-Private	Attendee	Conference	Urbanism, Exports, Smart Cities, Built Environment	Danish Foreign Ministry, The Danish Trade Council	
Join the Data-Driven (R)evolution – Unlocking the business potential of Big Data!	14/06/2017	Public-Private	Attendee	Conference	Data-Driven, Big Data, Business, Self-Driving Cars, Finance, Exports, TechPlomacy	Danish Industry, Ministry of Higher Education and Science, Ministry of Foreign Affairs, MADE, WelfareTech, Copenhagen FINtech	
"Info-Nation"	14/07/2017	Civil Society	Attendee	Festival/Social	Urbanism, Smart City, Digital	SPACE10, In-Between Economies	

					Infrastructure, Commons		
Meeting about data in organizations	08/08/2017	Public	Organizer	Meeting	Data	Anonymized public sector organization	
Digital Futures: Big Data	17/08/2017	Public-Private	Participant	Workshop/ Seminar	Big Data, Built Environment	BloxHub, The Alexandra Institute	
Meeting concerning data and bicycles in the Copenhagen area	18/08/2017	Public	Organizer	Meeting	Data, Urbanism, Bicycles	The Alexandra Institute, Municipality of Frederiksberg, Copenhagen Solutions Lab	
Smart Interregional Collaboration through Clusters – an exclusive session with Dr. Christian Ketels	23/08/2017	Public-Private	Attendee	Workshop/ Seminar	Clusters	City of Copenhagen, Cluster Excellence Denmark, Greater Copenhagen	
Tag dit eget Big data Lab med hjem	23/08/2017	Private	Attendee	Workshop/ Seminar	Big Data	IDA	
TechFestival	05/09/2017	Civil Society	Attendee	Festival/Social	Tech	TechFestival	Multiple day event. Until 08-09-2017.
InfinIT Summit 2017: Smart Society	06/09/2017	Public-Private	Attendee	Conference	Smart Society, Smart Cities, Tech	InfinIT	
Datasprint	07/09/2017	Public	Organizer, Contributor	Datasprint/ Hackathon	Datasprint	Anonymized public sector organization, IT-University of Copenhagen	
"Data Nation"	07/09/2017	Civil Society	Attendee	Festival/Social	Platform Economy, Digital Infrastructure, Commons, Open Data, Open Source, Urbanism	In-Between Economies, Danish Business Authority	Part of TechFestival
Internetdagen	13/09/2017	Public-Private	Attendee	Conference	AI, 5G, Data, Big Data, GDPR, Internet	DK Hostmaster, Business, Danish Industry, Danish Chamber of Commerce, Danish Internet Forum, Institute for Human Rights, Medierådet for Børn og Unge, Red Barnet, FN	

						forbundet, CURE	
Workshop w. Claus Skytte	13/09/2017	Private	Participant	Workshop/ Seminar	Futures, AI, Utopianism	DK Hostmaster	
DTU High Tech Summit	20/09/2017	University	Attendee	Conference	Digital Transformation, Digitalization, Tech, AI	DTU	
Big Data Business Innovation - Module 1	20/09/2017	University	Participant, Contributor	Workshop/ Seminar	Big Data, Business, Banking, Digitalization, Digital Transformation	DTU	Multiple module course, with two days in each module.
Big Data Business Innovation - Module 2	02/10/2017	University	Participant	Workshop/ Seminar	Big Data, Data Visualization, Machine Learning, IoT, Cyber Security, Cognitive Computing, Fog Computing	DTU	Multiple module course, with two days in each module.
Architecture as Software - BloxHub Science Forum	05/10/2017	Public-Private	Attendee	Workshop/ Seminar	Architecture, Built Environment	BloxHub	
Urbanization & Exports	06/10/2017	Public-Private	Attendee	Workshop/ Seminar	Urbanism, Exports, Smart Cities, Innovation	BloxHub	
#SmarterCitiesNOW Conference	11/10/2017	Public-Private	Attendee	Conference	Smart Cities, Innovation, IoT, Business Models, Start-ups, Urbanism	Tech Nordic Advocates, Tech London Advocates, The Capital Region of Denmark, Loop City, BloxHub, zumtobel group, Ravensbourne	Multiple day event. Until 12-10-2017.
London Big Data Week Conference	13/10/2017	Private	Attendee	Conference	Big Data, Cyber Security, AI, ML, Business Models, Blockchain, IT Architecture, Computing	London Big Data Week, bigstep	
IDA Driving IT	03/11/2017	Private	Attendee	Conference	IT, Self-Driving Cars, Smart Cities, Data, Singularity,	IDA	

					Start-ups, Innovation, IT Architecture, Cloud, Smart Contracts		
In-Between Economies #6: Democra-city	17/11/2017	Civil Society	Attendee	Festival/Social	Democracy, Media,	SPACE10, In-Between Economies	
Mind-Lab morgen: The digitized citizen	23/11/2017	Public	Attendee	Festival/Social	Citizenship, Digitalization	Mind-Lab	
Food and the City	23/11/2017	University	Attendee	Presentation	Urbanism, Architecture, Food, Design	KADK	
Turning Public Needs into Private Investment Opportunities?	30/11/2017	Public-Private	Attendee	Workshop/Seminar	Urbanism, Green Tech, Design, Innovation, Public-Private	BloxHub	
In-Between Economies #7: Ukendt-Danmark	15/12/2017	Civil Society	Attendee	Festival/Social	Denmark, Urbanism, Countryside	SPACE10, In-Between Economies	
Smart City, Cybersikkerhed og GDPR: Hvordan udvikler vi sikre løsninger til gavn for borgerne?	04/12/2017	Public-Private	Attendee	Workshop/Seminar	Smart Cities, Cyber Security, GDPR, IoT	Smart City Cybersecurity Lab, IDA, Danish Cybersecurity Clusters, Gate21, Capital Region of Denmark	
Gate21 Masterclass i udbudsfri OPI	25/01/2018	Public-Private	Attendee	Workshop/Seminar	Public-Private Innovation, Contracts	Gate21	
Citizen Services Development Meeting in CARD	30/01/2018	Public	Attendee	Workshop/Seminar	Data, Data-Driven	CARD	
Smart City - Smart Living 2018: Det gode liv i byerne	08/02/2018	Public-Private	Attendee	Conference	Smart City, IoT, Public Sector, Innovation, Virtual Reality, Robots, Open Source	Gate21, NRGi	
How the built environment shapes our lives - BloxHub Science Forum	05/03/2018	Public-Private	Attendee	Workshop/Seminar	Built Environment, Urbanism, IoT	BloxHub	
Big Data Business Academy Masterclass	06/03/2018	Public-Private	Attendee	Workshop/Seminar	Big Data, Business Models, Data Maturity, IoT	Big Data Business Academy	

Meeting w. ReD Associates	06/03/2018	Private	Participant	Meeting	Collaboration	ReD Associates, Researcher	
Opening of BLOX	06/05/2018	Private	Attendee	Presentation	n/a	BLOX, RealDania	
Folkemødet 2018	14/06/2018	Civil Society	Attendee	Festival/Social	Digitalization, Democracy, Dataethics	Foreningen Folkemødet	Multiple day event. Participated 14th and 15th.
#DataForBusiness Summit'18	20/06/2018	Public-Private	Attendee	Conference	Data, Big Data, Business Models, Data Maturity	#DataForBusiness	
Perspektiver på data og organisationen	04/03/2019	Public	Organizer, Contributor	Workshop/ Seminar	Data, Organization	CARD, Researcher	
TechFestival	06/09/2019	Civil Society	Attendee	Festival/Social	GovTech, Business Models, Smart Cities, TechPlomacy, Tech	TechFestival	
Surveillance Capitalism or Digital Responsibility	27/09/2019	Public-Private	Attendee	Presentation	Data, Surveillance, Capitalism, Business Models, Regulation	ITU, Dansk Industri, The Agency for Digitalization	Event hosting Shoshana Zuboff
SOF/ITU Hackathon	24/03/2020	Public	Organizer, Contributor	Datasprint/ Hackathon	Hackathon, Data	ITU, Researcher, Depart of Social Affairs in the Municipality of Copenhagen	

APPENDIX B: INTERVIEWS

Table 4: Overview of interviews

No	Interviewee	Conducted	Type	Duration	Recorded	Trans-cribed	Used in paper:			
							1	2	3	Back-ground
1	City Data Exchange interview	In-person	Semi-structured w. pre-prepared interview guide	59:16	Yes	Yes	X			X
2	Event ethnography interview	In-person	Semi-structured w. pre-prepared interview guide	1:17:07	Yes	Yes	X			X
3	CARD employee 1	In-person	Semi-structured w. pre-prepared interview guide	56:41	Yes	Yes				X
4	CARD employee 2	In-person	Semi-structured w. pre-prepared interview guide	50:28	Yes	Yes				X
5	Data project employee 1	In-person	Semi-structured w. pre-prepared interview guide	1:32:17	Yes	Yes		X	X	X
6	Data project employee 2	In-person	Semi-structured w. pre-prepared interview guide	1:36:04	Yes	Yes		X	X	X
7	Data project manager 1	In-person	Semi-structured w. pre-prepared interview guide	1:02:49	Yes	Yes		X	X	X
8	Data project employee 3	Skype	Semi-structured w. pre-prepared interview guide	1:37:06	Yes	Yes		X	X	X
9	Data project employee 4	Skype	Semi-structured w. pre-prepared interview guide	1:27:58	Yes	Yes		X	X	X
10	Data project employee 5	Skype	Semi-structured w. pre-prepared interview guide	1:26:16	Yes	Yes		X	X	X
11	Data project manager 2	Written	Written questions	n/a	n/a	n/a		X	X	X
12	Data project employee 2	In-person	Semi-structured w. pre-prepared interview guide	1:10:19	Yes	Yes		X	X	X
13	Data project employee 3	In-person	Semi-structured w. pre-prepared interview guide	44:20	Yes	Yes		X	X	X
14	Data project employee 4	In-person	Semi-structured w. pre-prepared interview guide	52:52	Yes	Yes		X	X	X

PART II

Research Paper 1 – Hot Air & corporate sociotechnical imaginaries: Performing and translating digital futures in the Danish tech scene.

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Hot air and corporate sociotechnical imaginaries: Performing and translating digital futures in the Danish tech scene

Michael Hockenhull

Marisa Leavitt Cohn

IT University of Copenhagen, Denmark

Abstract

This article analyzes the role of hype in performing and translating corporate sociotechnical imaginaries of digital technologies, into the context of Danish society. Drawing on ethnographic fieldwork of technology events in Denmark, this article proposes "hot air" as a concept to describe how hype for the future performs these imaginaries. This article describes the overlapping sociotechnical imaginaries that dominate these events and the performative effects of hype and its critique, in articulating and translating them. This article makes an empirical and conceptual contribution to the study of sociotechnical imaginaries, in particular, their socio-material performance, the role of corporations in articulating them, and how hype is central to their translation.

Keywords

Big Tech, corporations, data, Denmark, digitalization, digital transformation, futures, hot air, hype, sociotechnical imaginaries

Introduction

This article explores how corporate sociotechnical imaginaries of digital and data-related technologies are translated into local contexts through promotional talks, conferences, and events. By analyzing ethnographic material from fieldwork

Corresponding author:
Michael Hockenhull, IT University of Copenhagen, Rued Langgaards Vej 7, 2300 Copenhagen, Denmark.
Email: michh@itu.dk

conducted at tech events in Denmark, a small welfare state in northern Europe, we put forward the concept of "hot air" to describe the dynamics of hype in performing and sustaining sociotechnical imaginaries.

Denmark is the most digitalized country in the world according to the United Nations (2018) and the EU (European Commission, 2017). While studies (Greve, 2013; Jæger and Löfgren, 2010; Schou, 2018) have accounted for the central role of neoliberal and austerity financial policy in driving this development, the role of private corporate actors in advancing particular imaginaries of digitalization is less explored. We approach the role of the private sector in Danish digitalization through an empirical analysis of tech events attended by both public and private sector actors.

The impulse for this article arose during fieldwork as we wondered what made these events work and why actors continued to attend them, despite frequent dismissals of their hype-saturated nature. Drawing on science and technology studies, the article examines the performative dynamics of such events and the future-making capacities of hype in sustaining sociotechnical imaginaries. We develop the concept of "hot air" to highlight the dynamics of how hype and its critique function to perform and translate corporate imaginaries into a local Danish context.

Corporatized imaginaries of digitalization and the performativity of critique

Sociotechnical imaginaries are defined by Jasanoff as "collectively held, institutionally stabilized and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff and Kim, 2015: 4). This definition extends Jasanoff's previous work with Sang-Hyun Kim (Jasanoff and Kim, 2009), and builds on a rich tradition within the social sciences of engaging with the imagination and imaginaries as an important site of study (Anderson, 2006; Castoriadis, 1997; Taylor, 2004). Whereas previous scholars such as Anderson and Taylor focused primarily on imaginaries as social phenomena, tied to topics of identity and nationalism, Jasanoff suggests that imaginaries are co-constituted through understandings of knowledge and technology, expanding the term with the "sociotechnical" prefix. An important commonality between Jasanoff's and previous understandings of imaginaries, is that they are both factual and normative, meaning that they describe both how societies are thought to be, but also how they should be. Finally, as Jasanoff's definition points out, imaginaries are quite often publicly performed ideas of the future, highlighting the importance that performances such as demonstrations (Shapin and Schaffer, 2011) have always had in sociotechnical life.

Recent academic work has explored the role of social and sociotechnical imaginaries with regard to the phenomena of (big) data (Lehtiniemi and Ruckenstein, 2019; Olbrich and Witjes, 2016; Ruppert, 2018), analytics (Beer, 2018), algorithms (Bucher, 2016; Williamson, 2016), and smart cities (Mertia, 2017; Sadowski and Bendor, 2018). Ruppert (2018) argues that current imaginaries of big data are concerned with the "possibility of the commodification of data through its circulation and its infinite reuse . . . " (p. 21). She draws on her research into transnational statistical agencies to show how the

imaginaries of big data affect expert knowledge and the epistemic authority of state institutions producing particular "data futures" through changes in practices of data production and analysis. Sadowski and Bendor (2018) similarly find that the notion of smart cities presents a certain vision of the future, in this case dominated by corporate narratives stemming from IBM and Cisco; that cities are beset by crises, and that corporate actors have the technical solutions to solve them. Mertia finds the imaginaries of Indian smart cities still in the making, with uneven edges stretching from housing apps to GIS visualizations to open data activism (Mertia, 2017). Beer focuses on the private sector analytics industry, and how a "data imaginary" paves the way for its invasive gaze (Beer, 2018) into what he calls the *data frontiers* of practices and organizations. He identifies the imaginary as being characterized by themes describing the data imaginary as speedy, accessible, revealing, panoramic, prophetic and smart.

We build on this interest in corporatized imaginaries of digitalization, through an ethnographic study of tech events hosted in Copenhagen. Rather than focus on a single industry or profession, we aim to describe the dynamics of hype in relation to an overlapping set of sociotechnical imaginaries present in the Danish tech scene. The focus of this article is how hype (and its critique) do performative and translative work *for* these imaginaries, and how the events are crucial sites for this work. To dismiss big data and similar new "disruptive" technologies as mere hype "underestimate[s] the material and political effects of imaginaries as they are taken up in practices through which new paradigms or ways of thinking are propagated" (Ruppert, 2018: 19). We are, therefore, particularly interested in how these imaginaries come to be "taken up in practices" through translation into local contexts. The imaginaries are in many ways transnational, as the studies by Ruppert, Beer and others show, but for them to come into practice they must be made local. We argue that corporate actors play a unique and under-appreciated role in this dynamic, and that tech events are one of the venues through which they do so.

The role of corporations in the articulation of sociotechnical imaginaries is an understudied aspect of the literature. As Sadowski and Bendor (2018) point out, the majority of this literature is concerned with the state and its role in establishing imaginaries. Other than Sadowski and Bendor's own contribution, Smith's (2015) analysis of the role of corporations in the imaginaries of social responsibility and global governance or Olbrich and Witjes (2016) examination of commercial satellite imagery, there are few other studies that focus on corporate actors. See, however, Williamson for a relevant contribution on Silicon Valley corporations' and the algorithmic imaginary (Williamson, 2016).

Our article also builds on a tradition in science and technology studies to study the performative effects of critique (Latour, 2004). Adopting this approach, we examine the effects of the events, rather than only the message they communicate, paying particular attention to the way that hype and its critique are invoked. We, therefore, follow a similar strategy to that of Jensen and Lauritsen (2005) in their study of IT reports and "read with the text" rather than against it by performing a material-semiotic analysis of the events. Our aim is not to expose the inconsistencies or problematic aspects of the hype surrounding sociotechnical imaginaries and their rhetoric, but to understand how criticism of hype becomes productive. In doing so, we build on David Beer's (2018) point that "it is this ability to conjure such hype . . . that is actually central to facilitating the spread of

data-led practices" (p. 15) and extend Jasanoff's point that performance is an important aspect of how imaginaries are enacted (Jasanoff and Kim, 2015: 9–14).

The next section of this article describes the methodology of our ethnographic study. We then outline the concept of "hot air" and the corporate sociotechnical imaginaries present in the field before diving into our in-depth empirical analysis of the performative effects of hype. We highlight three dynamics of hype that we conceptualize as "hot air" and conclude with a discussion of how "hot air" serves to translate corporate imaginaries into the local Danish context.

Ethnographic attention to hype

The empirical material for this article derives from a wide range of technology events in the Copenhagen area attended over the course of a year, from 2017 to 2018. More than 30 events with formats such as workshops, conferences, masterclasses, seminars, and courses were attended. Their topics ranged from smart city technology, data-driven innovation, export of Danish technology, big data, public digitalization, sustainability, data visualization and more. These events were hosted by a mixture of actors in the Danish technology sector, including ministries, municipalities, lobby organizations, labor unions, universities, technology clusters, and private companies. Attendants represented many different organizations and industries, from both the public and private sectors.

Meetings and professional gatherings have long been a topic of interest within management and business literature (Schwartzman, 2013), and have recently been given increasing attention in connection with anthropological and ethnographic work (Leivestad and Nyqvist, 2017; Sandler and Thedvall, 2017). We focus on a broad selection of events, ranging in size from small workshops to large-scale professional gatherings, in an effort to capture the hype surrounding corporate sociotechnical imaginaries in a variety of settings. Events were selected on the basis of a mixture of snowball sampling and following prominent tech media outlets and organizations in Denmark. This approach matches the social arena being studied, as actors themselves move through and are situated in different constellations of relations that routinely cross national and professional boundaries. In this sense, these events are better characterized as a "widening gyre" (Zabusky, 2002) than "social" or "ethnographic fields" (Leivestad and Nyqvist, 2017) in that the site is not a delimited field but instead a churn of different sites and topics. In fact, it is this churn that we identify as a feature of hype's performativity in our empirical analysis and conceptualization of "hot air."

These events provide a window into a scene in Denmark occupied by private companies and public institutions, developing, selling, purchasing, or engaged in discussions of digital technologies and data-driven futures. The events, while often accessible through a public sign-up, were aimed at industry actors or those interested in learning more about new technological developments such as big data or smart cities who were already reading tech newsletters or blogs. Venues for the events were often luxurious, held in the glass and steel domains of industry or modernized medieval buildings of ministries. There was almost always free catering, and attendees wore suits, traded business cards, and caught up with people they had met

at similar events, performing what Leivestad and Nyqvist (2017) call "an integral part of many professional's lives today" (p. 9) as it is through such social processes that knowledge is brokered.

Ethnographic material from participating in these events includes fieldnotes, photographs, power point slides, and other promotional materials collected during the events. Fieldnotes were a mixture of direct observations and transcripts of events, after-the-fact notes of conversations with other participants and short memos put together after the events were over. Interviews and multiple informal discussions with informants who frequent these events form background knowledge for the study. This material was coded using a semiotic clustering approach (Feldman, 1995), in which events were labeled according to type (workshop, conference, seminar, etc.), mode of communication (promotional, informational, case-study, community-oriented), topic (innovation, business models, smart city, big data, exports), and what sociotechnical imaginaries were articulated. On the basis of this high-level coding certain events stood out as particularly relevant for our purposes. Further analysis through memoing identified features that were associated with the production and critique of hype. These features were then again memoed about, and constitute three dynamics of hype which we call "hot air." These are *crafting publics*, *historization and projection*, and *authentication*.

The performativity of sociotechnical imaginaries

> I enter the building of glass and steel, the headquarters of the Danish Industry lobby, across from the brick and copper Town Hall. I am attending a conference entitled "Join the Data-Driven (R)evolution: Unlocking the Business Potential of Big Data." Those of us joining the conference are treated to breakfast; long but narrow tables of steel-cut oats, fresh orange juice, small croissants and more. The main conference hall is huge and professionally decked out with curved sound paneling along the walls and changing LED-lights. I sit, listen and take notes of reactions. The organizers and presenters say that the topic is really important. That there's a lot of talk and buzz words about it, but that **there is something to it, despite that**. In fact, they say without blinking, the topics at hand are crucial for the future of industry and the country itself. The presenters mention projects about the cloud, digitalization, disruption, about data and about other conferences coming soon. The day finishes and there are drinks on the roof terrace with a view over the city. I empty my drink, and leave the data-driven revolution.

As the above vignette illustrates, tech events are presented as important and substantial, despite being filled with hype and buzz words. We introduce "*hot air*" *as a concept to denote the dynamic of hype as a performative phenomenon that is simultaneously vacuous and productive.* The concept points to how hype is vacuous when unsubstantiated, bloated and overpromising, but is simultaneously productive in generating effects. It is particularly the critique of hype, which is endemic to hype itself, that we argue creates many of these effects. The concept leans into the idiomatic sense of hot air, while also referring to the buoyancy created by hot air as in a balloon that carries us places.

Hype has been studied through fields such as the sociology of expectations (Brown and Michael, 2003), but where Brown and Michael's influential piece focuses on how

expectations *change* over time and the effects of this, we are more concerned with the immediate effects of hype and the dynamics of the performative and translative work it does. Others have worked extensively on the importance of hope for the future and anticipation, and we return to this work in the discussion.

Having outlined here what is meant by the concept of "hot air," we first describe the multiple and overlapping corporate sociotechnical imaginaries present at the various tech events and then examine three different dynamics of hype and how this "hot air" articulates these imaginaries.

Sociotechnical imaginaries of Danish tech events

In this section, we examine the overlapping sociotechnical imaginaries articulated at the events studied. We describe these as *corporate* sociotechnical imaginaries both on the basis of the literature (Beer, 2018; Olbrich and Witjes, 2016; Sadowski and Bendor, 2018) but also following the observation that, even when the events were arranged by public sector actors, it was very often by corporate actors or with reference to corporate examples that these imaginaries were articulated.

It is difficult to delineate a single sociotechnical imaginary from the empirical material. Events ostensibly dealing with one topic, such as the data revolution, invariably invoked topics of disruption, self-driving cars, and smart cities—and vice versa. This messy, multiple, and overlapping set of imageries is emblematic of the "gyre" (Zabusky, 2002) of the tech scene, in which topics, speakers, and audience are constantly crossing boundaries and recomposing the field. As the focus of this article is on the role hype plays in performing and translating sociotechnical imaginaries, we are not concerned with distinguishing these multiple imaginaries from one another. Rather, we acknowledge this multiplicity and draw on already established research into the imaginaries surrounding digital technologies and data to account for them. Thus, the imaginaries we find in the Danish tech scene are close to identical to those others have already identified, such as the value of data "as the new oil" or as a source of "disruptive innovation," and the attendant changes in temporality, epistemology, and promotion of particular digital futures (Beer, 2018; Lehtiniemi and Ruckenstein, 2019; Olbrich and Witjes, 2016; Ruppert, 2018).

Imaginaries present at these events not only exemplify imaginaries of "data" but also often conjure specific techniques of "Big Tech" such as recommendation engines, newsfeeds, or algorithms (Bucher, 2016; Williamson, 2016). Within this narrative of "technological solutionism" (Morozov, 2013), the services offered by corporate actors like Facebook, Google, Amazon, or Apple become the default for imagining solutions to local challenges. For example, when building a data marketplace for Copenhagen from 2014 to 2016, the Hitachi corporation claimed to be building the "amazon of datasets." Such imaginaries of "Big Tech" emphasize the importance of novelty, innovation for innovation's sake, and technology as a panacea (Pfotenhauer and Jasanoff, 2017) and frame social problems as a deficit of innovation (Pfotenhauer et al., 2019) pointing to the inevitability of technological "disruption." Familiar corporate sociotechnical imaginaries of smart cities with their narratives of crisis and technical solutionism (Mertia, 2017; Sadowski and Bendor, 2018) are woven into these other imaginaries.

"Hot air": dynamics of hype

In this section, we examine three instances of the dynamics of hype, showing how hype is both vacuous and productive within these tech talks. The performance of the corporate sociotechnical imaginaries at the events rely on hype, but simultaneously involve critique and disavowal of hype.

Crafting publics. An ever-present feature of these tech events was the sometimes subtle and sometimes overt addressing of a community or public.[1] The particular communities differed, depending on whether the event aimed primarily at engineers, public servants, businesses, or a mix of these. Speakers made efforts to articulate these groups as somehow select or elite. It stands out in the material how organizers created an intimate or enclosed space where important information is imparted. The audience is made to feel special. This subtly boosts the persuasive power of the dynamics of the hype described in the following sections. Narratives about the past and future are given more weight, since they are related to a particular group who is told that they need to act now and within these intimate enclosures, examples, and cases from other organizations present all-the-more cutting-edge demonstrations of how they in particular can progress.

At an event hosted by the Danish Engineers Association (IDA), the chairman underlined how "IT . . . runs the world," and that, "You are the heroes of IT." This rhetoric is to be expected at a labor union for engineers, but in conjunction with other rhetorical devices, it builds a much stronger argument for a given case. Following the chairman, the keynote, a representative from the tech evangelist organization SingularityU,[2] started his talk with a joke about the happiness of Denmark compared to the United States, based on how Danish power plugs look like a smiley face. This is a classic rhetorical ploy to make an audience laugh and build favorable sentiment. However, it crafts a public in the way it plays on the popular notion of Denmark as being the supposed happiest country in the world and joins that to a technological image, which the audience can laugh at together, establishing shared understandings and values.

The example with the power plug is innocent, but many of these rhetorical moves were made to describe publics as "elite" or using a national framing to make it about Denmark in particular. Thus publics are crafted in a particular vein, making the ground fecund for understanding a message in a certain way. At one conference, the relative Danish-ness was articulated by both the host, one of the presenters and two government ministers. The message was that what was being communicated was relevant in particular to Danish industries and companies, for these actors to safeguard the wealth, growth, and leadership position of Denmark within digitalization. Rather than think about the presentations as opportunities to advance self-interest, the audience was crafted into a public that was elite by being directly addressed by two ministers and as having a particular responsibility for Danish prosperity on a whole. This has the effect of crafting the audience as agents of change and technological progress. "Hot air" is here the productive effects of hype crafting a group into a specific public.

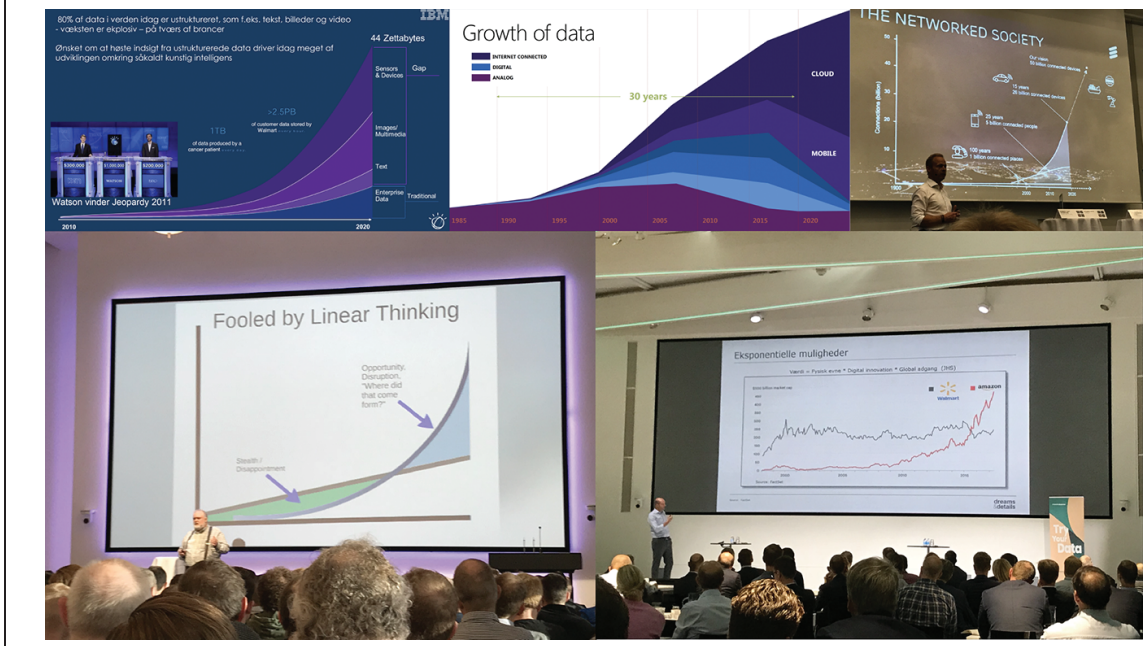

Figure 1. A collage of projections or historical trends from slide shows at tech events.

Historical narratives, future projections. A common and striking feature of many presentations at the events studied is the marshaling of historical arguments, and projections about the future on the back of these. The collage above shows five different slides from the empirical material (see Figure 1). They feature a variety of graphs and make claims about how technology has developed and is developing now. A fieldnote recounts the comments of a professor giving a keynote at an event on "Digital Trends in the Built Environment": "Exponential Innovation > disruptive development goes much faster than traditional development." This statement accompanied Figure 2 below, explaining with simple graphs and numbers how things were going faster now and creating a historical overview by detailing how fast a given "technology" reached 50 million users, stretching back to the telephone.

At the events attended, such slides and arguments are usually made at the beginning of a talk or event. They set the stage by outlining what has come before, and what is yet to come. This came across as hype, in the way that such claims were often broad, undocumented, generic, or reproductions of tropes of this type of statement, such as Ray Kurzweil's (1999, 2001) "Law of Accelerating Returns." These historical narratives create hype because they posit that the future necessarily will be better and more prosperous than the past or the present—if they are taken into account.

At one event, a slide with an image of an old Forbes magazine cover described Nokia as the mobile phone "king," implicitly showing how leading companies are quickly dethroned if we look to history. Such a slide plays on the common knowledge of how Nokia no longer is a business leader and leaves the "why" of the loss of leadership ambiguous, while strongly indicating that Nokia failed to look ahead (see Figure 3.).

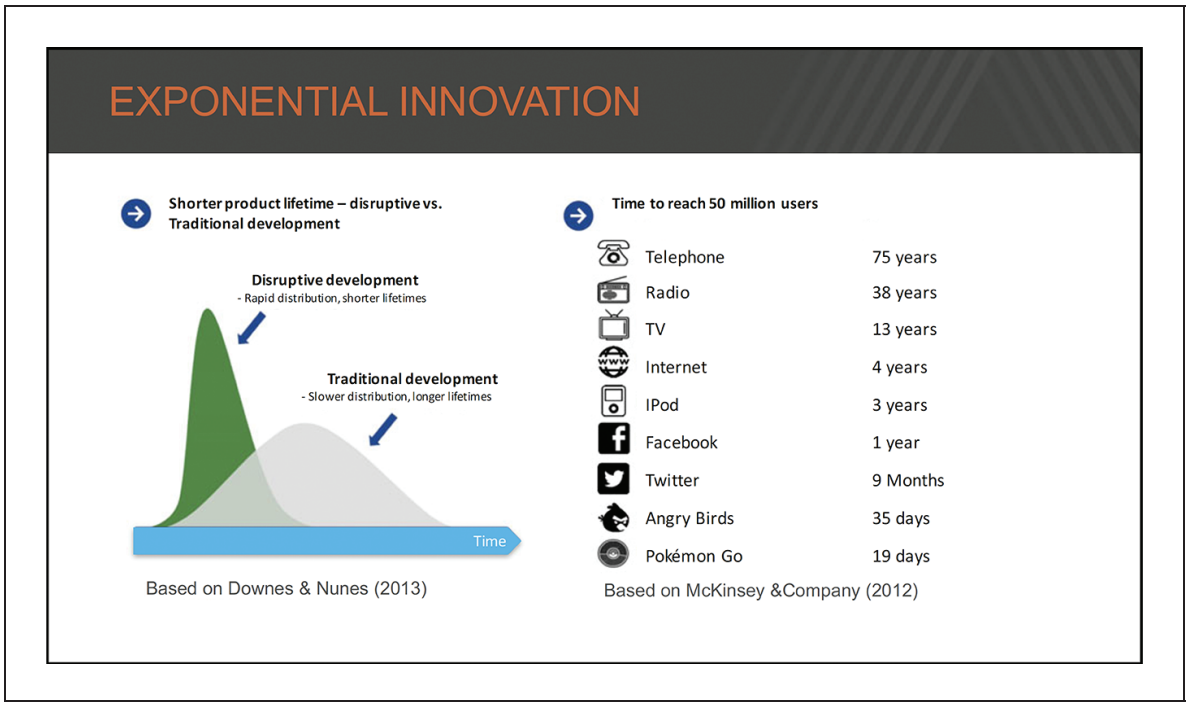

Figure 2. Exponential innovation and time to reach 50 million users.

At many other events, the term "4th Industrial Revolution" was brought up as part of a historical retelling of the three previous industrial revolutions. The 4th Industrial Revolution is a term coined by Klaus Schwab (2017) of the World Economic Forum, who suggests that technologies such as artificial intelligence (AI) will change our societies as thoroughly as the previous industrial revolutions.[3] As can be seen in the collage of Figure 1 above, many of the graphs consist of lines curving upward, showing the amount and type of data, connected units, market value, growth potential, or just abstract representations of technology, rising over time.

These histories present the viewer with historical narratives that show a uniform progression and rise. They provide the most simple and immediate description of the past, presenting these developments as self-evident history. Such histories frame the audience with naturalizing arguments that suggest that it could not have been otherwise. By stipulating a certain history, the presentations build up excitement and hype about the current moment and what is to come.

Such historization is often followed or conjoined with projections about the future. Graphs with trend-lines, claims about new technologies or changes happening to all industries make up the bulk of such projections. One presenter claimed that "in the 21st Century, if you aren't a software company, you aren't a company at all," and another speaker similarly said, "You will all be software companies very soon." Such claims impress upon the audience the need to act, and become software companies. It is difficult to dismiss such claims when they follow a graph showing that the top five publicly traded companies now all are in the tech sector. The ominous tone of the earlier quotes demonstrates how such rhetoric can almost have a threat-like quality, promising doom to whoever does not act in accordance. By

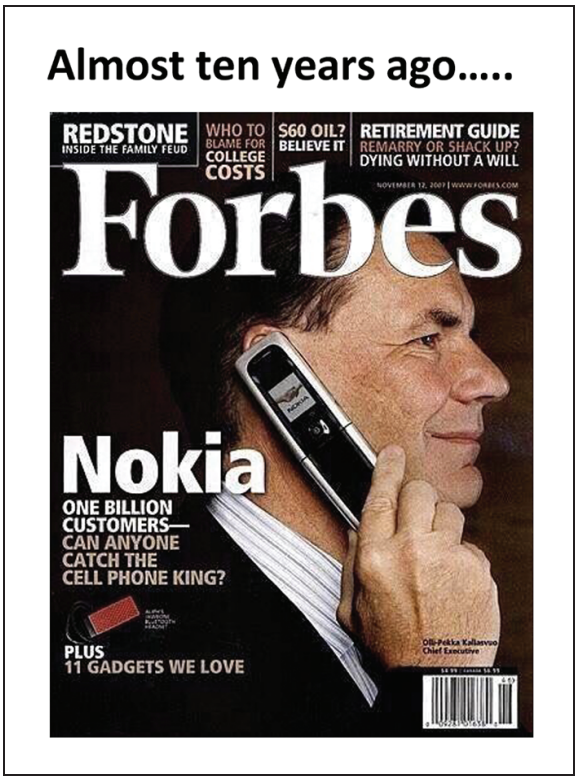

Figure 3. Slide showing an almost 10-year old cover of Forbes magazine, featuring a Nokia flip-phone and describing the company as the "Cell Phone King". The slide was used in a presentation on the way in which new technology challenge market incumbents.

placing trend-lines showing the rise of data or the potential future markets on the back of historical narratives, the projections gain weight and reality that belie their conjectural nature.

Taken together, historization and projections place the audience on the cusp of a great change. At one conference on data-driven transformations, a presenter said that changes based on digital technology were "happening around the world," and that while Denmark was doing well, it needed to get even better. This notion of "getting better" at working with data and new technologies becomes all the more pressing when sandwiched rhetorically between past trajectories and future projections. As a speaker claimed when discussing the market capture of Amazon: "This isn't a curve, this is evidence." As "evidence," it cannot be argued with.

Often these historical narratives and projections of trends are not even argued for, but presented as self-evident. When a speaker from Microsoft showed a graph of the growth of the amount of data from 1985 to 2025, he did not explain the graph, provide reasoning for the projection or any sources. What does the lack of argumentation signify? One interpretation is that the presenter's lack of explanation can be understood as an assumption that the statements are so commonsensical that there is no need to argue.

This dynamic of historization and projection constructs a simplistic history, projects an equally simple future, and positions the audience at crucial points in these trajectories, suffusing the tech events with hype for their naturalized narratives.

Authentication: examples and cases

> We sit in the semi-circle of the amphitheater-like presentation space, nestled in the middle of the campus of the university. The professor asks "How do we make money with big data?" and answers his own question with a claim: that unlocking the value of the digital is possible. He shows us models, talks mindset, and ultimately gives examples to make his point: the slide shows the image of a metal box, a rat trap, we are told, and a company logo. The company figured out that their pneumatic rat-killing devices were producing so much data, they could sell it to the city, helping them monitor sewer water levels. Or the other company that had transformed to doing filter-replacement-as-a-service. Or the other company that had . . . and so the list of examples went on.

The use of numerous examples at events is another dynamic of hype as "hot air." Presenters make claims about technology that are abstract, arguing for the importance of disruption, innovation, and the value of data. To make these claims more concrete, examples which marvel with their ingenuity, unexpected value creation, or weirdness are crucial. At a conference on "Smart Living" a representative of the Municipality of Copenhagen described how they optimized the city's street sweeping machines by using an algorithm that was originally developed to devise the most efficient route for pub-crawls. This algorithm could incorporate citizen-reported debris such as broken bottles or even less savory "leavings" of late-night carousers into a route, and then efficiently merge the route back into the unit's original path. Such an example serves multiple purposes: being both entertaining, weird and showcasing the potential improvements of specific technologies or digitalization in general.

Converse to the weird ingenuity on display in the above example, many presentations fall back on rehashing old examples. An instance of this is the well-known Target-example, wherein it made headlines that American retail store Target accidentally alerted a father to his daughter's pregnancy by sending the household gravidity-tailored offers. Target had determined this on the basis of her purchasing habits, which matched their data profile of a pregnant person. This was first covered by the New York Times in 2012 (Duhigg, 2012), but the case is from several years before that. Though old, this example is still used to demonstrate the power of big numbers.

While at first stimulating, many examples are repeated and circulate, as with Target, or lack the explanatory and revelatory power that their presenters introduce them with. The aforementioned Target-example is by now overused, and adds little new. At one talk attended during the fieldwork, a Danish government minister referenced it, but prefaced it by saying that it was an old and well-known example. In order to make a point with the example, he had to tacitly acknowledging its worn-out nature.

Examples build hype by showcasing and promising innovative new business models or technologies. They are stories that exemplify an abstract concept and make it concrete and actionable for the audience. When a senior Microsoft representative shows a video of how their Cortana Cognitive Services allow McDonalds to use speech recognition to receive orders in their drive-through restaurants, it is to sell a technology, but also sell the wonder of what can be achieved with modern technology. This is hype, in that it showcases what can be done with a technology but does so without the messiness of actual business practices and what is needed to make this technology run reliably. This

shows something that is genuinely exciting in what the technology can achieve, but which lacks context. Similarly, when a computer science professor describes the shift in the business model of the Danish windmill producer Vestas, from primarily producing and selling physical windmills to seeing a 30% increase in their "aftersales services," this is an example given to showcase how digitalization of the economy is happening and that such business transformation is possible for other companies. While this example demonstrates how a business has transformed itself so that others might emulate it, most if not all of the context and details have been removed, leaving the audience to wonder what exactly such transformation means in terms of lay-offs or reskilling and whether it even is possible in the industry they occupy.

Examples drive the narratives about digital transformation at tech events. The fact that they are often used repeatedly or come from a different sector or organizational context does not stop presenters from using them, as they are instead assembled as clichés to be surpassed or disregarded. In one talk, a senior editor from the magazine *The Economist* described the coming impacts of AI, and began by asking the audience what three examples all talks on AI must include. It turned out that mentioning the then-recent victory of AI AlphaGo against the Go world champion, the AI Skynet from the Terminator movies and the psychedelic images composed by the AI software DeepDream were "clichés." In distinction to this, the presenter insisted that he would talk about "ideas." Such a distinction and disavowal show that hype is acknowledged by actors themselves, and that they attempt to distance themselves from it. The speaker in question went on to use multiple examples, two of which we had encountered earlier at a different event and one which was a reference to George Orwell's "1984," to preface a discussion of authoritarian surveillance. This is not to make aesthetic or moral judgments about the talk in question, but to emphasize how references to clichés or disavowals of "buzz words" are done selectively, in order to acknowledge the hype yet still proceed to do it.

Examples are thus central to presentations on tech, in that they showcase abstract principles in a concrete manner, making it possible for the audience to become excited, interested and see an application for their own situation. They create hype for a given technology, business model, or overall trend by pointing to the ways in which it is promising, without demonstrating the difficulties it might present. The use of examples can be repetitive as certain examples are reused and become clichés. Reference to this cliched nature shows how hype is acknowledged and places emphasis on their iconic status. At the same time, we distinguish these examples from cases which are used to ground or "anchor" grand narratives of technological progress. These cases, which we describe next, provide deep dives into the difficulties of real-world digital transformation opening up a space for participation in the imaginaries.

Cases as anchors

A massively broad screen occupies the innovation lab. The woman takes the stage, joining the man in the suit. She explains how their company, an unassuming electricity and water supplier, have taken the journey of data-driven digitalization. She's not a CEO, CTO or jumped-up consultant. Her accent and choice of words are down to earth. She jovially says,

> almost without second thought, "We know when people are home, and whether the husband is cheating . . . ," and people laugh at the joke. She describes their journey and references the course they took: "Much of what we took home with us from [the course] was to go back and get our own processes and data under control." There is a banality to her tale, emphasizing organizational communication, leadership visions, trial and error. She points out all the ways in which they are lacking as an organisation. But also all the ways that they have succeeded—how they have, in some senses, made it.

In order to make the sociotechnical imaginaries authentic, the vacuous hype is accompanied by a variation of the example which we call the "case." Rather than the superficial and circulatory qualities of the example described earlier, a "case" is an example that is instantiated and made personal. An individual from a company or research project will be given time and will explain how they have, in one way or another, "made it" or provide a deep dive into a particular technology. What having "made it" means will vary. The point is that a presenter goes into depth with sharing how they have successfully achieved some sort of ideal. In the vignette above, this was done by describing how a Danish utilities supplier, driven by leadership decisions and upcoming EU-law on remote-readings of electricity consumption, took a masterclass course, reviewed their work processes and through trial and error developed new aspects of their business model based on data of usage patterns. This deep dive into the case had time dedicated to explaining the context of the company, the steps they had taken, and for queries from the audience. This meant that the presentation came across as authentic and useful. It was something real and not just a small element in a slick presentation.

A case grounds the hype of examples, making it productive. Attendees can hear how it is not only Google, Facebook, and Amazon that can benefit from the digital economy. Instead, a small Danish company has been successful in harnessing the power of data to build a new business model, or a public institution has successfully disrupted its procurement procedures by using a new type of public-private agreement. However, a common refrain is that while they have achieved some success, there is more work to be done and many more processes to digitalize or change. Authenticity is created not only by the personal presentation, but also by the admission of lack, the acknowledgment that there is a long way to go. At another masterclass course, a consultant presented on the development of a new national model for determining the price of real estate. This was a highly politically charged topic that had often been debated in the media, and so the case both afforded a sense of privilege to the audience, at being given a peak and also as something tangible that dealt with a real problem. The consultant discussed the conceptual and technical difficulties of the assignment, addressing data quality, privacy issues, how algorithms needed to weigh multiple variables and the difficulties of managing the processes and workflows of such a large project. This case showcased the many complicated aspects of working with big amounts of data and also showcased what technology such as algorithms could do, grounding the hype of other presentations of the day into a more realistic assessment that such projects are neither easy nor guaranteed successes.

There is a tension however, between examples, cases and hype-laden presentations. Whether something is an example or functions as a case is an open question, and there are instances where what was a genuine case in one context becomes the kind of hype-

Figure 4. Slide from the presentation "Case Local Supply: A common language creates the framework for data-driven digitalisation." The slide reads, "The Future. Utilize Machine Learning: thermographic fly-over by drones to detect possible leakages in the heating network. Robotically controlled TV-inspections of the sewer network. Realtime data on leakages and breakages on the water network." Translations by the authors.

laden rhetoric that it was a reprieve from. At a later conference, the woman in the vignette above was present once more to tell the story of her company again. However this was a bigger audience, and some time had passed. While many beats were the same, one of the final slides was entitled "the future" and featured an image (Figure 4 above) of a group of children, standing with yellow safety vests at an industrial site. The text of the slide juxtaposes this very literal representation of the future, with the company's future plans for machine learning. They intend to do "thermographic flyovers with drones to detect possible leaks in the heat-net" and use "robotically controlled visual inspections of the sewer network." The soundness of these ideas for the business is hard to determine, however it appears in the presentation as an afterthought tacked on to say something that sounds futuristic and exciting. While it was still a presentation of a case, it was less authentic and rather than interesting, it appeared as yet another "smart" idea.

Where hype is built and constitutes the many examples—of the potential of data, the digital, smartness, disruption, and more—cases provide an anchor for the hope that such transformations are possible for the attendees. Authentication is a dynamic of hype as "hot air" concerned with the performative and translative work of hype. As we have seen, presentations are filled with hyped up examples, but also of cases which act as a counterpoint to the hype. The corporate sociotechnical imaginaries are performed both through the various examples, and through the cases which allow for an authentic and practical understanding of the imaginaries. The dynamic and contrast between examples and cases is an instance of hype as "hot air."

Discussion: translating futures through "hot air"

Much has been written both in the popular press (Bartlett, 2018; Bridle, 2018; Foer, 2017; Taplin, 2018; Zuboff, 2016) and in academic publications (Ball and Snider, 2013; Flyverbom et al., 2019; Poon, 2016; Srnicek, 2017) about the domination of data and digital technologies by so-called "Big Tech." Attention has been directed at explicating the politics of the new technologies they employ (Ruppert et al., 2017), providing the possibility of a new type of governance (Dunleavy et al., 2006; Fishenden and Thompson, 2013) or as representing an entirely new epistemological phenomenon (Anderson, 2008; boyd and Crawford, 2012; Mayer-Schönberger and Cukier, 2013). In this article, we have focused instead on the corporate sociotechnical imaginaries tying together Big Tech, data and digital technologies in the context of Danish society, and the role that hype as "hot air" plays in performing these imaginaries. In the following, we discuss how "hot air" may play a role in the translation of global imaginaries into local contexts, such as the Danish one.

The tech talks we have studied are sites that offer a pedagogy of digitalization (Irani, 2015) through the dynamic of "hot air." Many others have pointed to how technoscientific futures position subjects temporally, through regimes of anticipation, hope, and speculation (Adams et al., 2009; Halpern, 2015; Mackenzie, 2013; Miyazaki, 2006). As Adams et al. describe, "anticipation is the palpable effect of the speculative future on the present" and one of the dimensions of anticipation is how it creates a "moral imperative" to orient toward a particular future, demanding "action in the face of ongoing contingency and ambiguity." Steinhardt and Jackson (2015) show how what they call "anticipation work" is involved in building and maintaining big data infrastructures. Local actors tack back and forth between local concerns and the broader sociotechnical imaginaries of a digital future. While these talks often promise what the audience knows cannot be delivered, they still provide a space in which people draw together to coordinate and calibrate local concerns to these larger narratives of technological advancement. "Anticipation work traces [this] real-time work and adjustments that underwrite any master narrative about the future" (Steinhardt and Jackson, 2015).

In the dynamic of "hot air," hype has implications for how it positions the subject temporally in relation to the past as spectacle, futures that disappoint, and an uncertain present that technological anticipation carries us through. The events fail, but they fail in a way that is sustained through repetition forming part of what Winthereik calls the "knowledge economy's zones of discomfort" (Winthereik, 2011) in which subjects are installed into a "ritualistic present" (citing Miyazaki) through the "temporal disjuncture between creating and completing." In the specific encounters of these tech talks, attendees "face in a sustained way" the promises and failures of digital solutions, while still opening up a sense of rapport between the examples and cases laid before them and the local practices they hope to bring into alignment with the broader sociotechnical imaginary (Winthereik, 2011).

The dynamics of hype as "hot air" affords actors the opportunity do this work of alignment, translating (Callon, 1984) the abstract imaginaries into local practice. Rather than accept them wholesale, the vacuous aspects of the hype allow for subjects to criticize or disavow parts of the imaginaries, while accepting others. This can be seen when

hype normalizes and internalizes disavowal, with claims that it is not all buzz words and hype. Disavowal becomes part of the "hot air" itself, and subjects thus learn to deflate or ignore critique of the imaginaries—either through the act of disavowal itself, or by countering that there is a greater truth to it despite the hype. If "hot air" was performative in this way, these tech events would be sites for not just the performance of the corporate sociotechnical imaginaries, but also their translation. Like the IT reports discussed by Jensen and Lauritsen (2005), these tech talks "travel" into different practices, establishing links to local contexts along the way. And as Jensen and Lauritsen also point out, critique is part of how such grand visions are specified, transformed, and made material. The visions "can only become more material, concrete, local, and real by becoming more mundane and compromised in contrast to 'grand ideas'" (Jensen and Lauritsen, 2005: 364).

The "hot air" we have described is in this sense related to other kinds of ongoing technoscientific anticipation work, through which subjects are challenged with aligning global corporate sociotechnical imaginaries with local practical realities. Tech events, we believe, are therefore important sites through which sociotechnical imaginaries are not only performed but also translated. "Hot air" denotes one of the central dynamics of this translation process, namely the recuperation of critique and the "making mundane and compromised" of these imaginaries.

Conclusion

In this article, we have described how Danish tech scene events feature the performance of multiple and overlapping corporate sociotechnical imaginaries. This performance, we showed, relies on hype as "hot air"—the dynamics of hype and its critique, and how hype can be simultaneously vacuous and productive.

We follow Jasanoff's suggestion that the concept of sociotechnical imaginaries needs to be "refined and extended in order to justify the myriad ways in which scientific and technological visions enter into the assemblages of materiality, meaning and morality that constitute robust forms of social life" (Jasanoff and Kim, 2015). We suggest just such an extension by focusing on how particularly corporate sociotechnical imaginaries are performed, and discuss how this allows for translation of these imaginaries into wider publics and socio-material configurations.

By using "hot air" as a concept, we draw attention to the way in which corporate sociotechnical imaginaries are performed, the dynamics of hype in this performance and the translations it enables, thus illustrating how such rhetoric and atmosphere is not mere bullshit (Frankfurt, 2009). Rather, it works in complex ways, crafting publics, reinforcing commonsense notions of history and trends, suspending disbelief, using disavowal of buzz words to create rhetorical ethos, and building authenticity by gathering examples and taking deep dives into cases. "Hot air" describes the dynamics that exists as these different articulations of hype play out together, lifting the audience out and up above the everyday and positioning them in relation to new technologies and attendant corporate sociotechnical imaginaries.

The events analyzed featured many overlapping sociotechnical imaginaries, some already described in research, some yet to be fully studied: they invoke notions of disruption, describe data as a resource of great importance, point to the techniques of

big tech, invoke smart cities or just generally trumpet novelty as being important. We suggest that these events should be considered as staging grounds for such imaginaries, where they are articulated, performed, and translated. If we were to simply dismiss the rhetoric of such events as only empty hype, we would lose an important part of the explanation for why these corporate sociotechnical imaginaries are as pervasive as they are.

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ORCID iD

Michael Hockenhull https://orcid.org/0000-0002-2670-2102

Notes

1. We kindly thank our reviewers for suggesting the classic work of Walter Lippmann (2017), *The Phantom Public* as an addition to this section. It was unfortunately not possible to engage with the work in this article, but we direct any reader interested in the making of the "public" or "publics" to it.
2. Also known as Singularity University.
3. See Schiølin (2019) for recent scholarship on the sociotechnical imaginaries of the 4th Industrial Revolution, which unfortunately was published too late to be included in this article's argument.

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Author biographies

Michael Hockenhull is a PhD fellow at the IT University in Copenhagen, a member of the Technologies in Practice research group, and was part of starting the ETHOS Lab. His work focuses on the intersections of data and digital technologies with imagination and speculation.

Marisa Leavitt Cohn is an associate professor and a founding Co-Director of the ETHOS Lab at the IT University of Copenhagen where she is a member of the Technologies in Practice research group. Her research combines anthropological and design-oriented approaches to the study of human computer interaction with a focus on temporalities of technological work in long-lived infrastructures and legacy system maintenance.

Research Paper 2 – Speculative Data Work & Dashboards: Designing Alternative Data Visions

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Speculative Data Work & Dashboards

Designing Alternative Data Visions

First A. Author
First Department Name, First Institution/University Name, City, State, Country, email@email.com

Second B. Author
Second Department Name, Second Institution/University Name, City, State, Country, email@email.com

ABSTRACT

This paper studies data work in an organizational context, and suggests *speculative data work* as a useful concept and the *speculative dashboard* as a design artefact, to better understand and support cooperative work. Drawing on fieldwork in a Danish public sector organisation, the paper identifies and conceptualizes the speculative data work performed around processes of digitalization and the push to become data-driven. The speculative dashboard is proposed as a potential design artefact, using practices from speculative design and research to facilitate speculation about data–its sources, visualizations, practices and infrastructures. It does so by hacking the 'genre' of the business intelligence data dashboard, and using it as a framework for the juxtaposition of different kinds of data, facilitating and encouraging speculation on alternative visions for data types and use. The paper contributes an empirical study of organizational use of and attitudes towards data, informing a novel design method and potential artefact for co-speculating on alternative visions of and for organizational data.

CCS CONCEPTS

• **Human-centered computing~HCI theory, concepts and models** • Human-centered computing~Empirical studies in HCI • Applied computing~E-government • Social and professional topics~Socio-technical systems

KEYWORDS

Speculative Design, Business Intelligence, Data Visualization, Ethnography, Data work

1 INTRODUCTION

"The only limits imposed are those of the imagination," was how a presenter described the Microsoft software "Power BI", at a workshop in the Municipality of Copenhagen, Denmark. Such imaginaries [75], mythologies [91] and speculation on the power of big data and analytics are rife within modern organizations. Dashboards are one ubiquitous aspect and paradigmatic example of such dreams; a board of instruments which promises the translation of data warehouses and lakes into an accessible overview of visually appealing graphical representations of the organization – its current state and goals – at a glance.

This paper provides two contributions to CSCW. It first provides an empirical analysis of a particular kind of data work we term *speculative data work* and examines how dashboards arise as a site of such work within a public sector organization. It then describes the design proposal of a *speculative dashboard* based on the empirical analysis and early prototyping work, aimed to account for, interrogate and support the aspects of anticipation, imagination and speculation present in organizational data work.

Based on fieldwork in the case organization – a public sector organization in a Danish municipality – we analyze a number of tensions and stresses caused by the centralized push to become a more digital and "data-driven" organization. Our analysis finds that data work is bound up with speculative activity, in that it involves both visionary speculation on the possibilities of new technology and more pessimistic speculation associated with cutbacks and changing work descriptions. We suggest the concept of speculative data work

to denote how speculation shapes the validity, affect and valences of data work before identifying how this work is connected to existing data infrastructures, especially the dashboard.

Informed by these speculative dimensions of data work and the role of dashboards in the organization, we draw on research on speculation from HCI, CSCW and STS to propose the speculative dashboard, a technique and potential design artefact for provoking different and more cooperative speculations about alternative visions of data. We describe early prototype work on the speculative dashboard developed in a pedagogical setting with organizational professionals, discuss how speculative design might inform and facilitate such alternative data visions inside of organizations and consider the broader implications for design within what we call the *economy of speculation* prevailing in current techno-capitalism.

Our contributions attempt to explore the following questions: How should we understand the role played by anticipation, imagination and speculation in data work? How might (speculative) design projects help listen to the concerns of public sector employees in the midst of digital transformation? How might existing infrastructures such as the business intelligence software Power BI be repurposed to support different kinds of speculative data work? What would an infrastructure/interface look like that would facilitate open "co-speculation" on what it means for a public sector organisation to be data-driven?

The paper proceeds by first reviewing the literature on data dashboards and infrastructures and how these relate to CSCW concerns. It then provides a review of literatures on speculation and speculative design from CSCW, HCI and STS. Having described the relevant literatures, the paper then describes the empirical case and the methods used to study it. The paper then conceptualizes speculative data work, sets out the analysis of the empirical material and then details and reflects on the speculative dashboard. Finally, the paper ends with a discussion of the relations between data infrastructures and speculation and a conclusion describing potential future directions for this research.

2 Dashboards, Organizational Data and Cooperative Work

Power BI, along with similar software such as Tableau, is a business intelligence (BI) software which is designed to be a comprehensive tool for the warehousing, cleaning, analysis, visualization and presentation of quantitative data [94]. BI is a tool bound up with the current mythology of big data, promoting the notion that quantitative and big data will provide organizations with objective and valuable insights that cannot be achieved through qualitative or interpretive work [91]. In practical use, BI software is typically a desktop or browser-run program, which enables the user to access data files from single files or from a data warehouse (if connected), and which can generate data visualizations and analysis either through drag-and-drop experimentation or through formula. Such data visualizations are typically a standard variety, such as pie charts, bar charts, scatterplots and geographical mappings of data. They can be combined within the business intelligence software to form reports, presentations, or, make up what is called "dashboards".

Dashboards are an increasingly ubiquitous form of data visualization and interface [27], used in private companies and also within public sector organisations in both western countries [8] and in South Asia [59,84]. Dashboard displays have a long history within cybernetic projects of information visualization and control [34], and remain a central aspect of modern smart city projects [57] and so-called "urban intelligence" management [54,55]. The term 'dashboard' supposedly originates from the car dashboard, understood as a board of instruments showing the key information needed to operate a car.

Dashboards are defined in the influential work on the topic by Stephen Few as: "A dashboard is a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance" [27:26]. As the definition suggests, dashboards are first and foremost a visual medium and so are related to the general rise and developments of data visualization.

Data visualization by some assessments is a primordial human occupation [30], although it is arguably the tight coupling of information with control and visuality as developed in cybernetics that has brought data visualization to its current ubiquity [34]. Data visualization has become commonplace in popular culture through the work of figures such as David McCandless [58], and within visual design and statistics Edward Tufte [90] in particular has defined the principles by which "good" and "bad" visualizations are judged. While the scope of describing the trajectory and norms of data visualization is far beyond the scope of this paper, these figures represent the overall tendencies towards data or information visualization as aesthetically pleasing, minimalist and tied to statistical displays of data.

The kind of dashboards assessed in this paper particularly represent the merging of software tools from business information modelling [51,73] with these trends within data visualization. Dashboards are thus increasingly presented as a solution for organizations, both corporate and public [8], faced with either rising amounts of data or with the narrative that becoming more data-driven is the only way to remain competitive. They offer to transform data into objective, truthful and accessible graphs and indexes [9]. At the same time, the development of dashboards themselves demand more data, in order to increase the potential inputs. That is, in wanting to become data-driven like other organizations that have dashboards, the dashboard enters into organizational thinking before there is data. In this way the dashboard is an artifact both supporting cooperative work with data as well as one that prefigures and articulates the need for certain kinds of data, as we will discuss.

The ability of dashboards to organize and make visible an overview of data and metrics position them as artifacts sitting at a unique crossroads of themes relevant to CSCW. A dashboard can be said to both help coordinate work [17,80], improve awareness [32], and to a lesser extent, facilitate knowledge management [1]. Attention to dashboards within CSCW has fallen along these lines, seeing researchers study and develop dashboards to support team activity awareness [11,44,89], facilitate idea management processes [5], explore and improve shared cognition and performance in teams [2,33] and coordinate work in design studios [63]. The focus within CSCW research has been to understand how dashboards support particular goals, such as productivity or awareness in programming, or explore more diverse topics, such as "workplace learning processes" [74] or college student mental health [97]. This focus has thus been somewhat instrumental–what are missing are more holistic studies of what the introduction of dashboards might mean for other work practices, social cohesion and employee wellbeing.

Many others in CSCW and HCI, while not examining the "data dashboard" genre specifically, have considered the role of data, its representation in organizations, and how this is changing as data-driven approaches have come into vogue [15,50]. This literature covers a wide range of organizations and technologies, from nonprofits [93], architecture firms [60], and healthcare [69] to civic data infrastructures [12,21] and municipal digital platforms [52]. In particular recent work by Bopp et al. explores how design aspects of information infrastructures such as the requirements of "primary keys" can be "coercive" for work practices, with significant effects for the work carried out in organizations [14]. Peer and DiSalvo's work on literacy and design with regards to data dashboards and infrastructures is also particularly relevant to the present paper, as it also seeks to interrogate how design can intervene into these topics [66,67]. These contributions are inspirations for the present work, with Bopp et al. pointing to the need to intervene through design in the make-up of data infrastructures themselves and with Peer and DiSalvo exploring how practices around dashboards and infrastructures such as workshops can help change practices of use. With regards to the specific Danish context, research has examined a diverse range of topics, ranging from the IT workflows and knowledge management practices of frontline welfare workers [16,62] to data work in healthcare settings [13]. All of this work considers the role of "data infrastructures as complex sociotechnical entities" [70] in reconfiguring classifications and categories, introducing new types of job titles or strategies, and importing conflicting logics into organizational work. We wish to contribute to this research by investigating BI dashboards as similarly "complex sociotechnical entities", and furthermore suggest that the design and effects

of IT systems such as dashboards are heavily dependent not just on their technical specifications, but also on the kind of imaginaries and speculations they are involved in.

CSCW has a strong commitment to the empirical study of work, and the design of systems based on close observation of actual, situated practices and the enactment of technologies-in-practice [65,79,87]. We argue that with the increasing pivot to data-driven work within organizations, empirical attention should be given not just to work practices, but also to the various rife practices of anticipation, imagination and speculation which data work both occasions and is often grounded in. Such speculative data work is an important but underexamined CSCW concern, as imaginaries of and speculation in novel yet unproven technologies, systems and organizational forms increasingly plays a role in managerial decisions and workplace changes [10,48,56,75]. We aim to demonstrate how speculative methods might aid in understanding, intervening in and designing for organizational work practices in such contexts. To do so we engage critically with dashboards as a genre and artifact for supporting cooperative work. The following section draws out and synthesizes feminist and critical strands within STS, CSCW and HCI dealing with speculation in a variety of ways, in order to explore how dashboards can be designed in a more pluralist and participatory manner [7] and thus better support cooperative work.

3 Speculation in Research & Design

Speculative design is a form of critical design [53] which refers to a type of design activity not specifically aimed at producing objects for the marketplace or according to criteria of efficiency or optimisation, but instead seek to create dialogue about the role of technology or more broadly, 'open up all sorts of possibilities that can be discussed, debated, and used to collectively define a preferable future for a given group of people" [23]. Dunne and Raby engage broadly with this notion of the 'speculative' in relation to both design objects, fictions and installations and focus on the notion of speculative design as a technique to opening up collective deliberation about 'preferable futures'. James Auger [3], on the other hand, differentiates speculative design from other similar design practices such as design fiction, design probes or discourse design by focusing specifically on design intended to engage popular discourse about technological trends and developments. Auger's approach is thus to encourage precisely speculation by drawing attention to the future possibilities or the paths not taken by existing technologies. Pierce and DiSalvo use speculative design to designate a process of design wherein they speculate on and explore potential design ideas on the basis of a wide range of tactics, theories and concepts in an attempt to address anxieties about networked technologies [68]. Desjardins has suggested focusing not on particular artefacts, but instead looks to "co-speculation" as a way of not just producing a different artefact but also to transmit knowledge "between researchers and the field" [20]. While speculative design methods have been applied broadly to design processes, few have specifically focused on the role that speculative methods might play in emerging forms of data work. Elsden et al. use an approach of "speculative enactment" to imagine what "datagraphy" might be and add to a wedding service, offering a useful example by speculating on how data from a wedding might be turned into meaningful visualizations [24].

While both Auger and Dunne and Raby position speculative design as different from commercially oriented design, and others have questioned to which extent speculative and critical design in fact is critical [64], Wong and Khovanskaya [96] point out that the practices employed by speculative design projects actually align with and are present within the history of commercial and industrial design research within HCI. They mention the example of Xerox PARC researchers, who drew on practices similar to those of speculative design, within the context of their commercial research. For Wong and Khovanskaya, this suggests that the criticality of speculative design has less to do with the specific methods employed, and more with the space they open for reflexivity and normative orientations amongst researchers. They encourage researchers to be strategic in using the ambiguity in speculative design projects as a means to not just critique, but to present critical projects as actual workable alternatives.

Speculative research [95] is a broad interdisciplinary project which also recognizes the ties between the speculative and the commercial and industrial. It ranges wider yet, pointing out how speculation is particularly associated with "negative" phenomenon such as financial speculation, and related attempts to predict and control the future through techniques of a probabilistic or statistical character. Orit Halpern has demonstrated exactly this issue, showing how contemporary projects of global resource extraction and instrumentation [35] have roots running deep into cybernetic ideas of information, control and a certain aesthetics of vision [34], all of which not only involve but rely on speculation both for prediction and profit. Thus for Halpern, "change itself is a medium for speculation" [36] and a necessary companion of the many transformations society is subject to. Wilkie et al. however wish to reclaim speculation from this connotation, or at least propose that it not be the exclusive provenance of the negative, and suggest that researchers must risk more speculative kinds of research, and thus perhaps create situations wherein those practitioners they research may themselves be interpellated by the lure of alternative, speculative futures. Part of this notion of speculative research is an explicit shift away from an understanding of the future and time as determined mechanistically, towards a focus on the kind of changes that lie outside of this conception, overturn expectations, and represent something truly new.

Speculation is also a central concept for Donna Haraway, who provides perhaps one of the best examples of research which risks and creates much through her engagements with the speculative. In *SF – Speculative Fabulations and String Figures* Haraway generatively speculates on the string figure, science fiction and engages in what she calls speculative fabulation, using string figures and mathematical equations to discuss practices of worlding, "opening up what is yet-to-come in protean times' past, present and futures" [41]. Haraway speculates by drawing up figures such as the cyborg [37], monsters [38] and companion species [39,40] and thinking through and with them, staying with the trouble that this may bring because trouble is not something that can be warded against, but must be learned to live with in the present rather than probabilistically predicted away through the future [42].

A strand of STS research also related to the theme of speculation is that of sociotechnical imaginaries, developed by Sheila Jasanoff and Sang-Hyun Kim [45,46]. Developing classic research on the role of the imagination in constituting the notion of society and the nation-state [18,88], Jasanoff and Kim have drawn attention to how sociotechnical phenomena such as nuclear energy also can be understood as constituting particular imaginaries. Their work has inspired studies of a wide range of topics, from GMOs [82] to smart cities [76]. Sociotechnical imaginaries are defined as "collectively held, institutionally stabilized and publicly performed visions of desirable futures" [46:4], which foregrounds a conception of imaginaries as stable, public and collective. Speculation can be both public and collective but is rarely stable. We draw on Jasanoff and Kim's work in the following to suggest that speculative data work as we define it, may (re-)produce certain sociotechnical imaginaries.

Within CSCW, there is relatively little work on speculation or speculative design. Steinhardt and Jackson [86], however, have advanced the notion of 'anticipation work' to denote the different kinds of work done by actors in relation to the future. They highlight the importance of paying attention to this type of speculation about the future, noting that, "Anticipation work makes visible the actors within our empirical cases as actively engaged in practices for managing the size of the project, both in the number of human and nonhuman resources as well as in their long term temporal scales." [86:450]. Vertesi and Dourish [92] highlight how understanding many facets of organizational data are important, if one wishes to design systems that effectively support cooperative work. By advancing the framework of a "data economy", they underline the importance of paying attention to how data is produced, as well as how it is circulated or used. We extend this argument, by looking not just at the systems of production and circulation which are actively in play, but how such systems are the result of an interplay of imagination, anticipation and speculation with the realities of organization, work practices and resources. Concretely this means attending to the speculative work which takes place before the establishment of new data infrastructures, systems or practices. This sort of speculation, as we will show, happens in relation to the realities which actors are faced with such as already

existing systems, resource constraints, historical precedents or more. We argue that this speculative data work prefigures data, shaping data in myriad ways such as what is valid data, the meaning of data or the kind of affect it is associated with.

In this paper we build on and combine the previous work on dashboards, speculative design and various kinds of speculation. We follow Vertesi and Dourish and pay attention to the data economy of production, consumption and circulation of data as it relates to dashboards and the data-driven organization, and also highlight the various kinds of anticipation work taking place within our case organization, per Steinhardt and Jackson. We thereby highlight how data work is also speculative data work. Rather than simply critique this tendency, we build on the above insights into speculation and speculative design to suggest how such work may be productively met and shaped. The speculative dashboard emerges as one such productive engagement.

The moniker 'speculative' here refers to the above wide range of related theoretical commitments: Speculation in this sense means simultaneously following Elsden et al. in seeking designs which make data meaningful for their users, Desjardins in encouraging "co-speculation," and per Halpern, Wilkie and Haraway trading on and exploring the ambiguity of meanings associated with the speculative – its economies and both negative and positive connotations. We recognize that invoking speculation in such a broad sense risks imprecision. However, we believe it is necessary to run the risk and invoke a certain sense of ambiguity, as both Wilkie et al. and Wong and Khovanskaya argue, if we are to succeed in interpellating others by the lure of alternative, speculative futures. The speculative dashboard therefore refers to a design process and potential design artefact which can support cooperative work through multiple meanings of speculation – by engaging with speculative data work, making it meaningful, co-speculation and creating openings for alternatives.

4 Case & Methods

The following section will describe the case being studied and outline the methodological approach to data collection and analysis underlying the present paper.

4.1 Case

The present paper is primarily based on a workplace ethnography of a particular project within a department of a Danish Municipality, the Culture, Arts and Recreational Department (CARD)[1], but also draws on wider ethnographic work done in the dynamic "gyre" [98] of the Danish tech and public sectors (see Author 1, forthcoming). The purpose of this wider project is to explore the relations between data as a socio-material phenomenon, these sectors of Danish society and various speculative practices and imaginaries.

CARD is the organization responsible for citizen service centers and municipally run cultural offerings, including sports facilities and cultural institutions such as concert venues and libraries, and is organized into several local units and a central unit comprised of management, a secretariat and a number of offices (HR, Strategy, Finance). It is politically led by an elected executive official and an elected board. See Figure 1 below for details of the organization. The fieldwork centered on a project within CARD named "Organizational Innovation" (OI), the goal of which was two-fold. On the one-hand it was to explore what the profile and tasks of the "employee of the future" might be, and on the other hand it was to assist with digitalizing and making CARD more data-driven. The present paper focuses on the aspects of the project associated with the second goal, whilst future publications will analyze the material with regards to the first.

[1] Name of the Department, units and projects are pseudonyms.

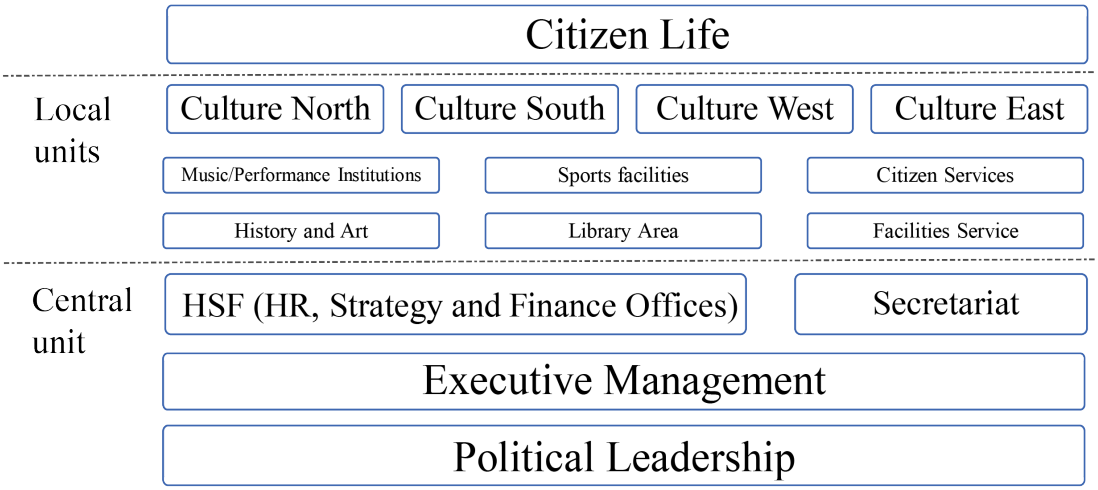

Fig. 1. An organizational chart of the Culture, Arts and Recreational Department. Fieldwork took place primarily within the offices of the central unit and administrative branches of the four main local units: Culture North, South, West and East.

The OI project consisted of creating up to 45 wage-subsidized positions in time-limited projects across the CARD organization and hiring graduates with humanities degrees to fill them. The motivation for the project was the relatively high unemployment rates of this kind of graduate, coupled with a supposition that their "humanistic competencies" could benefit the "work with digital and data-driven organisational development and ethics"[2]. These hires were initially called "digital humanists" by those managing the project.

Within the Danish public sector, organizations are generally required to host a number of wage-subsidy positions to contribute to upskilling unemployed persons and giving them a "foot in the door". These positions may not, however, entail doing labor that would otherwise need doing. This provision is meant to ensure that wage-subsidy positions do not become "free labor" which puts regular full-time jobs at risk. In order to create these wage-subsidized positions, numerous sub-projects within and across the various local units of CARD were therefore developed. The sub-project entitled the "Data Project" (DP) was chosen for in-depth study. The DP consisted of a cross-organizational mapping of existing data sources and practices in the different local cultural units, in order to improve these practices and support other ongoing projects to make the organization more data-driven. Concretely this meant that the five employees were deployed across the units of CARD, with one based in the central unit and the remaining four distributed across Culture North, Culture South, Culture West and Culture East. Organizationally, the DP was coordinated by a project manager based in the strategy office, but the project was devised as a collaboration between the finance office and the four local units. It was thus a cross-organizational project.

During the four-month period of the DP, its project members developed an interview guide, conducted a series of interviews with CARD employees of the local and central units, analyzed their findings and created a report which was presented to key figures in the relevant units at the end of the project. Their mapping of data focused on its types, sources, practices and attitudes towards data, but also covered obstacles and organizational issues.

[2] Source: Project application. Authors' own translation.

The OI project was but one of many projects in CARD focused on digitalization, each with separate emphasis om topics such as "digital leaderships" etc. The next section of the paper will analyze the intersection of these projects in greater detail.

The CARD organization, the OI project and Data Project sub-project were chosen to be a case study due to the combination of it being a public sector organization, having a focus on the use of data and the speculative and unusual nature[3] of the OI project. These features were important for the wider research agenda which this paper is a product of, for allowing for an empirical study of how speculative imaginaries of the future are enacted in actual practice within a Danish public sector organization. Additionally, and in line with the notion of a speculative ethnography (Author 1, forthcoming), the case offered the possibility of studying how such practices are co-produced with research and the expertise it is taken to represent.

4.2 Methods

The paper is based on a workplace ethnography of CARD. This ethnography took place over 18 months and entailed a written agreement which granted access to CARD's physical premises, access to the intranet, a (moving) desk and an institutional e-mail account. The ethnography mainly took place in the strategy office, but also involved visits to the local units where the DP took place. The fieldwork consisted of participant observation in meetings [77,81], workshops, daily lunches and social events, and material was gathered via jots and fieldnotes [26], casual discussions, formal interviews and collection of documents.

Access to CARD and the DP were negotiated through an informant working in the strategic unit of CARD, who would go on to be hired as project manager of the OI project. It was given in part out of goodwill as CARD is a public organization, and in part in exchange for 1st author hosting a two-day workshop on the topic of data, for the hires in the Data Project. This workshop was carried out during the fieldwork. The fieldwork consisted in following the development of the "Organizational Innovation" from its conception, to actually hiring employees and then following those associated with the "Data Project" and interviewing these employees about their work with mapping the various data sources and practices already existent in the organisation. The ethnographer (first author) was met with a mixture of curiosity, confusion, benign neglect or interest by informants. They understood the researcher's role as a combination of studying the OI project for purposes of publishable research (as part of dissertation work), as being an expert or resource with regards to digitalization (due to affiliation with a technical university) or were unsure of what the role was. Which part of this understanding was highlighted depended on the informants' role and position within CARD. Employees working in the central unit were more likely to view the researcher as a curious and interesting actor who could be enrolled into meetings on their projects and be solicited for expertise on what was trending in research of on digitalization. Members of the Data Project initially regarded the ethnographer as an expert due to the presentation conducted as part of the access agreement but came to see them as an independent researcher and confidant who could act as a release valve for articulating frustrations. Employees of local units generally regarded the researcher with benign neglect and some curiosity.

Ten formal interviews were carried out during the fieldwork. All interviews except one were conducted using a semi-structured interview guide and were recorded digitally and transcribed verbatim. Of these nine interviews, six were conducted face to face and three were conducted over Skype due to distance constraints. A single interview was carried out by e-mail due to time and distance constraints.

Selection for these interviews were made based on positions in the projects being studied: the first project manager of the OI project, Rebecca, and her replacement, Emil, were each interviewed once. The five individuals hired for the Data Project were interviewed at the beginning and end of the project (only three of

[3] Hiring 45 wage-subsidized employees who were initially referred to as "digital humanists". Even though the project was funded by the municipality's Innovation Fund, and thus did not rely on the department's internal budget, this represents a large investment in a unproven and untraditional category of employment.

the five were available for the end-of-project interviews). All of the latter interviews were between 1.5 and 2 hours long each. A range of documents were also collected during the fieldwork, including e-mail correspondences, PowerPoint slides from meetings, meeting briefs, workshop evaluation results, promotional fliers. A number of photographs were also taken.

All material has been analyzed through a mixture of grounded theory and memo techniques, in which themes and concepts were distilled via engagement with the empirical material. Adele Clarke's interpretation of grounded theory as situational analysis [19] provided a general inspiration for the approach to analysis, in which material was iteratively interpreted and coded during the fieldwork according to a range of categories (organisational, non-human, symbolic, discursive, etc.) and plotted in messy maps.

Memoing was used to explore how these phenomena cut across the empirical material and develop insights into their importance. Based on this process of memoing about the coded material, and repeating this iteratively, themes of the analysis appeared which form the basis of the structure of analysis below. The analysis was conducted by posing questions to the material. Synthesizing the analytical insights thereby derived, namely the interrelation of various kinds of speculation with actual data work, materials and infrastructures, resulted in the concept of speculative data work. Tables 1, 2 and 3 below were developed as part of the analysis work, helping to systematize and structure the themes found in the material. In particular Tables 1 and 2 helped develop the central concept of speculative data work by providing a structure for analyzing the different ways in which data was speculated about in the organization. The following sections details the analysis enabled by the coding process, memoing and tables.

Having now introduced the case and the methods used to gather and analyze empirical material, the following sections will put forward the actual analysis and findings of the paper. Section 5 will introduce the concept of speculative data work, relating it to literature on data work and exemplifying how it took place within the case organization before diving more deeply into the different themes. Section 6 will then consider the role dashboards played in the CARD organization. The section will describe how this type of data infrastructure was central to speculative data work, and on this basis will outline the idea of speculative dashboards and prototyping efforts done so far.

5 Speculative Data Work

The following section shows how data within the CARD organization can be understood through the notion of speculative data work. This concept designates the particular ways in which speculation plays a central role in organizational data work. To show this we analyze certain themes of how data was enacted within CARD, in particular what was considered valid data, what affects it produced and the wider data valences forming the backdrop. We also relate the concept to existing literature on data work and the various kinds of work within CARD. Speculative data work is an attempt to capture the complex sense in which data is speculated on, in and about. Data produces affect, has certain valences attached to it, is circumscribed as being valid in a particular way and is the subject of a lot of work. Speculative data work captures how *speculation* is a central part of this.

This paper proposes the term speculative data work to conceptualize this particular type of data work we observed in which speculation with, on and about data took place within the CARD organization. The concept is distinct from existing CSCW research on data work [6,13,15,25,29,61] but takes inspiration from it, and synthesizes how data valences *[28],* the production of affect around data and the determination of what is valid data all represent and perform a particular kind of work within the organization. These themes were derived from coding and initial analyzes (in the form of memos) of the empirical material and informed by literature. Questions were then formed on the basis of these themes, which form the basis for the following analysis of how speculation and data work are related. Table 1 below outlines these themes of and questions. At the end of the analysis we answer these questions via Table 2, an expanded version of Table 1.

Table 1. Data in CARD

Themes and Questions
Data work: what kinds of data work are performed and what tools are used?
Valid data: what is seen as valid and useful data?
Affects of data: how do groups relate to data on the level of affect and emotion?
Data valences: what are the main valences of data?
Data-driven imaginary[4]: What is understood by the notion of a data-driven organization?
Main speculation: What kind of speculation is stimulated by use and discussion of data?

Speculative data work refers to the work of speculating with, on and about data. This concept points to how speculations on data which appears to be contradictory (worrying and being passionate about it) or how imagining what futures it might bring (supporting cultural work differently or streamlining organisations more) all comprise different examples of the same kind of work, that configures data in particular ways. This work is not purely abstract as it stems from both material interactions with data (collection, sorting, analysing) and anticipatory or imaginative work (anticipating what data might be used for, drawing on existing imaginaries).

As Wong and Khovanskaya note, speculative design practitioners have traditionally traded on the rhetorical ambiguity of the term "speculative" with relation to its critical use or its more general future-orientation. We invoke speculation throughout this paper in a variety of ways: Speculation is both something our informants engage in, something we wish to encourage and the nature of our own project. We distinguish per Wilkie et al. [95] loosely between forms of "negative" speculation which are probabilistic, statistical or economic or just conventional worry about cutbacks, and forms which are more "positive" and "open." We do not believe that the latter can replace the former, and we therefore purposefully trade on the multiple meanings of speculation, in an effort to "stay with the trouble" as Haraway says. To decisively separate different kinds of speculation would be counterproductive to this effort, and we therefore encourage that "speculation" and "speculative" be read with these multiple valences simultaneously.

Data work is a growing theme of study within CSCW research. It has found to be relevant in many diverse contexts such as interdisciplinary collaboration in Ocean Science [6], sensemaking of personal data from the past [25], IoT implementation [29], hospitals [61] and the new reality of the push to be data-driven facing many organizations [15]. These studies emphasis data work in an equally diverse set of ways, with Baker at al. focusing on its relation to infrastructures and collaboration, Elsden et al. considering it a rhetorical kind of appropriation of own data, Fischer et al. describing it as a range of collaborative activities done between IoT advisors and clients, Møller et al. highlighting the importance of attention to clerical data work whilst Bopp et al. describe data work as an administrative burden related to other organizational dynamics, caused by the focus on becoming data-driven. We put forward speculative data work as a related but different type of data work, which focuses on the particular kind of speculative work within the CARD organization. The analysis that follows shows how data is a topic of both practical work, definitional work, affect, imagination and speculation. Speculative data work is a concept that draws attention to how these forms of actual work with data are intimately tied up with affects and wider imaginaries of what data is, could and should be.

[4] The following sections explore the notion of the data-driven as an empirical example of speculative data work producing a sociotechnical imaginary. The concept of speculative data work does not necessarily rely on this particular imaginary, and other contexts in which speculative data work takes place will likely produce or interact with other imaginaries. Within city planning speculative data work might for instance involve the imaginary surrounding Smart Cities. We include the imaginary in the table as it played an important role in the way speculative data work took place within the CARD organization.

5.1 Speculative Data Work in a Danish Public Sector Organization

In practical terms, data work within CARD ranged from mundane and manual as in counting cultural event attendees and adding them to excel sheet, to extracting datasets from online portals on social media statistics or automated visitor counter sensors, to compiling reports, analyzes and data visualizations for management to the very symbolic work of producing strategies, power-points or conducting workshops on the meaning and importance of data. This work took place in differing parts of the organization, with most of the manual work concentrated in local units, and with the more abstract work such as analysis or strategy centered in the central units.

CARD thus contains data work which is sustained locally and practically [72], is plainly administrative or clerical [15,61], collaborative [6,29], involving the rhetorical reconstruction of data traces into narratives [25] and anticipatory of the future [86]. Our concept of speculative data work however focuses on how speculation is woven into all these varying forms of practical or symbolic data work. Two examples of speculative data work can make this clearer: One is the notion of the data-driven, which was developed, discussed and contested within the CARD organization and the other is the role of sensors in generating organizational data within CARD.

The data-driven is an empirical phenomenon in the form of a term used by actors in various projects. Concretely, the term was used for two separate projects, one entitled "Data-driven leadership & development" and another called "Data-driven CARD". However, the varying articulations of what was meant by the term both within and across these different projects demonstrate that it was a kind of sociotechnical imaginary [46] produced by speculative data work. For one of the projects data-driven meant an innovative and open approach to understanding data as both quantitative and qualitative, and that work practices within an organization focused on culture summarily must account for this broad definition of data. For the other project, data-driven meant an association with "big data" [56] and the development of sound data governance and infrastructures. Additionally, there was uncertainty even *within* the projects as what the term meant, as demonstrated by Figure 2 below, which depicts a slide from a presentation given on the notion of a "data-driven CARD".

The notion of the data-driven within CARD can therefore be understood as an example of speculative data work in process, showcasing speculation *in* particular ideas of data where it is simultaneously unclear what data precisely is or is meant to achieve, yet where it is coupled to wide-ranging imaginations and indeed constitute a kind of "desireable future" [46:4] for the organization. These organizational sociotechnical imaginaries are partially collective and performed through discourse and material artefacts such as power-points slides referenced. Speculative data work in this example refers to the work of imagining what data-driven means, anticipating the future needs of the organization, practically developing slides with these articulations and corralling other actors to adopt and use this terminology – and the speculation or investment all of this represents.

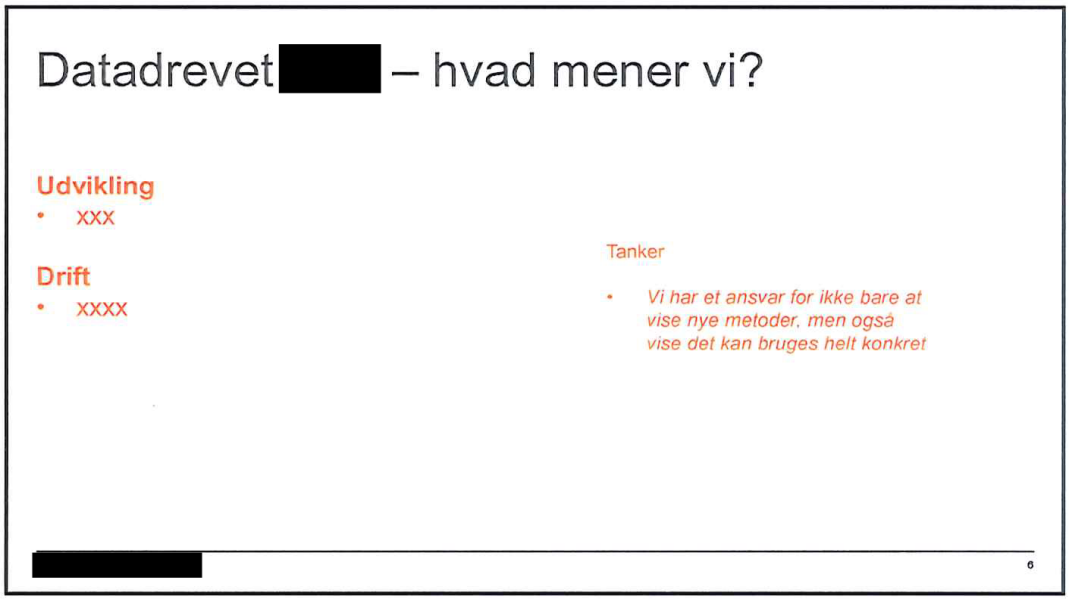

Fig. 2. A powerpoint slide produced in CARD. The slides says 'Datadriven [Name of Org.] – what do we mean?', under which both "Development" and "Operations" are filled with Xs and the only description is a point called "Thoughts" where it says "We have a responsibility to not just show new methods, but also show that it can be used concretely".

A very different example is the speculative data work produced by something mundane such as the visitor counting sensor depicted in Figure 3 below. This sensor was installed at an entrance to a cultural institution under the purview of CARD and counted the number of people entering the facilities. These numbers were stored in a database and were used in certain reports to estimate the number of users and as an overall metric of performance. However, employees working at the cultural institution actually did not know how it really worked, finding themselves stumped and puzzled by basic questions about how it for instance distinguished between visitors entering and leaving the building. At a meeting held between the Data Project members and key stakeholders from both the local and central users, disconcertment at sensors such as these was relayed from the DP members. They outlined how cultural workers felt uneasy at the quality of data produced by the sensors, citing its apparent inability to for instance count children visiting libraries, because they were too short to be registered based on how the sensor was installed. This was particularly disconcerting because employees felt that management decisions with regards to their institutions were being based on information such as visitor counts.

We suggest that these are empirical examples of speculative data work where the sensor is a socio-material technology which employees speculate on (performance importance, workings) and are affected in various ways (puzzlement, unease, disconcertment) by the technology and the data it produces. This is different from the example of the data-driven in being a much less discursive and symbolic kind of speculative data work, but similar in that it involves speculating on the role and relations of data within the organization.

Fig. 3. A sensor in "the field", at the entrance of a cultural institution in the municipality. Used for counting visitors, but the precise parameters for its data collection were unclear, making it a source of unease with regards to data quality.

In summary data work within CARD can be said to be very multifaceted, comprised both of mundane adding of numbers to excel documents, of developing dynamic dashboards featuring visualizations and KPIs for management purposes and of more qualitative, discursive or symbolic work. We have suggested speculative data work as a concept related to but distinct from existing research on data work within CSCW and argue that it denotes a particular complex of these various kinds of work with and the speculation in, on and about them. The following sections will explore aspects of speculative data work in greater detail, describing how this kind of work is related to the themes of validity of data, the affect produced by it and the dominant data valences within CARD.

5.2 Data validity

What was considered data was not itself immediately clear from the scope of the Data Project – there were multiple data practices in the various units of CARD, and the point of the project was to get a better understanding and map all the various sources and practices surrounding it. The members of the DP therefore took an open approach, interviewing employees in order to get a better handle on what data meant for them. Through this process they identified a large variety of data and practices, ranging from manually counting individual attendees at cultural events and adding them to an excel sheet to accessing and gathering data from Facebook on how well a certain post performed. "Data" thus came to be mapped as a very broad category yet referred primarily to any kind of documentation practice relying on numbers used locally or communicated to the central unit. At the same time, such data work was identified as being very irregular across the various units.

On a more conceptual level, however, perceptions of what constituted valid "data" differed substantially within the CARD organization. During a meeting prior to the start of the workplace ethnography, the first author discussed data with an internal CARD consultant, who asked for a research perspective on data and the data-driven. In this meeting, data was discussed as encompassing both qualitative and quantitative material, and that it might require interpretation and have to be fitted to local contexts of operation. This

CARD consultant worked in the strategy office of the central unit, where this perspective of data was generally more accepted.

The finance office within the central unit had a very different view of data however, and was generally skeptical of anything that was not computational and quantitative data. The main focus of employees within this unit was the development of sound and conform data practices, which could feed into CARD's database infrastructure and in turn form the basis for reports and dashboards.

In summary, what was considered valid data within the CARD organization was understood to be a range of different things, depending on the units in question. Validity is here understood not as a particular qualifier, but as a distinction between what is and is not considered data. It is an aspect of speculative data work in that it represents the boundaries of what is speculated on. While maintaining the boundaries of what is and is not data is always a part of data work, speculative data work refers to the work of actively challenging and speculating on what these boundaries are. When the CARD consultant was openly considering that data might mean something more than what it conventionally had, they were engaged in speculative data work.

5.3 Data affect

Data generated a lot of varied forms of affect within the CARD organization. In the course of the fieldwork, through our own ethnographic experience and by interviewing the DP members, it became clear that organizational data was a matter of some unease within the local units and perhaps even conflict with the central unit and management. In one conversation the interviewee was asked what her mapping of data practices had revealed about the understanding of data amongst local employees. She replied with little hesitation that it was "stress": "It's something which is really on everyone's mind, because when I mention 'data', then it's perceived as something decided from above. So generally, a kind of stress factor, and some nervousness in relation to resources and that one all of a sudden has to have a lot of focus on it." This understanding of data would turn out to be symptomatic for how many employees in the local units perceived data. Based on discussions during the fieldwork and various written materials produced by the "Data Project" employees, it became very clear that data was a both stressful and contentious topic.

Data was a stressor for local employees for multiple reasons: The above-mentioned collection and registration of data (such as number of visitors) was often manual, and thus an extra task competing with others. It was also unclear for many employees exactly what the purpose of the various data collections were, since they were most often not given any feedback on what they submitted, nor saw the results of the analyses compiled centrally. Employees also experienced that some of the automated processes of data-collection, such as sensors were unreliable, a feeling underscored by the difficulty in teasing out how they functioned and what they actually counted. Figure 3 above illustrates one such sensor, as discussed.

Data was also a stress on a more conceptual level, as the public sector within Denmark has been the subject of austerity and an annual budgetary reduction of 2% for many years, and new technology and data are often linked to cutbacks. Thus, for many of the employees at the local units, registration of data was equated with potential cutbacks and firings.

Within the central unit, the affect of data was far more one of curiosity, novelty and even passion. Employees from the finance office talked enthusiastically at workshops about Power BI, making jokes about being "data nerds" and loving the experience of "drilling down" into the data. Data for these employees was commonplace. Members of the strategy office also considered data as a novel trend to be mastered in the organization and discussed it with a mixture of mystery, interest and reserved distance. Unlike employees in the finance office, many in the strategy office did not consider themselves "data nerds" or "technical" enough to be experts in data, and so data produced an affect of mixed interest and disdain as it was seen to be important but also inscrutable.

5.4 Data valences

Fiore-Gartland and Neff's concept of data valences [28] was developed based on studies of discourses, practices and expectations around data within health and wellness communities, and offers up particular valences such as self-evidence or actionability. Following their suggestion, we utilize the concept here to make sense of the data valences within the CARD organization. In relation to the particular case described here these valences have been slightly re-interpreted and supplemented to fit the case. Data valence is defined by Fiore-Gartland and Neff as a multidimensional concept for describing both the discourse and material practices, including expectations and gaps in these, around data.

Due to the above-mentioned perceptions within local units of data work as being an extra task with dubious quality, much of the data collected was not perceived as central to or as getting to the heart of the kind of cultural work that individual employees were passionate about. They were interested in creating meaningful events or connections for the individuals for whom it might matter, more than they were concerned with increased visitor numbers which they viewed as arbitrary abstractions. "Data" was generally associated with technical IT-systems and was understood to be quantitative measurements such as visitor numbers, frequency, geographic distribution, etc. It was therefore difficult for employees of local units to make the connection between how this sort of data could support their ultimate goal of providing quality cultural services to citizens who need them. However, the employees did express wishes for data and technologies which did support this sort of goal.

Using Fiore-Gartland and Neff's examples of data valences within health care communities, the most appropriate valences are therefore those of actionability and discovery. Local unit employees wanted from data something which was actionable and could help them with what they saw as their core task. But they did not find that what was commonly understood as valid data within CARD would help them with this. Simultaneously, they also wanted data to help with discovery of what was needed to do.

Differing data valences of course existed between the strategy and finance offices within the central unit. The strategy office saw data as a topic of political importance which it was important for the organization to be competent within, and to a lesser extent, was willing to consider data a "site for conversation" [28:1475] about topics of organizational relevance. The finance office on the other hand generally considered data important for reasons of efficiency and economy and considered data itself as having a "truthiness" and "actionable" valence. Within Fiore-Gartland and Neff's interpretation, these latter terms represent an understanding of data as being objective and representative and as being centered on making decisions and actions possible based on correct knowledge. Furthermore, the finance office also favored the valence of transparency, albeit in a limited sense, in that they advocated the roll-out of more coherent data goverance and analytics software such as Power BI in order to make data more broadly accessible throughout the organization. However, as we shall see, access to data was not equal and the finance office was the arbiter of what levels of access were afforded other units and employees.

Data valences is a concept which connects multiple dimensions of data as it exists in practice, discourse and between institutions and communities. This is similar to speculative data work in its multidimensional nature. However, our purpose has been to refer to the particular work which takes place against the backdrop of valences, affects and validity and participates in producing these in turn. Data valences has thus been a helpful concept in precisely articulating this background but does not encompass what speculative data work itself is. The valences of data which we have described within the different CARD units show the range of opinion present in CARD, underscoring how data was a concept open to widely different interpretations.

5.5 Summary

Having outlined the notion of speculative data work and exemplified it through the imaginary of the data-driven, the visitor counter sensor and the themes of validity, affect and valence, the following table

summarizes the analysis of the empirical work so far. The different themes and questions concerning data in relation to three different actors – the strategy office, the finance office and local units – are described in Table 2 below. The table illustrates how different actors engage with data differently not just on a conceptual level, but also very practically. Data is both affective and practical on some level for all of these groups, and they also have certain goals and normative notions of what "counts" as valid data and the valences of this data.

What can be seen is that all of these units engage in some form of speculative data work, but that the kinds of speculation are very different. The fieldwork thus outlined a situation where organizational data was the source of speculation in a myriad of ways: stress for some employees in local units, a contested topic between the strategy and the finance office, and a potential source of conflict between local employees and central management.

Table 2. Data in CARD: Themes and questions in relation to different groups of actors

Data themes and questions	Strategy Office	Local units	Finance Office
Data work: what kinds of data work are performed and what tools are used?	Analysis, strategy, symbolic	Manual collection, some report access	Power BI, analysis, visualization, formulas
Valid data: what is seen as valid and useful data?	Multiple kinds	Anecdotal, experiential	Quantitative data
Affects of data: how do groups relate to data on the level of affect and emotion?	Novel, new, important, visionary	Stress, burden	Investment, enjoyment, fun
Data valences: what are the main valences of data?	Political, competency connection	Cultural work	Actionability, truthiness, discovery economic, budgetary, efficiency
Data-driven: What is understood by the notion of a data-driven organization?	Competencies and thinking differently/innovatively on the basis of data	n/a (no articulation)	Infrastructure and tools
Main speculation: What kind of speculation is stimulated by use and discussion of data?	Hype and futures	Cutbacks	Accumulation, Control and Efficiency

6 Dashboards in the CARD organization

The use of Microsoft Power BI was a central way that employees at CARD engaged with organizational data. As part of the fieldwork a Power BI workshop was attended, where over 40 employees attended. These employees were taught the basics of how to use the software by an internal expert from the finance office,

the unit with most expertise using the system. In this workshop employees were taught the basics of importing data, cleaning it and making basic analyses using the standard example dataset which Power BI loads with. This standard data set was fashioned as that of a generic store franchise operating in the US, including sales of different types of goods such as furniture in different store locations in the US. This is perhaps an innocent coincidence, but it showcases that this sort of software is built primarily for commercial use, intended for the tracking of sales figures across different segments and locations. However participants learned and trained in using the software through speculating with this commerical dataset about what kind of visualizations might be possible. While data was a locus of stress for many employees in local organisations, this did not necessarily translate to dashboards being a source of stress. Dashboards, as described earlier, were used in the organisation as analytical tools mostly intended to be used by management. Whilst there was a move to spread the use of dashboards wider in the organisation, this was a work in progress that had yet to be completed at the time of the fieldwork.

Microsoft Power BI was presented within CARD as a tool for generating "pretty visualizations", creating an overview and working more in depth with data. It was presented as an amalgamation of Power Point and Excel, which would allow users to interactively work with and present data. Dashboards in particular were presented as "screens" which were central for the sharing of analysis work done in CARD. More specifically, it was articulated that the central unit would be making reports "for and with" the local units, why it was important that people there knew how "to do some of the stuff and understand some of it." This underscores an understanding of dashboards as a tool for making aesthetically pleasing representations of knowledge work done mainly within the central unit of CARD, which can then be interacted with to some extent by employees in other units. We suggest that dashboards are a centralized tool, and is an instrument of control insofar as it primarily allows the central unit to define the parameters of the various dashboards being created. This is the case because it was a small group of super-users within the central unit who were experts in the system, had an overview of the available data and guided others in its use. In this way, dashboards are also a site of speculative data work using quantitative measures as a means to make projections about the future. Another way of understanding this is through the lense of problematizations, a Foucauldian concept that points out that problems are not neutral phenomenon that exist free of political and sociotechnical interests and values, but rather are constructed and shape our way of thinking [4].

Through the fieldwork this acceptance of a certain set of problematizations became apparent when the "Data Project" prepared its final report, mapping the data practices of CARD. The report consisted of qualitative descriptions of the earlier mentioned issues with data in the organisation – i.e. that it was a stress-factor – and a set of data visualizations. Due to the affordances of the Power BI tool and the data available, the only data visualizations that were produced related to the number of visitors to the cultural facilitates operated by CARD. When asked why they had not tried to creatively visualize some of the issues with data quality or the requests for data more related to cultural work, the project members of the "Data Project" replied that they were told that since there was not any relevant data on those topics, they could not visualize it. As Peter, a member of the "Data Project" expressed it: "I think, Frank from analysis or the data department, he said: 'With the datasets we have, we only do descriptive reports.' So, in that way, with regards to […] the needs that were there and all the qualitative data, we had all of that, we had generated far more things, which could have justified [making] far more nuanced reports. We just couldn't do that, because we didn't have data on it, and we couldn't feed statistics or graphs with no data." While this is of course straightforwardly true, it showcases how dashboards do not allow for the investigation or challenge of existing problematizations: one can only visualize based on data that has already been collected, based on what was considered relevant at the time.

Finally, dashboards are interfaces that are often focused on results rather than processual work. As Bartlett and Tkacz demonstrate in their report on dashboards in the UK government, dashboards are often home to Key Performance Indicators (KPIs) and similar target measures, that inform managers or employees how well one is performing in relation to a goal [8]. Similarly, in the fieldwork, dashboards were discussed as

tools which might be used by management to make decisions about operations. This could for example be using data about visitor numbers to determine how many employees were needed to be available in the off-hours of a library. In this way, dashboards were seen as an interface to be used to make a singular decision as opposed to a processual tool. While the interactive aspects of using a dashboard, with the ability to drill down into underlying layers of the data, and the process of making the dashboard may be partially processual, the functions of dashboards were still mainly related to the ability to focus on making decisions. An alternative, more processual, use of dashboards might be to collaboratively explore a topic together as a unit over an extended period of time, rather than management making one-off decisions based on decoupled targets. Table 3. below summarizes how dashboards were used and presented in practice at CARD in a table of dashboard "traits".

Table 3. Different perceptions of dashboards amongst employees in the local unit

Dashboard traits	Description
Epistemological	Related to the production of knowledge through analysis
Representational / Aesthetic	Dashboards are thought to depict the organisation through and transmit knowledge through aesthetic representations.
Centralized	To be mainly developed by the central unit of the department, then potentially consumed by others
Result-oriented	Focused on decision-making and KPI-like metrics for determining operational aspects of the organization.
Instrument of Control	By only allowing certain employees to work with data, dashboards become a potential instrument for control
Accepted problematizations	Work with dashboards is constrained by existing understandings on what issues and problems are worth working on, and what data is seen as relevant to this

While dashboards themselves were perceived and used in CARD according to the above table, they were not the main source of anxiety or locus of the speculative data work for employees – data itself was. It was the collection of data that caused unease and speculation amongst local employees about the quality, use and purpose of data collection. Dashboards, rather than allay this unease and speculation were instead used to facilitate a different kind of speculative data work amongst the members of the strategy and finance offices – towards their respective visions of the data-driven. The dashboard is therefore representative of a wider organizational difference with regards to data and the kind of speculative work about it one engages in.

The analysis described above highlights how dashboards are perceived and used as result-oriented artefacts that centralize control of data around accepted problematizations, thus failing to address central concerns around data by local employees but still being the site of uneven speculation around data and its futures. Taking up the question from Wilkie et al. on how we might speculate positively [95], but keeping in mind the concomitancy of change and speculation posited by Halpern [36], the following explores how insights from speculative research and design can inform a response to the situation in the CARD organization through a design proposal.

The fieldwork illustrates that a large group of employees were not well served by the existing practices, infrastructures and tools around data, and that the Power BI tool and particularly its data dashboards were a site where data "met" the organisation and thus already a site of some speculation. It showed that speculative

data work of varied sorts was indeed already taking place, but was doing so in a siloed and differentiated manner.

As a response to the issues highlighted by the analysis of the empirical material, we propose the speculative dashboard as a different way of engaging with and perhaps infrastructuring [71,83] the speculative data work which is already taking place. The following sub-section develops this idea by detailing a pedagogical exercise in which the notion of a speculative dashboard was first prototyped and then put forward an exploratory proposal for using it as a design intervention in the field.

6.1 Prototyping speculation

The speculative dashboard is a very simple design idea; it consists in using or "hacking" the recognizable form or "genre" of the dashboard as it is known from BI software, and using some of the quadrants or space to introduce other kinds of data. The effect is to juxtaposition data types, typically quantitative, and its visualizations, with qualitative data which often is not considered legible, usable or interesting to most organizational data infrastructures. This is reminiscent of Peer and DiSalvo's "remix a visualization" approach, where they encourage community members to try to build different narratives about existing data [67]. As part of the speculative ethnography that forms the context for this paper, we decided to conduct a pedagogical exercise to explore and engage with speculation. We did so in order to take seriously that pedagogical settings such as universities are a central site of dissemination for sociotechnical imaginaries and practices which inform speculative data work. By engaging with IT professionals and encouraging them to speculate with data and dashboards, we hoped to better understand the kind of imaginaries they had and actively involve them in pushing the boundaries of these through a speculative design prototype.

The speculative dashboard was developed as a pedagogical exercise for a Masters course taught to IT professionals, as part of a Masters in IT-Management. This course explored the notion of the "data-driven organisation" and what "visionary leadership" meant in such a context. Drawing on literature from Information Systems, Infrastructure Studies and STS, the goal of the course was to explore the complex interrelations of data infrastructures, organisations and both qualitative and quantitative data. The course participants were introduced to a case, in the form of a cultural institution in Copenhagen, Denmark, and were tasked with exploring the themes of the course through the challenges faced by and data of this institution. They were given quantitative (visitor numbers, sales, audience geographical location, etc.) and qualitative data (interviews, photos, presentation by head of the institution) on the case, and explored the quantitative data through the BI software Tableau.

In practice the exercise consisted in the course participants being given the task of designing a quadratic space using either A3 paper or through a digital mock-up, and both some of the quantitative and qualitative data provided, according to a thematic challenge outlined by the case institution such as "increased diversity" or "volunteer engagement". They were also tasked with developing a fictitious use scenario which would include as many relevant stakeholders as possible.

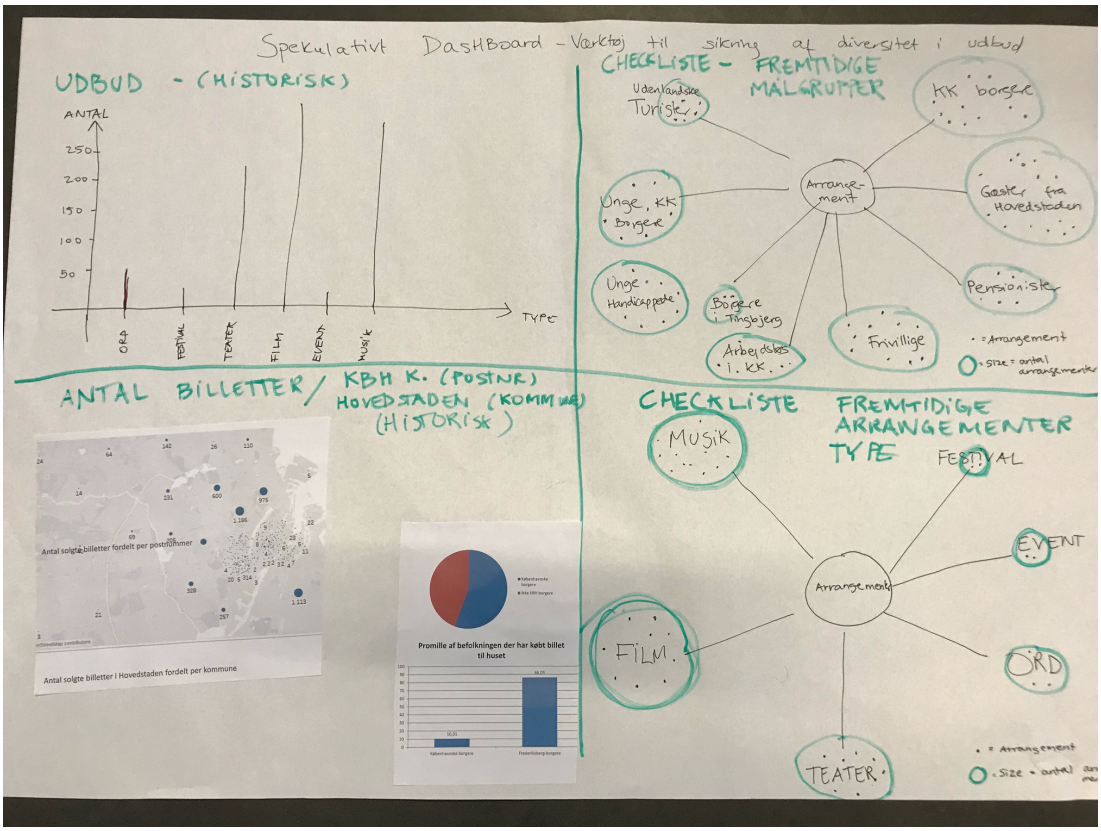

Fig. 4. An example of a participant produced speculative dashboard, focused on 'ensuring diversity in event types' by using a mix of hand-drawn diagrams.

The pedagogical exercise with the speculative dashboard generated some insights into how data workers might engage and speculate with multiple data sets. In particular, the course participants' prototypes show that there is a tendency to reproduce existing technical and quantitative approaches, which rely on the existing imaginaries of data-based technologies. For example, in the speculative dashboard in Figure 5, the course participants suggested gauging how an evening in a cultural institution with multiple concert venues had gone by combining ticket sales data with the venue's social media feed, a "heat map" showing where people had been and a network graph over visitors' music type interest. In contrast to the other visualizations, the course participants did not have access to data that would be able to produce the aforementioned "heat map", nor did the institution have the requisite infrastructure to generate that sort of data. Thus, the participants had themselves assessed that a heat map – showing visitor density but in principle providing anonymity – would be a valuable "alternative" kind of data. Rather than use qualitative data from interviews or photos, one could argue that they used the speculative dashboard to speculate on data infrastructures and visualizations that are more technical, imply more surveillance and move further away from qualitative data. In this way the speculative dashboard, as a somewhat blank canvas, risks encouraging more speculation about data that is based in considerations of technocracy and economics than less. We can conjecture that this is partially because people simply draw from the already existing kinds of sociotechnical imaginaries that exist around digital technologies [46,78].

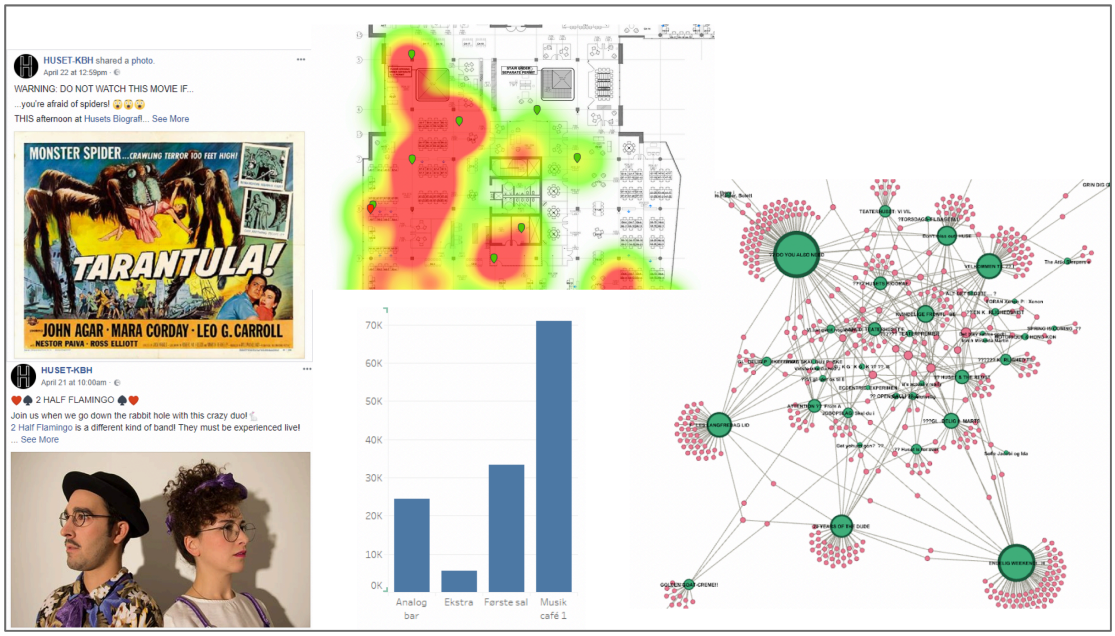

Fig. 5. A speculative dashboard designed by course participants, showing a social media feed, a heat map of visitor concentration, a bar chart over tickets to different venues and a bipartite network graph of visitors and different concerts, showing clusters of genres.

Despite the issues of reproducing technical tropes, the speculative dashboard did lead to discussion amongst course participants of the sources of the data, the infrastructure it was collected through and the kind of social contexts surrounding its production and use. Done in dialogue with the teachers of the course, this process is reminiscent of what Desjardins calls "co-speculation" [20]. In addition to this, the aforementioned dashboard with the heatmap also included a kind of "qualitative" data in the form of a social media feed from the institution, and the use scenario suggested was one in which weekly meetings would be held around the dashboard between cultural institution employees and volunteers, who could try to discuss and gauge how well the previous night or weekend's concerts had gone based on the data. Thus, whilst the experiment indicated that speculative dashboards in many ways rely and further existing sociotechnical imaginaries, it also indicates that they can occasion discussions of these imaginaries and existing technologies, and prompt use scenarios that are substantially more inclusive and open to different speculation than standard BI systems.

This initial experiment raises some questions for future work. What would the speculative dashboard look like and how would it function in practice? The following considers some basic implications for how one might be designed for the public sector organisation where the fieldwork was done, but which could potentially be used in other organizational contexts. The device is intended to address some of the concerns raised by public sector employees about the use of data within their organisation – namely that it is a source of stress, uncertainty and that they do not find it supports the central aspect of their work – and the siloed way in which data already is speculated upon and with, within the organization.

These concerns obviously reach beyond a single design artefact, and touch upon organizational structure and goals. To take in and address these issues is an ambitious goal, and there is no doubt that the speculative dashboard cannot change how data is understood on its own. However, it can be designed in such a way that it might create the possibility and encourage a different kind of relation and speculation with data.

For the above reasons, we imagine a speculative dashboard as an interface similar to existing dashboards, but with a number of changes intended to encourage speculation and address the issues identified through the

fieldwork. The first change is that certain spaces are reserved for qualitative and "other" kinds of data, which can be uploaded from the units currently submitting quantitative data. This would allow for employees at decentralized units to upload images, videos, sound bites, or free-form text to the dashboard, effectively changing the nature of the dashboard from a one-way data output interface where local employees are unsure of what their data is used for and where it goes, into a channel for also communicating rich qualitative data which may add context or caveats to other sources.

Secondly, the speculative dashboard might also be designed as an object to be gathered around and discussed, much as a "matter of concern" [22,49], rather than displayed on the wall on the tablet device of a manager. This might be implemented by purposefully placing the speculative dashboard in a horizontal position, similar to a "smart table". This would make it possible for users to convene, discuss and speculate on the meaning of data, discussing the ontology of the different variables and categories and taking into account the qualitative dimensions of the data uploaded by others.

In these two ways, the speculative dashboard would be both a small and a large change in practice. Small in that the interface is left quite similar to its original shape and function, but large because it focuses on changing the overall practices surrounding the use of data, including adding new ones for the submission of qualitative data and thereby encouraging more collective speculation about organizational data and its infrastructures.

7 Discussion

We have explored dashboards as a site of speculative data work for public sector employees, and asked how it might be possible to create a speculative design project that would listen to the concerns of currently unheard employees, and which might repurpose existing infrastructures and enable more open and collective speculative data work across the organisation.

The provisional answers to these questions have been to focus on the visual format of dashboards as existing infrastructures and their contexts of use and consider how these may facilitate speculation. Having done this, we turn first to a discussion of the nature of dashboards *as* infrastructure and gathering points for matters of concern – how speculative dashboards can be used to co-design novel visualizations and suggest the speculative dashboard as something different from BI dashboards. Secondly, we raise this discussion of the role of speculation into the wider digital economy, arguing for how the speculative dashboard might lure organizations and be implemented.

7.1 Co-design with speculative dashboards

Based on the described pedagogical experiments and reflection about how experiences from this may be translated into speculative artefacts, we propose that speculative dashboards could be designed as artefacts that would have different properties than those of BI Dashboards. Table 3. below illustrates the contrast between the BI dashboard and the speculative dashboard we propose. Where BI Dashboards are mostly considered epistemological artefacts that represent knowledge of an organization, we suggest that speculative dashboards be understood as explicitly ontological in their nature, meaning that they aid to construct the organization rather than represent it. We say "explicitly" because whilst BI Dashboards are often understood as epistemological artefacts, we know from STS research that calculative devices and infrastructures are *indeed* ontological [43,47]. By epistemological and ontological we here mean the broad senses of these terms, as developed within STS scholarship. BI Dashboards are in this sense epistemological because they are a tool through which actors *know* their organization, and speculative dashboards are ontological because the ability to input alternative kinds of data into them allow actors to trouble or redefine what *exists* within the social world it represents. By encouraging more juxtaposition of different kinds of data the speculative dashboard can help to denaturalize the given data categories existent in the system, and by shifting the context of use to be an object used for gathering matters of concern [22,49], engagement and speculation on data can perhaps

be made into a more explorative, process-oriented and ultimately democratic practice. In short, we believe that the tendency towards speculative data work can be harnessed towards more positive processes and outcomes for cooperative work with data.

Table 3. Different perceptions of dashboards amongst employees in the local unit

BI Dashboards	Speculative Dashboards
Epistemological	Ontological
Representational / Aesthetic	Constructive
Centralized	Democratic
Result-oriented	Process-oriented
Instrument of Control	Tool for exploration
Accept problematizations	Open problematizations
Report Matters of Fact	Gather Matters of Concern
Speculative	Parasitically Speculative

7.2 Implementing speculative dashboards

Concretely, the speculative dashboard is a multifaceted tool for the exploration of data, which we imagine to be used by groups of managers and employees to discuss, collaborate and co-design visualizations that make sense of and speculate on the social worlds of the organization. We imagine the most critical uses of the speculative dashboard to be at moments where organizations adopt new data infrastructures. At these times, the speculative dashboard would be a tool that could strongly support a kind of speculative data work which involves co-design and positive alternative visions for how infrastructures should be built and what data should be collected.

However one cannot invoke the "speculative" without also invoking the political economy within which much digitalization takes place; the speculative investment in promising but unproven future technologies [31], the more straightforward speculation of the direct investment of VC capital, IPOs and stock market dynamics surrounding tech companies [85] or the speculative economy of exploitation of the earth through extraction, sensor-instrumentation and high-frequency trading [35]. Speculation is, it seems, somehow appropriate to the hype-infused discourse (X and X, forthcoming) of tech – including data, its visualizations and dashboards. The present paper builds on these understandings of speculative design and research, in suggesting design ideas that attempt to interrogate an alternative version of an existing technology [3] and open up a discussion of preferable futures [23]. However, in doing so, the design ideas are strategically crafted [96] so that they may act as "lures" [95] for actors, by trading on the visionary qualities of alternative visions of the futures of organisational data. The notion of the "lure" is also similar to what Auger calls a "perceptual bridge" [3:12] which is the connection that an audience may make between a speculative design object and a context or situation which they are familiar with. The lure is different in that it is predicated on promising a wholly different future, but is similar in that it provides a means of connecting the intended (or unintended!) audience to an object of speculative design. We wish to propose that whilst the speculative dashboard might not immediately be appealing with the present capitalist economies of speculation in digitalisation, it does precisely engage with what the hype of these economies constantly seeks: novelty, newness and trying something different. In this way we believe that the speculative dashboard might be able

to actually lure in interest from organizations and actors, especially those that have an orientation towards public goods, culture or have the surplus to try something radically different. Based on this discussion and the reflections in this paper, we are planning to prototype the speculative dashboard within an organizational context.

8 Conclusion and Future Directions

We conclude the paper by listing a number of questions and considerations which future work can orient itself on the basis of:

- In the context of a speculative economy and hype around novel technologies, try to take an active decision as to how the project relates to these conditions.
- Consider how speculation and hype might be used strategically as "lures" or "perceptual bridges" towards design projects and interventions.
- When encouraging speculation, be aware of existing sociotechnical imaginaries around data and data infrastructures.
- Consider how such existing imaginaries may be disturbed, interfered with or remixed.
- What might a "lure" or "perceptual bridge" for alternative futures for public sector digitalization look like?

The fieldwork that forms the basis of this paper empirically pointed to organizational data being a source of stress for public sector employees. This data was uncertain in quality and purpose, it was associated with cutbacks, and its contribution to central aspects of the work was unclear. Based on CSCW, HCI and STS literatures on speculation, the speculative dashboard has been developed as an intervention into the data infrastructures that support this perception of data.

The speculative dashboard is intended as an exercise or design artefact which can help facilitate positive speculative data work: either as an exercise that can be done in groups or as part of a data infrastructure, connecting different parts of an organisation. It works by the juxtaposition of different types of data within a familiar visualization space, and also by creating different contexts of use focused more on collective discussion and deliberation.

By drawing on speculative design and research practices, the paper has proposed the speculative dashboard as an object of speculation, but also *for* the promotion of a different kind of speculation. In a sense, this kind of speculation is akin to changing dashboards from devices that focus on matters of fact to things which are able to help in articulating matters of concern.

We recognize that the paper might have taken on and engaged in co-design or participatory design together with the users who were present in the ethnographic study, but the goal of the paper has been not to co-create but instead to attempt to think up infrastructures that might help others co-speculate. We suggest participatory design to be a very valuable area for future research on the topic of speculation and data economies.

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To be added.

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Research Paper 3 – The "Digital Humanist": Figurations of Danish public sector digitalization work

Hockenhull, M. Manuscript. The "Digital Humanist": Figurations of Danish public sector digitalization work.

The "Digital Humanist": Figurations of Danish public sector digitalization work

Michael Hockenhull, ITU

Abstract

This paper studies an innovation project in a Danish public sector organization and explores its attempt to reimagine the relations between digitalization, humanist labor and what is here called digitalization work. The paper provides a contribution in the form of a study that compares how digitalization is *figured* with how it is actually *configured* and experienced in practice. Based in ethnographic fieldwork, project documents and interviews, the paper analyzes three figures of digitalization articulated in the project, as well as the actual digitalization work conducted and the experience of it by the workers. The analysis finds that two of these figures represent an attempt to do digitalization differently by experimenting with drawing on more humanistic competencies, while the third is a formal figure of the Danish labor market which sits uneasily between upskilling and exploiting labor. The actual work consisted of two kinds of work: qualitative humanistic knowledge work of mapping and analyzing the organization's data practices, and relational work to build rapport and navigate the organization's political reality. The work was experienced as a mixed success, with application of humanist competencies but uncertainty as to whether it would have any impact on the organization. The analysis concludes this was due to poor organizational integration, associated with the third figure analyzed. Based on the analysis the paper discusses the role of humanists and social scientists in making intellectual critiques of Big Tech and digitalization, and in trying to influence these organizations and sociotechnical trends as professionals by adding more humanistic competencies such as reflexivity and sense-making. The paper argues that more focus on the political economy of digitalization is necessary, if these critiques and professional engagements are to be effective rather than simply pouring more fuel on the fire. The paper ends with exemplifying this approach in a brief discussion of digital welfare, the future of work and the Danish state.

Introduction

The wage-subsidized workers hired for the Data Project arrive one by one. It's early morning in March – still dark out in Denmark. Ceiling panels cast a neutral light, as we go over the agenda. I'm introducing them to "Perspectives on data and the organization" as part of the agreement for my ethnography on the project. I feel both nervous at the responsibility and excited about the opportunity. They are afterall potential "employees of the future." We do introductions, hearing about their backgrounds. Communication studies, human-centered design, international development studies and more. I discuss data as an object, as knowledge, as valuable and as ontological. They're introduced to data as both strings and floats, that it is "the new oil" and conversely that "raw data is an oxymoron." We work with actual data, importing csv-files, cleaning variables, making graphs, discussing as we go. They say it's exciting but difficult, and preempt themselves: "I'm not very good with numbers." I smile and tell them neither am I. The point is that data work is far more than numbers. They nod, not entirely convinced. By the time the session is over, daylight fills the room. I feel that just maybe I've

helped both illuminate and complicate what "data" is in an organization. Whether that makes them "digital humanists" is another matter entirely.

For a brief moment in time, the term "digital humanist" was used within a Danish public sector organization to refer to a potential new kind of employee: a person with a background in the humanities[1], who might help do digitalization differently, due to their training in being reflexive, interpretive, contextual, communication-oriented and working with ethics. This paper explores the digital humanist and related figures as particular configurations of what is here called digitalization work – and how that work was conducted and experienced in practice.

As more and more organizations, both public and private, seek to undertake "digital transformations" (Scupola 2018; Pittaway and Montazemi 2020) or become "data-driven" (John Storm Pedersen 2019a), work is being transformed (Plesner, Justesen, and Glerup 2018) to involve more analytics, dashboards (Bartlett and Tkacz 2017), visualizations, data work (Møller et al. 2020) and other digital practices. Adopting these new practices and technologies however, requires what is here called digitalization work – mapping existing practices and data sources (Slota et al. 2020), the development of infrastructures (Ribes and Polk 2015; Rising and Clausen 2015), data governance regimes (Janssen et al. 2020) and upskilling employees or hiring new competencies altogether.

This paper studies a pilot project called the Organizational Innovation (OI) project. It consisted of hiring workers with unconventional profiles – those with a humanities degree – to perform such digitalization work. Using time-limited wage-subsidized positions the project would test and develop whether such workers might be "employees of the future." Building on project documents, a workplace ethnography and interview material, the paper analyzes the various ways in which these employees were figured as "employees of the future," as "digital humanists" and simply as "wage-subsidized workers" and compares this with how their work was actually configured and experienced. The paper thereby draws attention to how such digitalization work is done in practice versus how it is imagined as a solution to organizational and societal challenges. The paper discusses these findings in relation to calls for more figures such as the "digital humanists" and for increasing critical engagement from social scientists and humanities scholars with technology and digitalization.

The paper contextualizes the OI project as a response to Danish public sector digitalization policy, labor policy and discourse. The analysis finds that in particular the figure of the "digital humanist" is a response to this context and to critiques that digitalization is too instrumental and gadget-oriented. The figure represents an attempt to do digitalization differently by connecting digitalization to humanist competencies and labor, by for instance "us[ing] humanistic competencies for digital and data-driven organizational development and ethics." In the practical configuration of the actual digitalization work, however, the analysis identifies two main strands of work: that of knowledge work (Pyöriä 2005) and that of relational work. The employees do indeed use their "humanistic competencies" to structure the project, conduct interviews, do analysis and communicate their findings. However, they must also spend much energy on navigating the political reality of the organization and experience the project as a mixed success: proud of their work but unsure of its efficacy and uptake. In practice, the figures of the "digital humanist" or "the employee of the figure" are superseded by the "wage-subsidy worker."

Based on these findings, the paper discusses the role of figures such as the "digital humanist" in the digital economy, focusing on their education and the research and intellectual

[1] Graduates from the humanities or liberal arts are simply called humanists in Danish: *Humanist* or *humanister* (plural). For the purpose of this paper the terms humanist or humanities graduates will be used interchangeably to refer to someone with this professional background.

approaches that inform it. The paper suggests that such figures and research represent a catch-22 where study of and intervention into technological fields and topics also draws more attention and labor to these areas, reifying them as of the utmost importance. It is suggested that a focus on the political economy of digitalization and technology provides tools for addressing this bind, both theoretically and practically. Finally, this perspective is briefly brought to bear on the notion of "digital welfare" and the future of work in the specific context of the Danish political economy.

The paper will proceed by providing a literature review of the relation between humanists and the digital economy and on configuration and figures such as the cyborg. The paper will then describe its methodological basis, before outlining the context of the case under study. Then, in the analysis, the paper will treat three figures present in the empirical material, analyzing how digitalization work is actually done and then detailing the experiences and attitudes to the project of the workers themselves. Finally, the paper will draw from its findings to discuss critical scholarship and figures such as digital humanist in the wider context of the digital economy, the potentials of political economy for this agenda and how this relates to the Danish context.

Literature review

Humanists and the Digital Economy

There has been a rise in recent years in popular literature and debate that speculates on the role of the humanities and the competencies of its graduates within the digital economy, from those heralding their arrival (Ellemann-Jensen & Birkemann, 2018; Kuchler, 2017; Pedersen, 2019), the importance and power of these competencies (Anders, 2017; Madsbjerg, 2017), to fervent arguments for their necessity (Hartley, 2017). This literature generally claims that those with a liberal arts or humanities background are especially skilled with regards to sense-making, relational work, communication, cultural understanding, reflexivity, and the ability to think beyond instrumental conceptions of technology. Related to this are the calls for more humanism (O'Neill, 2018) and (data) ethics (Hasselbach & Tranberg, 2016) within the tech sector. These perspectives have also been shared in the Danish debate (see for instance Pedersen and Ellemann-Jensen & Birkemann above). This paper investigates some of these arguments, exploring a case in which "digital humanists" were meant to help do digitalization differently and potentially better.

Furthermore, intellectuals from the social sciences and humanities have leveraged withering critiques at so-called "Big Tech" and new technologies, sounding the alarm over surveillance capitalism (Zuboff 2019), digital totalitarianism (Vestergaard 2019), racially discriminating facial recognition technology, big data (boyd and Crawford 2012), fake news, data ethics (Hasselbalch and Tranberg 2016), platform capitalism (Srnicek 2017) and more (Sadowski 2020; Bridle 2018; Bartlett 2018). This diverse body of work consists of analyses attempting to describe the changes being brought about by digital technologies, Big Tech corporations and nation states, and outlining the potential risks they pose to society and life in western liberal democracies.

In a related vein and often as a reaction to the overinflated promises and visions of techno-optimists such as Chris Anderson (Anderson 2008) and companies such as IBM (Stapleton 2011), researchers have proposed correctives and complements to tech discourse. They have attempted to supply alternative concepts such as thick data (Wang 2013; Hockenhull and Winthereik 2017), develop research agendas to nuance and study these technologies in practice (Kitchin and Lauriault 2014; Iliadis and Russo 2016; Winthereik and Gad 2015; Ruppert, Isin, and Bigo 2017), cultivate data and data infrastructure literacy (Gray, Gerlitz, and Bounegru 2018) engage civic society in technology design (DiSalvo, Jenkins, and Lodato 2016) and generally perform the sort of critique and "critical thinking" that is sometimes suggested to be the purview and benefit of training in the humanities, social sciences and liberal arts (Small 2013; Bate 2011; Nussbaum 2016:24–28).

The digital humanities (Liu 2012; Svensson 2010) are themselves a disciplinary development which represents a diverse response to this topic. The digital humanities have been described as both a "big tent" and a "trading grounds" (Ramsay 2011; Svensson 2012) The term encompasses a wide array of activities, from the use of digital techniques to perform so-called "distant reading" (Moretti 2013), to the promotion of digital literacy, to building labs and working with 3D-printers and more. These mirrors the overall intellectual response to the increasing importance of technology in society: critique, engagement and appropriation all in play.

All of the above efforts are necessary and laudable intellectual and practical projects to engage with technology. Yet despite them and the announcement of "techlash" (Wooldridge 2013) after "techlash" (Paul 2019), little has happened (Moore 2020). The valuations of Big Tech companies continue to skyrocket. Recently COVID-19 has underlined Amazon's dominant position and much white-collar work and teaching has pivoted to online channels in a way that MOOC-proponents of yesteryear could only have dreamed of. As Thatcher et al. have remarked on critiques of Big Data: "But big data is not going away; these critiques are not causing its downfall, but, instead, suggest its normalization and recession into the banality of the everyday" (Thatcher, O'Sullivan, and Mahmoudi 2016).

Governing bodies within the western hemisphere have also largely continued to digitalize in a variety of ways, for instance procuring AI-technology for military use (Simonite 2019), predictive policing and border surveillance (Simon 2020; Ramskov 2017) and digitalizing access to public service provisions (Alston 2019). Most recently former British Prime Minister Tony Blair has suggested the adoption of a global digital ID in order to help transition out of COVID-19 lockdown (Lauchlan 2020). The European Union's adoption of a General Data Protection Regulation and the more aggressive stance of EU actors such as European Commissioner Margrethe Vestager towards Big Tech (Satariano and Stevis-Gridneff 2019) do seem to mark some signs of taking a proactive regulatory approach, however limited in scope.

This paper investigates the role that humanists or social scientists "on the ground" can potentially play within digitalization and the uptake of technology in our society and institutions. By studying how "humanists" trained in the aforementioned competencies do digitalization work in practice, the paper offers a better grasp of what is possible. "Digital humanists" in this sense are figures which represent certain ideals and notions about competencies, professional identity and technology. The next section will examine the history and relevance of such figures, figuration and configuration.

Figures and Configuration

The use of certain allegorical or symbolic figures as shorthand for wider social or psychological phenomena have a long history, arguably going as far back as Plato and Socrates' portrayal of the sophists as symptoms of a general decline of education (Derrida 1993) and continuing to this day with recent and contemporary figures such as C. Wright Mills' "cheerful robot" (Mills 2000), Marcuse's "one-dimensional man" (Marcuse 2007) or even the so-called "Bernie Bro" (Bruenig 2015). In relation to studies of science and technology, Donna Haraway's work on cyborgs (Haraway 1991) stands out as a paradigmatic example. Both Haraway and Lucy Suchman have subsequently theorized the "figure" along with "figuration" and "configuration" in more detail, setting them out as methods for socio-material readings of and intervention into the history of technoscience (Haraway 2018) and the study and design of technical objects (Suchman 2012).

Developing and interrogating figures, or figuration, is for Haraway an engagement with the material from which narratives about technoscience are drafted, which themselves draw from the much deeper well of cultural meanings and symbols, in particular those of secularized Christianity. As she says, "Figuration is a complex practice with deep roots in the semiotics of

Western Christian realism." (Haraway 2018:9) Rather than shy away from this practice, Haraway's work engages with it by advancing composite figures of her own, such as the cyborg (Haraway 1991), the modest witness, the FemaleMan and the OncoMouse (Haraway 2018), monsters (Haraway 1992) and many more (Haraway 2003; Haraway 2013). Through these figures, she is able to complicate and question the streamlined narratives of modern technoscience: "We inhabit and are inhabited by such figures that map universes of knowledge, practice and power. To read such maps with mixed and differential literacies and without the totality, appropriations, apocalyptic disasters, comedic resolutions, and salvation histories of secularized Christian realism is the task of the mutated modest witness" (Haraway 2018:11).

Focusing on a particular figure of Haraway's, the cyborg is together with "simians" and "women," described as "monsters" who sit at the boundaries of complex systems of domination and exploitation, in particular in relation to systems of technology and knowledge creation. Writing as a female former biologist turned historian of science, Haraway incisively explores the ways in which knowledge is constructed. She instead advances the case for an epistemology of partial perspectives and suggests the cyborg as an alternative and potentially liberating figure. The cyborg is an embrace of the fact that our organic matter and technical systems are already deeply connected, as we now see with pacemakers, smartphones and other infrastructures.

Haraway's work is a philosophical critique of both epistemologies and the ontological assumptions about subjectivity which these are based in. In promoting the figure of the cyborg, Haraway draws attention to the co-constitution of our beings within technical systems. The cyborg, as she says, "is a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction" (Haraway 1991:149). Crossing these boundaries, Haraway poses questions about the nature of reality, politics and fiction. As she acknowledges, the cyborg is of course a well-recognised figure of fiction, drawing on the non-fictional (although perhaps fantastical) field of cybernetics. Haraway rewrites the cyborg, replacing its alienating cold war figuration with that of a boundary-crossing creature, not beholden to the past and open to a novel future. The invocation of the cyborg nature of human and animal existence is beyond doubt also a reference to the pervasiveness of cybernetic imaginations and universalisms (Bowker 1993) of the time.

Whilst Haraway focuses on the epistemological consequences of increasing cybernetization through the figure of the cyborg, Orit Halpern has explored its ramifications for the organization and aesthetics of urban space (Halpern 2014). Halpern's work interrogates the effects of cybernetic thinking as articulated through Norbert Wiener and his colleagues on our contemporary focus on the data-driven and data visualization. She makes the case that cybernetic notions of feedback and control have had deep ramifications for our cultural forms of perception, producing a particular kind of temporality and aesthetics. This aesthetics – beautiful data – underlies our current fascination which indeed often borders on obsession, with the ability to visualize data.

Lucy Suchman has also advanced the use of figures and in particular the notion of configuration and reconfiguration (Suchman 2012; Suchman 2007) as a method for engagement with technologies which highlights how these are always composites of material and imaginary qualities. Suchman's focus on configuration derives from her own groundbreaking work with the design of systems involving human-machine interactions. She outlines configuration as a method for studying technologies, which consists of identifying the figures or tropes present in a technology, how it is configured materially and in practice and potentially how it can be reconfigured (Suchman 2012).

Distinct but relevant work on figures has been conducted within organization studies and architecture, where Reinhard Martin's discussion of William Whyte's "organization man" (Whyte 2002) as a "module", an element that circulates in his analysis of architecture as an "organisational complex" consisting of the "aesthetic and technological extension of (…) 'the

military-industrial complex'" (Martin 2003:3–4). Keller Easterling performs a similar architectural reading as Martin, but focuses rather on the "orgman" (In Harold Rosenberg's shorthand) as an agent of global just-in-time logistics (Easterling 2004). Foreshadowing the argument she develops in Extrastatecraft (Easterling 2016), Easterling hones in on the mobility of this actor, moving seamlessly between national borders, constructing special economic zones and spreading their brand of always-on infrastructure.

Haraway has argued that technoscience in the United States is informed extensively by Christian "figural realism", carrying with it a certain understanding of time and eschatology. By pointing to this prevalence she underlines the arbitrary nature of this temporality, in an attempt to open up the history of technoscience to different readings (Haraway 2018:9–11). If this is the case for North American technoscience, it probably holds to some extent for Danish technoscience, due to the country's long protestant history and the influences of the Anglo-American university system. More directly pertinent to the purpose of this paper however, is the question of whether Danish public sector digitalization might be beholden to a certain kind of figuration?

The paper explores this question by studying, in particular, the figure of the "digital humanist." This figure is analyzed as an attempt to figure Danish public sector digitalization differently through establishing a new relation to humanist labor in an innovation project. The paper then analyzes how the digitalization work implicated in the project was actually configured and experienced by those performing it. This analysis shows that rather than providing a reconfiguration of digitalization work, the figure of the "digital humanist" was eclipsed by the figure of the "wage-subsidized worker."

Methods

The present paper is part of dissertation research investigating the use of data and increasing digitalization in the Danish public and private sectors. This paper looks at a select part of these sectors: mainly academic and wage-subsidized workers affected by and participating in the increasing digitalization and use of data. Previous work has described how hype as hot air helps make corporate sociotechnical imaginaries palatable to local Danish contexts (X and X, 2020), and how data work and infrastructures in the Danish public sector have a speculative character (X and X, forthcoming).

Methodologically, the present work is part of a wider *speculative ethnography*. This refers to an ethnography which actively engages with the speculative practices of the field under study such as widespread tech hype, imaginaries and projections. Informed by speculative research as articulated by both pragmatist (Wilkie, Savransky, and Rosengarten 2017) and technofeminist (Haraway 2013) approaches, the paper understands speculation to be a phenomenon which carries negative connotations but that the "trouble" it represents needs "staying with," i.e. being engaged and taken seriously.

In order to conduct the ethnography in this engaged way, the study has conceptualized its field as a dynamic "gyre" (Zabusky 2002) of flows between the private and public sector, rather than bounded sites. It has studied this gyre by using ethnographic methods such as participant-observation, but also by engaging with how the research itself was enrolled by informants. As a representative of academia, the author was asked to act as an expert through giving talks, organizing workshops or performing consultancy. Reflexive interaction with this parasitical (Serres 2007) dynamic was used as an opportunity to "stay with the trouble" (Haraway 2016) and develop "speculative lures" (Wilkie, Savransky, and Rosengarten 2017).

Following this approach, the ethnography has consisted of two phases. The first phase consisted of tracing heterogenous relations of organizations, individuals, technologies and

discourses by attending multiple (30+) events, workshops, conferences and seminars over the course of 1.5 years. The second phase of the ethnography consisted of a workplace ethnography, taking place over 8 months, which generated the main empirical material for this study.

The empirical material used for the analysis in this paper is comprised of 10 formal interviews (Skinner 2012; Hockey and Forsey 2012; Rubow 2010), months of ethnographic fieldnotes and jots (Emerson, Fretz, and Shaw 2011), and a collection of documents such as meeting notes, powerpoint slides, project descriptions, reports, etc. Interviews were conducted either face to face or via video call, using a semi-structured interview guide and approach. These interviews were recorded and transcribed. One interview was conducted in written form via e-mail correspondence. Interviewees were selected based on participation in or relation to the Data Project.

This material has been analyzed using a combination of approaches: ethnographic fieldnotes and jots have formed the basis for memos, which in turn helped develop thematic codes for analyzing the interview transcripts. This analysis process was informed by grounded theory as interpreted by Clarke (Clarke 2005). Documents have been analyzed for background context and by applying the notion of "figures" to the material, per Suchman and Haraway (Suchman 2012; Haraway 2018).

Context: Labor and Digitalization in the Danish Public Sector

The following section describes the public discourse surrounding humanities graduates and the conditions they face on the labor market. It then describes the public sector organization under study, how it was affected by public sector digitalization policy and the particular projects relevant to this paper, the OI and Data Project. Taken together these discourses and policies show the context within which the case being examined here took place. As the following outlines, the OI project was a response to this context, an attempt to cleverly meet goals of digitalization policy while also solving a perceived problem of unemployment amongst humanists. Informed by discourse about how humanists can contribute to the digital economy, the project sought to experiment with and make use of this contribution.

Humanists in Labor Discourse and Policy

Within Denmark, debate regularly flares up on the merit of the so-called "breadless" disciplines of the arts and humanities. Mostly, these debates have consisted of various criticisms being made of the humanities, ranging from the academic programmes being too easy (Holm 2012), being useless and unnecessary (Andersen 2014; Richter 2009) and even moralistic characterizations of academics as being lazy (Winther 2019; Politiken 2019) – with various representatives of the humanities defending themselves as best they are able (Kock 2014; Trads 2019).

The continued return of this sort of debate undoubtedly has many causes, but a central one is the focus within Danish politics on the preservation of the welfare state and the role of educational and labor policy in achieving this goal. Denmark retains a relatively strong welfare state compared to other advanced capitalist economies, and has seen limited growth in precarity amongst workers (Andrade 2015), including resisting certain parts of the "gig economy" (Thelen 2018). It is therefore also dependent on high levels of taxation, and a sufficient tax base in the form of both population and companies.

The Danish economy is export-based and focused on a mixture of agriculture, pharmaceuticals, shipping and a green energy cluster. The successes of companies such as the windmill producer Vestas and what is called the industrial "wind adventure" (Dyrekilde 2017), the insulin-producer Novo Nordisk (Sindbæk 2019) and the recent IPO of the software developer

NetCompany (Ritzau 2018) are totem poles to the belief that STEM is the path to future growth and prosperity in Denmark, and eo ipso, preservation of the welfare state. Within this sociotechnical imaginary (Jasanoff and Kim 2015) STEM graduates are therefore widely perceived to be the essential source of future Danish prosperity, whether educated from the existing population or invited as a case of "good" immigration.

Students pursuing a degree in the humanities on the other hand, are construed as both useless and a drain on the welfare state. Useless because they are thought to not be valuable to STEM companies that are thought to represent the future. And a drain on the welfare state due to the fact that tuition in Denmark is free and complemented with a stipend to cover basic living costs. Facing demographic change (Andersen 2003) and increasing global competition (Andersen 2006; Bennike 2014), many believe that Danish society cannot afford the humanities.

Despite the fact that this is not true (Dansk Magisterforening and Vesterbæk 2019), the consistent debate contributes to low professional confidence and creates feelings of stress amongst many academics and graduates with a humanities degree. Especially those entering the job market feel they have to contort themselves overtly in order to land a job as quickly as possible (Schack 2020). Compounding this sense, this category of graduates does have an elevated level of unemployment in the immediate period after graduation, particularly in the capital region of Copenhagen (Ejsing and Christoffersen 2020).

Exacerbating these feelings of stress, public debate has raged about the merits of the Danish unemployment system and what is seen as a harsh, uncompromising focus on endless activation and useless job training. While Denmark retains a welfare and social security net, it has also transitioned to a particular kind of "workfare" – meaning amongst other things the, "subordination of social policy to the demands of labor market flexibility and structural competitiveness" (Jessop 1993) – characterized and celebrated as flexicurity (Bredgaard, Larsen, and Madsen 2006; Rosdahl and Weise 2002). Concretely, to receive unemployment benefits, one must constantly be applying for jobs, taking courses and using one's network to search for a job. Many experience this system as deeply demotivating, especially when jobs are difficult to come by.

The use of wage-subsidized positions is one part of this active labor market and workfare policy, which consists of an option for an unemployed person to be hired into a time-limited position (usually four months) where their wage is subsidized by their unemployment allowance. This effectively means that the unemployed person receives the same payout as when they were "only" applying for jobs, with the organization hosting them only providing a limited amount of overhead costs. The intention with this construction is to make it possible for unemployed individuals to gain a foothold on the labor market through their temporary position, learning new skills, gaining experience and building a network of connections. Wage-subsidized positions are possible in both the public and private sectors, but public sector organizations have an annual quota as a public service.

Thus, while there are arguments for the importance of the humanities in the digital economy, and examples of successful commodification of humanist competencies (Bennett 2014; Hartley 2017), graduates with a humanities degree are exposed to a hostile public debate and are prophesized as facing difficulties in obtaining a job (or at least a well-paying one), potentially before they even begin their degree. Humanists are thus a figure of contention, both a punching-bag and scapegoat for certain issues facing the Danish welfare state. Furthermore, the unemployment system makes the prospect of job-searching one of existential dread and anxiety for many humanities graduates, including the digital humanists studied in this paper.

Digitalizing the cultural department

The Culture, Arts and Recreations Department (CARD) is the department of a municipality in the Copenhagen capital region which is responsible for coordinating and provisioning cultural and recreational offers to citizens. This includes libraries, sports facilities, concert venues and citizen services. The department both runs actual institutions which offer activities and collaborates with volunteer organisations by supporting them through training and facilities.

CARD is organized into a number of local units and a central unit. The central unit contains the organization's politically elected leadership, its executive management, a secretariat and the HSF unit which contains HR, Strategy and Finance Offices. There are four local units corresponding to the geographical areas of the municipality: North, South, East and West, and a number of cross-geographical subunits covering genre-specific topics such as 'Sports facilities' and 'Library area.'

As part of the public sector in Denmark, CARD has been subject to the ongoing "modernization and efficiency-programme" requiring the organization to continuously deliver the same services with a reduced budget. Innovation, and thereby often digitalization, has been one way in which public sector organizations have sought to meet these budget-reductions. This is in line with the overall neoliberal logic of efficiency and cost-saving in Danish national digitalization policy (Greve and Ejersbo 2008; Schou and Hjelholt 2019).

This digitalization policy has been very successful on most accounts, leading to Denmark placing as one of the most digitalized countries in the EU and even the world (United Nations 2019; UN Department for Economic and Social Affairs 2018). In practice, digitalization involves a range of changes to the public sector, which in addition to changing how citizens experience it (Jørgensen and Schou 2020; Madsen 2015; Pors 2015a), how it is managed (John Storm Pedersen 2019a), what constitutes citizenship (Schou 2018) and also transform how work (Plesner, Justesen, and Glerup 2018) within the sector takes place. These changes mean the merging, transformation or reduction of classically bureaucratic and expertise-based jobs, into a variety of other positions ranging from deskilled service-oriented tech-support (Schou and Hjelholt 2018) to highly skilled and specialized knowledge work type positions such as algorithms development or data science.

In the CARD organisation this focus on innovation and digital transformation (Pittaway and Montazemi 2020; Scupola 2018) was also present. At the time of the ethnography, the organization was pursuing a programme to create a "Data-driven Department", a cross-department course entitled "Data-driven leadership", another project called "Digital Leadership" and expanding the use of the business analytics toolset Power BI. All of these projects were directed from the HSF unit, but involved participants from the whole organization. These projects had many goals, including to enable the organization to be more attractive for employees, perform more efficiently or deliver innovative new services. A central goal however, was to "contribute directly to creating more culture for less money" as a PowerPoint slide on one of the projects described. The Organizational Innovation (OI) project was another of these projects, which is the main object of study of this paper.

The Organizational Innovation project and the Data Project

The idea for the OI project was devised by a junior director in CD, who had a penchant for developing creative project ideas and was also occupied with digitalization, robots and other emerging technologies. He combined the focus on digitalization with the observation of high unemployment rates amongst humanities graduates within the municipality.

The OI project was his proposed solution, entitled "From wage-subsidy to the employee of the future." It would allocate strategic funds to hire unemployed humanists in temporary wage-subsidized positions and set them to work on various digitalization and future-oriented projects. The municipality could thereby further its own digitalization agenda, help upskill the humanists

and potentially reduce unemployment as well. In particular, the project was conceived as preparing the organization for the future by experimenting with uncommon professional profiles who might "use humanistic competencies for digital and data-driven organizational development and ethics." The OI project is thus an example of the kind of discourse about the relevance of humanistic competencies in the digital age. The project would also be tasked with "innovating" how wage-subsidies were done in CARD, by experimenting with how the positions would be onboarded and integrated.

Funding for the project was acquired from an innovation fund: salary for hiring 45 humanists in four-month positions and for a full-time project manager. An internal candidate in a temporary position, Rebecca, was hired to fill this position. Rebecca had a background in the humanities, with a BA in rhetorics and an MA in Persuasive Design, and had been part of developing the project application. Rebecca was also one of the main proponents of the idea that the project was about hiring "digital humanists," a central figure which will be analyzed below.

The OI project concretely consisted of a number of smaller projects spread throughout the CARD organization. This paper focuses on one of these, the Data Project (DP). The DP existed for four months and was aligned to the broader organizational effort to become more data-driven, especially by the adoption of the Microsoft business analytics software, Power BI. The goal of the DP would be to map the data practices and sources of the local units within CARD, in order to create an overview and improve data governance.

Five humanists were hired to fill the positions: one central coordinator and four satellite-employees, each one assigned to a different local unit. The hired individuals had backgrounds in classical liberal arts or interdisciplinary humanistic programmes. They all identified as humanists when asked about their academic identity. Their motives for applying for the position varied. Some wished to build a network in a public sector organization working with culture, others hoped the position could lead to a permanent one, whilst one had actually applied for a different opening, but was referred to this one instead for bureaucratic reasons.

Analysis: Figures, Configurations and Experiences of Digitalization Work

The paper has so far introduced and reviewed literature on the role of the humanities and intellectual critique in the digital economy and the notion of figures, figuration and configuration. It has described its underlying methods and described the backdrop of labor and digitalization policy and discourse against which the OI project and Data Project were developed. The following section provides an analysis of how the OI project attempted to figure digitalization differently and how it was subsequently actually configured and experienced in practice.

The analysis will proceed by first analyzing three organizational figures present in the empirical material: the employee of the future, digital humanist and wage-subsidized worker. These figures provide different conceptions of the connection between labor and digitalization and digitalization work[2]. The analysis then proceeds to look at the actual digitalization work performed by the employees of the Data Project, identifying it as a composite of knowledge and

[2] The difference between work and labor is an analytical distinction within the Marxist tradition (Fuchs and Sevignani 2013). This distinction is based on an interpretation of Marx's writings which upholds that there is a difference between work, which understood "anthropologically" is a necessary part of human existence in the sense that it is needed for humans to reproduce themselves, whereas labor refers to the alienated work performed in the specific "historical" context of capitalism, in order to produce surplus value. The paper does not make use of this distinction, but instead differentiates between labor as referring to the whole or parts of the labor force and work as referring to the actual practical work done in connection with employment.

relational work. Finally, the analysis examines the attitudes amongst the employees themselves to their work, describing an ambivalent experience of feeling they could use their humanist competencies and being interested in data and digitalization work, yet frustrated by the lack of actual upskilling, organizational integration and the trajectories of the project.

Taken together, this analysis outlines how the OI project and its goal of experimenting with the "employee of the future" and the "digital humanist" in practice had some but limited success. Instead it was configured in a way such that the figure of the wage-subsidized worker was dominant, achieving limited experimentation and leading to mixed experiences and outcomes amongst the employees themselves.

Figures of Digitalization

This section provides an analysis of three different figures present in the empirical material, the "employee of the future", the "digital humanist" and the "wage-subsidized worker." They are here read as representing different kinds of figurations of labor with digitalization. The "employee of the future" is a figure with a limited presence in the empirical material which nevertheless represents a kind of speculative and open configuration in which the future is unknown and must be experimented with. The "digital humanist" is a more articulated figure that directly invokes certain skills, competencies and backgrounds in an attempt to do digitalization differently. Finally, the "wage-subsidized worker" is a figure which is more formal and neutral with regards to digitalization. As part of the wider labor market policy of activation and attempts to up-skill the unemployed, the "wage-subsidized worker" sits uneasily between exploitation and opportunity for both workers and organizations.

All three of these figures overlap and at times meld into each other in the empirical material, but represent distinct ways in which digitalization and labor are attempted figured: either as an experimental innovation with new forms of work, an intervention aimed at doing digitalization differently through humanistic competencies or as a neutrally framed labor market feature. By examining these figures from the OI project the following sub-sections analyze how digitalization as a process, labor as understood as groups of the labor market and digitalization work as concrete tasks were conceived and connected in different ways.

Figure of the Employee of the Future

The full project application which formed the basis for the OI project was entitled "From wage-subsidy to the employee of the future", and thus ties together two of the figures discussed here. The latter, the employee of the future, describes a figure the details of which are as of yet unknown, but is an experiment for wage-subsidized hires to "obtain in-demand competencies in relation to the work tasks and needs of the future"[3] such as "digital and data-driven organizational development" or "use of design competencies in the development of institutional culture and recreational activities".

This figure is loosely described and bound up with fulfilling the perceived needs of the municipality, the labor market and the individuals themselves. It exists only in the OI project document as a sort of connective tissue, defined more by the silhouette of these other actors, rather than by any substantive conception of what a employee of the future might be or need. The figure implies the need for the municipality to change in response to technological change and innovation, and proscribes experimentation as a way to do this.

Figure of the Digital Humanist

[3] From project document, author's own translation.

The term digital humanist was never actually formally explicated anywhere in the organization or project application, but was used extensively by the initial manager of the project, Rebecca. She was not the originator of the term and explains that, "As far as I know, it came from the one junior director who also came up with the project." For Rebecca, the term digital humanist and focusing the OI project around it meant:

> *Something along the lines of translating the key competencies of humanities graduates, such as thinking analytically, reflexively and critically alongside having an interest in people, language, meaning, culture and combining it with digital development, in the hopes that it might heighten the quality of that work, and possibly also lead to more ethical and well-considered directions within the digital development.*

This understanding of what it meant to be a digital humanist was also implicitly articulated by the five employees who were hired into the Data Project. When asked about their professional identity and competencies, all of them identified as humanists, and expressed an interest in people and culture. They foregrounded their methodological competencies and abilities to work with qualitative approaches, but also the ability to be curious, reflexive, conceptualize on the fly and work in a processual manner. Peter explains that, "It's not because we're sitting around and talking about Plato and so on at the meetings, but there are just some foundational forms of perception that are really good to put into play (…) in order to put into perspective, what we are actually talking about."

The focus on digital humanists was thought to be relevant for CARD because it was an organization focused on cultural activities. It was also a response to dissatisfaction within the HSF unit about the kind of digitalization efforts that had been done so far. Rebecca elaborates that, "I was tired of digitalization constantly being so hyped, and I wanted partially to complexify it and move focus a little bit from (…) gadget-thinking to a more holistic approach."

Rebecca further explains that the above understanding of digital humanists was shared by many of her close colleagues, who also had backgrounds in or were shaped by the humanities in some way. As for other parts of the organization, they showed enthusiasm for the idea, but she suspected this was also partially just because they were interested in the free labor offered by the project. The digital humanists is thus an organizational figure present in the empirical material which was used to signify a different approach to digitalization within the organization.

Figure of the Wage-Subsidized Worker

Finally, the figure of the "wage-subsidized worker" is a more formalized figure, drawing on the existing category in the Danish labor market. It is discernible through the use of the term "wage-subsidy" when describing the positions in the OI project application document, in its presence in the ethnographic and interview material, and through the general way that the work of these positions was directed.

Wage-subsidized positions, as discussed earlier, are a general feature of the Danish labor market and unemployment system, intended to act as opportunities for those without a job to gain experience, skills and network. The whole OI project was predicated on the existence of wage-subsidized workers as a structural element in the labor market enabling the "pilot project" itself. As a figure in the empirical material, the wage-subsidized worker represents both a vehicle for experimenting with and arriving at the employee of the future, and a conventional figure of a temporary employee with no specific attachment to digitalization. In the ethnographic and interview material, wage-subsidy is used to refer exactly to this kind of temporary workforce which raises a range of suggestive themes without explicitly articulating them: free labor, unintegrated tasks, an organizational obligation, toleration but not integration and sympathy for being unemployed.

Digitalization Work

Through the open windows one can look out on a blue sky dotted with cotton-white clouds. In return, the sounds of the city's traffic rhythmically booms in. A dozen employees, from local unit managers to the wage-subsidy employees, sit at the tables arranged in a horseshoe formation. A knowledge sharing meeting. Peter stands by the screen with the slides, describing their mapping of the department's data practices so far: interviews have been done in the local units, cross-referenced, and themes have emerged. He goes into the findings. Someone closes the windows. Discussions break out from time to time. What does "imprecise" visitor-counting sensors mean? Are they not dependable or do they count the wrong thing? What does the need for more "qualitative data" mean? More data variables or more interviews? A sense of tense frustration starts to fill the room. The air has grown stale. Questions are raised about the point of the project. Should it go to a higher-up? What do you need from us? Where should it go from here? No one seems to have the answers or want to take ownership. Peter and the other humanists recede, making forays into a discussion now between other stakeholders. The meeting ends. The door is opened, leading to the open plan office. Everyone evaporates on to their next appointment, leaving the humanists a chance to catch their breath but with few answers on what to do next.

This sub-section analyzes the work performed in the Data Project, breaking down what it consisted of in practice. This analysis stems from close readings of interview transcripts, ethnographic fieldwork and project documents.

The study of work is of perennial importance (Schmidt 2016), and it is therefore essential that the ways in which work and labor are changing in the digital economy be studied. This is particularly important, as this work is often precarious and reliant on the exploitation of marginalized groups (Gregg and Andrijasevic 2019) despite its proponents' tendency to describe it only in positive terms. Whether it is commodified domestic labor (Huws 2019), micro-tasking (Irani 2015; Irani and Silberman 2016), labor supporting AI-development (Tubaro, Casilli, and Coville 2020) or the monetization of online activities (Postigo 2016), the precarious dimensions of digital labor is either invisibilized or valorized as increased flexibility.

In respect to the Danish public sector, studies have focused mostly on how work is changing as a result of digitalization, examining the shifts in frontline bureaucratic work and contacts with citizens (Pors 2015a; Pors 2015b; Jørgensen and Schou 2020; Lindgren et al. 2019) or how digitalization affects public sector work itself, and can be designed for (Plesner, Justesen, and Glerup 2018; Boulus-Rødje 2018). Between these two kinds of studies, the effects of digitalization in changing public service *provisions* versus its effects on changing public sector *work*, the following account analyzes the work done in order to achieve digitalization in the first place, what is here called *digitalization work*. This is part of what others have called "digital transformation" (Scupola 2018; Pittaway and Montazemi 2020), but here focuses more on the local, detailed work of doing what in other contexts have been called "prospecting" for data (Slota et al. 2020).

The digitalization work performed by the employees in the Data Project consisted in mapping the data practices and sources within CARD, ostensibly performing the kind of knowledge work (Pyöriä 2005) they were trained to do by creating a research design, conducting interviews and collating a report. However, the Data Project also required them to engage in other kinds of work such as data work (Møller et al. 2020; Ribes and Jackson 2013), and navigating the political reality of the CARD organization. The following analysis thus points to how the work of achieving digitalization in a public sector context, and potentially in an organizational context in general, requires a wide variety of work efforts. The analysis shows how this work was configured in practice as knowledge work requiring humanistic competencies, relational work and to a much lesser extent, experimentation.

Knowledge work

Knowledge work is a very general term, utilized both in lay-person discussion, mainstream media and academic discourse. There is not a single agreed upon definition of knowledge work or workers, however the literature seems to agree that common traits are "a high level of education and skills and the use of information technology" (Pyöriä 2005).

As noted, the members of the Data Project were tasked with mapping data practices and sources throughout their organization. Concretely, they conducted this task in a self-directed manner on the basis of their education. As one of the participants, Amalie, notes about how she felt her academic qualifications matched the task: "We have had to stand on our own two legs with regards to finding the direction and how we should approach things methods-wise. In that way we have had to figure out what to do on our own, to a large degree, and in that way I've been happy to have a background in the humanities, so I could develop interview-guides and so on."

The work, as the quote attests, consisted of being self-directed in developing the investigation of data practices in the organization, first by determining what methods to use, identifying relevant people to interview and designing an interview guide. In this process, the Data Project employees emphasized their ability to structure their work and be reflexive with regards to defining what they were investigating. As Peter remarked, "We are in the process of forming a conception about something, but we are doing so based on the things we are discovering along the way. And that means, that there's a crazy amount of things to be attentive to and reflexive about."

Subsequently, the employees then executed their plan by performing these interviews with local employees working with data in various ways, distilling them into discreet findings about data practices, sources, types, challenges and worries. Here, as will be explored in-depth below, the Data Project members also used their training in qualitative methods to make sure the interviews went smoothly.

They then synthesized their material into a coherent narrative, received training in and then used the data analytics software Power BI to visualize (some of) these findings, and finally gathered these elements into a report which was presented for relevant stakeholders. The final report amounted to 19 pages, describing the trajectory of the project and its findings. The report identified seven main findings as a "Mapping product," and included an interactive data visualization dashboard on one of the seven main findings, hosted within the Power BI business analytics infrastructure.

These findings of their report can be summarized as a lack of a clear sense and practice of what it meant for the organization to be data-driven, both at a conceptual and definitional level, but also in more practical way, such as with regards to data validity, clear data practices and clear and transparent chains of command with regards to data decisions and support. This final phase of the work was problematic, drawing criticisms of the employees for the short

introduction to Power BI, its late timing in the project as well as for the limited data available with which to visualize their findings.

This work can be understood as knowledge work, but there are also elements of it which can be analyzed as a kind of articulation work (Suchman 1996; Schmidt and Bannon 1992) and data work (Møller et al. 2020; Ribes and Jackson 2013) and visualization (Tufte 2001). The goal of this was to articulate and gain an overview of data sources, processes and practices that were not well-known at the time, and engage in work of representing these and issues with them through written or visual analysis. This is similar to the kind of prospecting characteristic of data science described by Slota et al. (Slota et al. 2020).

In relation to the figures described earlier, the actual work conducted culminated in an analytical product containing both articulations and critiques of existing data practices. While this work is humanistic, in the sense that it makes use of the ability to do qualitative research such as interviews and formulate analytical insights, the role of digital technologies or experimentation were not very prominent. Indeed, the use of Power BI was not a success. However the work did to some extent live up to the idea of doing digitalization differently, given that the employees used their reflexivity to develop nuanced critiques of how digitalization, through increased focus on data, was in fact taking place. The next section will analyze how this critique was both made possible and ultimately was sidelined by another aspect of their work, what is here called relational work.

Relational work

Another aspect of work conducted in the Data Project, was how the employees had to negotiate between central and local sub-units of CARD. This sort of work can be analyzed as a kind of relational work, meaning the work that goes into creating, maintaining, understanding or observing relations to others in any social setting.

A Data Project employee, Amalie, recounts:

> *"I find it has been challenging with this role that I have, that I on the one hand am from the central unit, but on the other hand am placed in the local unit. Also because I can feel that there is a relatively big gap between the central and decentral units. Centrally they really want to talk about data, being data-driven. And it's maybe a bit, it's a different reality out here in the local units."*

As the quote details, the Data Project members had an intense sense that they had to navigate two divergent organizational realities, each with their own pressures and expectations. Amalie goes on to say that she feels like they were "a louse between two nails"[4], having to navigate on the one hand having a centrally-mandated and designated task but also being perceived as potential representatives for the decentral units, able to relay messages.

The topic of data was itself what necessitated this relational work, as the above quote also indicates. The perception of many local unit employees was that registration of data was taking

[4] A Danish idiom similar to the English "between a rock and a hard place."

time from the substantial work of delivering cultural offers to citizens, that automated data-collection such as that from visitor-counting sensors was inaccurate, that the purpose of data collection was unclear and that data was ultimately linked to cutbacks of positions in the local units. Data Project members thus encountered reactions of distrust and unease from some local employees at the very prospect of discussing data, while others made use of the interviews to express their criticisms or to attempt to influence an agenda they perceived to be unavoidable.

These different agendas and pressures positioned the Data Project employees as boundary figures, belonging neither to the central nor to the local units wholly, and engaged in a difficult balancing act of attempting to faithfully discharge their job of mapping data practices, whilst also representing local concerns, wishes and objections about the data agenda in a relevant way. Performing this work was of course a task that required a range of skills associated with qualitative research, such as building rapport and having empathy for the interviewees, as Julie relates: "When I've interviewed people I've tried to create trust to the work I'm doing, as not everyone wants to be interviewed and quoted." Simultaneously, the Data Project members also described their work as understanding, interpreting and communicating the wider purpose of the data agenda through the interviews.

This work was to some extent personal and at times even emotionally charged for members of the Data Project, as they had strong feelings about the relation between cultural work and data. Metteline describes that,

> *"when I ask about these different things, which I'm there to interview them about, there is some sort of worry, about whether something is being pulled down over their heads, that doesn't fit with how they view culture[al work], and there are definitely some apprehensions. And I agree with them very much. And I think that can be a strength, that they meet a person, where they think, okay I can say these things because she seems to agree. (…) But I have to discharge this task, and right now that's on the level of investigating and collecting knowledge. And then that has to be that."*

Furthermore, the Data Project employees were temporary workers as per their wage-subsidized positions, with a short, four-month contract. They were not embedded within the organisation in any integrated manner. As Marie recounts, "I think I felt we were there, because somebody had been told we had to be there. Not because there was someone, who was engaged in us being there." As they finished the mapping of data within the local units and all started working daily from the central unit, in order to work on synthesizing and analyzing their material, they experienced this lack of integration in both large and miniscule ways: "We were not really introduced to anyone, and were not included in any meetings, so we were all of the time kind of out of the loop with regards to what was going on around us. And it was also something entirely concrete, like if Metteline went to get a piece of fruit from the wrong basket, then she was told that that was their fruit and she wasn't allowed to take it."

The latter part of the previous quote speaks to the pettiness of office politics that almost anyone will have had experience with, but underlines how the project was organizationally

"homeless." In this way, the Data Project employees were forced to spend time and energy navigating the extended politics of the CARD organization, due to a combination of the substance of their work and their organizational position.

The Experience of Digitalization Work

The analysis has so-far identified three different figures of digitalization work, described in deeper detail the actual work and analyzed it as knowledge work and relational work. The analysis now turns finally to considering the professional identity of the project employees and their attitude to working with digitalization, analytics and data visualization. Where the first parts of the analysis drew out the figurations and actual configurations of digitalization work, this part examines what participating in this work has meant for the group professionally and in their attitudes to data and digitalization.

The Data Project members considered their work first and foremost through the actual specifications and trajectory of the project itself, and secondly through the figure of the wage-subsidized worker. They never referred on their own accord to the notion of the "employee of the future" or the "digital humanist", terms which stem from project documents and discussions prior to its actual start. They conceived of their work as 1) aiding a public sector organization in getting better at using data, 2) navigating this data agenda between local and central units through their skills in qualitative work, analysis and communication and 3) as a personal opportunity to gain experience, new competencies and potentially gain access to fulltime employment.

In assessing their subjective experience of and attitude to the Data Project, there are therefore a number of themes that are worth exploring:

- How they experienced the project itself.
- How they felt the project aided them professionally.
- Furthermore, in light of this paper's interest in the digitalization work and the emergence of figures such as the "digital humanist", it's also worth exploring what their attitudes were and are to topics such as digitalization and data visualization.

The experience of the project itself was generally one of disappointment with positive elements. The positive elements were the team cohesion in the Data Project itself, the opportunity to use their professional skills with regards to structuring tasks, performing interviews, reflecting on findings and doing analysis in an occupational setting. However the overall impression was one of disappointment, rooted in a sense of not belonging anywhere, not feeling that the work done was ultimately meaningful or useful to the organization and dissatisfaction with aspects of the project's plan.

In terms of the project's impact on their professional identity and career prospects, the graduates seemed to view it as a mixed success. Some attributed the positions gained after the end of the project to experience they had picked up during it, and others agreed that the project had given them meaningful opportunities to gain practical skills in things such as facilitating meetings. They all still identified strongly as humanities graduates/humanists, but did feel interest about other professional approaches, Amalie for instance finding that, "I still see myself very much as a humanist, but I hope that it, and I think it has, maybe kickstarted being a bit more open and curious to learn, what the [numbers-perspective] can contribute with."

The Data Project members' attitudes towards data, digitalization and visualization techniques was generally both apprehensive and curious at first. Based on their experiences in the project, they were tempered by actually getting to work with these topics in practice. They considered working with data in Power BI "fun" and "super positive," but also underlined that they only felt they had had the briefest of introductions. None of them felt confident in saying they were proficient in working with data visualization and software such as Power BI. Peter remarked on

the training they received: “I don’t think that there was a lot to it, but that it maybe has sown the seed for me later being able to upskill myself.” Indeed, they were generally critical of the limited use of data analytics and software in the course of the project, and felt it was tacked on.

In relation to digitalization as a wider change to the Danish public sector, or in society in general, their attitudes were reflected and nuanced, expressing their own take-aways from the project they had participated in. Julie argued for more qualitative data to contextualize the quantitative visitor and website statistics, but was also in favour of overall more data, going as far as to criticize the EUs General Data Protection Regulation (GDPR). Amalie did not have a strong opinion on the matter, but argued to focus organizational work with data in certain areas where there were direct benefits, rather than to try to make the whole CARD organization data-driven.

The experience of the Data Project team members was thus one of mixed success with regards to the project itself and its impact on their careers, in which they gained some professional experience in line with the intent of wage-subsidized positions. They were proud of the work they achieved, although they were unsure what impact it would have. Of the five members of the team, at least one believed she subsequently acquired a full-time job due to the position in the Data Project, and one other also got a maternity cover in the CARD organization.

Their experience with digitalization, data visualization and data work was also mixed. The particular training in the analytics software Power BI was considered a disappointment in its timing and extent, but the quality of the training was praised and the potential of using a tool like that to do data visualization in the future was something they all thought would be interesting. On an organizational, and to some extent societal level, their positions on digitalization and use of data bore traces of their experience from the Data Project work. They generally were in favor of this process, but all qualified their ideas in a number of ways.

Configurations of Digitalization work

This analysis has foregrounded the different kinds of work actually done by members of the Data Project, and how it was experienced. It has shown this to be constituted of both knowledge work and relational work. If configuration per Suchman is a *con*joining of the practical or material and the imaginary, then what does the analysis of work as it played out in the Data Project point to? The analysis highlights how digitalization work, in the case of the Data Project, drew on humanistic competency to deliver insights, analysis and critique. The project’s attempt to experiment with digital tools such as Power BI did not work well, but the work did generate reflexive critiques of how digitalization was working (and not), and how it might be improved. In order to arrive at these critiques, the humanists in the Data Project had to do relational work in order to build rapport with local employees. This relational work was also necessary due to their organizational position. However because of this position, their work was experienced as being sidelined and they felt unclear as to what impact it would have within the organization.

Digitalization work was in practice thereby configured as both knowledge and relational work. Aspects of all three of the figures of digitalization were in play, however in practice it was the figure of the wage-subsidized worker which determined the uptake of their work.

Discussion

The general increase in digitalization, reliance on data, rise of platforms and push to adopt novel technologies in the public sectors of governments around the world (Alston 2019), and indeed in many if not all aspects of the global economy means that there are continued calls for more research and workers to support this expansion. The calls for increased involvement of liberal arts or humanities graduates in the digital economy (David Budtz Pedersen 2019; Hartley

2017; O'Neill 2018) can be understood both as a defense of and attempt to adapt those disciplines, an argument for a corrective to instrumental thinking and a way to achieve better outcomes for tech. It can however also be understood as a means of mobilizing more labor in service of a digitalization agenda. This paper has investigated an innovation project which sits at the intersection of these differing but not incompatible agendas.

Just as Haraway describes the construction of "women's experience" – and the cyborg as an elaboration of this phenomenon – as simultaneously necessary fact and fiction, the digital humanist represents a similar borderland. It is a speculative fabulation, a fictional fact that hopes the work done by the digital humanists within the Data Project could be a potential different avenue for digitalization. However the digital humanist, to some extent in the same way as Haraway's cyborg, is also a deeply ambivalent figure which is embedded in the same history of militaristically informed technology, that colours our aesthetics and makes data beautiful (Halpern 2014).

The figure of the digital humanist is ambivalent however, not particularly because of this history, but because of its modern instantiations in which data is unironically lauded as "the new oil" (Toonders 2014) amidst a climate crisis. Digital humanists represent on the one hand a call to mitigate the "solutionism" (Morozov 2013) surrounding modern technology and the tendency of its proponents to "move fast and break things" (Taplin 2017), and instead argues for a more humane approach tempered by "thick data" insights (Wang 2013), ethical principles (Hasselbalch and Tranberg 2016; Aitken et al. 2020; Metcalf, Moss, and boyd 2019) and critical design practices (Malpass 2013; Bardzell 2010). On the other hand, they cement through their engagement the importance and even unavoidability of an ever-increasing role of technology in human lives and societies, from infrastructures and platforms (Srnicek 2017) to "intimate infrastructures" such as blood-sugar measurements (Forlano 2017).

This is not a new problem or tension with regards to discussions of technology. It can be traced back to figures such as the luddites and machine-stormers, but is perhaps exacerbated now as technology plays an ever greater role across domains and in societal functioning (Stiegler 2016; Stiegler 2010). What the digital humanist perhaps allows for, is a particular case which showcases some of these general issues.

As the problem is articulated here, the humanities and social sciences are as disciplines faced with a choice between Scylla and Charybdis: either technology is allowed to develop without corrective critique and engagement, or technology's hegemony is allowed to grow as also these disciplines turn to them. This opposition is of course a simplified and false dichotomy, however it highlights the real difficulty faced by trying to balance engagement in a topic with simultaneous critique of it.

This paper has examined attempts to figure digitalization in the Danish public sector in new ways as a response to Danish labor market and digitalization policy. In practice, the digitalization work of the Data Project employees consisted of doing analysis and critique based in their humanistic competencies and attempted to navigate existing organizational barriers. Due to their position as wage-subsidized workers and poor integration of the project into the organization, the employees were unsure of what it would lead to. Thus while the novel figures of the "employee of the future" and "the digital humanist" promised new takes on digitalization, it was in effect the "wage-subsidized worker" that represents the actual configuration of their work: utilization of their humanistic knowledge and relational work competencies to potentially serve the existing digitalization agenda. The reflexivity and critique represented by the "digital humanist" was neutralized by their position as poorly integrated "wage-subsidized workers."

When discussing the role of the humanities and social sciences in relation to digitalization, or even arguing for the *need* for intensifying such a relation, the take-aways of this paper are not to have more training in ethics, reflexivity or communication skills for computer scientists and

engineers (though this cannot hurt), but to center the relative arrangement of different aspects of the economy. The take-away is a call for a focus on the political economy of how digitalization and technology in general is integrated with arrangements of labor and ownership of capital. Concretely, this line of thinking has two dimensions: a research dimension that follows from this, and a practical dimension of educating and training for doing digitalization differently based on this kind of analysis.

The research dimension suggests that attempts to understand both how digitalization is achieved in practice and what it's effects are, need to take into consideration the wider relations of institutions, infrastructures, practices and capital. A recent special issue on exactly this topic (Prainsack 2020), shows the benefits of this approach in critiquing innovation (Birch, Chiappetta, and Artyushina 2020) and datafication (Redden, Dencik, and Warne 2020) to name some pressing topics. Similarly, Nick Srnicek's work on platform capitalism (Srnicek 2017) and Shoshana Zuboff's much lauded work on surveillance capitalism (Zuboff 2019) point in this direction, though the latter fails to address the role of the state (Lucas 2020).

The practical dimension is that any attempt to change current digitalization agendas should adopt this sort of orientation, if it is to have systematic impact. The Data Project members were skilled in performing the aspects of their work that concerned knowledge production and, though to a lesser extent, the organizational reality. However they had an acute sense that the result of this work would not be taken up by the organization in any meaningful way. A better understanding of the political economy of the CARD organization and the wider economy it is embedded in would have helped them act in order to make their work and its findings more impactful.

This point can be further extended to the pedagogics of training graduates to be "digital humanists." While skills such as "critical thinking" or the ability to use qualitative methods are laudable and necessary, they are always at risk of being applied in instrumental ways. Adding training in political economy would complement these existing perspectives by supplying a framework for understanding the dynamics of *why* digitalization is undertaken beyond simple stopgap answers such as "efficiency" or "improving service."

Digital welfare & the future of work

As digitalization and automatization of the economy continues apace, or perhaps picks up in light of the COVID-19 pandemic (Frey 2020), old questions are again raised about the future of work, universal-basic income (Bregman 2018) and increasing concentration of wealth (Piketty 2020). The findings of the present paper obviously offer limited insights with regards to these grand questions. However in line with the previous discussion and the focus of this paper on how digitalization work is carried out, some suggestions are nonetheless appropriate.

Work is the axis around which the social democratic project of the Danish state turns. It is the axiomatic principle of this political project that work in and of itself is a social good, as being a part of a workplace creates social ties and is fundamental to a meaningful existence. Furthermore, work is a central element of the Danish political economy, insofar as the welfare state requires high levels of employment in order to ensure a sufficient tax base. As not just a welfare state, but as a "competition state" involved in the global economy and dependent on exports, Danish policy-makers and business leaders have pursued increased digitalization to improve public sector efficiency and a strategy of investment in technology and human capital to make its goods and services attractive.

Based on this analysis, there is little chance of the appearance of any radical change with regards to the future of work in Denmark. Instead, investments continue to be made into digitalizing not just the state apparatus in terms of contact with the state, but also core aspects of delivering welfare provisions and work itself. This raises the question of the development of

digital welfare (John Storm Pedersen 2019b) or welfare after digitalization (Galis and Winthereik 2019), rather than the digitalization of the existing welfare state (Schou and Hjelholt 2019).

When the Danish welfare state was first founded, it was subject to wide public debate involving not only differently aligned politicians, but also authors and intellectuals (Kjældgaard 2017). Central to this debate was the question of what the meaning or purpose of the state was to be. A prominent answer to this question at the time, formulated by the Danish author and philosopher Villy Sørensen was that "the silent precondition for the whole welfare system is that it is only a means, not an end; social security can never be a goal in itself, only a backdrop for the individual's personal existence" (Kjældgaard 2018:279). As Kjældgaard points out, this sentiment was quickly made obsolete by various reforms already in the seventies and the welfare state has now very much become an end in itself in Danish society.

The digital welfare state and the emergence of digital welfare so far seem to continue this tradition of being an end rather than a means. To study how technological changes such as those represented by digitalization and automation affect welfare and work, we must not only study networks, infrastructures, practices, professionals and imaginaries – we must also understand the wider political economy in which these operate and in turn constitute. On integrating these perspectives, we may be able to point to how digital welfare as a means rather than ends and a different future of work, is possible.

Conclusion

This paper has investigated the digitalization work of a public sector innovation project, describing how this work was figured in principle and conducted in practice, and how the work was experienced by the employees of the project.

The analysis identified three distinct but overlapping figures in the form of the employee of the future, digital humanist and wage-subsidized worker. The analysis then showed how the digitalization work of the project in practice involved humanist or qualitative knowledge work and relational work to navigate the internal political reality of the organization. Finally, these analyses of figures and work were contextualized by the meaning and experience of it by those conducting it.

The paper provides a contribution in the form of a study of how digitalization is done in practice, and the role of those trained in "critical" disciplines such as the humanities and social sciences in this work. Digitalization work, the study attests, is a complex endeavor, which can benefit from professionals with these backgrounds, but will generally encounter many difficulties in doing so.

The paper discusses these findings in relation to ongoing discussions about the relevance and need for human-centered, sense-making or critical perspectives within digitalization or with regards to Big Tech and the digital economy. The view is taken that while more of such approaches are no doubt helpful in providing what could be call "a human face" for digitalization and also improving the efficacy of this work, what is more pressing is to both research and educate for understanding the wider political economy within which this work takes place. In particular in the Danish context, it seems evident that digitalization is pursued to preserve the existing arrangements of and around the welfare state. Until research and education of critical perspectives on digitalization take a step back and also ask what the wider meaning of this state and its political economy is, we will continue to reproduce its issues and forms of work.

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