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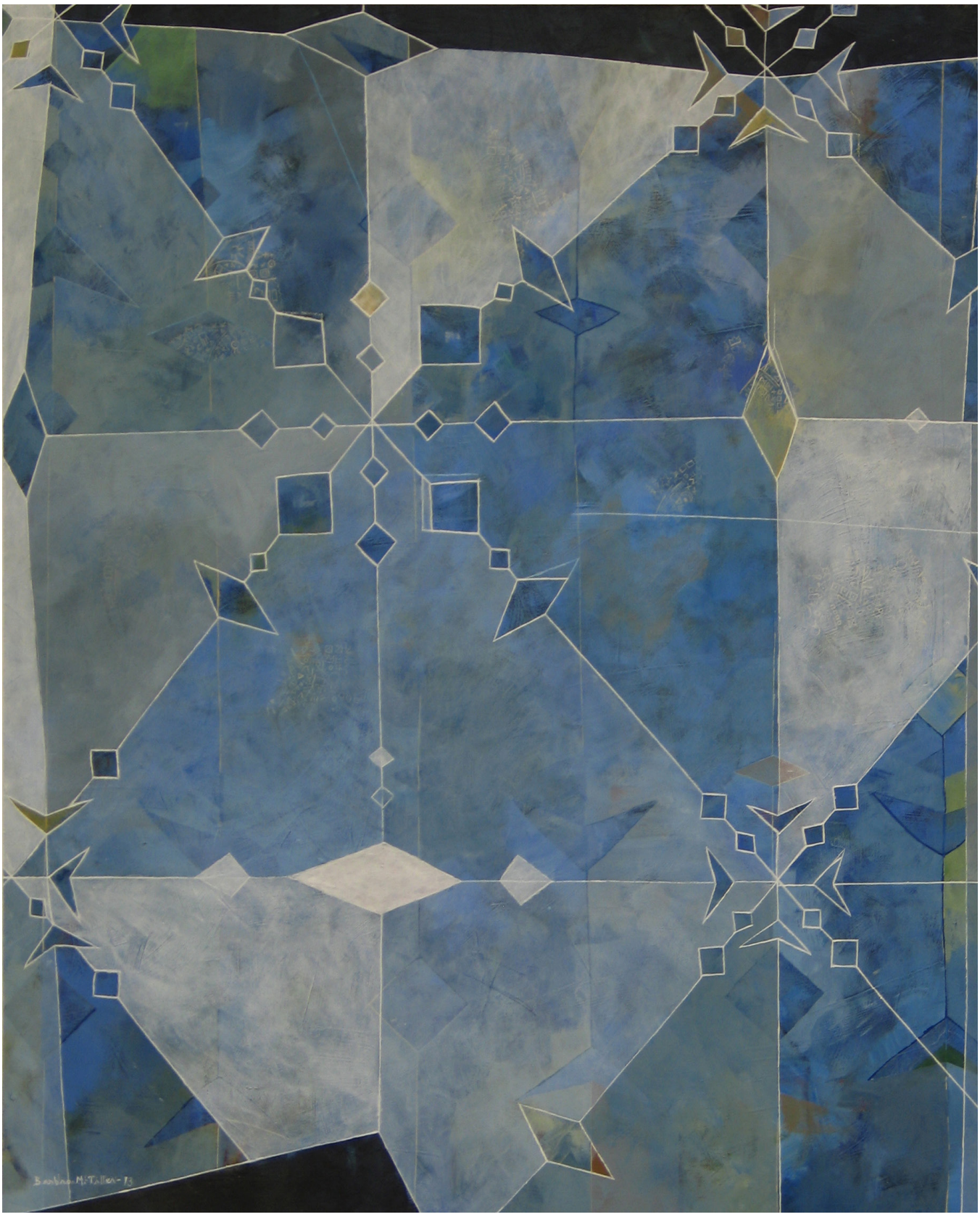

"Mønster 6" by Barbro Maria Tiller

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Editorial

Articles

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EDITORIAL

Knowledge, technologies and the police

By Jenny Maria Lundgaard, Brita Bjørkelo, Guro Flinterud & Johanne Yttri Dahl

This issue of the *Nordic Journal of Science and Technology* (NJSTS) is edited by the members of the research project 'A Matter of Facts: Flows of Knowledge through Digitalized Police Practices'. The project is carried out at the Norwegian Police University College and is funded by the Research Council of Norway (grant 301762). The aim of the project is to explore digital knowledge production in policing. Digitalization plays a major role in current plans and strategies within the Norwegian Police Service and digitalization is drawn out as a key process both for fighting and preventing crime as well as increasing efficiency of police work in general. As digital tools are presented as the solution to a host of challenges, there is also a need for more critical reflections on how digitalization affect police practices and knowledge production. Our project thus asks; in what ways does digitalized police practices affect the production of knowledge, both within the police, and in their contact with the public?

We are delighted to present this special issue which examines human-technology interactions and the influence of technologies on knowledge production within policing. We invited scholars interested in some of the same topics as us to contribute, and the result is the seven articles featured. They all examine the role of knowledge and technology in policing in a Nordic context, using perspectives from the tradition of Science and Technology Studies (STS). Each contribution offers new insights into how the interplay between humans and technology shapes what is recognized as 'knowledge' in the context of policing.

Human-technology interaction in police work shape how meaning and value is ascribed to information. These processes are fundamental in creating and sustaining what is considered 'knowledge', which again takes part in shaping the worldviews that the police build their work on and disseminate to the court and the public. In a democracy and under the rule of law, critical scrutiny of the foundation and becoming of 'knowledge' in and by the police is crucial, given their significance and authority in society. As knowledge and technology are inextricably intertwined, this becomes even more pertinent as new technologies emerge and digitalization increased. Decades of science studies scholarship has demonstrated the different ways that knowledge is not a question of finding one pre-given truth, but a process contingent on material-discursive and socio-technical entanglements. Although the role of technologies in policing has been subject to increased scrutiny over the past years, their concrete role in knowledge production has been less studied.

The articles in this issue employ a broad range of theoretical concepts, amongst them actor network theory, epistemic cultures, theories of visual evidence, and socio-technical imaginaries. They underscore the complexities of policing by addressing operational, forensic, and intelligence-led practices, as well as plural policing and the challenges of inspecting the digitalization of the police. They explore the roles of various material artefacts, such as physical evidence, digital registries, and drones, as well as that of auditing models, crime prevention technology, and checklists. Each article provides new explorations and insights into the empirical field they scrutinize, and together they showcase the relevance of studying policing for academics in the tradition of STS, as well as showing the significance of perspectives from STS for police scientists.

The first article is «A Matter of Facts: Mapping Materialisations of Digitally Mediated Knowledge in the Police», by **Guro Flinterud, Jenny Maria Lundgaard, Brita Bjørkelo** and **Johanne Yttri Dahl.** The article present core perspectives from our research project that exemplify how theoretical concepts from STS can shed light on policing. Discussing three cases, the article explores how human interaction with digital technologies take part in shaping what becomes considered 'knowledge', both within the police and in society at large.

In «Negotiating digital traces: The epistemic power of recorded police data», **Helene O. I. Gundhus, Pernille Skjevrak** and **Christin Wathne** investigate how *digital traces* following in the wake of intelligence-led policing affects workflows and knowledge production in police units working with radicalization of youth. Analysing officers' experiences, they find that these traces are not necessarily used as envisioned and discuss the importance of police culture for how digitalization plays out in practice.

Jenny Maria Lundgaard examines the relationship between *seeing* and *knowing* in «Seeing as One? Materialisation and Distribution of the Police-drone Gaze», where she explores how drone technologies shape the police gaze. Through ethnographic analysis, she studies how drones reshape professional vision in operative policing. While intended to simplify decision-making by providing trustworthy images, drones can also complicate these processes, and achieving a mutual situational understanding in ongoing police operations remains a complex and delicate endeavour.

In «Making space for digital statecraft: The work of consultancy models in an audit of police digitalisation» **Gro Stueland Skorpen** and **Hilde Reinertsen** empirically explore how state auditors use "digital transformation" models to evaluate the digitalisation of the Norwegian Police Service. While the models offer clear directions for achieving 'digital maturity', they lack specific guidance on implementation. The authors illustrate how these consultant-developed models influence the public sector and are engaged with differently by auditors and the police.

«Beyond Error Detection: The Performative Role of Checklists in Shaping Forensic Practices» by **Nina Sunde** explores how checklists may enhance the quality of digital forensic analysis. She examines how checklists extend procedural use and actively shape forensic report practices, as well as the content and quality of such reports. Drawing on practitioners' experiences and peer reviews from a Quality Control Project, Sunde shows how checklists enact professional, ethical, and legal standards, highlighting their transformative capacity.

Maja Vestad explores how objects at crime scenes can disclose ordinary human behaviour and daily routines within the extraordinary event of the crime, in «From crime scenes to digital spaces: A mundane object's journey through forensics». She follows the journey of a seemingly ordinary sock as it transforms into something forensically informative through various technological interactions. Thus, she reveals how forensic knowledge emerges as material objects transcend into digital representation and offers a new lens to explore knowledge production in police investigations.

In «Longing and Lacking: Pasts, presents, and futures in municipal crime prevention technology» **Katarina Winter** investigates how the expectations of a leading crime prevention technology, referred to as 'System X', producers and users materialized in practice. With the use of concepts of articulation work and sociotechnical imaginaries the article findings reveal how imaginaries of the past, present, and future is integral to the establishment of System X. The study highlights the importance of critically analyzing optimism-driven technologies and their tendency to obscure the complex realities they aim to address.

We would like to express our sincere gratitude to the authors for their contributions and for selecting our special issue as the platform for their work. It has been a privilege collaborating with you all, and we have gained invaluable insights from reading your articles. With great pride, we now present this special issue to both academics and police practitioners. We are confident that the empirical findings, theoretical reflections, and thought-provoking ideas in these seven articles can inspire further advancements in both police research and practice.

Jenny Maria Lundgaard, Brita Bjørkelo, Guro Flinterud & Johanne Yttri Dahl
Special issue guest editors

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A MATTER OF FACTS

Mapping Materialisations of Digitally Mediated Knowledge in the Police

by Guro Flinterud, Jenny Maria Lundgaard, Brita Bjørkelo & Johanne Yttri Dahl

Digitalisation and the use of technology are at the core of knowledge production in policing. This paper presents various ways in which perspectives from the diverse field of science and technology studies (STS) can provide new insights into studies of policing. In detail, we suggest ways in which STS, with its broad and open perspectives, can be employed to investigate how different practices involving human–technology interaction within policing act as authorisation processes that turn uncertain information into facts. Through theoretical and empirical examples, we exemplify how STS perspectives can be used to address knowledge construction in three areas of police: operative practices, online presence, and criminal investigations. These examples demonstrate that perspectives from STS are relevant to many areas of policing as digitalisation and the production of digital information affect and change policing, not only at the micro-level but also as a whole. By doing this, we hope to present the field of STS with an organisation that is less commonly associated with it and police researchers with new perspectives on the interplay between technology and knowledge in policing.

Keywords: Digitalisation, police, STS, knowledge, production

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Introduction

This article originated from discussions in our interdisciplinary project about how digital technologies and humans co-create knowledges in, and in conjunction with, different parts of the police as an organisation. It presents various ways in which perspectives derived from the diverse field of science and technology studies (STS) can provide new insights into studies of policing. Rather than providing a detailed introduction to STS and its historical development (see e.g. Fujimura & Holmes, 2019), we suggest ways in which the tradition, with its broad and open perspectives, can be employed to investigate how different practices of human–technology interaction within policing work as authorisation processes and turn uncertain information into facts (e.g. Shepard, 2022). Including the ways technological developments might undermine and obscure how knowledge production is a cultural process.

Both within the police as an institution and in its interactions with society at large, human interaction with communications systems, registries, databases, software, social media networks, and devices shape the foundations of what becomes 'knowledge'. Our theoretical stance is drawn from the overarching assumption that it is through the materialisation of information that authoritative facts are made. What is deemed *information* or *facts* is not static but rather constantly emerging through practices, which in contemporary society are increasingly intertwined with digital technologies (e.g. Kaufmann, 2023, Lundgaard et al., 2022). As such, we argue for studying the police organisation and its knowledges as materialised from its practices. Information is always "in-formation" (Kaufmann & Leese, 2021, p. 69), and in an increasingly digitalised police organisation, this makes the co-constitution of knowledge through human–technology interaction a particularly fruitful perspective. The process from information to fact is scrutinised by following the movements and flows of data and information and exploring the becoming of knowledge in various parts of the police as an organisation.

A common way to understand the relationship between technology and the police, is through distinguishing between *digitalisation* and *digital transformation* (see e.g. Seepma et al., 2021; Terpstra, 2024). While the former refers to the process of replacing analogue tools with digital ones within specific organisational work contexts, practices, or processes, the latter suggests that larger practices and structures within an organisation are being challenged or undergoing significant changes (e.g. Ask & Søraa, 2023; Flyverbom, 2019; Stark, 2020). Taking this broader perspective, our focal point for this paper is how knowledge is materialised and transformed through flows of information, which Kaufmann (2023) called the 'life cycles of data'. We are interested in how knowledge materialises in processes that include actors, both within and outside the organisational structure.

We begin by presenting some of the existing social science studies on policing and technology, followed by a conceptual and theoretical framework for researching police within STS. In this part, we also present an example from previously published work from the project, which is an empirical exploration of two software systems used by Norwegian police emergency control rooms. These are their core system, for call handling and incident logging, PO (short for *police operative system*), which is used for call handling and incident logging, and the social media platform X/Twitter (Flinterud & Lundgaard, 2024; Lundgaard et al., 2022). We then present three brief cases that exemplify some of the nuances provided by STS perspectives to address knowledge construction in three parts of the police: operative practices, online presence, and criminal investigations. The examples show us that perspectives from STS are relevant to many areas of policing and that digitalisation and the production of digital information affect and change policing, both at the micro-level and as a whole. By doing this, we aim to present the field of STS with an organisation less commonly associated with it and police researchers with new perspectives on the interplay between technology and knowledge in policing.

Technologies in Policing

Technology has always played an important role in policing. Technologies come with promises (Marx, 1995) that are often linked to efficiency (Lum et al., 2017) or that are presented as quick fixes to various problems, including crime (Egbert & Leese, 2021). Technologies used in policing can be both manual and digital (Byrne & Rebovich, 2007; Harris, 2007; Lundgaard & Sunde, 2025), but our focus here is mostly on digital information technologies.

Police scholars have explored information technology in policing since its integration. Digital tools meant to fight crime through better knowledge have fundamentally altered policing by making police officers knowledge workers (Ericson & Haggerty, 1997) and have led police organisations to turn to science to remedy the shortcomings of a purely experience-based knowledge (Ericson & Shearing, 1986). Manning explored the role of various analytical tools (1988, 1992, 2008), showing how technologies both provided new opportunities for crime work and were met with organisational hindrances. The intertwinement of technologies in organisations showcases how social context contribute to both technological success and failure (Ackroyd et al., 1992) and how the intersection of science, technology, sociology, and law is always complex (Lynch et al., 2008). This research, in line with other studies (e.g. Gundhus, 2009; Sanders & Condon, 2017), showed how technologies are among the greatest contributors to changes in policing (Chan, 2001). However, not all change has been positive; related to increased use of digital technology are dilemmas linked to militarisation, coerciveness,

privatisation (Byrne & Marx, 2011, p. 1), privacy (Rouvroy, 2008), and police discretion (Gundhus et al., 2022). In this article, we are concerned primarily with the role technology plays in knowledge production and how it co-creates what eventually gains status as 'facts', as well as with concerns regarding police legitimacy, accountability, and the much-contested ideals of objectivity (Gundhus, 2013; Vestby & Vestby, 2021; Wood et al., 2018).

Society continues to face rapid increases in digitalisation (Sunde & Sunde, 2021), and new technologies come with new or enhanced affordances. Digital tools and technologies provide ways to materialize information so that it can be stored, altered, moved, or translated, making it something that is best understood as very lively (Kaufmann, 2023). The collection and storage of data in police systems shows great potential for research (i.e. Bjelland & Dahl, 2017; Hohl & Stanko, 2024; Stanko & Hohl, 2024), but the limitations of and dilemmas with these systems must also be explored to understand their role in the production of knowledge (Flinterud & Lundgaard, 2024; Lundgaard et al., 2022).

The increasing datafication of policing (Chan et al., 2022), as well as the rise of digital forms of governance, has become subject to critical scrutiny from academics who have highlighted that data, and especially what has been coined as big data (Završnik, 2017), is increasingly shaped and governed by algorithms (Kaufmann & Leese, 2021) and presented as something that will help predict uncertain futures (Aradau & Blanke, 2017; Egbert & Leese, 2021). The affordances of these technologies fuel how tools are evaluated and found accountable (Bennett Moses & Chan, 2018), and as algorithmic patterns gain authority, their varying, opaque, and fundamentally political understandings of crime feed back into policing and society (Kaufmann et al., 2018).

Although there is currently much focus on new, and at times not yet fully developed technologies, there is still much to be explored in the systems and technologies that have been part of policing for decades (Lundgaard & Sunde, 2025; Vestad, 2024). Therefore, our project is not directed solely towards the latest technologies but takes into consideration technologies that are taken-for-granted.

Our aim here is to contribute to the growing body of empirical research and to apply theoretical scrutiny at the intersection of policing, technology, and knowledge production. Inherently, the above ideas underline the importance of further study of the fast-evolving use of technology in policing to explore the wider implications of what the technologies themselves do and what they do together with humans. In this article we focus on how knowledge materialises through flows of information in the Nordic police setting. We turn to the specific practices and materialities of the technologies by conceptualising their agencies in multiple situated police contexts. By viewing police and technology through an STS lens, our discussion will provide insights into how practices arising from the use of technologies are also knowledge producing. In the following section, we dive further into the theoretical framework, which we believe is fruitful for further exploring these questions.

Theoretical Perspectives: Material Agency as Inspiration

The premise of several founding scholars of STS in general, and of actor–network theory in particular, was the emphasis on the mediating role and agency of material objects and technologies (Callon, 1990; Latour, 2005; Law, 2007). This notion serves as a key inspiration as we explore the role of technologies in policing. Other scholars took this view further, emphasising agency as arising from the relations between non-human objects and their surroundings (Mutlu, 2016, p. 174)—what Barad (2007) called *intra-actions* (p. 33). In this paper, we follow this line of thinking, conceptualising agency as the outcome of meetings between humans and technologies in contexts that are the product of a specific situation and not pre-existing qualities inherent to interacting agents. There are important implications of this thinking that go beyond semantics. This means that every phenomenon—situational or organisational—must be scrutinised in its specificity through its practices.

Studying the police is often understood as synonymous with studying the various effects of policing as a social practice. Understanding police practices through perspectives from STS that emphasise how objects have agency, we highlight the role that digital tools and technologies play in establishing these practices. This means looking at practices in a broader sense and focusing on what current socio-material practices in the police as an organisation make it possible to know. It also means that these practices must be studied inclusively—that is, not discarding what at first glance does not seem relevant to policing but including all the elements constituting police practices, from drones (Lundgaard, 2023, and this issue) to the form and content of posts on social media platforms (Flinterud, 2022). It also means acknowledging that practices that take place at the administrative level also shape police knowledge production (i.e. Asdal & Reinertsen, 2022).

Socio-materiality: Understanding Complex Human-Technology Configurations in the Police

The previously mentioned focus on agency arising from practices resonates with theories and methods in studies of what is actually taking place at work (Barley & Kunda, 2001; Orr, 1996). The police as an organisation, along with the workplaces therein, is embedded in societal contexts, physical places, and social relations. Police workplaces are characterised by different work groups (e.g. disciplines) with different ways of reasoning (e.g. logics) and closely associated tools (e.g. software).

Rather than conceptualizing these as separated entities and investigating the associations, interactions, and causal effects between them,

a socio-material perspective views the organisational practices of which these are all part as relational in that the human and non-human co-constitute each other (Orlikowski, 2007). This opens questions such as what characterises 'the *actions* that perform a particular phenomenon' (Barad, 2003, p. 815, cited in Scott & Orlikowski, 2014, p. 875; our italics). This implies that what an organisation 'knows' is co-constituted by, and is a result of, what workplace artefacts know (Bechky, 2003) and the knowledge of the users, as such knowledges are co-created through intra-actions. As such, no knowledge is solely technical (e.g. software), human (e.g. expertise), or a practice (e.g. procedure).

Numerous technologies, both manual and digital, are used in policing, and they all play a role in shaping police practices, making policing a highly socio-technical environment (Lundgaard & Sunde, 2025). Socio-material perspectives offer a lens that yields access to knowledge about how knowledge claims and meaning are intertwined with settings, artefacts, and technology use in the police. Taking the stance that the material and the social are intimately related, socio-material perspectives are useful in illuminating and challenging organisational-level practices that are taken-for-granted (Orlikowski & Scott, 2008). One taken-for-granted organisational-level practice in the police is the movement and flow of information and how that materialises into what the police as an organisation holds as a fact at any given time.

The Becomings and Transformations of Data

By theorizing agency as co-constituted between humans and objects we gain tools to explore the becomings and transformations of data in policing. Data and information are often framed as something given, but as Kaufmann (2023) showed, they are lively and constitute something that 'actively changes and is changed in processes of making, shaping, and giving form' (p. 1). In these processes, both humans and technologies play an active role. Our aim is to contribute to the understanding of the role that digital data play and to conceptualise the agency of digital technologies in policing. Such a theoretical approach means we can empirically explore how information is collected, shaped, transferred, and presented (see Kaufmann & Leese, 2021). By following flows of data, we can illuminate and understand taken-for-granted organisational practices within the police. Lundgaard and Gundhus (2024) called this *a game of Chinese whispers*, pointing to police intelligence processes. Police intelligence is a managerial effort where data is collected and analyzed to provide support for decisions and resource allocations (see Gill & Pythian, 2018; Ratcliffe, 2016), making digital systems crucial for the collection, storage, and analysis of data (Gundhus & Lundgaard, 2025). The game of whispers points to how data collected in one context ends up being used in another, and how it along the way is reinterpreted and influenced by the human and non-human actors it encounters. These processes construct meaning, convergence (Callon, 1990; Cressman, 2009), biases (Babuta & Oswald, 2019) and is influenced by the affordances of the digital systems in significant, but not always traceable, ways (Lundgaard et al., 2022).

These processes are connected to what has been termed data-fication, meaning that 'social phenomena are put "in a quantified format so that [they] can be analyzed"' (Mayer-Schönberger & Cukier, 2013, p. 78, cited in Chan et al., 2022, p. 1). Datafication describes how, in digitalised societies, human activities increasingly materialise as digital traces—the analysis of which is then reflected to us as 'reflections of knowledge [that] inform action and so can be seen to shape social domains' (Flyverbom & Murray, 2018, p. 2). Thylstrup (2019) criticised the tendency to view datafication as a way of repurposing old data to create new insights, pointing out that the traces produced can also be conceptualised as waste, explicating the problematic sides of recycling and repurposing these traces through analysis. While knowledge processes involving digital technologies are shaped by and shape practices, the idea of a life cycle of data and datafication as recycling reminds us that the facts they produce are not, in and of themselves, necessarily more accurate or trustworthy. Rather, they are materialisations of practices and cannot be understood as external to the phenomena from which they emerge.

Conceptualising Police, Technology, and Knowledge

Police, technology, and *knowledge* are not in themselves singular categories whose meeting is the sum of their pre-existing states. Instead, meanings arise when they intra-act, when they are practiced, and when they co-evolve in specific situations (Barad, 2007). While analyses are always predicated on our previous knowledge and preconceived categories, the concept of intra-action reminds us that meaning making is situated and processual: if we want to know how the digitalisation of the police relates to knowledge construction, we must be open to the unexpected and pay attention to minute details as they unfold. There might be new and surprising agencies arising from within each intra-action that would not have been recognised if we had conceptualised it only as a meeting between pre-existing agencies. Each intra-action is different, and as a result, police, technology, and knowledge has different meanings in different contexts.

The vantage point for writing about the police in this sense is to understand it in its multiplicity as a concept and organisation that is practiced in a wide variety of contexts. In this sense, we follow Mol (2002), who called for the study of objects as they are 'enacted in a variety of practices', with the vantage point that knowledge should no longer be 'treated primarily as referential, as a set of statements *about* reality, but as a practice that interferes with other practices' (pp. 152–153). In this article, we operationalize the multiplicity of the police by zooming in on three areas of a specific police organisation, the Norwegian Police Service (NPS). We do this to provide insights into the complexity and diversity of the practices that constitute this organisation and its many roles in and effects on contemporary society.

Our theoretical argument is structured along the lines of the internal and the external—what Sheptycki (2017) called the front- and backstage divide in policing—making an analytical cut between technologies used as tools for improving policing and technologies as tools for interacting with the public. In practice, these concerns are interlinked, not least through the assumption that more technology equals more efficient policing, which raises trust, and that trust creates good relations with the public, which in turn provides grounds for more efficient policing. One example is the emergency control room, which relies heavily on internal digital systems when handling incidences, from receiving and assessing calls to dispatching patrols (Lundgaard, 2021), but also has an important external function in alerting the public about relevant emergencies and incidents. This was previously mediated through traditional news media, but became a digitalised process mediated through the open web (Flinterud, 2022; Lundgaard et al., 2022). The analytical benefit of making the cut between technologies reaching inwards and outwards is that it highlights the agencies of the technologies as they arise from clearly defined practices (Barad, 2007, p. 175). All technological devices or pieces of software are implemented with a purpose and conceptualising their purposes as primarily fulfilling internal or external needs by focusing on practices allows us to more clearly describe the complexity of the knowledge production embedded in the technologies the police use.

The internal and external dimensions of machineries of Police Knowledge Construction

Two publications from our project have explored the relationship between the external and internal, focusing specifically on the agency, process, and use of the PO call-and-dispatch system and the social media platform X/Twitter (Flinterud & Lundgaard, 2024; Lundgaard et al., 2022). In one of these publications, the practice-rich control room was conceptualised as an *epistemic culture* (Cetina, 1999). An epistemic culture 'is designed to capture … interiorised processes of knowledge creation. It refers to those sets of practices, arrangements, and mechanisms bound together by necessity, affinity, and historical coincidence which, in a given area of professional expertise, make up how we know what we know' (Cetina, 2007, p. 363). Here, PO is understood as having agency within the knowledge production inherent in the work of defining and understanding incidences. Within these bounds, knowledge is the sum of the information that helps make sense of what is happening 'out there', where the caller and the patrols are. In this setting, PO has the agency of materialising and reducing the complexities of the sometimes unclear and messy information provided orally by the caller (Lundgaard, 2021). As such, the structure of PO merges seamlessly within the epistemic culture of the control room and is tailored to its specific needs.

Bringing in the external perspective through their use of X/Twitter, Flinterud & Lundgaard, (2024) highlight a more disruptive material agency, bringing out the complexity of knowledge production in the control room. Employing Ingold's (2008) notion of meshworks, the control room's use of X/Twitter was interpreted as creating a passage through which the consensus-based knowledge within this bounded epistemic culture moves into a different epistemic environment in which it takes on different meanings. Through this passage, the situated knowledge of the control room becomes condensed and reduced information about incidents, while also feeding into more generalised conceptions about the police as seen from outside, ranging from praise to criticism. Dividing analytically between the internal and external allows for separation between the different types of knowledge construction in which the control room takes part through the epistemic agencies of the systems they employ, showing some of the ways in which their technologies make them part of the wider societal machineries of knowledge construction.

Information Flows in the Police – Three Cases

As stated above, the vantage point of this paper is to study the police in its multiplicity, highlighting the flows and differences resisting an understanding of 'the police' as a unified whole. In this section, we present three aspects of police work with the intention of exemplifying how the perspectives outlined above can be used to study the police from an STS perspective. We now move on to three cases that present a sample of the multiplicity of police practices: (a) the role of digital technologies in emergency patrols; (b) the use of social media platforms for outreach purposes; and (c) the use of DNA in criminal investigations. Our focus is on the epistemic aspects of the organisation and its practices, and how technologies take part in its knowledge construction through intra-actions within human practices.

Operative policing: A growing datafication of the street patrols

What is traditionally understood as being at the core of policing, patrolling the streets and responding to incidents, has been made possible by distinct technologies. Harris (2007) showed how three technologies have defined policing on the beat—namely, the car, the radio, and the telephone—and how the sum of these has shaped policing into what we recognise it as today. Response patrols are still dependent on these technologies to such an extent that it is hard to imagine how policing could be done without them and how the role and responsibilities of patrols could be fulfilled if one or more were missing.

Today, these basic technologies are accompanied by newer tools, many of which are digital. In the Norwegian police the first digital device to be included in the patrol vehicle was a router, but today, vehicles are equipped with numerous devices and digital artefacts (Lundgaard, forthcoming). GPS transmitters, radio systems, and various trackers, as well as computers and various displays, connect

vehicles to other sites and systems in multiple ways. Police units are thus a complex assemblage of humans, things, connections, and technologies. Crucial here are computers: From 2015, iPads became standard equipment in Norwegian patrol cars (Lundgaard, 2021); smartphones with various police apps form part of officers' personal equipment; and laptops are now becoming a new standard in Norwegian police vehicles. These elements provide patrols with immediate access to databases and systems that were previously only available at the police station and make it possible for officers to receive information, conduct searches, and log information to a greater degree than before. Their use also makes patrols responsible for using and logging information themselves. As such, these tools have become part of police practice and are shaping the way police knowledge is created in the operative context.

The role of these technologies in contemporary patrolling has become an essential topic for researchers interested in the interactions between humans and technologies in policing, as has understanding the ways in which information comes into being, flows, and is transformed in these networks of technologies and human interactions.

The flow of information during an early stage of an emergency or incident usually starts in the emergency control room before a patrol is on site. Understanding how information is shaped into in situ knowledge and how it then moves further into systems and registries, demands an understanding of emergency control room practices as well as of the patrols and systems used in both these contexts. The control room answers and assesses calls and directs and steers patrols and other police units. Its main tool, apart from radios and telephones, is the previously mentioned system for call handling and control and command, PO (Lundgaard, 2021). This system has been in use since 1993 and is owned and developed in-house by Police IT Services. It started as a simple computer-based notepad and system for control room oversight but has expanded both in form and function. There are now links from other systems and databases to PO that connect information from other parts of the police, registries, and historical events to current incidents (Flinterud & Lundgaard, 2024). For the control room operator, making sense of an incident includes conducting searches in databases and systems and connecting this information with the information received by phone or radio. Through the actions of humans and technologies, information is distilled into knowledge (Lundgaard, 2021). Once information has been entered into PO, it can spread in multiple ways. The most immediate way is to send it to patrols and tactical officers on their way to an incident, but the information can also be used for managerial and statistical purposes (see Lundgaard, 2021; Lundgaard et al., 2022)- It can also be picked up, looked at, assessed, and entered into new police contexts, such as a source for intelligence officers (Lundgaard & Gundhus, 2024). In these ways, what started out as a complex and unpredicted situation, followed by acts of information reduction to make the incident manageable, can become a basis for the creation of knowledge that, in turn, not only shapes the handling of the incident itself but also potentially end up being used in myriad future situations, both operational and managerial.

Returning to the question of how digital technologies influence emergency patrol units, these units are part of operative policing and are thus heavily influenced by the incidents that occur. Such policing has traditionally been difficult to steer or manage, as the incidents are defined by their unpredictability, and operative policing is therefore best understood as irregular, complex, and messy (Lundgaard, 2021). Other areas of the police have been described as increasingly data-driven and defined by technologies (e.g. Chan, 2001; Chan et al., 2022, Gundhus et al., 2022; Sheptycki, 2004), but there is a need to explore how digitalisation influences emergency patrols and operative policing. Chan et al. (2022) showed how datafication changes the epistemic basis of intelligence in policing, and though they stated that street policing is less affected by datafication, patrols are also increasingly subject to such influences. As a growing amount of information and data is made available to police patrols through the devices they carry with them, the patrols are also met with new demands to register information on site, expanding their role as producers of information (i.e. digitalisation and digital transformation).

The expanding role of digital technologies means that the operative parts of policing become subject to datafication and, therefore, potentially more manageable and governed. This means that patrols become increasingly steered and influenced by data from various digital systems. They also produce more data, which can be monitored, transferred, and turned into knowledge to be potentially used for future governance. In patrols' on-site decision-making, historical data and information become present in new ways, not only conveyed by radio from the control room but also present and available on their own devices. This makes it relevant to scrutinise the relationship between the information used and produced by patrols and the other parts of their practices, which are often highlighted as more intuitive, and experience driven. As only a fraction of any given reality becomes digitalised (Flyverbom, 2019; Lundgaard et al., 2022), a crucial question for police researchers is to map and explore which parts of policing become digital and which do not and how this influences knowledge production. Law and Mol (2002) emphasised the need for social scientists to consider the messiness and complexities of a world in which simplification and reductionism dominate. Datafication implies simplification, but operative policing will always be messy and complex. Theoretical perspectives from STS, emphasising intra-action and the co-production of agency, highlight ways to research the outcomes of encounters between managerial efforts aimed at controlling and managing police practices, and the unpredictable complexities of operational policing and the incidents they encounter.

Online spaces: Performing knowledge through Online Patrols

The advent of connective technologies, such as social media platforms, has impacted the police in several ways as channels for outreach as well as investigation and intelligence (i.e. Ferguson & Soave, 2021; Rønn & Søe, 2019; Schneider, 2016). Within the NPS, the possibilities provided by connective technologies have contributed both to the creation of a (short-lived) outward-reaching information

channel from the emergency control room to the public on X/Twitter (Flinterud, 2022) and to the establishment of an organisational sub-unit—*the Online Patrol*—working within a new type of spatial reality, reconceptualising the meaning of 'local' from geographical to shared areas of interest (Rønn, 2023). In other words, connective technologies have elicited changes in how established units work, such as adding a task to the emergency control room, but they have also impacted the organisational structure. This organizational change implies the idea that these technologies are so fundamental and ubiquitous in our society and culture that not only should they be used within the existing organisation, but they also warrant specifically trained officers working with these issues. However, while these practices on the surface seem to imply that the NPS put a lot of resources into their work on and in connective technologies, observations of the practices of policing on online spaces show a more fragmented picture.

The first organisational unit dedicated to online policing in Norway was set up by the National Cybercrime Centre (NC3) in 2015 (Rønn, 2023, p. 3). While originally set up as one unit covering both overt and covert policing, it was soon divided into two sections, separating outward-reaching and prevention-focused practices from those related to investigation and intelligence. In other words, while the initial initiative was based on bringing together officers based on the properties and logics of the technologies they were to use, they soon decided to split along the lines of police practices. This also represented a split along the lines of different types of knowledge production, one fulfilling the need to collect information to create knowledge about criminality or risk for internal use, and the other fulfilling the need to communicate police information to create knowledge about crime and risk in the public.

This led to the establishment of the Online Patrol, which are units in all police districts dedicated to patrolling open online spaces, mainly in the form of content creation on social media platforms such as Facebook and Instagram, and to a lesser extent TikTok and Snapchat (Rønn, 2023, p. 3). This split echoes the analytical division made in this research project between the internal and the external and further emphasises Barad's (2007) point that agencies arise from phenomena and are not inherent to singular agents. When we emphasise external dimensions and the flow of knowledge out into the public, it is not as an inherent attribute of social media platforms but as an agency arising from the intra-action between outward-reaching police practices and social media platforms. Police use of social media also has internal dimensions—for example, when they are used for investigations and intelligence gathering (i.e. Rønn & Søe, 2019, on social media intelligence [SOCMINT]; Wilson, 2019, on platform policing)—although it is the difference arising from their intra-action, not the properties of the involved actors, that alerts us to the differences between the external and internal dimensions. A focal point in this case is how social media not only provides the police with an opportunity to collect and systematise data but also makes them *create* data, thus performing police knowledge in specific ways that then flows into algorithmically governed spaces and takes on a liveliness of its own (i.e. Flinterud, 2023; Kaufmann, 2023).

Since the establishment of the Online Patrols, the national patrol at NC3 has moved away from having a presence on open social media platforms to more proactive patrolling on gaming-based chat servers, such as Discord (Rønn, 2023). Online patrols in the districts also turn to these channels in parallel with being on social media platforms. This type of online presence represents a shift in online patrolling towards the traditional beat patrol, turning to online spaces that look more like the group-based communication of chat servers and discussion boards before the advent of algorithmically governed open social platforms. This expansion in platform presence has not yet elicited any change in the organisational unit apart from the national Online Patrol shutting down its social media presence. However, seen as intra-actions these different practices amount to significantly different agencies.

As mentioned, patrolling open social media platforms, such as TikTok, will always be performative, where information is performed through content creation. This is in line with what Bucher (2018) termed the *algorithmic imaginary*—that is, practices performed to cause the content to spread far and wide through algorithmic means based on experience-based, imagined rules. This includes conforming to standards for content production on social media, such as making dance videos and funny skits. These performative practices contribute to the vernacularising of police knowledge, in which the police strive to achieve vernacular authority by performing institutional information (e.g. Howard, 2022). The content enters a space of vernacular meaning making, where it is spread and used or hidden and forgotten, beyond the police's control (Flinterud, 2023). It is also more clearly a data practice whereby the visible performances leave easily visible traces and, as such, can be argued to create data with longer material-discursive lives.

On chat servers and in games, however, communication is more direct and not necessarily easily retrieved, similar to the traditional beat patrol. Their presence expresses conventions of traditional preventive policing in which practical skills, such as playing computer games, are as valuable on the beat in youth clubs as they are online. Thus, changing between different types of connective media turns out to be more than a question of keeping up with where the public (and the kids) are; it also represents different forms of materialising knowledge and moving it around.

STS perspectives that incorporate the agency of technologies in this way can contribute to a broader understanding of the police's different online presences as part of knowledge production from a broader perspective. Paying attention to the agency arising from the technologies in practice—that is, the particularities of these platforms as they are used in the specific context—is crucial for understanding how such shifts may affect the extent to which police knowledge travels and becomes part of general meaning making, as well as how public knowledge and debate about police practices may take part in shaping these very practices.

Investigations: collecting the pieces of the puzzle

Conducting both criminal investigations and court cases may be seen as solving a puzzle where some of the pieces are missing and some are considered more important than others (Dahl, 2009). The pieces of such puzzles all contain knowledge and information is constructed and translated throughout the working processes. DNA evidence may be one such piece of the puzzle and is often considered important evidence for solving crimes and obtaining correct convictions. In a criminal investigation, it is essential that evidence that is considered especially important is 'collected, examined, analyzed and presented in a way that safeguards their evidential value and minimises erroneous or misleading outcomes' (Sunde, 2022, p. i).

DNA technology and DNA evidence are often considered objective truths that are difficult to challenge by court participants (Dahl 2012, 2015) and are sometimes called a 'Truth Machine' (Lynch et al., 2008). However, DNA is neither a fixed entity nor solely material. Instead, it is a continuous production process in which the material and the social are inevitably and inextricably entangled (Kruse, 2016). For a biological sample, such as blood, semen, or skin, to become DNA evidence, it must travel from one site to another (Kruse, 2023), both physically and digitally. Furthermore, it must travel through several different epistemic cultures that have to collaborate on sharing data and exchanging knowledge to enable the translation process from trace to evidence. As mentioned above, epistemic cultures are 'cultures that create and warrant knowledge' (Cetina, 1999, p. 1) and differ in focus and knowledge.

Depending on the apparent severity of a crime at a crime scene in Norway, it is either patrolling officers or crime scene investigators who gather biological samples. Accordingly, they are the first to handle a DNA trace on its path to become a piece of DNA evidence for investigations and criminal cases (Kallmyr, 2021). In Norway, both groups are always police-educated, in contrast to several other countries. To enable the criminal justice system to produce as much and as nuanced forensic evidence as possible, 'traces must move seamlessly from the crime scene to the laboratory' (Kruse, 2016, p. 63) and back again to the police as digital representations. In the police's investigation database, the "Request for Analysis of a DNA sample at OUS [Oslo University Hospital]" form is completed by the police when they request DNA analysis. It is supposed to be the main form of communication between crime scene investigators and forensic scientists. Studies have shown (Dahl & Lomell, 2016; Kallmyr, 2021) that the quality of the content of the completed forms varies significantly and that the sender's knowledge about DNA is reflective of how police employees complete the form (e.g. linguistically and use of terms). When the sender does not contextualise the traces, it is hard for geneticist to know what to do (Dahl & Lomell, 2016).

These inconsistencies imply that digital forms are not sufficient to enable dialogue and knowledge exchange across epistemic cultures. The crime scene technicians find the traces in their natural habitat—that is, where they have been left at a crime scene. Forensic evidence is the result of crime scene technicians' work and contributes to understanding what has happened at the crime scene. The forensic scientist who analyses the samples makes a probabilistic assessment of one or several pieces of trace (Kruse, 2023). For more serious crimes, this leads to frequent communication between the two disciplines consisting of different epistemic cultures to obtain a mutual understanding of the assignment, outside the form. This communication is sometimes poorly documented by the police (Bechky, 2003; Kallmyr, 2021), and understanding how encounters between these epistemic cultures contributes to the production of knowledge provided by DNA as a piece of evidence could be studied in more depth. For more petty crimes, however, this additional communication is not conducted, and accordingly, the use of DNA technology is less efficient, as the digital form does not provide enough information for forensic scientists to obtain DNA profiles, and the results are likely to be less precise.

In Norway, the Department of Forensic Sciences at OUS conducts all DNA analyses for the NPS. This implies that biological traces leave the police organisation, go to OUS, and come back as DNA results. Accordingly, OUS is an obligatory passage point (Latour, 1987) in the construction of DNA evidence for criminal cases. The technical part of what happens to the DNA evidence at OUS is considered black boxed by several of the participants involved in the production process of DNA evidence (Dahl, 2009). Being an obligatory passage point, the forensic technicians at OUS have become translators of DNA evidence, laying the foundation for turning it into knowledge about the crime for the parties involved, such as police, lawyers (defence and prosecution), jury members, and judges (Bechky, 2003; Dahl, 2009).

If a biological trace ends up as a DNA profile (not all traces do), it is sent to the National Criminal Investigation Service, which oversees the National DNA database, to see whether it matches the three DNA registers: the suspect, the investigation, and the trace registers. If there are matches, the police districts will be informed, and in most cases, a match will influence the investigation process. On its journey, the DNA sample will have been part of several intra-actions involving patrolling officers, crime scene analysts, crime scene technicians, forensic scientists, and investigators, with their various technologies. The agency of the sample as it travels is constantly renegotiated as contexts change, and its potential final status as evidence is thus dependent on many factors, both human and technological. The perspectives of epistemic cultures, as well as intra-agency, lend themselves well to exploring these types of flows, whereby police knowledge and, by extension, the rule of law depend on the outcomes of intra-actions across epistemic cultures.

Concluding Remarks

This paper presented ways in which perspectives on the epistemic agency arising from intra-actions with humans and technologies within the police can be addressed. It showed how data and information come into being through different police-related practices, laying the basis for the construction of police-based knowledge. Our cases explored the ways digital technologies created new flows of knowledge, both within the police organisation and externally through public organisations or the public.

Forensic practices, such as fingerprints and DNA, have been an important field in the STS literature for a long time (see e.g. Cole, 2001; Jasanoff, 1998; Kruse, 2016; Lynch et al., 2008). In many, but not all, jurisdictions, these practices are the domain of the police. However, from a traditional STS perspective, large parts of the police have not been the most obvious subject of enquiry, as it is an organisation traditionally associated with experience-based practices and the explicit enforcement of power on behalf of the state. However, in the knowledge society, police organisations lean increasingly towards scientific principles and bureaucratic management. Yet, unlike scientific and bureaucratic practices in which the exertion of power lies implicitly within discursive practices, policing is a practice in which the enforcement of power is at the core, and the discursive practices of science and bureaucracy are introduced to provide accountability and legitimacy to the enforcement of power through measures such as violence, arrests, and expulsions. These developments, which have taken place in concert with the ubiquitous digitalisation of contemporary society, have made the police a curious case of an organisation whose authority as a knowledge producer exists in the balance between scientific principles and experienced-based practices, all while hinging on managing the state monopoly of violence.

The idea of *intra-action* (Barad, 2007), conceptualised through *socio-materiality* (Orlikowski, 2007), provides a lens for understanding the organisational aspects of the police as mutually constituted by humans and technologies, highlighting how digital technologies, as materiality, are part of knowledge production and sets the scene for understanding technologies as social (Bechky, 2003; 2020). Socio-material perspectives provide a framework for understanding that the different practices within the police organisation must be understood on their own terms, exemplified through a look at operative policing, online policing, and investigations. As such, they are useful in illuminating and challenging taken-for-granted organisational-level practices. In addition, we emphasised the idea of the liveliness of data (Kaufmann, 2023) to further stress the process perspective of digital practices. The concept of *epistemic cultures* (Cetina, 1999) was employed to conceptualise how the increasing incorporation of digital technologies within the police organisation and its practices can be framed as knowledge-producing practices within bounded areas. Our three empirical examples illustrate this conceptualisation, making it clear that the police as an organisation can be understood as comprising several epistemic cultures, with the three chosen being only a few.

The case of operative policing exemplified how the perspective of meetings between epistemic cultures is useful not only in cooperation between differing organisations, but also within the police organisation itself. Here, we saw how digital technologies are employed as mediators between various parts within the police, such as the control room and patrols. The main point to highlight is that even though the impact of digital technologies may be more visible in units with more clearly knowledge-producing practices, such as intelligence and investigation, the increased use of digital devices in operational policing intensifies a form of datafication that ties these practices as material data points to epistemic practices at various levels within the police organisation, in addition to impacting practices on the ground.

The second case addressed an area of policing that is better understood considering Cetina's (2007) concept of macro-epistemics, which seeks to conceptualise those areas of distributed knowledge production characterised by networked connections rather than appearing within bounded knowledge-producing groups. When the police incorporate social media platforms in their outward-reaching practices, they open a passage between themselves and the public that materialises police knowledge and practice in specific ways, often in forms that break with traditional police communication, such as dancing and funny skits. Nevertheless, these are still epistemic practices in which police knowledge and knowledge about the police flow into the public sphere in ways and formats that are highly specific to the multiple platforms and software on which they appear.

The final case, regarding the construction of DNA as evidence, showed how employing the perspectives of epistemic cultures and socio-materiality reveals that these flows are not necessarily as smooth or objective in practice as they are assumed to be. The passage from police to forensic institutes and back again is necessary for performing the scientifically proven process of making biological material DNA evidence. In practice, however, it turns out that the digital form that enables this process also impacts the production of evidence in specific ways (Kallmyr, 2021) as well as how knowledge is produced through the language and terms applied in the content of a form. Such a form is, in such cases, a necessary communicative passage between two epistemic cultures, but it becomes clear that as a rigid format, it not so much mediates as highlights discrepancies, thus having the agency of shaping decisions about the handling and status of the evidence, as well as what constitutes 'evidence'.

Studying the police from an STS perspective opens a fruitful and critical path for scrutinising the principles upon which legitimacy and accountability are constructed. It invites us to challenge taken-for-granted organisational-level practices by asking questions about

the becoming of knowledge and how knowledge is constructed within the complex machineries of police technologies and practices, including exchanges with other organisations and the public. This paper offers STS to policing, as well as the police organisation to STS, as a lens and site for exploring these questions on digitalisation and technology. The cases above are only a few examples of how focusing on entanglements between the social and the material can help us expand our understanding of how police practices are integrated in society, not only through the enforcement of law and order but also through the enforcement of power as producers of knowledge.

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References

Ackroyd, S., Harper, R., Hughes, J., Shapiro, D., & Soothill, K. (1992). *New technology and practical police work: The social context of technical innovation*. Open University Press.

Aradau, C., & Blanke, T. (2017). Politics of prediction: Security and the time/space of governmentality in the age of big data. *European Journal of Social Theory, 20*(3), 373–391. https://doi.org/10.1177/1368431016667623

Asdal, K., & Reinertsen, H. (2022). *Doing document analysis: A practice-oriented method*. SAGE.

Ask, K., & Søraa, R. A. (2023). *Digitalization and social change – A guide in critical thinking*. CRC Press.

Babuta, A., & Oswald, M. (2019). *Data analytics and algorithmic bias in policing*. Royal United Services Institute for Defence and Security Studies.

Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.

Barley, S. R., & Kunda, G. (2001). Bringing work back in. *Organization Science, 12*(1), 76–95. https://doi.org/10.1287/orsc.12.1.76.10122

Bechky, B. A. (2003). Object lessons: Workplace artifacts as representations of occupational jurisdiction. *American Journal of Sociology, 109*(3), 720–752. https://doi.org/10.1086/379527

Bechky, B. A. (2020). Evaluative spillovers from technological change: The effects of "DNA envy" on occupational practices in forensic science. *Administrative Science Quarterly, 65*(3), 606–643. https://doi.org/10.1177/0001839219855329

Bennett Moses, L., & Chan, J. (2018). Algorithmic prediction in policing: Assumptions, evaluation, and accountability. *Policing and Society, 28*(7), 806–822. https://doi.org/10.1080/10439463.2016.1253695

Bjelland, H. F., & Dahl, J. Y. (2017). Exploring criminal investigation practices. The benefits of analysing police-generated investigation data. *European Journal of Policing Studies, 5*(2), 5–23. http://hdl.handle.net/11250/2452047

Bucher, T. (2018). *If … then: Algorithmic power and politics.* Oxford University Press.

Byrne, J., & Marx, G. (2011). Technological innovations in crime prevention and policing. A review of the research on implementation and impact. *Journal of Police Studies, 3*(20), 17–40.

Byrne, J. M., & Rebovich, D. J. (2007). *The new technology of crime, law and social control*. Criminal Justice Press.

Callon, M. (1990). Techno-economic networks and irreversibility. *The Sociological Review, 38*(1), 132–161. https://doi.org/https://doi.org/10.1111/j.1467-954X.1990.tb03351.x

Cetina, K. K. (1999). *Epistemic cultures: How the sciences make knowledge*. Harvard University Press. https://doi.org/10.2307/j.ctvxw3q7f

Cetina, K. K. (2007). Culture in global knowledge societies: Knowledge cultures and epistemic cultures. *Interdisciplinary Science Reviews, 32*(4), 361–375. https://doi.org/10.1179/030801807X163571

Chan, J. (2001). The technological game: How information technology is transforming police practice. *Criminal Justice, 1*(2), 139–159.

Chan, J., Sanders, C., Bennett Moses, L., & Blackmore, H. (2022). Datafication and the practice of intelligence production. *Big Data & Society, 9*(1). https://doi.org/10.1177/20539517221089310

Cole, S. A. (2001). *Suspect identities*. Harvard University Press.

Cressman, D. (2009). *A brief overview of actor-network theory: Punctualization, heterogeneous engineering & translation*. Centre for Policy Research on Science and Technology.

Dahl, J. Y. (2009). Another side of the story. Lawyers' views on DNA as evidence. In K. F. Aas, H. O. Gundhus, & H. M. Lomell (Eds.), *Technologies of insecurity: The surveillance of everyday life*. Routledge.

Dahl, J. Y. (2012). Overdreven tro og tillit til DNA i strafferettspleien *Sosiologi i dag, 42*(2), 29–47.

Dahl, J. Y. (2015). DNA-bevis i retten: De profesjonelle aktørene i rettsvesenets erfaringer og oppfatninger. *Tidsskrift for rettsvitenskap, 128*(3–4), 364-386

Dahl, J. Y., & Lomell, H. M. (2016). En god og en dårlig nyhet – om DNAs effekt på oppklaringsprosenten i vinningssaker. *Nordisk politiforskning, 3*, 9–28. https://doi.org/10.18261/issn.1894-8693-2016-01-03

Egbert, S., & Leese, M. (2021). *Criminal futures: Predictive policing and everyday police work*. Taylor & Francis.

Ericson, R. V., & Haggerty, K. D. (1997). *Policing the risk society*. Clarendon Press. https://doi.org/10.3138/9781442678590

Ericson, R. V., & Shearing, C. D. (1986). The scientification of police work. In G. Böhme & N. Stehr (Eds.), *The knowledge society: The growing impact of scientific knowledge on social relations* (pp. 129–159). Springer Netherlands. https://doi.org/10.1007/978-94-009-4724-5_9

Ferguson, L., & Soave, V. (2021). #Missing to #Found: Exploring police Twitter use for missing persons investigations. *Police Practice and Research, 22*(1), 869–885. https://doi.org/10.1080/15614263.2020.1753516

Flinterud, G. (2022). Codes colliding in connective cultures: The emergence of the Norwegian Police Emergency Control Room Twitter. *On_Culture: The Open Journal for the Study of Culture, 14*, 1–20. https://doi.org/10.22029/oc.2022.1304

Flinterud, G. (2023). "Folk" in the age of algorithms: Theorizing folklore on social media platforms. *Folklore, 134*(4), 439–461. https://doi.org/10.1080/0015587X.2023.2233839

Flinterud, G., & Lundgaard, J. M. (2024). Machineries of knowledge construction: Exploring the epistemic agency of digital systems in policing. *European Journal of Policing Studies, 6*, 1–21. https://doi.org/10.5553/EJPS.000010

Flyverbom, M. (2019). *The digital prism: Transparency and managed visibilities in a datafied world*. Cambridge University Press. https://doi.org/10.1017/9781316442692

Flyverbom, M., & Murray, J. (2018). Datastructuring – Organizing and curating digital traces into action. *Big Data & Society, 5*(2). https://doi.org/10.1177/2053951718799114

Fujimura, J. H., & Holmes, C. J. (2019). Staying the course: On the value of social studies of science in resistance to the "post-truth" movement. *Sociological Forum, 34*(S1), 1251–1263. https://doi.org/10.1111/socf.12545

Gill, P., & Phythian, M. (2018). *Intelligence in an Insecure World* (3rd ed.). Cambridge: Polity Press. https://doi.org/10.1111/1478-9302.12073_52

Gundhus, H. O. I. (2009). *"For sikkerhets skyld" IKT, yrkeskulturer og kunnskapsarbeid i politiet*. Unipub.

Gundhus, H. O. I. (2013). Experience or knowledge? Perspectives on new knowledge regimes and control of police professionalism. *Policing: A Journal of Policy and Practice, 7*(2), 178–194. https://doi.org/10.1093/police/pas039

Gundhus, H. O. I. (2016). Å målstyre skjønnsutøvelse: Profesjonalisering av politiets utlendingskontroll. *Sosiologi i dag, 46*(1), 54–79.

Gundhus, H. O. I., Talberg, N., & Wathne, C. T. (2022). From discretion to standardization: Digitalization of the police organization. *International Journal of Police Science & Management, 24*(1), 27–41. https://doi.org/10.1177/14613557211036554

Gundhus, H. O. I. & Lundgaard, J. M. (2025) Intelligence. In Lomell, H. M. and Kaufman, Mareile (Eds). *De Gruyter Handbook of Digital Criminology*. De Gruyter.

Harris, C. J. (2007). Police and soft technology: How information

technology contributes to police decision making. In J. Byrne & D. J. Rebovich (Eds.), *The new technology of crime, law and social control* (pp. 153–183). Lynn Rienner Publishers.

Hohl, K., & Stanko, E. A. (2024). *Policing rape: The way forward*. Taylor & Francis.

Howard, R. G. (2022). Manufacturing populism: Digitally amplified vernacular authority. *Media and Communication, 10*(4), 236–247. https://doi.org/10.17645/mac.v10i4.5857

Ingold, T. (2008). Bindings against boundaries: Entanglements of life in an open world. *Environment and Planning A: Economy and Space, 40*(8), 1796–1810. https://doi.org/10.1068/a40156

Jasanoff, S. (1998). The eye of everyman: Witnessing DNA in the Simpson trial. *Social Studies of Science, 28*(5/6), 713–740.

Kallmyr, T. (2021). *"Alt er ikke gull som glimrer …": En studie av kommunikasjon mellom kriminalteknikere og rettsgenetikere om DNA-spor* [Master's thesis, Politihøgskolen]. https://hdl.handle.net/11250/2758482

Kaufmann, M. (2023). *Making information matter: Understanding surveillance and making a difference*. Bristol University Press. https://doi.org/10.2307/jj.4953552

Kaufmann, M., Egbert, S., & Leese, M. (2018). Predictive policing and the politics of patterns. *The British Journal of Criminology, 59*(3), 674–692. https://doi.org/10.1093/bjc/azy060

Kaufmann, M., & Leese, M. (2021). Information in-formation: Algorithmic policing and the life of data. In A. Završnik & V. Badalič (Eds.), *Automating crime prevention, surveillance and military operations* (pp. 69–83). Springer International Publishing. https://doi.org/10.1007/978-3-030-73276-9_4

Kruse, C. (2016). *The social life of forensic evidence*. University of California Press.

Kruse, C. (2023). Swabbed dogs and beaches in pizza boxes: Crime scene alignment work and crime scene technicians' professional identity. *Science & Technology Studies, 36*(4), 62–79. https://doi.org/10.23987/sts.112067

Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Open University Press.

Latour, B. (2005). *Reassembling the social: An introduction to actor–network theory*. Oxford University Press. https://doi.org/10.1177/009430610903800150

Law, J. (1986). *Power, action, and belief: A new sociology of knowledge?* (Vol. 32). Routledge & Kegan Paul. https://doi.org/10.2307/590707

Law, J. (2007). *Actor network theory and material semiotic*. http://www.heterogeneities.net/publications/Law2007ANTandMaterialSemiotics.pdf

Law, J., & Mol, A. (2002). *Complexities: Social studies of knowledge practices*. Duke University Press. https://doi.org/10.1215/9780822383550

Lum, C., Koper, C. S., & Willis, J. (2017). Understanding the limits of technology's impact on police effectiveness. *Police Quarterly, 20*(2), 135–163. https://doi.org/10.1177/1098611116667279

Lundgaard, J. M. (2021). *Nød og neppe: Fra anrop til beslutning ved politiets operasjonssentral*. Universitetsforlaget. https://doi.org/10.18261/9788215040974-2021

Lundgaard, J. M. (2023). Reassembling operative policing: The introduction of drones in the Norwegian police. *International Journal of Police Science & Management, 25*(3), 313–323. https://doi.org/10.1177/14613557231184693

Lundgaard, J. M. (forthcoming): Material imaginaries of operative policing.

Lundgaard, J. M., Flinterud, G., Bjørkelo, B., & Dahl, J. Y. (2022). Transparens og tilsløring i politiets kunnskapssystemer. *Nytt Norsk Tidsskrift, 39*(2), 111–121. https://doi.org/10.18261/nnt.39.2.2

Lundgaard, J. M., & Gundhus, H. O. I. (2024). Den digitale hviskeleken: data informasjon og kunnskap i etterretningsstyrt politiarbeid. In E. B. Unneberg, P. Jansen, & O. Trønnes (Eds.), *Etterretningsanalyse i politiet* (pp. 220–232). Universitetsforlaget.

Lundgaard, J. M., & Sunde, N. (2025). Politi og teknologi. In P. Larsson, H.O.I. Gundhus, & R. Graner (Eds.), *Innføring i politivitenskap* (2nd ed.). Cappelen Damm Akademisk.

Lynch, M., Cole, S. A., McNally, R., & Jordan, K. (2008) *Truth machine – The contentious history of DNA fingerprinting*. The University of Chicago Press.

Manning, P. K. (1988). *Symbolic communication: Signifying calls and the police response, MIT Press series on organization studies*. MIT Press.

Manning, P. K. (1992). Information technologies and the police. *Crime and Justice, 15*, 349–398. https://doi.org/10.1086/449197

Manning, P. K. (2008). *The technology of policing: Crime mapping, information technology, and the rationality of crime control* (Vol. 4). NYU Press.

Marx, G. T. (1995). The engineering of social control: The search for the silver bullet. In R. P. J. Hagan (Ed.), *Crime and inequality*. Stanford University Press.

Mol, A. (2002). *The body multiple: Ontology in medical practice*. Duke University Press. https://doi.org/10.1215/9780822384151

Mutlu, C. E. (2016). The material turn: Introduction. In M. B. Salter & C.E. Mutlu (Eds.), *Research methods in critical security studies: An introduction* (pp. 173-179). Routledge.

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies, 28*(9), 1435–1448. https://doi.org/10.1177/0170840607081138

Orlikowski, W. J., & Scott, S. V. (2008). *The entangling of technology and work in organisations*. London School of Economics and Political Science.

Orr, J. E. (1996). *An ethnography of a modern job*. Cornell University Press.

Ratcliffe, J. H. (2016). *Intelligence-led Policing* (2nd ed.). London: Routledge. https://doi.org/10.4324/9781315717579

Rouvroy, A. (2008). Privacy, data protection, and the unprecedented challenges of ambient intelligence. *Studies in Ethics, Law and Technology, 2*, 1. https://doi.org/10.2202/1941-6008.1001

Rønn, K. V. (2023). Mediated proximity: Community policing in the digital age. *Nordic Journal of Studies in Policing, 10*(1), 1–15. https://doi.org/10.18261/njsp.10.1.8

Rønn, K. V., & Søe, S. O. (2019). Is social media intelligence private? Privacy in public and the nature of social media intelligence. *Intelligence and National Security, 34*(3), 362–378. https://doi.org/10.1080/02684527.2019.1553701

Sanders, C., & Condon, C. (2017). Crime analysis and cognitive effects: The practice of policing through flows of data. *Global Crime, 18*(3), 237–255. https://doi.org/10.1080/17440572.2017.1323637

Schneider, C. J. (2016). *Policing and social media: Social control in an era of new media*. Lexington Books.

Scott, S. V., & Orlikowski, W. J. (2014). Entanglements in practice: Performing anonymity through social media. *MIS Quarterly, 38*(3), 873–893. http://eprints.lse.ac.uk/57603/

Seepma, A. P., de Blok, C., & Van Donk, D. P. (2021). Designing digital public service supply chains: Four country-based cases in criminal justice. *Supply Chain Management: An International Journal, 26*(3), 418–446. https://doi.org/10.1108/SCM-03-2019-0111

Shepard, M. (2022). *There are no facts: Attentive algorithms, extractive data practices and the quantification of everyday life*. MIT press.

Sheptycki, J. (2004). Organizational pathologies in police intelligence systems: Some contributions to the lexicon of intelligence-led policing. *European Journal of Criminology, 1*(3), 307–332. https://doi.org/10.1177/1477370804044005

Sheptycki, J. (2017). The police intelligence division-of-labour. *Policing and Society, 27*(6), 620–635. https://doi.org/10.1080/10439463.2017.1342645

Stanko, E. A., & Hohl., K. (2024In the eye of the storm: Permacrisis in the investigation of rape and other sexual offences. *The Political Quarterly, 95*(3), 459–463. https://doi.org/10.1111/1467-923X.13425

Stark, J. (2020). Digital transformation of Springfield Police Force. In J. Stark (Ed.), *Digital transformation of industry: Continuing change* (pp. 79–83). Springer International Publishing. https://doi.org/10.1007/978-3-030-41001-8_13

Sunde, N., & Sunde, I. M. (2021). Conceptualizing an AI-based police robot for preventing online child sexual exploitation and abuse. *Nordic Journal of Studies in Policing, 8*(2), 1–21. https://doi.org/10.18261/issn.2703-7045-2021-02-01

Sunde, N. (2022). *Constructing digital evidence: A study on how cognitive and human factors affect digital evidence* [PhD thesis, Faculty of Law, University of Oslo].

Terpstra, J. (2024). Digitalization and local policing: Normative order, institutional logics and street-level bureaucrats' strategies. *European Journal of Policing Studies, 7*, 1–2.

Thylstrup, N. B. (2019). Data out of place: Toxic traces and the politics of recycling. *Big Data & Society, 6*(2), 2053951719875479. https://doi.org/10.1177/2053951719875479

Vestad, M. (2024). The persistent attractions of low-tech: Challenging the efficiency paradigm of forensic technology. *International Journal of Police Science & Management, 26*(2), 292–301. https://doi.org/10.1177/14613557241231164

Vestby, A., & Vestby, J. 2021. Machine learning and the police: Asking the right questions. *Policing: A Journal of Policy and Practice, 15*(1), 44–58. https://doi.org/10.1093/police/paz035

Wilson, D. (2019). Platform policing and the real-time cop. *Surveillance & Society, 17*(1/2), 69–75. https://doi.org/10.24908/ss.v17i1/2.12958

Wood, D., Cockcroft, T., Tong, S., & Bryant, R. (2018). The importance of context and cognitive agency in developing police knowledge: Going beyond the police science discourse. *The Police Journal, 91*(2), 173–187. https://doi.org/10.1177/0032258X17696101

Završnik, A. (2017). *Big data, crime and social control*. Routledge. https://doi.org/10.4324/9781315395784

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NEGOTIATING DIGITAL TRACES

The epistemic power of recorded police data

by Helene O. I. Gundhus, Pernille Erichsen Skjevrak & Christin Thea Wathne

Drawing on two empirical cases in different Norwegian police units, we explore how the increasing data gathering, recording, sorting, standardizing, and integration required by the Norwegian police's Intelligence Doctrine is experienced by users. Inspired by domestication theory, we provide new insights into police officers' varied perceptions, interpretations, and use of data. Our main finding is that digital traces were not necessarily used as the steered and managed intelligence process envisioned in the Intelligence Doctrine, and that this led to various adverse outcomes. Police officers engaged with recorded and digital traces in varied ways—rejecting, resisting, ignoring, supporting, adopting, or negotiating them. The intelligence process was constrained by bias inherent to the system, which resulted from focusing information gathering on what was already available, and from connecting it to recurrent individuals and problems. In the processes of turning analogue objects into digital ones, police officers' gut feeling and intuition still mattered, for example when information was selected for the crime intelligence system. The way the police related to the epistemic power of the data varied, but officers were obliged to relate to this uncertain element. Despite the standardized framework for how data should be applied, differences in practical routines, the digital tools used, symbolic work and learning processes revealed that its domestication in the police organization was messy. We found gaps between policy and practice, which can be seen both in unexpected workarounds and in solutions for organizing routines and everyday work. These reciprocal processes influenced and were influenced by police culture. As police intelligence evolves, the interpretation and utilization of recorded data may change, especially with the use of algorithms and artificial intelligence. Future research will show how police navigate between data-driven and observation-based narratives, and how this affects their social identity within a continuum of "datafied" and "contextual" police culture.

Keywords: Digital traces, domestication theory, epistemic power, intelligence-led policing, police

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Introduction

Intelligence-led policing is one of the main strategies embraced by police services in the Western world (Fyfe et al., 2018). The Norwegian police implemented a version of intelligence-led policing in 2014–to support managers' decision-making in governing and preventing crime. In the National Police Directorate's Intelligence Doctrine, intelligence-led policing is described as a management approach to how the police should collect data, analyse it, and report it to managers (National Police Directorate, 2014; 2020). Information and communication technology (ICT) is key in this work, its aim being to share and act upon data to make reliable and actionable intelligence reports. In the doctrine, making intelligence is described as a process whereby «raw» data is converted into meaningful information, which can be used to make assessments of possible future developments (Helmersen, 2024, p. 151). One aspect of this that is not clearly described is the significance of the repurposing of data, so that data collected for one purpose can be reused for other purposes: a phenomenon known as 'digital data recycling'. This recycling relies heavily on the input of officers to police registers during their everyday work, which we refer to as creating 'digital traces'. In this article we ask *how this recorded data is used, seen and integrated into the organization's everyday routines.*

Our exploration of the significance of digital data is inspired by the domestication theory developed by Lie and Sørensen (1996), which analyses how technologies are interpreted and used in three dimensions. The first of these is practical work, where users develop patterns of usage when making artifacts part of their daily routines; the second is symbolic work, where people attach symbolic meanings to artifacts and adopt or transform the meanings inscribed in the technology; the third is cognitive work, which includes learning about artifacts (see also Sørensen, 2006). This approach aims to sharpen the analytical focus on the use of technology and local negotiations, and on the way users also reshape the technologies in these three dimensions in a two-way process (Ask, 2016).

To analyse the knowledges, practices and interpretations at play in the domestication of digital data recycling we examine two empirical cases. The first involves the application of intelligence to prioritize resource allocation in local and central units within a police district we will call «South Police District» for reasons of anonymity. The second involves the application of intelligence to youth crime prevention in a local unit in what we will call «Central Police District». Our starting point is that digital data is not objective or neutral: it is made visible through «digital prisms that 'refract' social domains and configure and reconfigure relations between datasets and algorithms in the making of actionable knowledge relating to pasts, presents and futures» (Flyverbom, 2024, p. 3). Data is imagined, selected, curated and shaped, to make social phenomena seeable, knowable and governable (Kaufmann, 2023). Information is extracted, decomposed, and needs to be condensed. This process of datafication «has consequences for its shape and the decisions we come to make based on data-based proxies that stand in for the original richness and complexity of the domain» (Flyverbom, 2024, p. 4).

In particular, we will explore how the tendency towards ever more gathering, recording, sorting, standardizing and integration of the data required by practicing intelligence-led policing is experienced by users in the organization. Digital traces lead to new visibilities, knowledge and governance in the police (Flyverbom, 2022, Lundgaard et al., 2022), and we explore how these are handled by different groups in different contexts. We are particularly interested in how different user groups acknowledges or challenges the recorded data, and by this negotiates the data's epistemic power. The term 'epistemic power' will be used to describe what are perceived as reliable and credible representations of knowledge (through storytelling, answering questions, or providing facts) which do not necessarily have any legitimate source, but which can influence what comes to be regarded as knowledge (Archer et al., 2020). Inspired by domestication theory, we provide new insights into how and why police units differ in their perception, interpretation and use of data.

The article is structured as follows: we first present the theoretical framework, the context of the digitalization of the Norwegian police, and the empirical cases and methodology. The first part of the analysis describes work routines, and the importance of digital traces and datafied information in intelligence work. We then look at differences in the understanding of digital traces in different police units, – that is, the way their practice, through collective symbolic structures, gives epistemic power to registered and visible data. Finally, we discuss how these variations in knowledges shape the learning and governing processes of police organizations.

Theoretical framework

We take a sociotechnical approach to user experiences, to which the domestication theory is relevant, since it approaches technologies from the user's point of view (Ask and Søraa, 2024, p. 65-67). The theory evolved out of media studies interest in how audiences listened to or viewed different types of media (Haddon, 2007). The Social Construction of Technology (SCOT)-approach, holds that rather than human actions being determined by technology, human action shapes technology, and makes the user central: users matter in the construction of technologies for instance, they demand that bikes should be made safe. In their definition of SCOT, Pinch and Bijker (1984) saw users as playing a key part in technological change (see Oudshoorn & Pinch, 2007).

The word 'domestication' conveys how new technologies are transformed from being 'wild', unfamiliar, exciting, and possibly threatening into familiar objects embedded in the culture of society and in the routines of everyday life (Silverstone et al., 1992; Lie & Sørensen, 1996). Silverstone and Haddon looked at how computers were introduced into the home and «tamed» by being used in a familiar setting (Silverstone & Haddon, 1996). More recently, domestication has been viewed as a two-way process in which both technological objects and people may change (Oudshoorn & Pinch, 2007), so that it can be described as a co-production between humans and technology, with both parties being modified in a two-way process (Ask, 2016, p. 16). For STS studies, co-production of the social and the technical dimension is fundamental (Ask, 2016, p. 66; Jasanoff, 2004; Sørensen et al., 2000). In this article we will therefore interpret knowledge transfer in a non-linear way, with knowledge taken from the data system by police officers being regarded as co-production.

Although we argue that this is a two-way process, our main focus will be on police officers' interpretation and use of data from ICT systems: it is their perceptions and interpretation of it that will be in the foreground. Due to the co-production of the data, the materiality of the technology will also shape officers' perceptions. However, we are not conducting an analysis of the functionality, design and related symbols and stories of the technologies, (what Ask and Søraa (2024, p. 85) call a script analysis), users will be the focus of our attention.

Selwyn and Cumbo (2024) claim that all domestication studies identify four stages of technology in institutional settings:

> (i) 'Appropriation': the acquisition of the technology and its initial incorporation into institutional spaces and practices; (ii) 'Objectification': the location and arrangement of the technology within the material, social, and cultural spaces of the institution; (iii) 'Incorporation': the integration of technological practices into the daily routines of institutional life and the change of capabilities that results; (iv) 'Conversion': the integration of the technology into people's self-identities and the broader social relations between the institution and the outside world (Selwyn & Cumbo, 2024, p. 91).

As early as the nineties, researchers at the Norwegian University of Science and Technology suggested that it is more fruitful to see domestication as composed of dimensions rather than stages (Ask, 2016). This is particularly true in the case of ICT, since it is difficult to separate the user from the producer of the outcome (Ask, 2016). In this Trondheim model, domestication includes the symbolic, practical, and cognitive work mentioned in the introduction. Although we are not conducting a traditional domestication analysis conforming to the theory (see Ask & Søraa, 2024), we take inspiration from this approach, and will explore practical, interpretative and learning aspects of digital traces in the two cases of police work.

In the analysis we will use three theoretically informed concepts to examine these dimensions: datafication, digital traces and epistemic power. 'Datafication', is used to describe domestication practices whereby human actions and proxies for it, are categorized and turned into searchable data in a database. Datafication is closely associated with management, control, and prediction (Flyverbom, 2022). What is seen and known is used to govern the present and the future. According to the Police Intelligence Doctrine, intelligence must be used to improve predictions. The digital prism, or what Beer (2019, in Flyverbom, 2022, p. 4) terms 'the data gaze', creates a particular form of visualization and knowledge production. As argued by Flyverbom, «Patterns or predictions are always to some degree 'proxies' for a given object (Mulvin, 2021), and the distance between the two is important to account for, as also suggested by Tsoukas (1997) in his work on 'information reductionism'» (2024, p. 7).

Digital traces, the second concept, are central to digital data recycling, where data collected for one purpose can be reused for others. Digital traces left on digital platforms are therefore of value: data can be reused and analysed to provide support for marketing or managers' decision-making (see for example Flyverbom, 2019; Gillespie, 2014; Lupton, 2016; Zuboff, 2019). The production and use of digital traces for digital data recycling are also an important part of thinking about new ways of working that aim to operationalize knowledge-based policing through sharing and managing collected data, which is supposedly a more politically neutral and objective form of knowledge (Chan et al., 2022). Awareness of the value of digital traces enables new strategies for knowledge production, while old-style knowledge production is modified by access to new software for data integration.

One objective of the intelligence process is to make uncertain knowledge less uncertain by applying social science methods to «ensure the greatest possible degree of objectivity and validity» (National Police Directorate, 2020, p. 37). However, within intelligence studies, the view that intelligence is objective and politically neutral has been questioned (Fyfe et al., 2018; Rønn, 2022). According to Rønn (2022) intelligence studies has defined objectivity in a variety of ways: as the positivistic ideal of interpretation-free objectivity, as value-free objectivity, (value-neutrality), as detachment, and as fairness. Most interesting for our study is the Intelligence Doctrine's view that objectivity will distinguish between data and personal values:

> It is important to distinguish between information obtained and the analyst's own assessments. The analyst's assessments are influenced by many factors, such as background, experience and professional qualifications. To overcome this and ensure the greatest possible degree of objectivity and validity, social science methods must be used, (National Police Directorate, 2020, p. 37).

The doctrine thus views data as raw, and discussions of this will be at the core of this article. The doctrine does not lay down which social science methods should be used, but the main principle

is that data is raw, and that the highest degree of objectivity is achieved by minimizing personal values and experiences (Rønn, 2022, p. 824). This is very close to what Rønn terms the scientification of intelligence, «in which science and intelligence are understood as two sides of the same coin, and the norms of intelligence are considered equivalent to the norms of (positivistic) science» (Rønn, 2022, p. 830). This scientification of intelligence is why we use the third term 'epistemic power' when analysing the results of datafication in police officers' everyday lives. According to Archer et al. (2020, p. 29) epistemic power can be defined as someone's power to influence what comes to be regarded as knowledge: «A person has epistemic power to the extent she is able to influence what people think, believe, and know, and to the extent she is able to enable and disable others from exerting epistemic influence.» As we said in the introduction, we define epistemic power as the power of definitions, narratives and items on an agenda that does not necessarily require legitimate sources. Epistemic power might therefore be seen in what are perceived as reliable and credible representations of knowledge, whether they are based on legitimate sources or not. Since epistemic power is an outcome of socio-cultural categorizations, we are also inspired by the cultural theory of Mary Douglas (2002) in our analysis of user experiences. As Bowker and Star (1999) point out, Douglas's cultural theory of categorizations is an early attempt to understand the social construction of classification systems, and how it is related to symbolic and cultural values. Exploring the use of digital traces in the practical, symbolic and learning dimensions makes it possible to understand this use from several angles. Domestication theory's roots in both STS and media studies underline the importance of bringing together cultural and material dimensions to understand why digital traces are used in different ways by different user groups.

There has long been discussion about the politics of knowledge production, with debates about the relationship of power and knowledge being most prominent in post-structural Foucauldian theory, which has decisively shown that, since power relations are always bound up with knowledge, knowledge can never be said to be disinterested or neutral (Foucault, 1977). Science and technology studies (STS) have considered how processes of classification and standardization shape politics, both «arriving at categories and standards, and, along the way, deciding what will be visible or invisible within the system», (Bowker & Star, 1999, p. 44). Bowker and Star argue that, since they are powerful technologies, «classifications should be recognized as the significant site of political and ethical work that they are.» (Bowker & Star, 1999, p. 319). We will engage with this idea by discussing different perceptions of the epistemic power of recorded data and digital traces, and how they relate to the particular professional and contextual environment a practitioner belongs to. We therefore examine processes of sense-making, practice and learning related to recorded police data and how this produce, or does not produce, epistemic power and aim to name these.

Digital tools and concepts in Norwegian intelligence-led policing

Intelligence-led policing has a long history (Ellefsen & Lomell, 2024). The above-mentioned Intelligence Doctrine represents a new stage where intelligence is not only implemented as a process, but as an overarching management concept with new police roles. Moreover, the doctrine was central to the recent police reform, where intelligence was one of the six functions that was relied on to make the police more proactive and risk aware (Gundhus et al., 2022). Intelligence-led policing aims to be a controlled process consisting of the systematic collection, analysis and assessment of information about individuals, groups, and phenomena, to form the basis for decision-making (National Police Directorate, 2014, p. 18). The doctrine lays down principles and standards for a decision-making procedure known as the intelligence cycle (National Police Directorate, 2014, p. 13); it is the traditional approach of various agencies to conceptualizing the intelligence process (Phythian, 2012). Its five steps are planning, collection, processing, analysis, and dissemination; the latter is highly dependent on the processing of data. The cycle begins by identifying management's 'information needs', and acquiring relevant data from databases, reports or human sources. The collected information is then processed, analysed, and assessed, and the resultant intelligence products are disseminated to managers for decision-making on interventions, operations or prioritization (Vestby, 2018).

Indicia, the Norwegian police's crime intelligence register, is the main digital tool used. It was developed specifically for the police and was launched in 2006. Indicia is regarded as the main search engine for intelligence practice, searching in all the main police registries. This is regulated by the police register regulations (Politiregisterforskriften, 2013). The police can record a wide range of information, such as details about offenders and their affiliations, and about individuals who are believed to be likely to engage in criminal activity. IBM's i2 Analyst Notebook, is also used, for both operational and strategic purposes, to visualize data patterns from different police registers. Analyst Notebook has been used by Norwegian police analysts since the late 1990s to visualize networks within organized crime and terrorist networks in both investigation and intelligence.

A central aim is to make further use of intelligence products within the police organization or to share them with collaborative agencies, such as customs and municipalities. This is briefly described in the doctrine as the intervention process governed by the manager (National Police Directorate, 2020, p. 52-53). A handbook has been produced to support the implementation of the interventions, known as KUBA, (knowledge-based policing), (Norwegian Police, 2020). The cases we will analyse in the article both involve making decisions in police districts on the basis of intelligence reports.

One is a geographical unit in Central Police District, where a crime prevention unit ordered an intelligence report. The other is a geographical unit in South Police District, which was conducting a broader KUBA intervention. In a KUBA intervention a crime prevention unit coordinates an intervention group comprising managers from crime prevention units, investigators, patrols and the chief of police to prioritize resources and measures. After intervention meetings, the managers and those responsible for each measure are tasked with ensuring implementation of the measures and prioritization in the assignment process. This might involve sending police cars to areas at risk. The police control room then oversees interaction and prioritization in the planned measures and the incidents that are occurring. Patrol managers also have an important role in gathering enough data to make intelligence reports.

In intelligence theory, a central idea is that intelligence should contribute to a shared understanding of the situation and be a common starting point for choosing interventions across disciplines and levels in the police (Ratcliffe, 2016). Intelligence should also be used in operations or more strategic plans to assess future threats and be shared with relevant societal actors, to help individuals and society prevent crime and undesirable incidents by protecting themselves and their assets (National Police Directorate, 2020). Intelligence reports are therefore made to facilitate interventions. In intelligence theory this is formulated as a requirement for intelligence to be actionable: it should provide the background information that is necessary for dealing efficiently with a specific situation, in the short or long term.

In addition to assigning this function to intelligence, the police reform also involved a reorganization, which reduced the number of police districts from 27 to 12 (Prop. 61 LS 2014-2015). The police were organized in two levels, with the chief of police in level one and the functional and operational units in level two. The operational units were divided into several geographical operational units at the same level as the functional level. Functional units provide support for all the geographic units. Most of the police's work is carried out in the geographical operating units, and the functional operating units are organized to support them. The functional units assist with intelligence, investigation, prevention, prosecution, immigration, administration and civilian tasks, in addition to being the main seat for the police control rooms (National Police Directorate, 2017). How the support functions are merged into joint units depends to some extent on the size and needs of the police districts (National Police Directorate, 2017). In this article, the functional intelligence unit is seen as being of special importance to the geographical police units' work on intelligence analysis.

Methodology

The empirical material is taken from two related research projects: Critical Perspectives on Predictive Policing (CUPP) and Algorithmic Governance of Policing (AGOPOL). The research projects are related, since both explore cases where digital technologies are used in intelligence-led policing in Norway.[1]

AGOPOL examined cases in three Norwegian police districts, anonymized as West, North and South, and an IT project in a special unit. Our selected case– Case A– featured the most in-depth investigation of an intelligence-led policing project, a project carried out in a geographical unit in South district. We looked at how digital traces are used to decide resource allocation and prevent both present and future crime. The process follows the Intelligence Doctrine, first the making of the intelligence report, and secondly what we previously presented as KUBA intervention, to make interventions based on the intelligence report (The Norwegian Police, 2020). Twenty-one police officers in various positions were interviewed: managers, investigators, patrol officers, and intelligence staff. Police patrols were observed for a total of 50 hours. This case can be seen as a 'prototype' of the use of digital traces and other forms intelligence, and provides important insights into practices that have developed over time. The A-case interviews were conducted jointly by Gundhus and Wathne.

The CUPP research project consisted of only one case in a geographical unit in Central Police District, which we will here call case C. In it, intelligence was used to identify and target, within their geographical area, 'young people at risk', who might be on the threshold of becoming criminals, so that early intervention measures could be taken. This was carried out at a police station. A traditional crime prevention unit (CP unit) collaborated with an intelligence unit to prevent youth crime which, for Norway, was an unusual and somewhat controversial initiative (Gundhus, Skjevrak & Wathne, 2023). It was a new approach, where intelligence analysts in a local police station tried to identify 'candidates' for early intervention through data in police databases (for a fuller description, see Skjevrak & Gundhus, 2025). In relation to it, approximately 17 hours of observation were carried out, and 18 people were interviewed in 14 interviews. Seven of the interviews were with key informant crime prevention police officers (CP officers) who took part in C. We also conducted interviews with five crime prevention specialists in the police district involved, two legal professionals, and a group of five officials from the National Police Directorate, which provided contextual information on crime prevention strategies and youth crime prevention in general. Most of the C interviews were conducted by Skjevrak, some were done by Gundhus.

1 Gundhus participated in both projects, Skjevrak was involved in CUPP, and Wathne in AGOPOL.

Gundhus and Wathne also interviewed fifteen ICT-related employees from the National Criminal Investigation Service (Kripos), Central Police District (CPD), the National Police Directorate (POD), the Police IT centre (PIT), and the Police University College (PHS). The choice of such a broad range of informants was designed to shed light on the variety of practices followed, and to understand the logic behind them. Our aim was to identify different perspectives, experiences, and unwritten practices, though in this article, the interviews mainly provide context for the domestication practices that we identified.

In addition to interviews and observations, in both cases we also draw on documents such as plans, minutes of meetings, and internal evaluations. These documents provided important background information about the intelligence projects' goals and their results, information on such things as how digital technologies were supposed to contribute to the intelligence process, and how they were perceived as solutions to the challenges in question, and what was thought about their results.

The interviews were semi-directive, so that informants could talk spontaneously and cover as many points as they wished, rather than being constrained by the order of the interview questions. We used thematic analysis for the initial coding and analysis of interviews, inspired by Braun and Clarke (2006). Codes and themes across the material were identified inductively, supported by a subsequent abductive process addressing theory. We also made use of situational analysis (Clarke et al., 2018). This is an extension of grounded theory, which helps address the shortcomings of a strictly inductive approach (Clarke, 2005, pp. 11–16). It is inspired by Foucauldian discourse analysis and social studies of science and technology, and was therefore appropriate for this study, where the focus is on analysing elements of situations and relations between those elements, the conditions for possible action, and related discourses—to ensure that differences became more visible. The individual interviewee's perception of situations is related to the wider network and subgroup they belong to, because we are particularly interested in similarities and differences in the practice of managers, CP officers, intelligence officers and front-line officers. All quotes and documents were translated from Norwegian into English by the authors.

The projects received the National Police Directorate's approval to observe the police. Interviews and observation were conducted following approval by the Norwegian Agency for Shared Services in Education and Research (SIKT), which is responsible for enforcing ethical guidelines, and following authorization by the chiefs of the police districts and the National Police Directorate. Each participant, recruited on a voluntary basis, received, and signed, an information sheet about the project, which outlined the aims, methods and implications of the research, the process of anonymization, ethical guidelines, and data management, as well as their right to withdraw from the project at any point.

To distinguish the two projects, quotes from A project interviews are marked 'A' and those from C are marked 'C'. The position of each interviewee is indicated. Intelligence analysts are marked 'IA', crime prevention officers 'CP', managers 'M', patrol officers 'PO', and IT personnel 'IT'.

Datafication workflows

To understand which factors that shape how digital traces are used, we will now present in more detail the practices the technologies are part of and the context of the police officers' negotiations with these technologies. The intelligence cycle is described as a process that is designed to organize how the police acts and governs itself. It assumes that the recording of data and its visibility facilitates knowledge sharing and learning from experience. Since data is fundamental to the intelligence process, the selection, quality, and compilation of the data recorded is of great importance. New police officers are taught that sharing data for decision-making is the correct way to produce knowledge. Intelligence-led policing aims to change routines and practices and, as we will see, available digital traces represent a very specific view of the knowledge, which determines subsequent interventions. These are highly dependent on the digital traces in police databases, but these traces are seldom used in a linear way (Lundgaard & Gundhus, 2024).

Features of the Indicia crime intelligence system follow the intelligence cycle that was later set out in the Intelligence Doctrine, as one informant described:

> Indicia functionality follows the Intelligence Doctrine process to the letter. We have prioritized functionalities for 'intelligence needs' from which police officers derive hypotheses. We therefore link 'information needs' to hypotheses and ask for specific data to be gathered. The resultant information can then be linked to 'information needs' and hypotheses. That way the entire intelligence cycle is covered. (IT personnel, A)

The doctrine suggests that data gathering is directed by hypothesis. As we will see, in practice, (and this is confirmed by a data controller at Kripos), the data put on the system is generally not a hypothesis to be investigated but simply information related to persons, phenomena or events. While all police officers had access to the system, the extent of their access varied. An intelligence analyst specializing in organized crime usually had more extensive access than a patrol or crime prevention officer. The increasing importance of what is stored in Indicia was described by an intelligence analyst:

> *So, for handling the information that is important for knowledge-based policing and preventive measures, Indicia is the only database that*

> *works. Because things are different now from ten years ago, as far as the use of recorded data is concerned... Society as a whole has become much more complex as regards the amount of information there is, both in criminal cases and everywhere else. Telephones, data traffic, social media...You have a completely different network now from what you had before. So, Indicia is much better than the other systems in terms of being able to handle, sort and systematize large amounts of information. (IA 1, A, 2021)*

In this quote, the analyst expressed the epistemic power of Indicia. If information is more smoothly handled, it made knowledge appear more valid. Indicia was perceived as a good solution for searching and systematizing data from the different police databases, even though the search engine did not integrate the data: officers must log in and out of the police registers to get more information about the result of a search. There are dozens of systems and registers, and in the interviews a perception often expressed was that the basic police systems were old and unable to «talk to each other». Although Indicia is well thought of as the main search engine for intelligence practice, other software, such as the i2 Analyst's Notebook, described above, was used for visualizing, interpreting, and analysing data. Due to privacy regulations, when data was selected for further analysis, it was not transferred directly to Analyst's Notebook from police systems but first imported into Excel to be structured and categorized. These procedures are very time-consuming and manual, as was made clear by interviewees. The process of checking data and making it ready for analysis in Analyst's notebook was based on discretionary assessments. The extraction, structuring and processing of data–what is called the cleaning process–was therefore not fully automated and demands manual work.

Division of labour between the collector of the information, the analyst and the commissioner of the intelligence assignment led to a divide between data collection, analysis, and decision-making. The aim is greater objectivity and a reduction of subjective discretion. Patrol officers must document what they do in the police register, and this should be immediately visible in Indicia and on their mobile phones. This is a step towards datafying the police, with work processes moving to digital systems and communication and collaboration taking place via distributed digital arrangements. The Intelligence Doctrine requires all information used to be recorded in Indicia. The police registers therefore act as 'digital prisms' that refract, categorize and organize data into distinct configurations and novel forms of knowledge: «digital technologies afford particular ways of managing visibilities, and shape what we come to see, know and govern – and not see, know and govern» (Flyverbom, 2024, p. 3).

Practices and sensemaking–the making and managing of digital traces

In this section we will explore various police officers' experiences of carrying out intelligence-led policing: as regards their practices when entering data, interpreting data and making subsequent interventions.

Practices

Although the interviewees perceived Indicia as much better than other systems for managing, sorting and systematizing large amounts of information, there was general agreement that what was recorded is random and coincidental. The arbitrary recording of data is therefore a key aspect of the domestication of digital data recycling. That being so, several information handlers described the data recorded as biased. For instance, one patrol officer said:

> *I know what I write in Indicia now will form the basis for the next KUBA [knowledge-based policing] period because it changes three or four times a year. And then it is... I think we've developed a lot, but we can get better at writing and sharing information in those systems. You can see that only a few officers, perhaps 20 %–30 % of us, write 90 % of it. (...) A small percentage write most of the messages in the intelligence system, and why is that? (PO, A, 2021)*

The officer argued that data visible in the police database is biased, since it is shaped by police officers' interests and motivation. For the police officers on patrol, it was obvious that the data recorded is selective. Several beat officers were clear that data is not objective in terms of raw data, since a lot of possible data is absent; they agree in thinking that data is biased, selective and partial. Moreover, in their view, uncontextualized data which lacks relevance and richness, for example details on people and the relations between them, or geographical information about places, was of little use to police officers patrolling the streets. The lack of context accompanying the information in the police databases was discussed at length during our observations of patrols in case A. In their experience, data retrieved from the police data bases lacked substance, and their criticism of data quality echoed what Flyverbom describes as follows:

> In processes of refraction and reconfiguration, contextual and many other features may be lost, and if we make inferences based on data alone, they may be based on selective, biased or partial information. This is so because when humans or social phenomena are reduced to data points and sorted out algorithmically, their origins and richness may be lost or made invisible. (Flyverbom 2024, p. 4)

Although the analysis staff responsible for the intelligence report can ask officers to gather specific information to meet so called «information needs», there are huge differences in whether, and how this information was approached, gathered and recorded by patrol officers. In the interviewee quote above, we also see that while everything that counts as relevant information and knowledge was supposed to be registered and available, few patrol

officers followed up on this. The data put into the system was highly visible, but few officers were sufficiently motivated to record all the data that was supposed to be there. One reason was that this data was gathered for the central functional unit, and not for local purposes. Here a local analyst lamented the failure to ask local units for data:

> *But the central analysis unit are dependent on local knowledge. If they need information for a case, they do some searching in the systems themselves. They could identify their information needs and ask for it, which we might be able to help with. But this probably won't be done, due to resources and their faith in the intelligence that has already been recorded... But this [identifying information needs] should probably be done much more than it is at present. (IA 1, A, 2021)*

Patrol officers also criticized intelligence reports for lacking local contextual knowledge, which meant they had to search the police registers for useful information themselves. To make good analyses, the central unit was dependent on local knowledge, just as the local police was dependent on information from the central analysts. However, what was recorded in the police registers was not just data that someone wanted to register, it was also data that was accessible and could be registered and stored. This was what came up as valid data, despite not having been verified or quality controlled. For patrol officers, the richness of contextual data was important, and was lost when their own observations and experiences were reduced into digital data. These perceived shortcomings in the data affected how it was used and therefore the domestication of digital data recycling. The police officers' views thus chimed with Flyverbom's notion that «what we encounter as data is not the same as the phenomenon that was turned into data points» (Flyverbom 2024, p. 4).

Sense-making

Several interviewees said that the data recorded in police registers is guided by intuition, not the information needs set out by the analysts. Analysts, for example, felt that what was registered was random and often determined by gut feeling:

> *You don't have a very conscious idea of what kind of information you're trying to get hold of. You kind of get... You get a bit of random information like that, and then you write it down, and then you see if it fits. It's like you're not trying to get what's being asked for. And it's actually a bit strange, because the police are good at police operations, you're good at targeted investigation, you're good at a lot, but... It's just that when it comes to the information that... It's called intelligence information, which in a way does not seem connected to a criminal case or other things that may be important, we are probably not clever enough to be goal oriented. (IA 1, A)*

In the quote above, the intelligence analyst touched on the logic of selectivity when he said that the police enter random information. What was entered in Indicia, he said, was a matter of whim and personal interests, rather than being information asked for by analysts to make assessments. Perceptions of what information was important was based on intuition, emotion and feeling, in a way comparable to the epistemic power of experience and gut feeling within police occupational culture (Cockcroft, 2020; Gundhus, 2013). This emphasis on gut feeling chimed with Brayne, Rosenblat and Boyde's observation that much of the information police officers put into the system was there because of their intuition that this data was important, rather than because they were trying to meet more official «information needs» flagged up by the manager (Brayne et al., 2015). In the quote below, we also see how an intelligence analyst chose to rely on gut feeling, despite knowing that objectivity was what was required:

> One of the basic principles of the Intelligence Doctrine is the requirement for objectivity and integrity in the work we do, and we strive to be objective at all times. Gut feeling isn't objective, it's subjective, isn't it? So, I relate to data. And I can have a gut feeling, and maybe often it is right.. Or it is right. I think– 'I should look at this guy. Ah, it was a good thing I looked at him, because he was relevant.' (IA 1, C, 2021)

As the intelligence analyst argued in the quote above, despite objectivity being the rule, data was shaped by construction: it was interpreted and made sense of. Following Douglas' (2002) cultural theory, the intelligence analysts' reflection can be viewed as representing a break with ordered relations, which threatens the boundaries of the cultural system. By defining gut feeling as a possible source of important knowledge, the boundaries of the epistemic power of recorded data are challenged. The same intelligence analyst went on to reflect on the process where young people was selected as suitable candidates for early preventive measures through discussions with the crime prevention officers:

> It may not be so emotion-based, but in the selection process, we (intelligence analysts) select the young people we think are suitable. (...) And sometimes we hear back [from the crime prevention officers]: 'No, these ten people were not suitable.' Then I might think: 'But it was strange that they weren't suitable.' I don't necessarily get to know why they are not suitable. But it is perhaps this type of situation which is the only time I can think of when there could be surprises. Or conflicting thoughts. (IA 1, C, 2021)

Why the interpretation of data also affected digital data recycling can be understood as a background element in the interviewee's story above. We see in it a distinction being made between a 'pure' digital system characterized by objectivity and rational thought on the one hand, and a 'dirty' human approach characterized by gut feeling, subjectivity and emotion on the other. This accords with the distinction made in the Police Intelligence Doctrine, which speaks of new data-driven methods and intelligence products helping to create a more objective and scientific basis for decision-making (National Police Directorate, 2014). The aim is to 'domesticate' subjective information possessed by individual police officers, by turning it into data and making it part of the intelligence cycle,

in which analysts should be objective and not make suggestions. When the intelligence analyst in the quote above reflected on the crime prevention officers' decisions on who should be kept on the candidate list, he showed that «he relates to data» and relied on it. Intelligence officers provided analyses of quality-assured data. This quality assurance was talked about as a cleaning process, during which they distinguished between clean and dirty data, even though they were aware that the objectivity of the data was questionable. For them the 'impure' was what flowed across boundaries and messed up the 'clean' stuff (Douglas, 2002).

The use of tools and processes which turned their work into quantifiable data that could be tracked, monitored, and analysed, and the requirement to discard experience-based knowledge, caused police officers to lose motivation, and forced them to navigate the process of datafication. One example of this appeared in the way experienced crime prevention officers in case C felt that they lost their value and professional pride when the task of selecting candidates was transferred to the intelligence analyst:

> (...) I was told that many of the old crime prevention officers felt that they had no value anymore, as it was the intelligence unit that was supposed to produce it [the knowledge] - I told them 'It's a new age.' I remember I taught on an intelligence course that some of the older people were on. I said that you must now register on Indicia the information you get. If you enter it into Indicia, then intelligence will pick it up, and that information will be included in the next report. And that's how you make your work visible. But they didn't want to (CP1, C, 2023).

The quote above makes clear gains and losses resulting from putting data into the system. The obligation to file information is rewarded with recognition for the police officer's work, and its appearance in the next report. But this reward had no motivating effect on «old school» crime prevention officers, who became either non-users or reluctant users of the technology. It made them think that they were now worthless, and that intelligence would produce knowledge for them:

> (...) some people believed that working for 15 years in the preventive field, in the same area, and with all the experience you get, made them better able to make judgements about whether someone was in trouble than these cold computers in the analysis office. (...) those who had been working for a long time were very negative about [name of the crime prevention project]. They thought it was difficult, and a pain and they were not used to registering their information. After all, these were people who kept things in binders, or in their own computer folders (CP1, C, 2023).

The older generation of crime prevention officers were reluctant to comply with the new requirement to put information about young people on the system. In interviews, they told us that delegating this task to the intelligence analysts also deprived them of one of the crime prevention officer's key tasks. The project targeting young people at risk required the crime prevention officers in the local unit to digitally record information that previously had often been kept in personal folders. This led to dissatisfaction among officers because of the increasing demand for documentation, which was time-consuming and meant that more time was spent «inside» in front of computers. This lack of motivation, which led to reluctance and even resistance, reduced the use of digital traces and can be understood as a dis-domestication of digital data recycling (Ask & Søraa, 2024, p. 76-77). The use of digital traces did not fit into the crime preventers' professional ethos or their everyday lives. This new data-driven approach marked a shift in their role, whereby transparency and accountability were paramount, in contrast to previous practices, and aligning more with the analytical approach of the intelligence unit and the younger generation of crime prevention officers (Skjevrak & Gundhus, 2025).

A key point made in this section is that meanings ascribed to the processes of data-driven approaches and the sense-making that took place reflected a division of tasks and decision-making. Police officers patrolling the streets or meeting young people face-to-face felt less obligated to the recorded data and intelligence reports. This raises questions as to whether intelligence-led policing contributed to knowledge sharing or knowledge separation. We argue that, while the goal was to share more knowledge, the division of labour between the intelligence analyst and the crime prevention officer also led to a devaluation of experiential knowledge. However, data that was stored was valued and regarded as significant for making interventions, which is something we will turn to next.

Learning – «if something does not exist in writing, then it does not exist at all»

All use of technologies requires some kind of knowledge and skill, be it operational skills or knowledge about their appropriate use. The last dimension we will explore is how learning and knowledge shape the use of digital traces.

We have pointed out that in the KUBA project, the central analysis unit rarely asked local units for data, while the patrols found that the unit's analyses lacked local knowledge. They had to search police records for useful information themselves. However, to make good analyses, the central unit was dependent on local knowledge, just

as the local police needed information from the central analysts. If the selection of data depends on hierarchical sharing of data, it is difficult for local intelligence officers to know what is going on. Central and local police may thus have different knowledge bases, which can lead them to give very different answers to questions such as «what is the most important challenge?» In intelligence, this question is a central tool for prioritization. We argue that, because the data flow is functional, systemic, and limited, there was little opportunity to criticize the data. It was not questioned or scrutinized in a learning forum (Gundhus & Wathne, 2024).

The knowledge recorded was to a certain degree delegated authority that was open to negotiation. Our analysis implies that it was difficult to negotiate data when it was embedded in the ICT systems. Data was either stored or not stored, and there was no scope for questioning what had been recorded and what had not. One option was simply to reject, ignore, or resist the doctrine by not registering on the system or using information in the system in an alternative, unintended way (Gundhus & Wathne, 2024). However, digital traces were inevitably domesticated in the subsequent process of creating an intelligence report. The basic discursive assumption of the doctrine was that aggregated information should be perceived as superior to contextual knowledge, and this was a challenge for police patrols. Contextual information lied *outside* the police database and therefore often resisted datafication:

> Yes, there is always someone working in the police who knows something about that person or the area around there, who lives there or something. I don't think they [analysts] are good at connecting with people [police officers] who have plenty of local knowledge. The big machine [intelligence cycle] just keeps on going. (…) But again, if you follow the rulebook, which is one way to solve the problem, then you're in the clear, as I understand it. (M PO, A, 2021)

Only information that was recorded in the system was used by intelligence analysts, to make valid information for the intelligence reports given to the police district managers. Digital traces were a key component of what analysts later used to make reports. This meant that, for them, only data stored in the system was actionable knowledge – and it was from this that conclusions were drawn, as this intelligence manager described:

> We try to be aware of the need to be objective. We are human, so there is always a danger that bias will come into play. But if something does not exist in writing, then it just does not exist. And it may well be that our assessment is wrong, and that [an officer in the village] knows that a person is not dangerous, but that has not been written down anywhere. If it hasn't been made available, we are not allowed to use it as a basis for further assessments. So, it is difficult for us to say anything about it. And that's why I say that, in a way, writing is absolutely necessary. And that is why we bear in mind the value of what is produced. So that we can produce more of the right kind of thing. If our premises are correct, the assessments will also be more correct overall. (IA 1, A, 2021).

According to the Intelligence Doctrine, only visible and recorded data was valid, and it was this data that contributed to subsequent knowledge production. Data which was not on the system did not exist. What counted as valid data, also depended on the system's user interface, design, and layout. Some changes have been made to attract police officers' attention, for example regarding the type of information they should collect when they are on patrol:

> A lot can be done to make it [the interface] nicer and better and maybe a little more intuitive, but it's much better now than when you just got a list of lots of events. Because that's what the police did back in the day, when they went in and got a list of events and there'd be something about drugs and like, 'that tip there on drugs, we can just go to this area,' (IA 2, C, 2022).

As the interviewee said, a more user-friendly design could also motivate patrol officers to be more aware of intelligence analysts' need for information to improve the quality of reports. Sharing intelligence reports can potentially also increase officers' understanding of the importance of this work and encourage them to help make knowledge digital and valid. Elsewhere in the interview, this informant emphasized that what we term the epistemic power of recorded data varies, depending on the user interface. Although data was based on insecure and biased inputs, what was recorded had authority, since it must be negotiated, corrected, used, or not used, and since digital traces had to be acted upon in one way or another. In a previous study, we described crime prevention officers' use of the Signal app—secure and private messaging app—that police officers downloaded to their phone to share pictures of young people and information about them (Gundhus, Skjevrak & Wathne, 2023). This use had now been stopped by police managers, showing how external factors (such as legal regulations) also affect (and can be setbacks to) domesticated communication practices (Hartmann & Hartmann, 2023). One of the informants said this led to more time-consuming practices requiring officers to go into systems only accessible from the car:

> It's not just inappropriate, it's not legal. So, what we do now is go into the media link in the case and look at pictures. So, then you have to get into the car. And so, it becomes less efficient. (WG 5, C, 2023)

In other instances, however, doing computer work in the car was described by this informant in more positive terms, since it was better than driving to the police station. As already mentioned, CP officers expressed dissatisfaction with all changes that meant spending more time in front of computers, either inside the car or at the station, since it took time away from being outside, where what they deemed to be the real preventive work took place. This attitude is not unique to the intelligence project targeting young people. Our interviews with officers from various police districts in Norway, involved in the AGOPOL research project, found

general dissatisfaction with the increased obligation to document observation and gather data in the police registers. There was impatience with writing and documenting everything, whether the officer had to do it in the car or at the station. In the A-case project, officers on patrol found writing in their cars difficult. There were issues with smaller hardware formats, and it was difficult to hide them from people passing by. Another informant said a new phone app made it a lot easier to register on the spot, describing it as a «speedway to recording things» (WG4, C, 2023). Thinking about what should be recorded and what shouldn't, he said:

> I don't have a good answer. I'm very curious about it myself. It becomes very subjective. I walk through a shopping centre, and just at that moment it happens that this place is quiet. Or the opposite. Because I get involved in a youth conflict there, it can quickly become 'true' that every time I am in a shopping centre there's trouble with young people. There is the danger that there will be some random examples from which you make a big picture a little too quickly. (...) If you write a report at the end of the evening, there is a greater chance that you will only include the negative. The advantages are probably that you get a lot more information, and hopefully also more positive information. The disadvantage may be that what an officer experiences once in a while can quickly become a general truth. (WG 4, C, 2023).

Several interviewees talked about the pros and cons of registering data while on patrol. For example, one of them argued that user interface was important for smooth processes.

In this section, we pointed out that only information that was visible on the systems was acted upon. Everything that counted as knowledge must be recorded. Those who advocated using technology to document police practices and make them more accountable argued that documentation could reduce problematic biases in police practices related to race, class and neighbourhood. Documentation would then function as an accountability mechanism, since the decision maker must justify discretionary judgments (Molander, 2016). Documentation is something that should be done for the sake of others. Instead of relying on officer intuition, intelligence-led policing, in theory, relies on data, which can standardize information across work periods and levels of experience, eliminating concerns about adequate information sharing. However, as argued by Brayne et al. (2015), it is important to avoid false binaries such as 'intuition-driven' versus 'data-driven' policing, because in practice, neither approach exists in isolation: each informs the other in consequential ways. Since the interviewees in our cases did not talk about data as either intuitively generated or data-driven, this is also confirmed by the empirical findings in the two cases. Contextual aspects related to the user interface, for example, affected what was intuitively seen and recorded in the crime intelligence database.

Discussion

According to the Intelligence Doctrine, only visible and recorded data is valid and contributed to subsequent knowledge production. Data that was not in the system did not exist. In this article we have highlighted user experience and perceptions of data's epistemic power. However, what counted as valid data was also affected by the system's user interface, design and layout. We have therefore shown that what we term the epistemic power of recorded data varied, depending on the user interface. Despite data being based on insecure and biased inputs, what was recorded acquired authority through being negotiated, corrected, used or not used, because digital traces must be acted upon in one way or another.

We therefore argue that police employees' different professional roles and positions in the police organization shaped what technology meant to them and how they used it. Interviews with police officers in different roles indicated that the epistemic power of digital traces varied, according to contextual factors such as whether they were crime prevention or patrol officers, and what crime challenges motivated them. However, since only recorded data was valid in knowledge production, it was difficult to negotiate and challenge the routines connected with the making of this knowledge.

Both our cases showed that the domestication and digital recycling of data in the police organization was shaped by the users' everyday life, rather than by a passive use of technical devices (Jasanoff, 2004). Moreover, when data was collected, a choice must be made from the limited amount of data that can be or has been collected, and that was retrospective. The selection of some data rather than other data entailed a tacit retrospective creation of meaning. The data collected had potential meaning and acquired importance by virtue of the fact that it had been collected. In contrast to other observations of social phenomena, this data was transformed and recontextualized as something else and something new: what Flyverbom (2024) refers to as «refraction». However, this data could have been understood, interpreted, and classified differently, had it been categorized differently or refracted through other data. This is significant for classification (such as sorting or «cleaning») and for selection (such as prioritizing what to act upon). It is difficult to question data that has been recontextualized. Once the data is coded, the context is broken down into bits that can be approached and used as data points (Flyverbom, 2024). Once it is categorized, recontextualized, and written into a report or an intelligence product, its contextual richness will have been lost. The data recorded in Indicia was very much value-based, but appeared detached from the morals, norms, values, connections, emotions, contexts, and situations surrounding it when it was recorded. Although the data was classified as being of varying reliability, it acquired the status of validity by being made into something neutral and objective that could be measured, indexed, read, and searched. In reality, there was a lot of data that could not be retrieved because it was not registered.

This gives recorded data a certain epistemic power regardless of how users domesticate digital traces. We argue that information that was seen and acknowledged to be uncertain conferred authority to be governed and steered by the users. However, it was not the uncertainty that gave this authority, but the data's visibility in the system, which meant it must be interpreted and managed by its key users, most often the intelligence analysts. The intelligence process was constrained by bias inherent to the system, which resulted from focusing information gathering on what was already available, and from connecting it to recurrent individuals and problems. Intelligence cycle data was bound to be based on «searching across existing data to locate new and emerging risks» (Innes, 2006, p. 230). The knowledge produced and which guides decisions was therefore

> (...) not neutral, objective representations of a reality out there, but rather (or at best) proxies (Mulvin, 2021) or digital doubles (Haggerty & Ericson, 2000) that often come to stand in for the individual or the social phenomenon under scrutiny. This obviously raises important questions about the accuracy of and correspondence between the proxies and the actual phenomena. (Flyverbom, 2024, p. 4)

This brings us to the implications arising from this. We suggest that datafication can be understood as a central domestication practice where the introduction of digital tools into police patrols and to crime prevention officers separates knowledge management processes into different functions in the organization and thereby reorganizes everyday police routines. Depending on whether the data is perceived as proxies or the true situation, there is variation in how it is interpreted and in subsequent learning from it, depending on the officer's proximity to or distance from the reality that the data represents. The difference in cultures between police at street level and managers, famously referred to by Reuss-Ianni (1993) as the divide between street cop culture and management cop culture, can also be understood as a factor in the variation. When digital tools are domesticated in policing practice, it can become part of police officers' understanding of themselves and of their broader social relations to the public. It may then lead to a divide between a 'datafied-cop culture' and a 'contextual-cop culture'.

Concluding remarks

Our main finding is that digital traces were not necessarily used as the steered and managed intelligence process envisioned in the Intelligence Doctrine, and that this led to various adverse outcomes. However, we argue that digital traces were of great importance, even if the data was uncertain, because of the status they acquired in the intelligence process. The data provided some instructions for use which did not need to be followed, but the police must relate to them in some way—either rejecting, resisting, ignoring, supporting, adopting, or negotiating them. Police officers therefore related to, made, and used digital traces in various ways, including ignoring them. We have also showed that the intelligence process required digitization, which involved simple processes of turning analogue objects into digital ones, by converting police observations of the environment and information from reports into digital formats. In this process police officers' gut feeling and intuition still mattered, for example when information was selected for the crime intelligence system.

In both the cases discussed, the Intelligence Doctrine was important in providing guidelines for how data processing should be managed. However, despite agreement on how data should be applied, differences in practical routines, the digital tools used, symbolic work and learning processes revealed that its domestication in the police organization was messy: everyday life and technology was both re-shaped, rather than it just being a matter of technical devices being adopted. We found gaps between policy and practice, which can be seen both in unexpected workarounds and in solutions for organizing routines and everyday work. Hands-on tasks in policing, including the use of tools and the handling of data quality and reliability issues took on various patterns in routine practice. These reciprocal processes both influenced police occupational cultures and were themselves influenced by them. For a deeper understanding of these two-way processes, we need more research.

The epistemic power of recorded data had the potential to undermine the meaning of local knowledge and devalue those who possessed it. We suggest that the Intelligence Doctrine therefore constitutes a symbolic structure in which ambiguous police work processes are codified and institutionalized (Douglas, 2002). The local context did not fit the structure of the new digitized work process: it was a stream that flowed across organizational borders. The domestication of digital data recycling thus conferred new epistemic power by making certain things visible and clean, while leaving out facts which were difficult to categorize and showed up as 'dirt'. The way the police related to the epistemic power of the data varied, but officers were obliged to relate to this uncertain element. How the digital traces were made, used and interpreted also depended on training and education. Intelligence is a developing discipline within the police, and the way recorded data is interpreted and utilized, might therefore change in future police projects. It will therefore be of interest to continue researching what happens when technologies are (tamed) and brought into the police domain, particularly when more hidden algorithms and artificial intelligence applications have been adopted. To what degree will police officers have to choose between supporting the narrative created by stored data or the narrative created by other observations? Here, the social identity of the police might come into play, since work practices characterized by datafication might also affect self-identities associated with either a 'datafied cop-culture' or a 'contextual cop-culture'. Future research will show whether these contrasting binaries can be better described as a continuum.

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References

Archer, A., Cawston, A., Matheson, B., & Geuskens, M. (2020). Celebrity, democracy, and epistemic power. *Perspectives on politics*, 18(1), 27-42. https://doi.org/10.1017/S1537592719002615

Ask, K. (2016). *Lucid work. Assemblages, domestications and co-productions of play*. [Doctoral dissertation]. Norwegian University of Science and Technology.

Ask, K. and Søraa, R. A. (2024). *Digitalization and social change: A guide in critical thinking*. CRC Press.

Bowker, G. C., & Star, S. L. (1999). *Sorting things out: Classification and its consequences*. MIT Press.

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Brayne, S., Rosenblat, A., & Boyd, D. (2015). *Predictive policing. Data & civil rights: A new era of policing and justice*. https://www.datacivilrights.org/pubs/2015-1027/Predictive_Policing.pdf

Chan, J., Sanders, C., Bennett Moses, L., & Blackmore, H. (2022). Datafication and the practice of intelligence production. *Big Data & Society*, 9(1), 1-13. https://doi.org/10.1177/20539517221089310

Clarke, A. E. (2005). *Situational analysis: Grounded theory after the postmodern turn*. Sage.

Clarke, A.E., Friese, C. and Washburn, R. (2018). *Situational analysis: Grounded theory after the interpretive turn*. Sage Publications.

Cockcroft, T. (2020). *Police occupational culture: Research and practice*. Policy Press.

Douglas, M. (2002). *Purity and danger: An analysis of concepts of pollution and taboo*. Routledge.

Ellefsen, B., & Lomell, H. M. (2024). Polisiær etterretning i et historisk perspektiv. In E. B. Unneberg, P. Jansen, & O. Trønnes (Eds.), *Etterretningsanalyse i politiet*. (pp. 36–56). Universitetsforlaget.

Flyverbom, M. (2019). *The Digital prism: Transparency and managed visibilities in a datafied world*. Cambridge University Press.

Flyverbom, M. (2022). Overlit: Digital architectures of visibilities. *Organization theory*, *3*(3), 1-16. https://doi.org/10.1177/26317877221090314

Flyverbom, M. (2024). Theorizing data analysis platforms – digital refractions and reconfigurations of pasts, presents and futures. *Information, Communication & Society*, 27(13), 2366–2380. https://doi.org/10.1080/1369118X.2024.2320907

Foucault, M. (1977). *Discipline and punish: The birth of the prison*. Vintage Books.

Fyfe, N.R., Gundhus, H. I., & Vrist Rønn, K. (Eds.) (2018). *Moral issues in intelligence-led policing*. Routledge.

Gillespie, T. (2014). The relevance of algorithms. In T. Gillespie, P. Boczkowski, & K. Foot (Eds.), *Media technologies: Essays on communication, materiality, and society*. (pp. 167–193). MIT Press.

Gundhus, H.I. (2013). Experience or knowledge? Perspectives on new knowledge regimes and control of police professionalism. *Policing: A Journal of Theory and Practice*, 7 (2), 178-194. https://doi.org/10.1093/police/pas039

Gundhus, H. O. I., Skjevrak, P. E., & Wathne, C. T. (2023). We will always be better than a spreadsheet: Intelligence logic and crime prevention in practice. *European Journal of Policing Studies*, *6*(1), 27–49. https://doi.org/10.5553/EJPS/2034760X2022001009

Gundhus, H. O., Talberg, N., & Wathne, C. T. (2022). From discretion to standardization: Digitalization of the police organization. *International*

Journal of Police Science & Management, 24(1), 27-41. https://doi.org/10.1177/14613557211036554

Gundhus, H.O.I., Wathne, C.T. (2024). Norwegian police as a learning organization in the age of data-driven intelligence? In T.Ø. Kuldova, H.O.I. Gundhus and C.T. Wathne (Eds.) *Policing and intelligence in the global big data era*, Volume II. (pp. 129-158). Palgrave's Critical Policing Studies. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-68298-8_6

Hartmann, M. R., & Hartmann, R. K. (2023). Hiding practices in employee-user innovation. *Research Policy*, 52(4), 104728, 1-12. https://doi.org/10.1016/j.respol.2023.104728

Haddon, L. (2007). Roger Silverstone's legacies: Domestication. *New Media & Society*, 9(1), 25–32. http://doi.org/10.1177/1461444807075201

Helmersen, N. (2024). En etteretningsanalyseprosess for politiet. In E. B. Unneberg, P. Jansen & O. Trønnes (Eds.), *Etterretningsanalyse i politiet*. (pp. 220-232). Universitetsforlaget.

Innes, M. (2006). Policing uncertainty: Countering terror through community intelligence and democratic Policing. *The Annals of the American Academy of Political and Social Science*, 605(1), 222-241. https://www.jstor.org/stable/25097806

Jasanoff, S. (2004). *States of knowledge: The co-production of science and social order*. Routledge.

Kaufmann, M. (2023). *Making information matter: Understanding surveillance and making a difference*. Bristol University Press.

Lie, M., & Sørensen, K. H. (1996). Making technology our own? Domesticating technology into everyday life. In *Making technology our own? Domesticating technology into everyday life*. Lie, M. & Sørensen, K. H. (Eds). (pp. 1–30). Scandinavian University Press:

Lundgaard, J. M., Flinterud, G., Bjørkelo, B. & Dahl, J. Y. (2022).Transparens og tilsløring i politiets kunnskapssystemer. *Nytt Norsk Tidsskrift*, 39(2), 111–121. doi: 10.18261/nnt.39.2.2.

Lundgaard J. M., & Gundhus, H.O.I (2024). Den digitale hviskeleken: Data, informasjon og kunnskap i etterretningsstyrt politiarbeid. In E.B. Unneberg; P.T. Jansen & O. Trønnes (Eds). *Etterretningsanalyse i politiet*. (pp. 220–232). Universitetsforlaget.

Lupton, D. (2016). *The quantified self*. Polity Press.

Molander, A. (2016). *Discretion in the welfare state: Social rights and professional judgment*. Routledge.

National Police Directorate (2014). *Etterretningsdoktrine for politiet. Versjon 1.0*. Politidirektoratet.

National Police Directorate (2017). *Rammer og retningslinjer for etablering av nye politidistrikter*. Politidirektoratet.

National Police Directorate (2020). *Etterretningsdoktrine for politiet. Versjon 1.2*. Politidirektoratet.

The Norwegian Police (2020). *Innføringshåndbok for Kunnskapsbasert politiarbeid*. Oslo: Politiet.

Oudshoorn, N., & Pinch, T. (2007). User-technology relationships: Some recent development. In E. J. Hackett., O. Amsterdamska, M.E. Lynch, & J. Wajcman (Eds.) *The handbook of science and technology studies*. (pp. 541-565). MIT Press.

Phythian M. (2012). Policing uncertainty: Intelligence, security and risk. *Intelligence and National Security*, 27(2), 187–205. https://doi.org/10.1080/02684527.2012.661642

Pinch, T. J., & W. E. Bijker (1984). The social construction of facts and artifacts: Or how the sociology of science and the sociology of technology might benefit each other. *Social Studies of Science*, 14(3), 399–431. https://doi.org/10.1177/030631284014003004

Politiregisterforskriften (2013). *Forskrift om behandling av opplysninger i politiet og påtalemyndigheten*. (FOR 2013-09-20-1097). Lovdata.

Prop. 61 LS 2014-2015. *Endringer i politiloven mv. (trygghet i hverdagen - nærpolitireformen)*. Departementenes servicesenter.

Ratcliffe, J. H. (2016). *Intelligence-led policing*. Routledge. https://doi.org/10.4324/9781315717579

Reuss-Ianni, E. (1993). *Two cultures of policing: Street cops and management cops*. Transaction Publishers

Rønn, K. V. (2022). The multifaceted norm of objectivity in intelligence practices. *Intelligence and National Security*, 37(6), 820-834. https://doi.org/10.1080/02684527.2022.2076331

Selwyn, N., & Cumbo, B. (2024). «We've tried to keep the beast on a leash»: The domestication of Digital Classroom Surveillance. *Surveillance & Society*, 22(2), 88-103. https://ojs.library.queensu.ca/index.php/surveillance-and-society/index

Silverstone R., & Haddon, L. (1996) Design and the domestication of information and communication technologies: Technical change and everyday life. In R. Silverstone & R. Mansell (Eds.) *Communication by design: The politics of information and communication technologies*. (pp. 44–74). Oxford University Press.

Silverstone, R., Hirsch, E., & Morley, D. (1992). Information and communication technologies and the moral economy of the household. In R. Silverstone & E. Hirsch (Eds.) *Consuming technologies: Media and information in domestic spaces*. (pp. 15–32). Routledge.

Skjevrak, P. E., & Gundhus, H. O. I. (2025). From personal archives to intelligence: Visibility and ignorance in forecasting 'youth at risk'. In V. Galis, H.O.I. Gundhus & A. Vradis (Eds.). *Critical perspectives on predictive policing: Anticipating proof?* (pp. 62-83). Edward Elgar publishing.

Sørensen, K. (2006) Domestication: The enactment of technology. In T. Berker, M. Hartmann, Y. Punie and K. Ward (Eds.) *Domestication of media and technologies*. (pp. 40–61). Open University Press.

Sørensen, K. H., Aune, M., & Hatling, M. (2000). Against linearity: On the cultural appropriation of science and technology. In M. Dierkes and C. von Grote (Eds.) *Between understanding and trust. The public, science and technology*. (pp. 165-178). Routledge.

Vestby, A. (2018). Policy-making without politics: Overstating objectivity in intelligence-led policing. In N. R. Fyfe, H. O. I. Gundhus, & K. V. Rønn (Eds.) *Moral issues in intelligence-led policing*. (pp. 265-282). Routledge. https://doi.org/10.4324/9781315231259-14

Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. Profile Books.

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SEEING AS ONE?

Materialisation and Distribution of the Police-drone Gaze

by Jenny Maria Lundgaard

From 2019, a one-year trial tested the use of drone technologies within the Norwegian Police Services. Drones, designed to facilitate the collection, storage, and dissemination of live film and images, were implemented with the expectation that shared visual data would enhance situational awareness and thus improve police practices. This study, based on ethnographic data collected during the trial period, examines how these new technological tools shape the practices of professional vision. It explores the relationship between seeing *and* knowing *by looking at how drone technologies influence 'the police gaze' (Finstad, 2000), police officers' collection and processing of their visual surroundings. As the human gaze merges with the drone gaze, visual data is produced and can be distributed in larger police operations. Drones were intended to simplify team decision-making by providing images considered true and certain, thus reducing the need for oral radio communication. However, paradoxically, one outcome of the trial was the creation of an observation manual for improving the oral conveying of drone-collected information. The findings underscore the complexities of police knowledge production, illustrating the intricate interactions between human and non-human agents in operational policing. While drones materialize and spread the police gaze, merely sharing images does not ensure a shared understanding of an incident or operation. Establishing mutual comprehension of incidents or operations remains a nuanced and delicate process.*

Keywords: Police gaze, drones, professional vision, digitalisation, team, ethnography

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Introduction

This article is an ethnographic exploration of how drones impact police practices and influence the police gaze (Finstad, 2000). It examines what happens as the gaze, materialised in the form of images and films collected using drones, is used in police decision-making. Researchers have discussed how this technology may be applied to policing (Engberts & Gillissen, 2016; Sakiyama et al., 2017), and critical questions have been raised. Such questions have been related to privacy and surveillance (Završnik, 2016), legal issues (Custers, 2016; Di Nucci & Santoni de Sio, 2016; Engberts & Gillissen, 2016), and moral and ethical concerns, especially for drones used with lethal outcomes (Cohn & Tutu, 2015; Davis, 2019; Di Nucci & Santoni de Sio, 2016; Sandvik, 2016; Stelmark, 2015) or problematic forms of automatization (Cuffe, 2021).

This study focuses on the less researched microlevel: the human-drone interactions and the impact the technologies have on the professional gaze. *Seeing* is crucial part of many professional practices (Goodwin, 1994; Lomell & Neumann, 2017). This is also the case for operative policing, where what officers sees defines their decisions and thus also their actions (Finstad, 2000). Understanding and interpretating visual perceptions is part of what the police often describe as the establishment of *mutual situational awareness* (Blandford & William Wong, 2004), a term adopted from a psychological model of decision-making (Endsley, 1995). In the Norwegian police, this term is often used to articulate officers' need for a common understanding of what they are facing so that, as each individual officer take action, the team pulls in the same direction. Here, I ask how drones influence the establishment of such situational awareness as the technology is used for information gathering and in decision-making.

Lundgaard (2023) showed how drones create new assemblages in policing at the legal, human, and operational levels. This paper can be considered a further elaboration of this argument but focuses on the professional and digitalised gaze. The gaze is constructed, not only by the assemblage of the drone and the police officer, but also as part of a larger whole: the team working together during a police operation. Drone images are constructed as actionable information in complex encounters of human and non-human actors where continuous processes of translations occur (Callon, 1984). This study examines how officers turn their gaze into images, and as these images are shared, are believed to become beneficial information in concrete operations.

In 2019 the Norwegian Police Directorate initiated a one-year drone trial, where the technology was tested by a group of officers from various districts. The empirically based argument in this article follows the observed development of the drone practices during this trial. The first part explores how the drone shaped the police-drone gaze. Here, the drone images are understood as materialisations of the police gaze, but as they spread in teams of officers during police operations, they were not always interpretated in the same manner. From this the focus of the second part of the article arises: To ensure that drone images were perceived in the same way, officers in charge of drone implementation focused on developing tools for better oral communication and wrote a 70-page manual for conveying observations. This development is used to discuss the possibilities and limitations arising from the digitalized police gaze, which is mediated by drones, and spread in complex police operations with the aim of better situational awareness.

Technologies come with promises (Marx, 1995), but because they are used by different people and groups, the result is not given. Pinch and Bijker (1984) described the implementation of technologies as stages, where things are initially flexible before becoming more stable and permanent. This is a heterogeneous, rather than a straightforward and given, process (Brenna et al., 2001). The structure of the article follows the chronology of the implementation of the drones in the Norwegian police, and this paper will be exploring the need for human dialogue to balance the digital interaction. During the trial period, misunderstandings and conflicting interpretations of drone images between officers occurred, and to answer to this problem the Police Drone Services created the observation manual, aimed at creating guidelines for improved communication about drone images and film. The first part of the paper reflects the flexible and early stages of the implementation of the technology, followed by a part that highlights the role of the observation manual, showing a step towards something more stable and unified. The professional development during the drone trial show the domestication (Gundhus, 2006; Tjora, 2009) of the technology, though drones are not yet fully domesticated and remain a 'young' technology still undergoing advances without a clear end point.

Police gaze as a technologically mediated and shared practice

The theoretical framing in this study draws on Science and technology studies (STS). Some of the early works in this tradition were groundbreaking explorations of visual interpretations in scientific practices (Lynch & Woolgar, 1990), and the relationship between seeing and knowing has continued to be investigated further by several scholars (Coopmans, 2014; Vertesi, 2015). Here, this theoretical framing is further made up of three co-constructing factors: the gaze as a professional practice, the technological mediation of the gaze by

the drone, and an understanding of the gaze as a team effort as the police aim at using drones for the establishment of a joint situational awareness. Thus, the framework is constructed as a combination of *gaze*, *technology*, and *team*.

This article is an engagement with Finstad's (2000) term 'the police gaze'. In her pioneering field study of the Oslo police in the 1990s, she used this term to describe the way in which police patrol officers visually collect and interpret their surroundings. The police gaze is both a description of police practices and a critique. As the gaze effectively categorises humans, constructing a basis for interventions in people's lives, the police become a sorting mechanism through which people, already carrying visual signs of troubled lives, become subject to intensified control. Thus, the gaze and the practices, perceptions, and assessment following are a foundational part of police practice, worthy of further assessment.

Lundgaard (2021) described how the at-site officers' visual interpretations of events and sites, by having 'eyes on the site', became an authoritative form of knowledge in operative policing—*to see is to know*. As the operative staff in control rooms deal with uncertain and ambiguous information, and do not visible access to the site, the information from officers on-site becomes a form of "pure" knowledge about ongoing incidents and is rarely contested.

The process of seeing is not simply bodily processes. Styhre (2010, p. 360) described its complexity, stating that 'vision is something which is produced through an intricate combination of physical and psychological processes. Vision and accompanying concepts, such as attention, are individual accomplishments, and is a capacity that can be trained and developed' (p. 360). Styhre links *seeing to knowing*, as 'vision is gradually established as an individual capacity that becomes part of the informed professional viewer's competence' (Styhre, 2010, p. 363). The police gaze is a professional and situated gaze that reflects Foucauldian perspectives on the medical one (Foucault, 2017 [1963]). The medical gaze is described as powerful and determinant in constructing the epistemic powers of the medical discipline: 'By means of looking, the gazing medical clinician may know how to treat the patient; it is a total and inclusive gaze' (Styhre, 2010, p. 364). Situated in a professional practice, the gaze is an example of what Goodwin (1994) calls *professional vision*. These are learned techniques of observation, specific to a particular profession, used to make meaning of what the professional actor observes. Goodwin described how seeing is 'a socially situated, historically constituted body of practices through which the objects of knowledge which animate the discourse of a profession are constructed and shaped' (Goodwin, 1994, p. 605). Police practitioners have a duty and right to exercise power on behalf of the state. Thus, understanding the basis for their decisions, construction, and consequences of their practices of seeing is pivotal, as is understanding how new technologies (re)shape these practices.

The gaze here in question is determined not only by the professional police context but also by the tools used for seeing. Mol (2002) highlighted the role of physical instruments in the diagnostic medicine practices she studied, and inspired by her, this study examines what happens as the police gaze is mediated by a technology. At the core of drone technology is a unique combination of an ability to produce digital images that can be distributed and reproduced, and a breach of the traditionally symbiotic connection between the camera and the street level (Choi-Fitzpatrick, 2014). According to Kaufmann (2016), this breach is linked to how drones are promoted as something that extends human capacities and senses, as they locate the police gaze in the air (Klauser, 2021). Lundgaard (2023) described how an airborne gaze can be both helpful and deceiving. At times, the drone acts as a problem solver, providing easy-to-read images that would otherwise not be available, but it can also work as a troublemaker, as images used for decision-making can be misinterpreted and misleading. Thus, the drone becomes a powerful actor (Kaufmann, 2016; Lundgaard, 2023), playing a significant role in mediating and shaping police practices.

This study examines digital tools used for professional practices of seeing, focusing on the ways that technologies change how knowledge is produced within these practices. Seeing and knowing are connected, but how does *what someone sees* become *what we know*? This question was also at the core of Vertesi's (2015) study of how a robot, the rover, was used to gather information about the planet Mars. She shows how the images provided by the rover were co-produced as knowledge by humans and technologies together. What she called to 'see like a rover' entails how '(l)earning to see requires both bodily skills and instrumental techniques' (Vertesi, 2015, p. 9).

The practices Vertesi studied, and other socio-technical knowledge-constructing practices explored by Coopmans (2014) were all scientific practices. Although policing is not science, it is knowledge work, as modern policing is concerned with information gathering and data collection (Ericson & Haggerty, 1997). Policing is a specific epistemic culture (Cetina, 2007) where knowledge in operative police work is linked to knowing what is taking place during concrete events and incidents (Flinterud & Lundgaard, 2024). Exploring the professional gaze as it is redefined by technology provides insights into the complex construction of police knowledge. In policing, establishing a mutual ground for decisions, that is, a suitable form of knowledge, is crucial. Such knowledge, what they themselves call mutual situational awareness, consists of many forms of information, including previous formal or personal knowledge, and current contextual or explicit knowledge (Diniz et al., 2005), including information from databases and registries (Lundgaard, 2021). Thus, the question arises: how does the drone affect the police's knowledge of a current situation?

Choi-Fitzpatrick (2014) highlight that drones offer spreadability of images and film. This is another aspect crucial to policing, as it implies that the gaze of the pilot officer merges with the drone and can be distributed and shared. By sending images and live films, other members of a team of officers can seemingly see what the drone pilot sees. As many police efforts require the actions of several officers working in teams, the role of the images from drones becomes crucial within teams. This leads to another important question regarding the police gaze: What does it mean to share a gaze?

Background and methods

The analysis in this article uses data collected in an ethnographic study of the initial stages of drone implementation in the Norwegian Police Services. During the Police Directorate's drone trial, the technology was utilised in ordinary policing. In the trial, eighteen officers from three selected police districts were trained as pilots and then carried out their ordinary duties, putting drones to use where they deemed it potentially beneficial. This trial period resulted in drones becoming a permanent tool in all police districts (for details, see Lundgaard, 2023).

In line with what Latour (2005) and Law (2007) emphasised, STS researchers should be in proximity to the field of study to empirically grasp the actual socio-material practices as they are carried out. This makes ethnographic methods suitable. Here, the ethnographic data answered to the projects aim, which was '[...] to assemble concepts, empirical data, and epistemological and ontological perspectives into an analytical story' (Aradau et al., 2015, p. 9), investigating the practices of drone use in policing. Ethnography (Geertz, 1973; Hammersley & Atkinson, 2004 [1996]) is not only central in STS, they also have a long tradition in studies of policing (see Finstad, 2000; Høigård, 2005; Manning, 2014; Reiner, 2015), as they provide much-needed and insights into police practices and exercise of power. Such methods provide proximity to practice (Brewer, 2005; Salter, 2013), as the researcher is situated where the officers are (Law & Singleton, 2012), in this case providing in-depth understandings of the human-drone interactions.

This project was initiated in collaboration between officers working in the Police Directorate and the researcher. The directorate welcomed the researcher from an early stage, and after their assessment of the project's legality, it was possible for the researcher to follow both the planning and carrying out of the trial project, with full academic freedom to plan and carry out the research as seen fit. The officers who chose to participate were exempted of their code of silence, making it the researcher's responsibility not to disclose sensitive data regarding concrete persons, operations, or tactics in the finished publications.

In this project, the researcher followed the implementation of drones closely over time, mainly by conducting participant observations with police officers. A total of 390 hours were spent doing field work in several districts and one specialised unit, mostly in 2020–2021, but also in 2023. Owing to the COVID-19 pandemic, the planned field work had to be changed and adjusted numerous times and did not become as extensive as planned. The research included observations of the majority of the 18 officers trained as pilots, who were followed both during their training to become pilots and during their daily duties. There were also some participant observations together with officers from specialised units policing public protests. Three districts were part of the drone trial, but this study included visits to six of Norway's twelve police districts as some of the drone pilots assisted in operations outside of their own district. The researcher was present and interacted with the officers, both in formal and informal settings, but was not involved in carrying out any actual police work. Fieldnotes were taken both during and after the observations, and later analysed using the theoretical concepts of the professional gaze, the technological mediation, and the team practices of constructing knowledge, to make sense of and discuss the socio-technical practices of seeing, as constructed in the interactions of drones and police.

The focus of this article is on the role of live images during ongoing police operations, how the images spread, and when they become knowledge. The majority of the drone pilots were emergency patrol officers, but some had other primary functions. In this article, the drone pilots working as forensic technicians are part of the analysis, as they have experiences with photography going back further than the drone trial, making them more attuned of the similarities and differences between ordinary forensic photography and drone photography. The main data comes from the observations of operative personnel, working in a different context, where the spreading of images and film have been used to a lesser extent.

As drones became a permanent fixture in the police, the initial training course offered to police officers was revised based on experiences throughout the trial period. The researcher observed parts of this training, focusing on the implementation of methodologies for observation. These new methodologies were developed by the Drone Services, a unit within the Police Helicopter Services established after the trial period. The Drone Services presented their methodologies in an observation manual released in 2022. The manual is a 70-page document meant to structure and support visual and oral mediation during operations. Data from this manual underline and supports central dilemmas observed during the field work. As the manual is an internal police document, its content cannot be referred to in detail, only at a more general level. It is used here to illustrate the shift that took place during the trial: From a belief that drones would reduce the need to talk, to an understanding that this was not necessarily the case, and the following development of the manual for improving oral communication when using drones.

Materialising the gaze: Drone images in a forensic context

Drone images are co-produced by multiple actors: the pilot, the technology, and the context in which they operate. The commercially available drones used during the trial were made for information gathering through images and film. They were equipped with basic features, such as cameras with zoom and thermal functions, a speaker, and a spotlight.

This article is mainly about operative policing, but to illustrate how the drone materialises the gaze, the analysis will first look at some forensic practices. In forensics, the focus is on constructing images that can be used as evidence that need to depict truth, and thus bears clear similarities with scientific evidence. Amman and Knorr-Cetina (1990) explored the role of visibility in the natural sciences, where the notion of evidence is linked to what can be observed and seen. In contrast to what is only heard or believed: 'only seeing bestows on objects an accent of truth' (p. 86), yet they also point out that 'nothing is more difficult than to know exactly just what we do see' (ibid). Lynch and Woolgar (2014) described the difference between perceptions, observations, and visualisations, where the latter is a more precise term for the process of making something visible in a scientific practice. Using this distinction, we can separate the act of seeing, as done by the drone pilot, from the drone's own contribution as it, together with the pilot, constructs 'witnessable and accountable material and virtual displays' (Lynch & Woolgar, 2014, p. vii).

An illustrative example of the making of such representations through visual material was found during a ride-along where the researcher was following a forensic technician drone pilot. We talked about the potential use for drone images. He expressed a need for more focus on what he called 'the quality of drone images' to heighten their value as potential evidence. He believed that much drone photography was meagre, and when asked what he meant by 'good images', he spoke of how images can lie, and about the augmented quality in images taken by those with more photographic experience. His descriptions of 'good images' had much in common with general rules for ordinary photography, such as attention to the focus in the image; the presence of clear, visual lines, and the absence of noise and distractions. He described his goal as making sure that anyone viewing the images he captured would experience the scene as he saw it when taking the photo—this applied equally to his drone images. For him, this meant that the image should depict what he believed was the actual situation; it should not be subject to interpretation or be critiqued for hiding or enhancing specific parts of the situation documented. Thus, his goal was to make a visual foundation, a mutual gaze, through material images that would 'speak for themselves' as objective conveyers of truth.

Another pilot, also with the primary function of forensic technician, further underlined this point when he was showing the researcher images from an accident between a trailer and a car where the driver of the latter was killed. The images taken by the drone provided an overview of the entire site. He pointed to areas of the image: scratches in the asphalt from bent metal, pieces of broken glass and plastic spread across two areas of the road, and noticeable break marks from tires. According to him, the image told 'the whole story', as it made it possible to trace where the initial crash happened, the subsequent movements of the vehicles, and the damages occurring during the various stages of the accident. He believed that the images provided more certain information than the traditional alternative; drawn illustrations, written text, and supplementing images of limited sections of the site. His stance reflects Amman and Knorr-Cetina (1990) who highlighted the fixation of the visual as evidence. He was convinced that the drone images could participate in ensuring a just trial, in this case supporting the confidence that the trailer's driver was not responsible for the accident.

However, 'the whole story' is also subject to interpretation. After a different car accident, this time non-lethal, the researcher was on site with an emergency response unit. When arriving at the scene, other units were already on site working. The drone pilot started photographing but was rushed by the police's tactical command officer who wanted to open the road to traffic. He also had to stop staff from the fire department who had started removing remains from the accident from the street. The pilot quickly took some images, but back at the station, he was not too pleased with them. He pointed at a vehicle with a hanger dominating several of the images. At the site, he thought the vehicle was involved in the accident, but it was not. Consequently, the story the images depicted became unclear. He was also frustrated by people present in the images, and by a fire truck covering most of the rubble from the crash. Although the drone images were supplemented by images taken on the ground, he believed the messiness of the images caused a need to supplement them with explanatory text.

The still-images taken by the drones in these examples were all meant to be used in later contexts, such as investigations and court trials. The forensic approach illustrates how the drone, as other cameras, works as a way of materialising the police gaze, but also points to how images can be misinterpreted. Images can be clear and indisputable, but they can also be the opposite, making unwanted room for more than one interpretation. This tension, between the indisputable and the interpretative, is the starting point for the rest of this article, which deals with the complexities of operative policing.

From an individual gaze to a team perception?

In operative policing, the police gaze is materialised and co-produced by officers and drones during ongoing events and incidents and can influence collective decision-making processes. There, the images constructed by the drone are used for a more immediate purpose than in investigations. In police operations, drones may be used to provide overview of sites and situations, to search for people or places, to explore hard-to-reach areas, or to mitigate risk before sending human personnel into an area or a building. In smaller operations, these tasks can be conducted by a singular pilot officer without spreading the images to other staff. However, the officer can also be part of larger team operation, with multiple units and officers and where images and films can be shared with the control room, tactical command officers, or other police. In the early stages of the trial, most work was done by the individual pilot alone, but as the trial continued, there was a shift towards more sharing of images. The increased spreading of images was wanted by the officers and became possible due both technological advances in the software.

In this article, the drone-gaze is conceptualised as a larger team effort and as the production of a 'shared vision' (Vertesi, 2015, p. 9). Vertesi showed how the knowledge produced about Mars was not the result of individual endeavour, but by a collective team consisting of scientists, engineers, and robots, who decided what the images depicted, the result being recognized as knowledge. The police gaze is not explicitly coined by Finstad (2000) as a larger team practice, though the patrols mostly consist of two persons. The team described in this article is larger, and also include the technology used. We can thus ask: What happens as a gaze collected through a technology is spread to devices and humans other than the officer filming?

Drones were applied in the Norwegian police with a great deal of techno-optimism and a belief that the technology would change policing for the better, making it more precise and efficient (Lundgaard, 2023). There were several reasons behind this sentiment, including the believed significance of image sharing during operations. The common understanding was that drones would ease the establishment of a mutual situational awareness, and assist in ensuring that all officers subsequently pull in the same direction (Lundgaard, 2021). Constructing such a mutual understanding of the incident is a complex yet crucial process. Sharing images was initially perceived as an easy and efficient way of sharing information, as images and film were considered to provide true and solid information. These ideas can be coined as a belief that drones can establish a *mutual gaze*, where officers watching the same image would see the same thing, thus sharing a gaze.

Lundgaard (2021) showed how the understanding of an incident is constructed in the initial stages of an incident, when the starting point is a notification from a caller to the police emergency control room. Such operative policing is often described as incident-driven but is more precisely described as driven by the control rooms' interpretation of the information from the caller and any additional information present (Lundgaard, 2021). These intricate processes result in the control room's situational understanding, which is then conveyed to and interpreted by the patrols on their way to the site. Once on site, the patrol officers' comprehension of the situation can differ from that of the caller or the control room. This can either result in unclarity or conflict, or in an updated mutual situational understanding of the incident.

The use of drones can be understood as reducing the number of translations taking place, as illustrated when the understanding of an incident significantly changed once the drone was 'on site' (Lundgaard, 2023): Information from a caller had led to concern that two groups of youth were about to start a violent fight, but the drone images were recognized as showing a group of youth filming each other rapping and dancing. From a chain of translations (Callon, 1984) that included the caller, the call handler, the other staff of the control room, officers on their way to the site, as well as telephones, radios, and data from the call handling system, the inclusion of drone images reduced this chain to the interpretation of the live images by the officers watching. As images are transferred by humans and technologies, there is always translations and mediation taking place.

The idea that drones will make it easier to establish a mutual situational awareness reflects what Amman and Knorr-Cetina (1990) calls a 'fixation of visual evidence'. At times, this evidence is clear-cut, but in practice it is often neither straightforward nor easily managed. To the STS scholars who investigated how images become knowledge (Coopmans, 2014), this is no surprise, and the challenges and developments of the polices' drone practices serve as further empirical evidence of these theoretical notions. Latour (2014, p. 349) rhetorically stated: 'if only there was no mediation at all, how much more accurate our knowledge would be', and followed up by emphasizing the need to understand images as visualisations of practices, referential to and moving along 'cascades of successive traces' (p. 347). Although many such aspects are visible in the drone images used as forensic evidence and for smaller human-drone interactions, they become crucial in larger-scale police operations where the police gaze is not only technologically mediated but spread and shared, with the ambition of creating a mutual gaze, resulting in better situational awareness.

The machinery of seeing and the repeated need for talk

The formation of the collective situational awareness in police operations is a complex and fine-tuned process in which humans and technologies both contribute. When a singular officer is looking at a site using the drone, the two make up a small team, that is, an assemblage of human and drone (Lundgaard, 2023). In other police operations, numerous persons and technologies participate in team efforts, just like in Vertesi's (2015) study, where the notion of 'seeing like a Rover' is understood as a joint practice. This is also the case for the drone, as it connects the various functions in the police (Lundgaard, 2023). For example, an officer might ask the pilot to investigate a specific area or an individual, the images might be shared with other officers on their electronic devices, or the control room might define a special task for the pilot to carry out. There is additional complexity added as officers may be positioned in different locations, as an operation might consist of many tasks, and due to the time-restraint often present in police operations. In Vertesi's study, everyone involved got to speak and bit by bit they reached an agreement. This is rarely the case in police operations, as radio communication has to be short and limited, with little room for in-depth discussion and nuance.

Establishing a mutual understanding based on visual images is a complex practice where the production of knowledge is distributed to all actors involved. There were often differences in the perceptions of drone images between officers. At times, the observed differences between various individual perceptions of drone images in the teams merely reflect how some images are poorer than others. Lundgaard (2023) illustrated how images can be unclear, ambiguous, or in other ways difficult to use for decision-making. In other cases, the interpretation of an image differs between officers.

During the fieldwork, the researcher observed the police's handling of several political protests, where drone images were spread throughout large teams. In such police operations many officers from various backgrounds need to work together for a short period. The teams consisted of officers specialised in a wide variety of tasks, from surveillance and community policing to the use of physical force and arrest, and all had to co-function during the police operation. During one of these manifestations, the police feared physical confrontations between groups with opposing views. On a roof nearby, two officers were using drones for surveillance. They came from a highly specialised unit that worked and trained together daily and were there to assist the district police. This district was not part of the drone trial and had little knowledge and experience with the use of drones in policing. One officer was operating the drone, and the other communicated by radio with other units. They hardly needed to talk between themselves, and their actions were so synchronised that they seemed part of a frictionless whole. By contrast, the other units involved were not familiar with drones, and some ambiguities and frictions arose between them and the drone pilots. The tactical command officer was pleased to receive images from the drone on the screen of his device, but being less familiar with the technology, he asked for drone assistance in less suitable tasks, such as searches in areas hard to explore from above. The command officer also asked the drone pilot questions regarding the images and needed help to understand what they depicted. Such uncertainties occurred during several operations, especially in police districts where drones were less used. When the officers and pilots had different levels of knowledge there was room for friction to arise.

By sharing images and film between the various actors in a police operation, the drone establishes teams, but the individual gaze of the pilot is not necessarily the same as that of the viewer of the images. The drone established connections, but not automatically shared perceptions. The potential solutions for such frictions were articulated in diverse ways during the trial. While some believed images would speak for themselves and should be transferred throughout the organisation without further explanations, others believed that there was a need for more training and development of methods for how to request and convey information. The initial expectation in the trial was that sharing images would reduce the need to talk and thus reduce the need to communicate by or listen to the police radio. However, the trial period ended, somewhat paradoxically, with an increased focus on oral communication. This outcome was materialised in the observation manual describing how police officers and pilots should be communicating about drone images. One of the officers in charge of developing the manual stated that he believed the crucial questions were 'What should we describe, and why? When should we describe what, why, and to whom?'

So, the implementation of a technology believed to reduce the need for oral communication had made talking even more pertinent than before. The operation manual was written by the officers at the Drone Services, whose job is to oversee the professional development and training of pilots. This article will not go into detail on the manual; here, the question is how to understand the seemingly paradoxical outcome of the drone trial, as 'talk' became so central when the starting point was 'seeing'. The aim of the manual was to establish and standardise observation practices, which was previously regarded as tacit knowledge, and propose various techniques for how to convey information about observations. The manual states that whilst all police must express themselves clearly, effectively, and correctly when communicating by radio, this is especially crucial for those conducting observations which are passed on to other units. There were guidelines on how to describe individuals, vehicles, sites, directions, movements, and other potentially police-relevant observations, in ways that aim at avoiding confusion. The manual covered assorted topics such as how the human attention works and how information gathering is performed. Alongside the development of the manual, the training

programme for the new pilots was changed, with an increased focus on the topics described in the manual.

This outcome, where new forms of seeing ended up demanding new ways of talking, reflects early works of STS on the process of turning visual evidence into knowledge. In a study, Amman and Knorr-Cetina (1990) examined the role of sense data in knowledge-producing practices, highlighted that seeing is a product embedded in talk, that talking is what turns observations into perceived truths, and that at its core, 'the machinery of seeing is talk' (Amman & Knorr-Cetina, 1990, p. 92). The drone becomes an active part of this interaction and influences both the seeing and the talking. However, there is also a disruptive element in the drone, as it can not only unite things that were previously separated (Lundgaard, 2023) but also separate what was previously united. The Drone Services' effort at establishing a new framework for talk can thus be understood as an attempt at bring together disruptions and enhance the drones' perceived ability to display images that may serve as actionable knowledge. Thus, the development of drone practices are continuous 'processes [that] constitute what we have called the fixation of evidence' (Amman & Knorr-Cetina, 1990, p. 115) but with an increased focus on the need for better oral communication, in contrast to the early idea that drones would reduce the need for talk.

Conclusion: A complex path from gaze to knowledge

This article has empirically examined how the police gaze is mediated by the drone and what it means to see through technology. The police-drone gaze is a specific and complex form of professional vision in which humans and technology must learn to co-produce and make sense of material and spreadable images and film. According to Styhre (2010, p. 365):

> Learning to master a specific form of professional vision is [...] a matter of individual training and practice, but it is also a matter of being part of a community and sharing a belief in what to see and how to interpret and inscribe meaning into what is observed [...]—it is both an individual and a collective accomplishment.

This collective accomplishment is made up not only of the interactions of the drone and the officer but also of the watchers of film and images. In police operations, images can become powerful in determining how a situation is perceived and therefore, how it should be handled. The process of turning the gaze of the individual officer into spreadable information useable for decision-making is complex. The drone reveals some of these complexities, showcasing that not all images speak for themselves and that the perceptions of images must be articulated orally to gain status as knowledge in a team. The establishment of the operation manual highlights the need to find ways of turning individual observations into collective and shared information.

The technological spreading of a materialized and shared police gaze through drones made it crucial to develop new ways of speaking, in contrast to the saying, 'a picture is worth more than a thousand words.' Thus, the drone trial underlines Vertesi's (2015) point that images do not show things in themselves but are the result of interpretations and that '[s]cientific seeing is not a question of learning to see without bias. Instead, scholars of scientific observation remind us, it entails acquiring a particular visual skill that allows a scientist to see some features as relevant for analysis and others as unimportant' (Vertesi, 2015, p. 8). This is also the case for the police where professional vision is a particular skill to be developed, both at an individual level and in teams consisting of both human and non-human actors.

Drone practices in policing reveal how the police gaze is not one, but several. By the drone's affordances, the gaze can be turned into images and film spreadable throughout an organisation. But the individual police gaze cannot be spread as information to a team without being translated into talk or text. The images, what they show, and how they are understood, must be articulated orally to ensure the establishment of a mutual awareness of a situation. Thus, the drone is only a first step in turning the gaze into material and shareable information, and to orally convey information creates a space for potential nuances is also created, conflicting understandings, and thus new and adjusted situational awareness in the team. When discussing visual representations of the realities used in scientific practice, Law (2014) argued that the social does not only shape but also misshapes representations as 'realities are enacted in technoscience practices' (Law, 2014, p. 338), with emphasis on *difficult*. Policing, like science, is about producing knowledge that is peculiar but useful in a specific epistemic culture (Flinterud & Lundgaard, 2024). To explore the concrete ways in which the police gaze is turned into live and still images, and how such images gains status as collective knowledge should thus be subject to more research, as it reveals important aspects of police decision-making. As policing is also inherently an exercise of state power (Guillaume, 2013), research must scrutinise the ways in which various types of information enacts the realities that lead to police interference in people's lives through investigations, intrusions, and other actions.

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References

Amman, K., & Knorr-Cetina, K. (1990). The fixation of (visual) evidence. In M. L. S. Woolgar (Ed.), *Representation in Scientific Practice* (pp. 85-121). The MIT Press.

Aradau, C., Huysmans, J., Neal, A., & Voelkner, N. (2015). Introducing critical security methods. In C. Aradau, J. Huysmans, A. Neal, & N. Voelkner (Eds.), *Critical security methods : new frameworks for analysis* (pp. 1-22). Routledge.

Blandford, A., & William Wong, B. L. (2004). Situation awareness in emergency medical dispatch. *International journal of human-computer studies, 61*(4), 421-452. https://doi.org/10.1016/j.ijhcs.2003.12.012

Brenna, B., Moser, I., Asdal, K., & Røssaak, E. (2001). *Teknovitenskapelige kulturer*. Spartacus.

Brewer, J. D. (2005). *Ethnography*. Open University Press.

Callon, M. (1984). Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay. *The Sociological Review, 32*(1), 196-233. https://doi.org/10.1111/j.1467-954X.1984.tb00113.x

Cetina, K. K. (2007). Culture in global knowledge societies: knowledge cultures and epistemic cultures. *Interdisciplinary Science Reviews, 32*(4), 361-375. https://doi.org/10.1179/030801807X163571

Choi-Fitzpatrick, A. (2014). Drones for good: technological innovations, social movements, and the state.(Media and Technology). *Journal of International Affairs, 68*(1), 19-36.

Cohn, M., & Tutu, D. (2015). *Drones and targeted killing : legal, moral, and geopolitical issues*. Olive Branch Press, an imprint of Interlink Publishing Group, Inc.

Coopmans, C. (2014). *Representation in scientific practice revisited*. The MIT Press.

Cuffe, J. B. (2021). Diffuse Diciplining: On the pervasive nature of autonomous systems and its concequences. In A. Završnik & V. Badalič (Eds.), *Automating Crime Prevention, Surveillance and Military Operations* (pp. 163-182). Springer.

Custers, B. (2016). Drones here, there and everywhere: Introduction and overview. In B. Custers (Ed.), *The Future of Drone Use: Opportunities and Threats from Ethical and Legal Perspectives*. Springer.

Davis, O. (2019). Theorizing the advent of weaponized drones as techniques of domestic paramilitary policing. *Security Dialogue, 50*(4), 344-360. https://journals.sagepub.com/doi/abs/10.1177/0967010619843483

Di Nucci, E., & Santoni de Sio, F. (2016). *Drones and responsibility : legal, philosophical and sociotechnical perspectives on remotely controlled weapons*. Routledge.

Diniz, V. B., Borges, M. R. S., Gomes, J., & Canos, J. H. (2005). Knowledge Management Support for Collaborative Emergency Response. *Proceedings of the Ninth International Conference on Computer Supported Cooperative Work in Design 2*, 1188-1193.

Endsley, M. R. (1995). Toward a theory of situation awareness in dynamic systems. *Human Factors, 37*(1), 32-64. https://doi.org/10.1518/001872095779049543

Engberts, B., & Gillissen, E. (2016). Policing from Above; Drone Use by the Police. In B. Custers (Ed.), *The Future of Drone Use. opportunities and Threats from Ethical and Legal Perspectives*. Springer.

Ericson, R. V., & Haggerty, K. D. (1997). *Policing the risk society*. Clarendon Press. https://doi.org/10.3138/9781442678590

Finstad, L. (2000). *Politiblikket*. Pax.

Flinterud, G., & Lundgaard, J. M. (2024). Machineries of Knowledge Construction: Exploring the Epistemic Agency of Digital Systems in Policing. *European Journal of Policing Studies, Online first*. https://doi.org/10.5553/EJPS.000010

Foucault, M. (2017 [1963]). *The birth of the clinic : an archaeology of medical perception* (Third edition. ed.). Routledge.

Geertz, C. (1973). *The interpretation of cultures : selected essays*. Basic Books.

Goodwin, C. (1994). Professional Vision. *American Anthropologist, 96*(3), 606-633.

Guillaume, X. (2013). Criticality. In M. B. Salter & C. E. Multu (Eds.),

Research Methods in Critical Security Studies. Routledge.

Gundhus, H. O. I. (2006). *"For sikkerhets skyld" : IKT, yrkeskulturer og kunnskapsarbeid i politiet*. Det juridiske fakultet, Universitetet i Oslo.

Hammersley, M., & Atkinson, P. (2004 [1996]). *Feltmetodikk* (2. ed.). Ad Notam Gyldendal.

Høigård, C. (2005). *Nytt politi? : en kommentert bibliografi over nyere nordisk politiforskning* (Vol. 2/2005). Institutt for kriminologi og rettssosiologi, Universitetet i Oslo.

Kaufmann, M. (2016). Drone/Body: the Drone's Power to Sense and Construct Emergencies. In K. B. Sandvik & M. G. Jumbert (Eds.), *The Good Drone*. Routhlegde.
https://doi.org/10.4324/9781315553405

Klauser, F. (2021). Policing with the drone: Towards an aerial geopolitics of security. *Security Dialogue*.
https://doi.org/10.1177/09670106211992661

Latour, B. (2005). *Reassembling the social : an introduction to actor-network-theory*. Oxford University Press.
https://doi.org/10.1177/009430610903800150

Latour, B. (2014). The More Manipulations, the Better. In C. Coopmans, J. Vertesi, M. E. Lynch, & S. Woolgar (Eds.), *Representation in Scientific Practice Revisited*. The MIT Press.

Law, J. (2007). *Actor Network Theory and Material Semiotic*.
http://www.heterogeneities.net/publications/Law2007ANTandMaterialSemiotics.pdf

Law, J. (2014). Indistinct Perception. In C. Coopmans, J. Vertesi, M. E. Lynch, & S. Woolgar (Eds.), *Representation in Scientific Practice Revisited*. The MIT Press.

Law, J., & Singleton, V. (2012). ANT and politics: working in and on the world. *Qualitative Sociology, 36*(4), 485-502.

Lomell, H. M., & Neumann, C. B. (2017). Profesjonsblikk som analytisk grep og begrep. *Norsk sosiologisk tidsskrift, 1*(04), 279-283.
https://doi.org/10.18261/issn.2535-2512-2017-04-01

Lundgaard, J. M. (2021). *Nød og neppe: Fra anrop til beslutning ved politiets operasjonssentral*. Universitetsforlaget.
https://doi.org/10.18261/9788215040974-2021

Lundgaard, J. M. (2023). Reassembling operative policing: The introduction of drones in the Norwegian police. *International Journal of Police Science & Management, 25*(3), 313-323.
https://doi.org/10.1177/14613557231184693

Lynch, M., & Woolgar, S. (1990). *Representation in scientific practice*. MIT Press.

Lynch, M., & Woolgar, S. (2014). Preface. In J. V. Catelijne Coopmans, Michael Lynsh, Steve Woolgar (Ed.), *Representation in scientific practice revisited* (pp. vii-ix). The MIT Press.

Manning, P. K. (2014). Ethnographies of Policing. In M. D. Reisig & R. J. Kane (Eds.), *The Oxford Handbook of Police and Policing* (pp. 1-41). Oxford University Press.
http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199843886.001.0001/oxfordhb-9780199843886-e-001

Marx, G. T. (1995). The Engineering of Social Control: The Search for the Silver Bullet. In R. P. J. Hagan (Ed.), *Crime and Inequality*. Stanford University Press.

Mol, A. (2002). *The body multiple : ontology in medical practice*. Duke University Press.
https://doi.org/10.1215/9780822384151

Pinch, T. J., & Bijker, W. E. (1984). The Social Construction of Facts and Artefacts: or How the Sociology of Science and the Sociology of Technology might Benefit Each Other. *Social Studies of Science, 14*(3), 399-441.
https://doi.org/10.1177/030631284014003004

Reiner, R. (2015). Revisiting the Classics: Three Seminal Founders of the Study of Policing: Michael Banton, Jerome Skolnick and Egon Bittner. *Policing and Society, 25*(3), 308-327.

Sakiyama, M., Miethe, T. D., Lieberman, J. D., Heen, M. S. J., & Tuttle, O. (2017). Big hover or big brother? Public attitudes about drone usage in domestic policing activities. *Security Journal, 30*(4).
https://doi.org/https://doi.org/10.1057/sj.2016.3

Salter, M. B. (2013). The ethnographic turn: Introduction. In M. B. Salter & C. E. Multu (Eds.), *Research Methods in Critical Security Studies: An Intoduction*. Routledge.

Sandvik, K. B. (2016). The Political and Moral Economies of Dual Technology Transfers: Arming Police Drones. In A. Završnik (Ed.), *Drones and Unmanned Aerial Systems : Legal and Social Implications for Security and Surveillance*. Springer International Publishing.

Stelmark, K. (2015). Weaponized Police Drones and Their Effect on Police Use of Force. *Journal of Technology Law & Policy, XV*.
https://doi.org/10.5195/tlp.2015.172

Styhre, A. (2010). Knowledge work and practices of seeing: Epistemologies of the eye, gaze, and professional vision. *Culture and Organization, 16*(4), 361-376.
https://doi.org/10.1080/14759551.2010.519931

Tjora, A. (2009). *Calls for care : coordination, competence, and computers in medical emergency call centres*. VDM Verlag.

Vertesi, J. (2015). *Seeing like a Rover: how robots, teams, and images craft knowledge of Mars*. The University of Chicago Press.
https://doi.org/10.1515/host-2016-0007

Završnik, A. (2016). Introduction: Situating Drones in Surveillance Societies. In A. Završnik (Ed.), *Drones and Unmanned Aerial Systems: Legal and Social Implications for Security and Surveillance*. Springer.

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MAKING SPACE FOR DIGITAL STATECRAFT

The work of consultancy models in an audit of police digitalisation

by Gro Stueland Skorpen & Hilde Reinertsen

Models for "digital transformation" are the current idiom for guiding digitalisation practice within key Norwegian state agencies, including the police. In this article, we follow how a team of state auditors encounter these models as they seek to evaluate the digitalisation work of the Norwegian Police Service. As we show in this paper, these models offer a clear direction for managers struggling with achieving digital change. Yet while proposing distinct steps to follow and criteria to fulfil to enable the complex organizational and technological development processes that allow them to reach "digital maturity", the models stop short of giving a specific recipe for how to get there. Through a detailed empirical study, we explore how such models, developed and promoted by management consultants, enter the public sector by means of books, meetings, and PowerPoint presentations. We show how the auditors and police officials engage with these models in different ways: For the auditors, they are tried out as a methodological aid in the process of evaluating the object of police digitalisation. For the police officials being audited, their chosen model helps them carve out a space for digitalisation, thereby becoming a useful aid in their internal political struggles. We argue that for the police, the model's authority comes from their being solid and opaque at the same time. This paradox turns out to be highly productive and enables the model to act as a placeholder delineating a space for action for the police officials struggling to digitalise their sector.

Keywords: Management models, digital transformation, digitalisation audit, police

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Introduction

"What is the alternative?" The question came from a digital advisor within the Norwegian police administration during a meeting between key police officials and an audit team from the National Audit Office (NAO). The audit team was mandated to conduct a broad investigation of the police's digitalisation work, a so-called performance audit that in the end would be highly critical of what the police had achieved and how their work had been governed by their superiors in the Ministry of Justice and Public Security (NAO, 2023). The digital advisor's question came as a response to the auditors' enquiry into how the police were using a specific model of "digital transformation" to aid their efforts of digitalisation. The scene produced a string of intriguing questions about the police and how to achieve and assess digitalisation: How can a model gain a level of authority to the extent that it *has no alternative*?

Rather than taking the digital advisor's question literally and look for alternatives to digital transformation models, this article tries to listen to and analyse the implied authority of such models. Zooming in on the models themselves, their characteristics and agencies, we look at how the auditors and the police use models for digital transformation, and we make the argument that although the models eventually are scrapped as tools for the auditors' enquiry, they create momentum and space for political action for the police staff working with digitalisation. They do this by enhancing the police's authority as the police navigate between the interests of superiors in the Ministry of Justice, colleagues more interested in active police work than in digital services, and citizens with ever-increasing expectations of the police's and the state's digital service provision. Indeed, the police's trouble with technological transformation and digitalisation has been a contested matter for several years (for studies of the Norwegian case, cf. e.g. Flinterud & Lundgaard, 2023; Gundhus et al., 2019, 2021; Lundgaard, 2021; for international examples cf. e.g. Chan, 2001; Terpstra et.al 2022). The Norwegian police's difficulties with maintaining and replacing ageing critical infrastructure, ensuring interoperability across technical systems, and improving digital interaction with citizens have also repeatedly caught the attention of external evaluators and auditors, including the National Audit Office (BCG, 2020; DFØ, 2023; NAO, 2018, 2021a, 2021b, 2022a, 2022b). In 2022, the consistent lack of results on the part of the police's digitalisation efforts, even despite the sustained scrutiny, raised the concern of the National Audit Office again: What could explain the Police Service's enduring shortcomings in their efforts to digitalise?

In analysing the digital transformation models at play in this case, we build from a definition of "model" developed by Margaret Morrison and Mary S. Morgan in their book *Models as mediators* (1999). These authors investigate the role of models in science and argue that models do more than simply represent a given theory or a phenomenon in the outside world. Rather, models must be understood as "autonomous agents" whose autonomy is what allows them to function as "mediating instruments" between the theory and the world (Morrison and Morgan, 1999, p. 10). Morgan further argues that models and the world they represent must be seen as "two spaces of exploration [that] are not always clearly demarcated" (Morgan, 2012, p. 37). In the context of our case this understanding of models is highly productive, as it enables us to approach models as empirical objects in their own right and explore how they create an interface between a "small" world in the model and the "big" world beyond it. While the empirical story in this article is about how management models from the consultancy world are sought out by governmental agencies struggling to perform their tasks of digital statecraft, it simultaneously pursues the analytical concern of understanding the *work* performed by such models. Digital transformation models offer simplification of the complicated political terrain of digitalisation and holds promises of a particular form of future (Delgado, 2021), one that can be reached by following their prescribed steps. Making the models of digital transformation the focal point of our analysis, we pursue the following research question: *What work do digital transformation models do?* In answering this question, we follow how two distinct models enter and impact the audit of the police. We also analyse the models in their own right as textual and visual devices that give shape to how the problem is understood and offer directions for how it may be solved (Asdal & Reinertsen, 2022).

Our analysis suggests that a key feature of digital transformation models is how they allow their users to carve open a space for digital change, what we may understand as a "space of placeholding" (Lettieri, 2024). When understanding a model as a potential placeholder with the ambition of carving out space for this vast thing referred to as "digital transformation", we suggest that what makes the digital transformation models so productive is their simultaneous vagueness, genericness, and concrete materiality, enabling their users to fill in the specificity of their own organisation. Thereby working as transformative devices (Asdal & Reinertsen, 2022), they also energise the direction of digitalisation, envisaging the future of the police's service provision as a digital one. As such, they have what Rachel Douglas-Jones calls *a moral charge* (2019): They premise that what *could* be otherwise also *should* be otherwise, and that this "otherwise" should be digital.

This article proceeds as follows: After presenting our analytical framework, methodology, and empirical field, we lay out our analysis in three parts: First, we introduce the two models of digital transformation that play a role in our empirical case. Second, we show how the state auditors try to work with these models in their enquiry into the Norwegian police. Third, we turn to how the auditors work to assess how the police are using their chosen model. In the conclusion, we discuss the paradox that the models' authority stems from their being both solid and opaque, qualities that enable them to build momentum for digital change without giving a clear recipe (Morgan, 2012) for precisely how to make it happen.

Analytical framework: Models for enquiry, models for authority

Since the field's inception, science and technology studies (STS) has paid close attention to how knowledge is produced and circulated. The now classic laboratory studies, with their rich ethnographic studies of how science is done in practice (Latour & Woolgar, 1986; Latour, 1987; Knorr-Cetina, 1981) showed how scientists engage in a range of social and textual activities in order to transform the world "out there" into data, data into analysis, and analysis into research publications, all by means of "inscription devices" such as annotation charts, protocols, spreadsheets and databases (Latour & Woolgar, 1986). Paying attention to the material and semiotic properties of such devices has given rise to the STS strand of material semiotics (Law, 2008, 2010; Akrich, 1992), and this article works from within this tradition by paying close attention to how digital transformation models work as specific forms of material-semiotic objects that emerge, circulate, and have effects (Asdal & Reinertsen, 2022). This way of approaching models as empirical objects entails that there are no objective or innocent models simply reflecting the world out there; all models are made and infused with conceptual and visual choices (Daston & Galison, 2000). As noted in the introduction, models should be considered "autonomous agents" (Morrison & Morgan, 1999, p. 10) that work as "means of investigation and enquiry" (Morgan, 2012, p. 256). Consequently, we need to examine why "a particular model is built, what questions it is designed to answer, and what uses it is put to" (Morgan, 2012, p. 6). Furthermore, models do not merely passively represent the world they are made to depict, they also *intervene* in it (Hacking, 1992; Morrison & Morgan, 1999). In order to grasp this combined capacity of models to both investigate and intervene in the world, we extend Morgan's notion of models used for enquiry, to also explore what we propose to term "models for authority": In other words, their ability to fortify resolve to go in a particular direction and prescribe clearly how to do so by "boxing in" their subject-matter (Bauer et al, 2020). As such, models are "epistemic genres" (Morgan, 2012) with a distinct "style of reasoning" (Hacking, 1992). Genres are not static categories; they are means with which to intervene rhetorically in a given situation, i.e. a form of "social action" (Miller, 1984). Building on this view, we study how models work as textual and visual devices shaping the readers' understanding of a phenomenon (Asdal & Reinertsen, 2022).

The STS literature on models discussed above has predominantly been concerned with models at work in the natural sciences and in economics (Bauer, 2024; Daston & Galiston, 2010; Hacking, 1992; Morgan, 2012; Morrison & Morgan, 1999). As these studies show, models often come across as self-evident and unassuming, black-boxing their own process of creation. Increasingly, scholars are employing this approach to study the work of models in other fields, including government and management, that involves a wide range of management tools (Baden Fuller & Morgan, 2010; Chiapello & Gilbert, 2019, Doganova & Eyquem-Renault, 2009; Reinertsen & Asdal, 2019). Taking a cue from Doganova and Eyquem-Renault's article "What do business models do?" (2009), we extend this approach to exploring what it is more specifically that digital transformation models do.

For the actors on both sides of the audit encounter in our empirical story, the choice of model is no theoretical exercise. It is chosen to do particular forms of work, to gain a desired effect. To achieve this, our actors look beyond their own organisations, the state, and Norwegian borders, as they reach for advice from management literature and consultancy firms. This landscape may be conceptualised as a trading zone (Galison, 1999) in which state actors and consultants seek one another out. More pointedly, we explore how instances of sovereign state power are combined with consultant knowledge models to make up a specific configuration of the national sovereign state (Amoore, 2013). This configuration is part of a current economy of knowledge that connects the nation-state to the transnational field of, in our case, digital consultancies. As such, this article answers Amoore's call to study the "critically unexamined" closeness of commercial consultants to the state (Amoore, 2013, p.18).

Digital transformation models emerge from within the field of management consultancy, but in this empirical study, they are headed for public sector agencies. Here, we build on work in STS on the "ordinary" political and bureaucratic work of state practice (Asdal & Hobæk, 2016, 2020; Maguire & Wintereik, 2021; Reinertsen, 2016). In studying the work of auditors who study the work of police administrators, who in turn grasp for tools from digital consultants, we draw on Amoore's understanding of states' sovereignty not as monolithic wholes, but as "the distinctive practices of authorization that enable private consulting, risk management, and software [...] engineering to flourish as expert knowledges, to act as though they were sovereign, as proxy forms of sovereignty" (2013, p.6). Our probing of the momentum added by digital transformation models does however not extend to a study of organisational change, which has its own literature of considerable breadth (see e.g. Kotter, 2012). Instead, our material-semiotic approach entails that we zoom in on the models as objects in their own right to observe *in detail* what these specific models do to achieve momentum. While the lines between consultants and the state are being blurred in practice, as noted by Amoore, the "epistemic genres" of management consulting distinguish themselves clearly from those of both science and government. Among the genres and tools explored in the research literature are business models (Baden Fuller & Morgan, 2010; Doganova & Eyquem-Renault, 2009), growth estimates (Reinertsen & Asdal, 2019), pdfs (Gitelman, 2014), and PowerPoint slides (Engen & Asdal, 2024). While often overlooked as research objects, such seemingly mundane documents may hold great importance. In the case PowerPoint slides, their minutely designed style and genre attest to their importance, making them "rock-solid" (Bourgoin & Muniesa, 2016) and "invincible" (Berglund & Werr, 2000) while at the same time being what Chong in an ethnography of management consulting terms "arrestingly opaque" (2018, p. 1).

These characteristics point to how consultancy models achieve their authority, and as such they can help our analysis of what work the models do. In drilling further into this, we draw upon Lettieri's concept of *the placeholder*, understood as a space "that leave[s] room for something that might change, transform, and transverse" (Lettieri, 2024, p. 82). The term "placeholder" separates the digital transformation model from what Lettieri refers to as "a condition of "voidedness": "A placeholder is not a blank spot or a gap but is itself a filler; it does not passively allow events to transpire but provokes a response" (2024, p. 86). This prompts us to explore *how* digital transformation models carve open a space for digital change and what it subsequently helps fill in.

Methods and materials

The encounter between state auditors and police administrators makes up the ethnographic field for this article. The studied actors all come from governmental agencies of prominence and authority. Both the National Audit Office and the police embody and exert core functions of the state apparatus – the police through their societal monopoly on violence and access to means of control and investigation, the auditors through their unmatched access to all governmental offices, accounts, and document archives at the state level. The Police Service (in Norwegian: *Politi- og lensmannsetaten*) is governed by the Police Directorate (*Politidirektoratet*), which in turn is subordinate to The Ministry of Justice and Public Security (*Justis- og beredskapsdepartementet*). The Police's IT Unit (*Politiets IT-enhet*) is subordinated the Directorate. Given that the audit team we follow in this article concentrated on the governing and implementation of digitalisation, the auditors mainly related to staff in the Directorate, but Ministry staff were also present in some meetings. The audit team we follow work in the National Audit Office of Norway (NAO), an agency with great institutional gravitas (Bringselius, 2017; Johnsen, 2019) and a distinguished position within the Norwegian constitutional system (Espeli and Nilsen, 2016). As the Norwegian Parliament's instrument of control over governmental agencies, NAO conducts both financial audit of state accounts (*regnskapsrevisjon*) and performance audits (*forvaltningsrevisjon*). The audit studied in this article is an example of a performance audit, which investigates whether state agencies carry out their tasks in accordance with the "will of Parliament" and provide citizens with adequate public services. The institutional authority of the office means that while there is an ongoing internal discussion within the office about the methods of audit, the often hard-hitting critique in their audit reports are rarely challenged in the public sphere.

Methodologically, the article is based on ethnographic fieldwork conducted by the first author within the National Audit Office of Norway between 2021 and 2023.The most intensive part took place from August 2022 to January 2023, when the first author spent most workdays in the audit office, participating in meetings and talking to audit office staff more informally. She followed their daily working life as closely as possible (Hagen & Skorpen, 2019; Rabinow, 2016), while centring on three ongoing audit processes of which the audit of police digitalisation was one. She took part in the audit team's internal weekly project meetings, video meetings with police officials and one physical meeting at the Police Directorate headquarters. During the meetings with police officials, the auditors introduced the ethnographer as "a researcher" studying the audit team, after which she asked for their consent to her being there (which was given in each instance). In addition to ethnographic observation, the material for this article includes two semi-structured interviews with the team leader from the police audit and one with his superior, each lasting about one hour. The extraordinarily broad access to engage in participant observation within the audit office (Bernard, 2011) enabled the first author to observe what the auditors did and said between themselves, rather than relying on interview data. In all conversations and interviews with auditors she made sure to check and triangulate her observational data, and shared raw analysis with the auditors to secure valuable feedback. All interlocutors have been anonymised; auditors have been given first name pseudonyms while police officials are identified by their formal roles.

Out of the ethnographic fieldwork grew an understanding of the importance of the materiality and agency of the documents the auditors used, including the documents that contain the specific digital transformation models we encountered (in a book and a PowerPoint file brought into the audit office). As a result of these observations, we further developed the methodological scope to include "document ethnography"; a conceptual and methodological effort to understand how documents move around the audit and police offices, but also how the documents themselves may be understood as *sites* whose spaces can be studied for their textual qualities, their agencies, and their interactions with other actors and sites (Asdal & Reinertsen, 2022, p. 16-25). This approach is informed by Bruno Latour's maxim to "follow the actors" and see what they do (Latour, 2005), which in our case entailed following both the auditors and the models at work. This move has informed an analysis conducted by both authors in a classically hermeneutical manner (cf. Ricoeur, 2016 [1981]), where we started from questions arising from the ethnographic data, to exploring possible theoretical framings, to engaging in close reading of documents, and back again to the ethnographic data and the research literature. The many hermeneutical iterations have led to the theoretical framing being deeply embedded in our analysis of the empirical data.

Two models of "digital transformation" enter the audit office

Through our analytical lens of material semiotics, we will in this part view and analyse the digital transformation models as *devices*, as objects that are used for specific purposes and to elicit specific effects. From there, we look at how they build their authority, and discern what, exactly, they produce or enable.

To approach the question of why digitalisation was so hard to achieve for the Norwegian police, the audit team started by asking how to design their investigation. It was during this early period that digital transformation models entered our study, and they did so in the form of a blue book, tucked under team lead Anders' arm as he came to the weekly team meeting. When the book came out from under his arm, the project team and the ethnographer found a slim volume with a matte blue, soft cover, with the title set in white letters. This book, it turned out, was also actively used in the police's efforts to digitalise. In the following, we therefore probe the material-semiotic properties of the model proposed both in this book and in a similar model picked up by the audit team, before we turn to explore what work these models do for the auditors and police respectively.

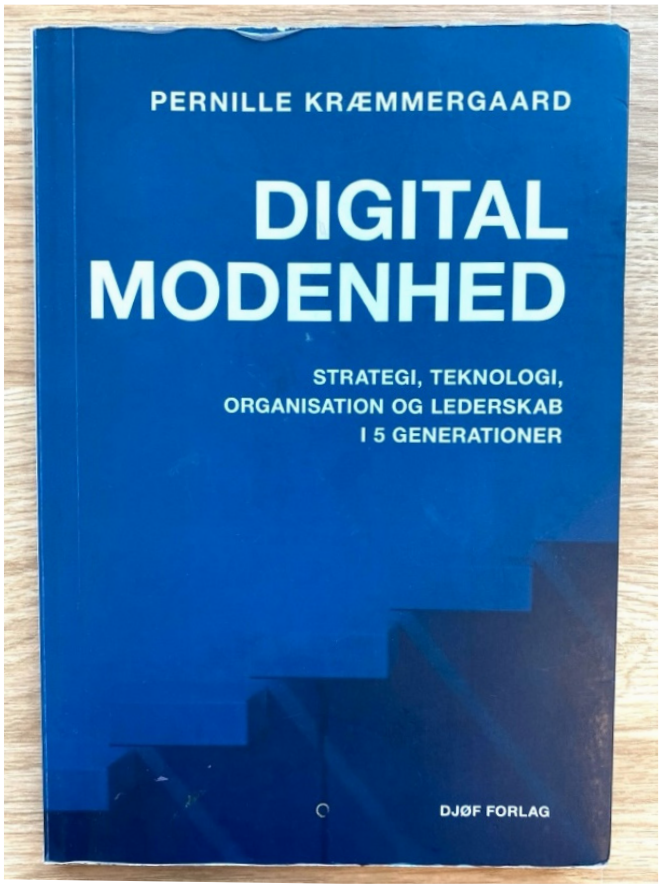

Figure 1. Front cover of Pernille Kræmmergaard's book Digital modenhed ("Digital maturity"), published by Djøf forlag 2021. Reprinted with permission

Digital transformation as stairs to climb

The book picked up by the auditors was titled *Digital Maturity: Strategy, technology, organisation and management in 5 generations* [our translation from Danish] by Danish digital consultant Pernille Kræmmergaard (Kræmmergaard, 2021a), who had previously published a book entitled *Digital Transformation* (Kræmmergaard, 2021b). Vaguely visible on the cover of *Digital Maturity* are five stair-like steps (cf. fig. 1) that embody the key concept of the book and constitute Kræmmergaard's model of digital transformation, literally drawing up how to achieve digital maturity in an organisation. Kræmmergaard refers to the five steps as *generations*, thus placing them along a timeline. The five generational steps are described in detail in successive chapters, where they are conceptualised as stages of digital development any organisation or business must go through. In Kræmmergaard's view, this development will have a particular pattern, taking an organisation from (1) *automation* and using IT as a system; to (2) *standardisation* and using IT as infrastructure; to (3) a change in *mindset*, where digitalisation adds new services and products; to (4) the development of *seamless services*, and finally (5) the *personalisation* of services for each user (fig. 2, Kræmmergaard 2021a, p. 18).

There is a clear directionality to this model: How far an organisation has come is contingent upon its effort and ability to climb the stairs, but the boxed-in steps are also distinct empirical phenomena, placed in historical time. For example, in highlighting the importance of agility and flexibility for digital transformation, Kræmmergaard asserts that "being agile [...] is crucial from Generation 3 onwards" (Kræmmergaard 2021a, p. 71). In the more detailed visualisation presented in Figure 2, Kræmmergaard combines graphic elements with written text, yet the book is mainly narrative in form. The style of writing is direct and without jargon, rather adopting a form of pragmatic storytelling: What is often in the IT world referred to as a "lack of interoperability", she calls "many individual solutions existing side by side" and a "spaghetti" (2021a, p. 39).

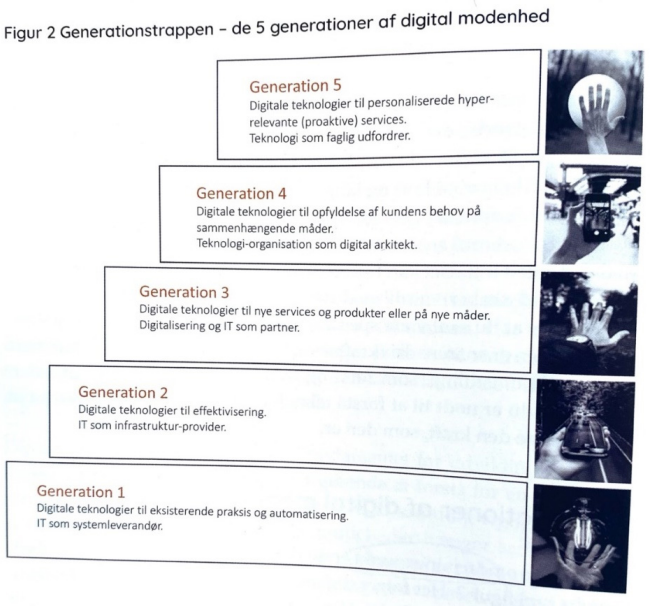

Figure 2. The steps toward digital transformation in Pernille Kræmmergaard's book "Digital Modenhed" ("Digital Maturity"). Facsimile of page 18. Reprinted with permission.

When discussing what is needed to undertake a digital transformation, Kræmmergaard invokes an audience with managerial responsibilities and little digital confidence: "As a leader, you must understand how, within your business or organisation, digital opportunities can create new value for customers and citizens" (Kræmmergaard 2021a, p. 8). After the introduction, the next five chapters are dedicated to each generational step, while chapter 7 outlines which competences are needed to climb the stairs, chapter 8 gives an overview of the interplay between strategy, technology, organisation and management in each generation, before chapter 9 asks in its title simply: "Where are you? Where do you want to go?" (Kræmmergaard, 2021a). We suggest that the model's pragmatic action-orientation and allusion to the agency of the managers themselves does the rhetorical work of allowing the reader to envisage themselves in a digital future. In appealing to the not-so-digital manager, the model offers a feasible path toward digital sophistication, reachable simply by following the right steps in the right order.

The model builds its own authority by repeatedly underscoring its connection to research, although Kræmmergaard also distances herself from the academic style. Both books present Kræmmergaard as having "25 years of experience doing research", and this is stated also on the website of her consultancy firm, The Digital Leadership Institute. In *Digital Maturity*, she points out that the title of her PhD thesis is "quite a mouthful", signalling to her readers that they do not need to worry about professorial tendencies (Kræmmergaard 2021a, p. 8). This produces a combination of authority and ease that also characterises the model itself: While giving a clear direction and a fixed order of developmental stages, the model stops short of being a recipe (Morgan 2012) that describes precisely *how* to go about doing digital transformation. Instead, it retains the style of reasoning of a normative prescription, letting the readers know the direction they should go in and what it looks like when they have arrived, without specific directions on how to get there. At the heart of the model, then, there is an open space, a generic quality, that functions as a placeholder (Lettieri, 2024) to be filled in by the empirical reality of the reader. This produces an authority that can be converted from the page to the world by the readers and capitalised upon in their own organisation. This is how the authority and directionality of the model offers momentum and direction that can be used to create space for digital change.

Digital transformation boxed up as criteria to assess

A second digital transformation model also entered the audit investigation. This version introduced itself to the audit team and the ethnographer during the first few months of the police audit, when a group of state auditors from another European country came to visit. The group gave a presentation on the approach they used to audit digitalisation work, which they in turn had obtained from the major international consultancy firm Deloitte.[1]

Figure 3. Screenshot of page 5 of the PowerPoint presentation titled "Digital Maturity Model. Achieving digital maturity to drive growth". Downloaded from Deloitte.com 23 February 2024. Reprinted with permission.

1 While the full version of this model could not be shared with us, as it had been purchased from a private consultancy, we have since confirmed that a PowerPoint presentation with a limited version of the model is available through the website of the consultancy Deloitte, who made and owns it. We refer to this version here, with permission.

Figure 3 shows one of the slides in the Deloitte deck. The text on the slide states that when conducting a digital transformation, businesses "must learn to see things differently, do things differently, and deliver things differently". Like Kræmmergaard, Deloitte conveys empathy with its target audience in management – "it's not easy". This message is supported with an aesthetically pleasing image where sun is filtered through dense, green foliage (fig. 3). In a later slide, the soft feel is replaced by a firm set of boxes visualising five "core dimensions" with 28 "sub-dimensions" for how to assess digital maturity, which are further divided into 179 "digital criteria" (see fig. 4). The bars of boxed criteria are represented in attractive colours, and the visual load of the deck as a whole is polished and generic. The sheer number of criteria add an unassailability and "rock-solid" appearance to the slide deck (Bourgoin & Muniesa, 2016). The fact that it is introduced to the Norwegian audit team by a team from another supreme audit institution helps it attain this position in our specific case.

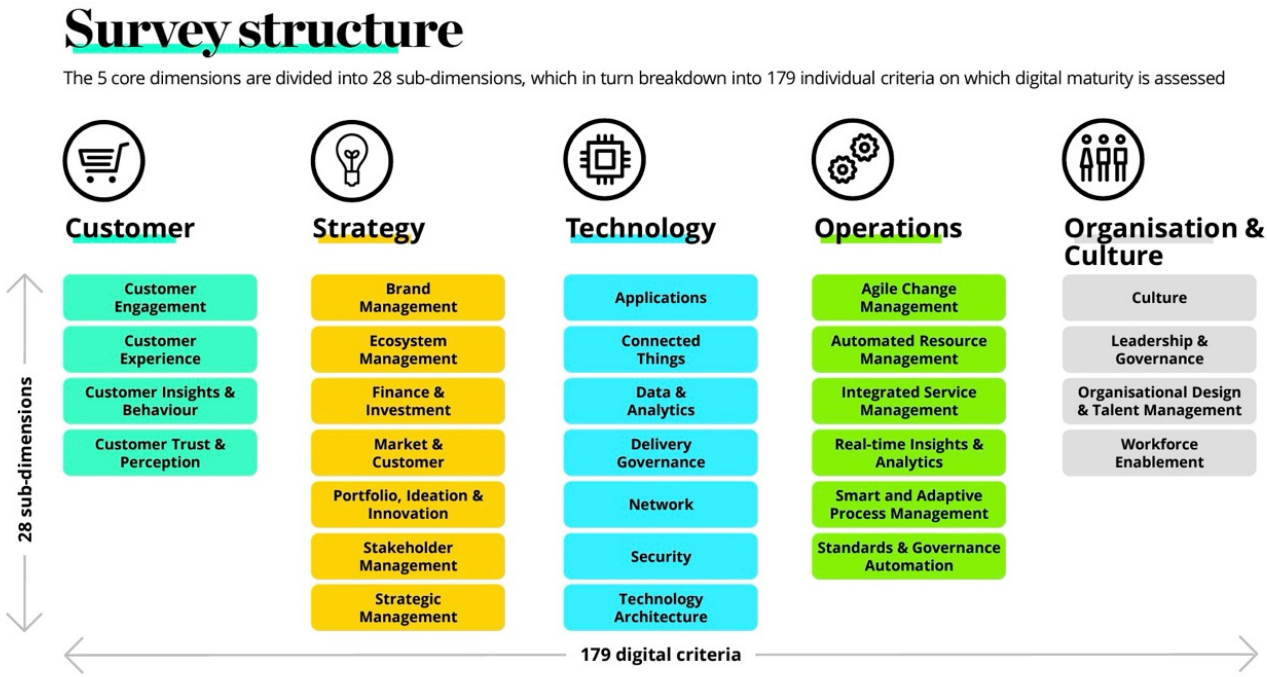

Figure 4. The 28 boxed-in categories for assessing digital maturity listed in Deloitte's model. Screenshot of page 11 of the Powerpoint presentation "Digital Maturity Model. Achieving digital maturity to drive growth". Downloaded from Deloitte.com 23 February 2024. Reprinted with permission.

The Kræmmergaard and Deloitte models recast digital transformation as a way of achieving "maturity", thus implying that this is a linear, natural, and desirable aim, and subsequently offer ways to help their main audience undertake this process. Their style is indeed different; while Kræmmergaard employs a form of pragmatic storytelling with a personal and embellished style, Deloitte employs an unassailable visual style with strictly delineated boxes and categories. They both assert the need for change, and they both leave open precisely how to do it. The two versions of the digital transformation model that are analysed here share a style of reasoning (Hacking, 1992) that is action-oriented (Reinertsen & Asdal, 2019). In Kræmmergaard's case, the ordering contributed by the aesthetic of the generational steps, the simplification provided by the direct address, and the connection to research in combination add to the authority of the model. For the Deloitte model it is the polished visual load and the detailed categories that help build its authority. Both models employ an affective register, speaking directly to the reader about what is difficult and what the reader needs and wants to achieve. While Kræmmergaard uses a simple and direct form of address to forge an alliance with the reader and underline the model's authority, Deloitte uses a pleasing visual load and a "rock-solid", unassailable aesthetic (Bourgoin & Muniesa, 2016). Each model in their distinct ways produce an "arrestingly opaque" quality (Chong, 2018, p. 1) that arguably stems from their refusing to state exactly what a digital transformation is and how it is performed: Instead of offering a recipe (Morgan 2012), the Kræmmergaard model envisages the future where the reader wants to go, while the Deloitte model establishes criteria for what it means to be there. Their authority, unassailability, and opacity make their message seem both applicable and enticing, and the slides and the book could speak to and work for almost any organisation. What these models do, then, is to help create momentum and space for digital change – thereby potentially working as placeholders (Lettieri, 2024) for digital transformation. Yet what happens when these models are put to work in practice by the auditors and the police, respectively? This is what we turn to in the following two sections.

Models for enquiry: Making "digital transformation" an object of audit

In line with our analytical tack, we now turn to how the digital transformation models (Kræmmergaard's and Deloitte's) entered the audit process. Understanding the models as material-semiotic devices (Asdal & Reinertsen, 2022), we follow them around the empirical field (Latour, 2005) with the aim of describing what work they do in the specific process of auditing the police's digitalisation efforts.

The designated audit team would meet every Wednesday in meeting room 6423 in their modern office building in central Oslo. Anders introduced first the Kræmmergaard model and later the Deloitte model to his colleagues, and they started assessing their respective merits. In several meetings, the audit team poured over a slide showing the criteria of the Deloitte model, considering them as means to assess digital maturity (fig. 4). In these conversations, they would often pull the Deloitte version of the digital transformation model up on the screen in the meeting room to discuss the criteria in detail. They engaged with Kræmmergaard's book in much the same way, often reaching for it as a form of material, visual aid. "I will just show you the model in the book …" Anders said to the ethnographer in one conversation, before leafing through his edition of Kræmmergaard (2021a) to find "the stairs", as we came to think of Kræmmergaard's five generation typology. When he found the figure, he proceeded to talk *from* it. In the process of auditing ongoing digitalisation work, repeatedly referred to by the auditors as "a moving target", the material and authoritative form of the model seemed to provide some comfort. It was significant that the book was quite literally something to hold on to as the auditors were entering a complex empirical landscape of the digitalisation efforts of the Norwegian police, including the diverse yet interconnected aspects such as the maintenance of aged infrastructure, digital service provision to citizens, and the Ministry's governance of the sector.

The auditors' search for the analytical handle on police digitalisation went on for the first few months of the audit. They tried to define digitalisation and digital transformation as audit objects, in close interaction with relevant research literature. They found few contributions on how digitalisation was to be audited, so to do this, the team initially engaged with management literature about digitalisation in general (e.g. Unruh and Kiron 2017), as well as research literature on the digital transformation of the Norwegian Welfare Administration (NAV) (e.g. Bernhardt et al., 2019). Anders also set up a reference group for the audit with Norwegian digitalisation researchers as members. The absence of literature on auditing digitalisation may explain why Anders, an avid user of research, continued to explore the Deloitte model, which had been introduced by their international colleagues, as best practice for the audit team on how to think about digital transformation from an auditors' perspective.

While entering the audit office via different routes, both models had their origin in the trading zone of digital consultancy. The Deloitte model had been bought by the visiting audit team, and Kræmmergaard's model came to Anders' attention through a conversation with a Norwegian management consultant experienced in working with large, complex digitalisation projects within the Norwegian state. This consultant planned to go on a training course with Kræmmergaard and thought this Danish version of the digital transformation model was the most relevant for Norwegian bureaucracy at that time. Consultants had brought these perspectives to Norwegian bureaucracy for a while – when we asked around about the emergence of ideas about digital transformation and maturity, several interlocutors directed us to the web article "The Advantages of Digital Maturity" co-written by MIT researchers and a director of Capgemini Consulting (Westerman et al., 2012), that makes the case for why business organisations should embrace digital transformation. This article exemplifies that while digital transformation models was initially developed for the private sector, public sector agencies soon came to be users of these same models. In Norway, one key explanation for this is the lack of clear direction from the state itself that public sector agencies could take guidance from. As the audit team explained to the ethnographer, the Norwegian Digitalisation Agency, which is the state agency responsible for coordinating and supporting the state's digitalisation efforts, used to have their own model for digital transformation, but it was no longer in use. Public agencies thus needed to find support for the complex and costly work of their digitalisation efforts elsewhere. This led to their seeking out advice from non-state-actors, effectively external consultants such as the one Anders had talked to and who had pointed him toward Kræmmergaard.

Not buying the model

While continuing to interact with the digital transformation models, the auditors did not uncritically buy into them. At one point, they seemed fascinated with one of the bullet points of the Deloitte approach that listed the need to audit an organisation's "culture" as a part of assessing its digital maturity. Similarly, a team member asked sardonically about another criterion: "What is a 'clear vision'? How do we tick that one off?" Although they were introduced to reduce complexity in managing digital transformation, the models brought out new complexities for the audit team. "We'll just follow this, and we'll be fine", Anders said in his dry way one day, while pondering the long list of assessment criteria in the Deloitte model. As well as not *buying into* the methodology of digital transformation models, meaning they would not only accept it wholeheartedly and without problematisation, they also would not buy the models as products of consultant knowledge, i.e. paying money to use them. Given that auditing the work of the state was their mandate, they seemed reluctant to leave more to consultants

than necessary. The rationale for this was often presented as being financial, but the ethnographer on several occasions encountered a critical attitude in the audit office toward the role of consultants and their usefulness within Norwegian bureaucracies. Still, consultant knowledge was indeed present in the audit office. At the time of this particular audit process, the National Audit Office relied on external consultants for their ongoing capacity building for data storage in a cloud infrastructure. And while the audit team did not buy the consultancy models, they actively engaged with them. They viewed their methodological scrutiny of the models as an integral part of the job of assessing digitalisation. But their own methodological light-footedness and their probing and testing of the digital transformation models also spoke of the auditors' confidence in their ability to evaluate complex knowledge objects such as the model well, without involving the consultants in their core task of audit.

Models as inspiration, not tools

Because the auditors had not bought the Deloitte model and thus abstained from entering the trading zone of digital consultancy themselves, it was available for them in part to see, but not to use in full. Anders suggested that his team use both models (Kræmmergaard's and Deloitte's) to find the *themes* of the audit, but not *apply* them directly as frameworks to encompass their whole analysis. For the auditors, this became something of a balancing act; they allowed themselves to be inspired but made sure that they were not applying the model to their own subject-matter. When asked about the use of the different models at play in the audit process, Anders said:

> I think I use them as knowledge [...] I try to design [the audit] in a way that is more knowledge-based, more than following [the models] to the letter. It would be nice to just take the model and say "check, check, check" [checking off whether the police met the criteria for digital maturity]. But then it would just be superficial. We wouldn't have time to go thoroughly into any of the themes if we were to check everything.

We see how Anders considers the models as part of the knowledge needed to make a thorough audit, on a par with all the different methodologies the team assesses and the input he receives from the interlocutors he engages with. The models thus in themselves become objects to assess, not methods to apply, and in the end the models are used to inform and inspire the consolidation of relevant audit themes. Partly, this is because the auditors are not conducting a digitalisation project, and so they are not themselves in the market for a methodology of how to do that. But ultimately, the audit team walks away from the digital transformation models as tools for enquiry (Morgan, 2012) for their audit, too. In the end, they are mentioned only twice in the final audit report (NAO, 2023).

How, then, did "digital transformation" become an object of audit? We have seen how the audit team engaged with two different models of digital transformation (the Kræmmergaard model and the Deloitte model), while also probing the wider field of digital transformation research and consultancy. Anders continued to try different methodologies and share them with his team, using research to support the enquiry. He also involved in-house IT staff who were usually not involved in audit directly, drawing on their expertise on the challenges of digitalisation. There was an ease in Anders' and the other auditors' way of looking at the different models of digital transformation and the accompanying research literature, a certain methodological light-footedness that said any approach could be tried on for size. In this way, the models remained what Morrison and Morgan call "mediating instruments" (1999); they were used as "models for enquiry" into their audited object, and the light-footedness of the audit team took advantage of the relationship between the model and the world not being "clearly demarcated" (Morgan 2012, p. 37). Instead, the team used the space left open by the model to try things out, without committing to any model originating in the trading zone of digital consultancy. Therefore, the audit team could also easily leave the models behind once their own analysis firmed up and they no longer needed their openness.

Models for authority: Making "digital transformation" an object of government

In this third analytical section, we zoom in on the model of digital transformation that had been adopted by the Norwegian police (the Kræmmergaard model). As in the previous section, we continue to follow the auditors, yet now focussing on how the auditors tried to assess the role of digital transformation models in the police. We will show how the police applied their model of choice not as a "model for enquiry" (Morgan 2012) as in the case of the auditors, but rather, we will argue, as a "model for authority": It helped the police administration force open a space for digital action, thereby working as a counterweight vis-á-vis the political priorities of the Ministry of Justice and Public Security.

Digital transformation as the only alternative

Unlike the auditors, the Norwegian Police Service were in fact customers of Kræmmergaard's: They not only used the model from her books, they also bought services from her consultancy firm. At the time of fieldwork, those tasked with strategic digitalisation work in the police's IT Unit had developed a close relationship with Kræmmergaard as consultant and had meetings with her personally. Adopting her terminology, they planned to discuss how technology changes so quickly that "in two generations" digital competence levels within the police organisation would be radically changed for the better. There was an acknowledgement of police

staff's low level of digital competence in this statement, and this was echoed by the auditors, who in internal meetings spoke of the lack of digital competence within the police force. These descriptions drew on imagery of an ideal type of a police officer who is practical and action-oriented. Most police officers probably did not join the force to sit in an office, as one auditor put it. This impression of a police force that was lagging behind the digital status quo of the nation was not anecdotal. It had been documented in a previous performance audit of the police (NAO, 2022).

The low "entry-level" of digital competence among police officers added to the complexity of the digitalisation process the Police IT Unit were tasked with, and so did the fact that the Police Service has a history of being closely governed by the Ministry of Justice and Public Security. As the formal target of the audit, the Ministry took part in some of the meetings between auditors and police. The Ministry's governance of the police came up at regular intervals; notably when the Ministry were not themselves present. One problem statement (*problemstilling*) in the audit was centred on the quality of governance of the police's digitalisation. The sentiment that the police were being kept on a tight rein by the Ministry of Justice, more than what was usual for state agencies, permeated the conversations between the auditors and the police officials in the Directorate. Anders said in the meeting about the digital transformation model:

> We can see that the Ministry is deeply involved in the nitty-gritty ("langt nede i materien"). There is a lot that is done because the Ministry asks for it.

The final audit report from the police team was scathing on the theme of the Ministry's governance of the police's digitalisation work. The third main conclusion in the report stated that the Police Directorate and the Ministry of Justice "have not governed the Police Service with a sufficiently long-term view" ("har ikke vært langsiktig nok") and that this had "hindered the improvement of digital services for users and more efficient use of resources in the Police Service" (NAO, 2023, p. 8 [our translations from Norwegian]).

While the responsible ministry was deeply involved in "the nitty-gritty" of police administration in a manner that served to hinder digitalisation efforts, the ministry responsible for state digitalisation had a hands-off approach to governance. As noted in the previous section, the Norwegian Digitalisation Agency did not at the time this study was conducted provide state actors with models or frameworks to aid them in processes of digital transformation. This helps explain why the police entered the trading zone of digital consultancy in search of methods and advice: There was no counterweight to the pressures of their own ministry to be found within the public sector. In order to gain the necessary authority vis-à-vis their superiors, they thus went outside the state to attain a knowledge model that could give them the necessary authority to their efforts of digitalisation. The key meeting between representatives from the Police Directorate, the Police IT Unit and the auditors was set up specifically to discuss the digital transformation model in use by the police (the Kræmmergaard model). At one point, an internal auditor from the Police Directorate asked whether the state audit team would challenge the digital transformation model itself and the way the police used it. The question lead to a terse reply from the digital advisor from the police administration: "But in 2022, what is the alternative?"

A model with no alternative clearly holds great authority. The comment from the digital advisor within the police served to show how the digital transformation model was imperative to them and to the digital expertise they represent within the police. The police officials tasked with digitalisation used the space opened by the model to do the work of organising, canvassing for, and rallying around their digital development process, known as a "transformation". The boxy steps leading toward increasing levels of digital maturity builds an epistemic authority that could be used politically: If the police managed to employ the model to carry through digital change, their success might carry more weight with the Ministry. We therefore suggest that what the Kræmmergaard model offered the police in this political terrain, was help with carving out a space for digital action, giving them the necessary authority to counter the demands from the Ministry on the one hand, and from colleagues disinterested in digital development on the other. Yet while Kræmmergaard's model helped the police administrators carve out this space, what did they eventually fill this space with?

Making space for Agile methods

Key to the police's way of working toward a digital transformation was one particular corollary: so-called "Agile methodology". A management theory originating in the world of IT development that prescribes that organisations should be organised in small autonomous teams with a shorter production cycle, this methodology has become central to many digitalisation projects in the Scandinavian welfare states (Papazu, 2024). It is often used to implement digitalisation projects referred to as "transformations". In the police's digitalisation work, the digital transformation models appeared to supply the vision of what the digital future should be like for Norwegian bureaucracies, while Agile was the underlying method or set of techniques with which "digital transformation" was carried out in a practical, day-to-day sense. As part of their investigation, the audit team became interested in projects carried out by the Welfare Administration (NAV), as NAV had used Agile methodology and promotes this as a success, and tried sometimes to compare their audit object (police digitalisation) with the digitalisation work that was underway in NAV. The police's IT director had herself been recruited from NAV and was thus well versed in NAV's way of working. Although often referring to research literature that nuanced the understanding of Agile as an optimal approach (e.g. Bernhardt, 2021; Vestues et al., 2022), audit team lead Anders said in one conversation:

> Agile is the method everyone in the private sector agrees on now. We have left the large projects behind. The large government agencies have had projects like that, and they have not gone well.

As the auditors worked on their investigation of police digitalisation, they routinely informed key actors in the police along the way. During this process, something happened: We could see an emerging alignment between the auditors and the police, as the auditors came to understand the problems the police were grappling with more deeply, and the police came to see that the auditors understood that the Ministry's way of governing posed a challenge to the long-term and well-planned processes that digitalisation work demands. Ultimately, the final audit report with its harsh critique of the Ministry of Justice and Public Security helped do the work the police administration had initially employed the model to do: Carve out a space for digitalisation work within their organisation.

Stopping short of approving Agile

Over the course of the audit, the auditors went from initially speaking about digital transformation models to, towards the end, only speaking of Agile methods. Anders consistently called Agile "the new way of working". In a meeting towards the end of the audit process, Anders said explicitly to the police officials present that the audit team could not give Agile "a stamp of approval":

> I don't know if you think we have given Agile a stamp of approval. But Agile is the industry standard. You employ a methodology that is widely acknowledged as good. Still, it is difficult for us to say how it will go.

Anders later told the ethnographer that he based this statement on several sources, including an evaluation report of the Agile digital transformation of the Welfare Administration (NAV) conducted by the consultancy PWC. Among its conclusions was that the Agile teams became too autonomous in NAV, that legislative hindrances were not factored in early enough in development cycles, and that projects were poorly managed (PWC, 2023). The concession from Anders that the police were working in accordance with the industry standard thus appears to be mostly a pragmatic stance: Agile is the method that is available to the police, but despite employing the state-of-the-art solution to large-scale digitalisation in bureaucracies, the audit found that the end result of this choice was still highly uncertain and that there was still room for fault. Anders' review of the research literature on Agile showed that digitalisation work conducted with the use of this methodology was not necessarily guaranteed success, but it was the best they had.

For the police, we suggest, the model worked as a "model for authority", rather than as a "model for enquiry" (Morgan 2012) as we saw was the case for the auditors. More precisely, what it does is to work as a "placeholder" (Lettieri, 2024), carving out a space for digital action which the police administration used to introduce a new mode of working within their organization, that of Agile methodology. However, the model's placeholding capacities can be used for more than diligent work in what the police referred to as "Agile product teams": We argue that the space the model creates is also political, in that it creates momentum for moving in a particular direction – toward the digital future. The authority of the model, stemming from its directionality, fortifies the police administration in relation to the Ministry. This provides a kind of epistemic counterpressure that the audit, given its harsh conclusions about the Ministry's governance, comes to strengthen. In this sense, the audit report and the digital transformation model ultimately join forces to strengthen the authority of the police administration's efforts of digitalisation.

Conclusion: Carving out space for digital statecraft

In their book *Models as mediators*, Morrison and Morgan write: "Just as one needs to use or observe the use of a hammer in order to really understand its function, similarly, models have to be used before they will give up their secrets" (Morrison & Morgan, 1999, p. 12). In line with this approach, we have in this article probed a specific kind of model: management models employed to enable "digital transformation" of public sector organisations. Empirically, we have followed an audit team from the National Audit Office in Norway from they define a problem question that asks why the police continued to run into major problems in their digital development processes, to they conclude that the police have not succeeded in increasing efficiency or creating more user-friendly services through digitalisation (NAO, 2023). As we followed the auditors, we observed how they encountered models of "digital transformation" developed by private consultants, one of which was being implemented by the police. These models became a key topic in the audit process itself, which led us to also make them the focal point of this article.

We have focused our analysis on the two specific models that entered our empirical field: one created by Danish consultant Pernille Kræmmergaard and another from international consultancy firm Deloitte. Both models cast digital transformation as a way of achieving "maturity" and offer ways to help their audience undertake this process. As our analysis shows, the two models have different rhetorical and visual styles, yet they both assert a need for change, and they both leave the specifics of how to do it open. They share an opaque quality that arguably stems from their refusal to explicate precisely what a digital transformation *is* and how it is to be performed. The two models share a style that serves to establish an authority and unassailability that in turn create momentum and space for digital change. We argue this means that what the models in fact do, is to carve out a space – they work as a placeholder for digital change (Lettieri, 2024). This is different from models that function as recipes for what should be done, and in which order (Morgan, 2012). In contrast to these, the digital transformation models' strength lies in lending their users the authority to demand this space to be opened within their own organisations, in our case the police.

Building on Morgan's notion of "models for enquiry" (Morgan, 2012) to suggest also the notion of "models for authority", we have shown

how the Kræmmergaard model's placemaking capacities was what made it highly useful for the police – but that this particular capacity also was what made it less useful for the auditors in their search for methodological tools in auditing their object of police digitalisation. After having looked into different versions, they never actually bought the models, neither financially nor methodologically, and ultimately scrapped them as an audit tool. The work the models eventually did for the auditors was to help them decide on what questions to ask, thereby limiting their role as "models for enquiry" in the audit process. In contrast, the Kræmmergaard model clearly helps the police to build authority in their internal political struggles by helping them carve out a space for digitalisation and give a clear direction to their work. As the Kræmmergaard model simplified the complicated political terrain of digitalisation and lent them a much-needed authority, it remained a valuable political tool, creating momentum for staff in charge of digitalisation in their efforts to convince the leadership of the Directorate and Ministry of the urgency of the matter. For the police, we suggest, this authority is founded in the model's paradoxical qualities of being both unassailable and opaque – it both takes for granted that it is right and blurs the view into its interior.

We suggest that the *action-orientation* of these models, which also aligns them with other tools of business and management (Doganova & Eyquem-Renault 2009, Chiapello & Gilbert 2019, Reinertsen & Asdal 2019), is the reason they work better for police than auditors. The police need to urgently take action – it is imperative to *do* something, while the imperative in the auditors' knowledge production is of a different kind; they are more concerned with posing and answering the right questions. We have argued that the model's momentum and clear direction served to energise the police's digitalisation efforts, and we have shown how one specific example of this is how the model prescribes new forms of working in the public sector, notably Agile methodologies, emerging from IT development. In addition to helping make space for digitalisation, the model thus also helps making space for new modes of working within the public sector bureaucracies.

As we have seen in this article, when it comes to managing digitalisation, public sector agencies seek out the advice and tools from private sector consultants on a grand scale. We have suggested to conceptualise this exchange as a trading zone (Galison, 1999) in which sellers and buyers of digital transformation models meet. As we have seen, the police bought not only the readings, but also the services of the Danish consultant Pernille Kræmmergaard, thus meeting her not only in the trading zone but also inviting her into their own organisation. For their part, the auditors move around the trading zone as they evaluate the police, trying out samples and observing sellers and buyers alike. Our study offers a glimpse into how public servants bring home goods from the international trading zone of digital consultancy, but the auditors also represent a case where the outcome is different, as no purchase is made. The trading zone metaphor serves to highlight how forms of privately owned expertise such as the one materialised in models for digital transformation contribute to new modalities of digital statecraft. Private and public forms of authority can proxy or stand in for each other in ways that are not altogether straightforward to see or understand, but where one result is that consultancies ultimately contribute to proxy forms of state sovereignty (Amoore, 2013).

In our empirical case, this situation is brought about because the knowledge needed for carrying out digital statecraft is not provided by the state agency responsible for digitalisation. But it is also brought about because the Ministry of Justice, as the audit report shows, has not been helpful in creating the needed space for digitalisation. Since the data collection for this article was carried out, a new digitalisation strategy for Norway has been launched (Ministry of Digitalisation and Public Governance, 2024). It remains to be seen whether this becomes a hands-on tool for bureaucracies. In the situation described here, where the state itself abstains from offering clear direction or indeed models of what good digital statecraft may be and how it may be achieved, our analysis shows that seeking out the trading zone of digital consultancy is what staff needs to do in order to make something happen. Indeed, for them there is no alternative.

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References

Akrich, M. (1992). The De-scription of Technical Objects. *In Shaping technology/building society: Studies in sociotechnical change*. 1992, pp. 205-24 (pp. 205–224).

Amoore, Louise. (2013). *The Politics of Possibility*. Duke University Press.

Asdal, K., & Hobæk, B. (2016). Assembling the Whale: Parliaments in the Politics of Nature. *Science as Culture, 25*(1), 96–116.

Asdal, K., & Hobæk, B. (2020). The modified issue: Turning around parliaments, politics as usual and how to extend issue-politics with a little help from Max Weber. *Social Studies of Science, 50*(2), 252–270.

Asdal, K., & Reinertsen, H. (2022). *Doing document analysis: A practice-oriented method*. SAGE Publications.

Baden-Fuller, C., & Morgan, M. S. (2010). Business Models as Models. *Long Range Planning, 43*(2), 156–171.

Bauer, S. (2024). Seeing Like a Model Fish: How Digital Extractions Mediate Metabolic Relations. *Science, Technology, & Human Values, 49*(3), 524–554.

Bauer, Susanne, S. (with Rentetzē, M., Schlünder, M.). (2020). *Boxes: A Field Guide* (First edition.). Mattering Press.

Berglund, J., & Werr, A. (2000). The Invincible Character of Management Consulting Rhetoric: How One Blends Incommensurates While Keeping them Apart. *Organization, 7*(4), 633–655.

Bernard, H. R. (2011). Participant Observation. In *Research methods in anthropology: Qualitative and quantitative approaches* (5th ed.). AltaMira Press.

Bernhardt, H. B. (2021). Endringsreisen i NAV IT 2016-2020 *En studie av den digitale transformasjonen i NAV IT og endringenes effekt på håndtering av Koronakrisen*. NTNU.

Bijker, W. E., & Law, J. (1992). *Shaping technology/building society: Studies in sociotechnical change*. The MIT Press.

Bourgoin, A., & Muniesa, F. (2016). Building a Rock-Solid Slide: Management Consulting, PowerPoint, and the Craft of Signification. *Management Communication Quarterly, 30*(3), 390–410.

Bringselius, L. (2017). Efficiency, Economy and Effectiveness – but What about Ethics?: Supreme Audit Institutions at a Critical Juncture. *Public Money & Management*.

Chan, J. B. (2001). The Technological Game: How Information Technology is Transforming Police Practice. *Criminal Justice, 1*(2), 139–159.

Chiapello, E. (with Gilbert, P.). (2019). *Management tools: A social sciences perspective*. Cambridge University Press.

Chong, K. (2018). *Best practice: Management consulting and the ethics of financialization in China*. Duke University Press.

Daston, L., & Galison, P. (2010). *Objectivity*. Zone Books.

Deloitte. (2018). *Digital Maturity Model. Achieving digital maturity to drive growth*. https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Technology-Media-Telecommunications/deloitte-digital-maturity-model.pdf

Doganova, L., & Eyquem-Renault, M. (2009). What do business models do?. Innovation devices in technology entrepreneurship. *Research Policy, 38*(10), 1559–1570.

Douglas-Jones, R. (2019). A 'good' ethical review: Audit and professionalism in research ethics. *Social Anthropology/Anthropologie Sociale, 23*(1), 53–67.

Espeli, H., & Nilsen, Y. (2016). *Riksrevisjonens historie 1816—2016*. Fagbokforl.

Flinterud, G., & Lundgaard, J. M. (2023). *Machineries of knowledge construction: Exploring the epistemic agency of digital systems in policing*.

Galison, P. (1999). Trading Zone: Coordinating Action and Belief. In Biagioli, Mario (Ed.), *The Science Studies Reader*. Routledge.

Gitelman, L. (2014). *Paper knowledge: Toward a media history of documents*. Duke University Press.

Gundhus, H. O., Talberg, N., & Wathne, C. T. (2022). From discretion to standardization: Digitalization of the police organization. *International Journal of Police Science & Management, 24*(1), 27–41.

Gundhus, H.O.I, Talberg, N. &Wathne, C. (2019). Politiskjønn under press? I: I.M. Sunde og N. Sunde. In *Det digitale er et hurtigtog! – Vitenskapelige perspektiver på politiarbeid, digitalisering og teknologi*. Fagbokforlaget.

Hacking, I. (1992). 'Style' for historians and philosophers. *Studies in History and Philosophy of Science. 23*(1), 1–20.

Hagen, A. L., & Skorpen, G. S. (2019). *Hjelp, jeg skal på feltarbeid!: Håndbok i etnografisk metode* (1. utgave.). Cappelen Damm akademisk.

Johnsen, Å. (2019). Public sector audit in contemporary society: A short review and introduction. *Financial Accountability & Management, 35*(2), 121–127.

Knorr-Cetina, K. (1981). *The manufacture of knowledge: An essay on the constructivist and contextual nature of science*. Pergamon.

Kotter, J. P. (2012). *Leading change*. Harvard Business Review Press.

Kræmmergaard, P. (2021a). *Digital modenhed – Strategi, teknologi, organisation og lederskab i 5 generationer*. Djøf forlag.

Kræmmergaard, P. (2021b). *Digital Transformation. 10 capabilities your organisation should master – and 3 you need*. SB Publishing.

Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Open University Press.

Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

Latour, B. (2010). *The making of law: An ethnography of the Conseil d'Etat*. Polity Press.

Latour, B. (with Woolgar, S.). (1986). *Laboratory life: The construction of scientific facts* ([New ed.].). Princeton University Press.

Law, J. (2008). Actor Network Theory and Material Semiotics. In B. S. Turner, *The New Blackwell Companion to Social Theory* (pp. 141–158).

Law, J. (2010). The Materials of STS. In M. C. Beaudry & D. Hicks, *The Oxford Handbook of Material Culture Studies*. Oxford University Press.

Lettieri, S. (2024). Placeholders: Leaving Space for New Subjects and

Individuated Agencies. *Journal of Architectural Education, 78*(1), 82–93.

Lundgaard, J. M. (2021). *Nød og neppe: Fra anrop til beslutning ved politiets operasjonssentral*. Universitetsforlaget.

Maguire, J., & Ross Winthereik, B. (2021). Digitalizing the State: Data Centres and the Power of Exchange. *Ethnos, 86*(3), 530–551.

Miller, C. R. (1984). Genre as social action. *Quarterly Journal of Speech, 70*(2), 151–167.

Ministry of Digitalisation and Public Governance. (2024). *The Digital Norway of the Future. National Digitalisation Strategy 2024-2030*.

Morrison, M & M. S. Morgan (eds.) (1999). *Models as mediators. Perspectives on Natural and Social Science*. Cambridge University Press.

Morgan, M. S. (2012). *The World in the Model: How Economists Work and Think*. Cambridge University Press.

National Audit Office of Norway (NAO). (2018). *Politiets behandling av våpensaker [The Police Service's handling of weapons cases] Report: Del av dokument 1 (2018–2019)*.

National Audit Office of Norway (NAO). (2021a). *Undersøkelse av myndighetenes arbeid med eksportkontroll av strategiske varer [Investigation into the authorities' work with export control on strategic goods] Report: Dokument 3:4 (2020–2021)*.

National Audit Office of Norway (NAO). (2021b). *Undersøkelse av politiets innsats mot kriminalitet ved bruk av IKT [Investigation into the Police Service's performance on ICT crime] Report: Dokument 3:5 (2020-2021)*.

National Audit Office of Norway (NAO). (2022a). *Myndighetenes innsats mot vold i nære relasjoner [The authorities' efforts to combat domestic abuse] Report: Dokument 3:8 (2021–2022)*.

National Audit Office of Norway (NAO). (2022b). *Politi- og lensmannsetatens måloppnåelse på sentrale oppgaver. [The Police Service's central task goal achievement] Report: Dokument 3:7 (2021–2022)*.

National Audit Office of Norway (NAO). (2023). *Digitalisering i politiet [Digitalisation in the Police Service] Report: Dokument 3:7 (2023–2024)*.

Norwegian Agency for Public and Financial Management (DFØ) (2022). *Sluttrapport: Effektevaluering av nærpolitireformen*. [The Norwegian Agency for Public and Financial Management: 'Final report. Effect Evaluation of the Neighbourhood Police Reform']

Papazu, I. (2024). Between bureaucracy and agility: The quiet transformation of the Danish digital state. In *Digitalization in Practice: Intersections, Implications and Interventions*. De Gruyter.

Power, M. (1997). *The audit society: Rituals of verification* (1. utg. reprinted 2013.) Oxford University Press.

PWC. (2023). *Evaluering av Prosjekt 3 i NAV. Evaluation report conducted by Price, Waterhouse Coopers (PWC for the Norwegian Welfare Administration (NAV)*.

Rabinow, P. (2016). *Reflections on Fieldwork in Morocco: Thirtieth Anniversary Edition, with a New Preface by the Author* (2nd ed.). University of California Press.

Reinertsen, H. (2016). *Optics of Evaluation. Making Norwegian foreign aid an evaluable object, 1980-1992*. [Ph.D. dissertation, TIK Centre for Technology, Innovation and Culture, Faculty of Social Sciences,]. University of Oslo.

Reinertsen, H., & Asdal, K. (2019). Calculating the blue economy: Producing trust in numbers with business tools and reflexive objectivity. *Journal of Cultural Economy, 12*(6), 552–570.

Ricoeur, P. (2016 [1981]). *Hermeneutics and the Human Sciences*. Cambridge University Press.

Terpstra, J., Salet, R., & Fyfe, N. R. (2022). Abstract Police Organisations: Distantiation, Decontextualisation and Digitalisation. In *Policing in Smart Societies* (pp. 9–26). Springer International Publishing.

Unruh, D., & Kiron, G. (2017). Digital Transformation on Purpose. *MIT Sloan Management Review*.

Vestues, K., Hanssen, G. K., Mikalsen, M., Buan, T. A., & Conboy, K. (2022). *Agile Data Management in NAV: A Case Study*. 445, 220–235.

Westerman, G., Bonnet, D., & McAfee, A. (2012). The Advantages of Digital Maturity. *MIT Sloan Management Review*.

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BEYOND ERROR DETECTION

The Performative Role of Checklists in Shaping Forensic Practices

by Nina Sunde

This study explores the performative role of checklists in enhancing the quality of digital forensic analysis and reporting within the criminal justice system. By drawing on theoretical frameworks such as Science and Technology Studies (STS) and Actor-Network Theory, the research examines how checklists extend beyond their procedural use and actively shape forensic practices. The study utilises the experiences of digital forensic practitioners during peer reviews within the Quality Control Project (Sunde & Dahl, 2023), revealing how checklists enact professional, ethical, and legal standards and thus shape forensic reports. The findings demonstrate that checklists do not merely guide actions, but function as dynamic actants, co-producing forensic outcomes through influencing both the content and quality of forensic reporting. Additionally, the research advocates for the public availability of checklists to enhance transparency, accountability, and trust in the credibility of digital forensic evidence. This study contributes to a deeper understanding of the transformative capacity (Asdal, 2015) of checklists in forensic practices and invites further investigation into the sociomaterial impact of comparable devices in other fields.

Keywords: Digital Forensics, Checklists, Sociomateriality,

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1. Introduction

The digitalisation of society and technological development have significantly influenced the investigation of crimes, and a report by the National Police Chief's Council (2020) suggested that 90 per cent of cases in England and Wales contained a digital element. The availability of digital evidence has not only created new opportunities for criminal investigations, but also introduced challenges such as backlogs, complexity, and novel technology (Cervantes Mori et al., 2021; Reedy, 2020, 2023; I. M. Sunde, 2021; Vince, 2016). In Norway, advanced digital investigations are conducted by specialised digital forensics practitioners (DFP) working in police district units or at the national level. These practitioners possess high expertise and utilise advanced technology to acquire and analyse data using methodologies universally recognised as forensically sound within the discipline. Typically, they collect data from mobile phones, personal computers, and online spaces, processing it with custom-made software.

The analysis is typically a shared task, where general investigators review the data for relevant evidential findings, and the DFPs perform a deeper technical analysis of the findings or search for additional relevant traces through more technically advanced methods (Sunde & Dahl, 2023). DFPs at national level assist the local DFPs with more advanced tasks for acquisition and analysis of data when they lack the skills or tools to adequately perform the tasks. Digital evidence holds considerable value due to its ability to illuminate critical investigative aspects such as intent and motive and is becoming increasingly influential in the criminal investigators' sensemaking due to the credibility they assign it (Innes et al., 2021:714, 718). However, the potential for flaws or misleading presentations of digital evidence exists, often attributed to suboptimal practices or mistakes (Cohen, 2013:30-32, 47-48; Stoykova et al., 2022). Therefore, the implementation of robust procedures to detect and rectify flawed digital evidence is imperative to prevent miscarriages of justice.

Despite the high-tech nature of digital forensics, documents and texts remain crucial in practice. When digital evidence is sought in a criminal case by seizing mobile phones, computers, or social media content, the evidence is not the digital carrier itself but within the information it contains. The evidential findings within this information are presented in reports as text, images, screenshots, and tables, alongside a thorough description of the procedures, tools, and methods used. The report plays a pivotal role in presenting relevant evidence to investigators or the court and in underpinning evidence reliability through the detailed presentation of these procedures and methods. Two studies exploring the quality of digital forensic reports revealed significant issues, such as one-sidedness and vague, incoherent formulations regarding evidential value (N. Sunde, 2021) or insufficient chain of custody documentation, weakening evidence reliability (Stoykova et al., 2022).

Research by Jahren (2020) and Bauge (2023) indicates that, contrary to best practices, quality control during the digital forensic process and at the reporting stage was neither systematic nor mandatory among Norwegian DFPs. Instead, it was sporadic, initiated at the discretion of DFPs, and primarily focused on language, grammar, and spelling errors rather than the presentation of findings. Although checklists are frequently used in other branches of police work, for example, patrolling, they were not commonly utilised in digital forensics casework at the time of the study.

The Quality Control Project was established in 2022 in response to research findings on report deficiencies and the lack of systematic quality control (Sunde & Dahl, 2023). The project aimed to explore a quality control approach based on the Peer Review Hierarchy for Digital Forensics (the 'Hierarchy'), as proposed by Horsman and Sunde (2020). The Hierarchy is an integral part of a broader quality assurance framework, the Phase-oriented Advice and Review Structure (PARS), detailed by Sunde and Horsman (2021). Tailored specifically for DFPs, the Hierarchy facilitates the quality control process for advanced technical analyses and reports. Comprising seven levels, the Hierarchy operates on a tiered system, progressively advancing in complexity and depth of assessment. Checklists are central in the PARS framework, supporting the peer reviewers during the review process and Reijers et al. (2017) describe checklists as follows "A checklist is typically a list of action items or criteria arranged in a systematic manner, allowing the user to record the presence/absence of the individual items listed to ensure that all are considered or completed" (p. 5774).

The inception of the Quality Control Project involved translating the PARS framework, the Hierarchy, and the associated checklist for digital forensic reporting (the 'DFR Checklist') into Norwegian (Sunde & Dahl, 2023:16). To enhance clarity, a comprehensive guideline (the 'Guideline') explaining each DFR Checklist item was also developed. Subsequently, workshops were organised, inviting all digital forensic units in the Norwegian police (Sunde & Dahl, 2023:17-21). The workshops provided training in the PARS framework and its underlying rationale. Following the workshops, the digital forensic units were invited to participate in a six-month trial phase of conducting quality control according to Hierarchy Level 4 (Conceptual review). Six (of twelve) local units and one (of three) national unit agreed to participate. After the trial, digital forensic leaders (n=7) and DFPs (n=13) from the participating units were interviewed to gather insights into their experiences. Anonymised checklists used during peer review were also collected. These interviews and checklists form the empirical foundation of this paper. A detailed account of the project and its preliminary findings have been published in a project report (Sunde & Dahl, 2023).

Perspectives from STS and Actor-Network Theory, outlined in Section 2, are employed to analyse the empirical data. In particular, the concepts of sociomateriality (Barad, 2007), sociomaterial practices (Orlikowski, 2007) combined with performative texts

and genres (Akrich, 1992; Aasdal, 2015, Aasdal & Reinertsen, 2022), are applied to examine the agency of checklists in triggering both intended and unintended actions and in the emergence of matters.

By studying the development and implementation of the DFR Checklist from a sociomaterial perspective, this study contributes novel insights into performative checklists, adding to research on performative documents, texts, and genres, and provides empirical insights into the conditions necessary for their effective functioning. The context of police investigations and digital forensics is also novel, as is the researchers' active role in implementing the checklist-based peer review.

2. Theoretical concepts

Central to this study is the DFR Checklist, a document designed to describe work routines and guide decisions within those routines (Reijers et al., 2017). Analytically, the DFR Checklist is interpreted through the lens of Actor-Network Theory, which attributes agency to both human actors and non-human actants (Latour and Woolgar, 1979/1986). The study also draws on the concept of sociomateriality, which acknowledges the inseparability of matter and meaning (Barad, 2007: 30) and emphasises that materiality is integral to organisational life (Orlikowski, 2007:1436). Orlikowski states that "there is no social that is not also material, and no material that is not also social" (Orlikowski, 2007:1437), and Cooren (2020) reminds us that materiality or matter should not be reduced to something tangible or visible, but rather viewed as a property of all organisational phenomena, where the study of materialisation - the process of 'becoming a matter' - is at the core. The performativity of specific sociomaterial devices, such as documents and texts, has been explored in foundational works like Cooren (2004) and Orlikowski (2007), and with more recent contributions such as Asdal (2015), Asdal and Reinertsen (2022), Douglas-Jones (2019), Druglitrø (2022), and Weber (2022).

According to Reijers et al. (2017:3), a checklist should ideally provide a purposeful and relevant representation of a particular real-world domain, meaning that the checklist's objectives and tasks must be carefully designed into it. Akrich (1992:208) describes the relationship between the designer and user as mediated by a set of instructions, behaviours, and expectations that are inscribed into the technology as a "script" or "scenario". These scripts dictate how users are expected to interact with the technology, thereby shaping social behaviours and interactions. The DFR Checklist can thus be understood as a document that materialises knowledge from the digital forensics field and seeks to offer guidance on best practices from moral, legal, and digital forensic science perspectives in documentation and reporting. In line with Akrich's (1992:209) notion of "de-scription", the success of this inscription process is best explored through the lived experiences of those using the technology, with any misalignments providing valuable insights into the agency of checklists.

Reijers et al. (2017) found that checklists have a shared purpose and recognisable properties, supporting their classification as a distinct document genre. Miller's (1984) seminal essay on genre as social action defines rhetorical genre as "based in rhetorical practice, in the conventions of discourse that a society establishes as ways of 'acting together'" (Miller, 1984:163). In a 2015 follow-up, Miller emphasised that genre is a culturally significant type of social action that creates meaning. It mediates between private intentions and socially objectified needs (exigence), with cultural categories playing a key role in constituting society (Miller, 2015:57).

This study involves two genres: digital forensic reports and checklists. However, as the study analysed only the completed checklists and descriptions of their usage, rather than the reports themselves, the focus will be on the checklist genre. Although Reijers et al. (2017:5775) adopt an instrumental perspective, viewing the checklist as an informational artefact, their study also opens avenues for understanding the genre through a sociomaterial lens. Recent research, such as Jahn's (2018) exploration of the performative relationship between firefighters and safety rules following a new policy doctrine, contributes to understanding the performative genre and generic texts. The checklist genre, specifically, has been examined from a performative genre perspective by Bazerman (1997), and also remains central in a more recent study by Druglitrø (2022).

Affordances are employed as a theoretical perspective when exploring the DFR Checklist's social role. According to Gibson (1977:127), an affordance is what a thing offers, provides, or furnishes, either for good or ill. Thus, when exploring affordances, both possibilities and constraints should be investigated. Affordances are neither objective nor subjective properties; they are both (Gibson, 1977:129). They may be thought of as various 'abilities' (Seberger, 2018:11), such as 'read-ability' or 'note-ability' when using a checklist for peer review. Although the designer may have inscribed a specific use or interpretation, a thing such as a checklist often produces something unexpected, such as an application or interpretation other than intended, and consequently, new problems and lines of inquiry emerge (Knuuttila, 2005:1269).

The properties of checklists and checklist items identified by Reijers et al. (2017) will be utilised and further developed through the application of a sociomaterial lens to the analysis. Central to this analysis are affordances, combined with the perspective of texts as speech acts (Searle, 1979; Cooren, 2004). Concepts from visual rhetoric (Courtis, 2004) are also applied to gain a more comprehensive understanding of how aspects such as colour, font, and arrangement of elements constitute the agency of the checklist

genre, that is – the performative aspects of the DFR Checklist. Through this lens, the study investigates not only how checklists trigger or influence actions, but also their role in creating, shaping, and resolving matters.

3. Method

The study was conducted in conjunction with the Quality Control Project, a research and development project led by Olav Dahl and the author, directed at DFPs and leaders in Norway. While briefly outlined in the introduction, a more detailed description is provided here. In September 2022, an invitation was extended to all DFPs and leaders in national and local digital forensic units within the police to participate in workshops focused on quality control of digital forensic reports through checklist-based peer review. During the first workshop, attendees were presented with the Hierarchy (Horsman & Sunde, 2020; Sunde & Horsman, 2021), initially proposed as a flexible framework for systematic peer review of digital forensic findings and reported results (see Figure 1).

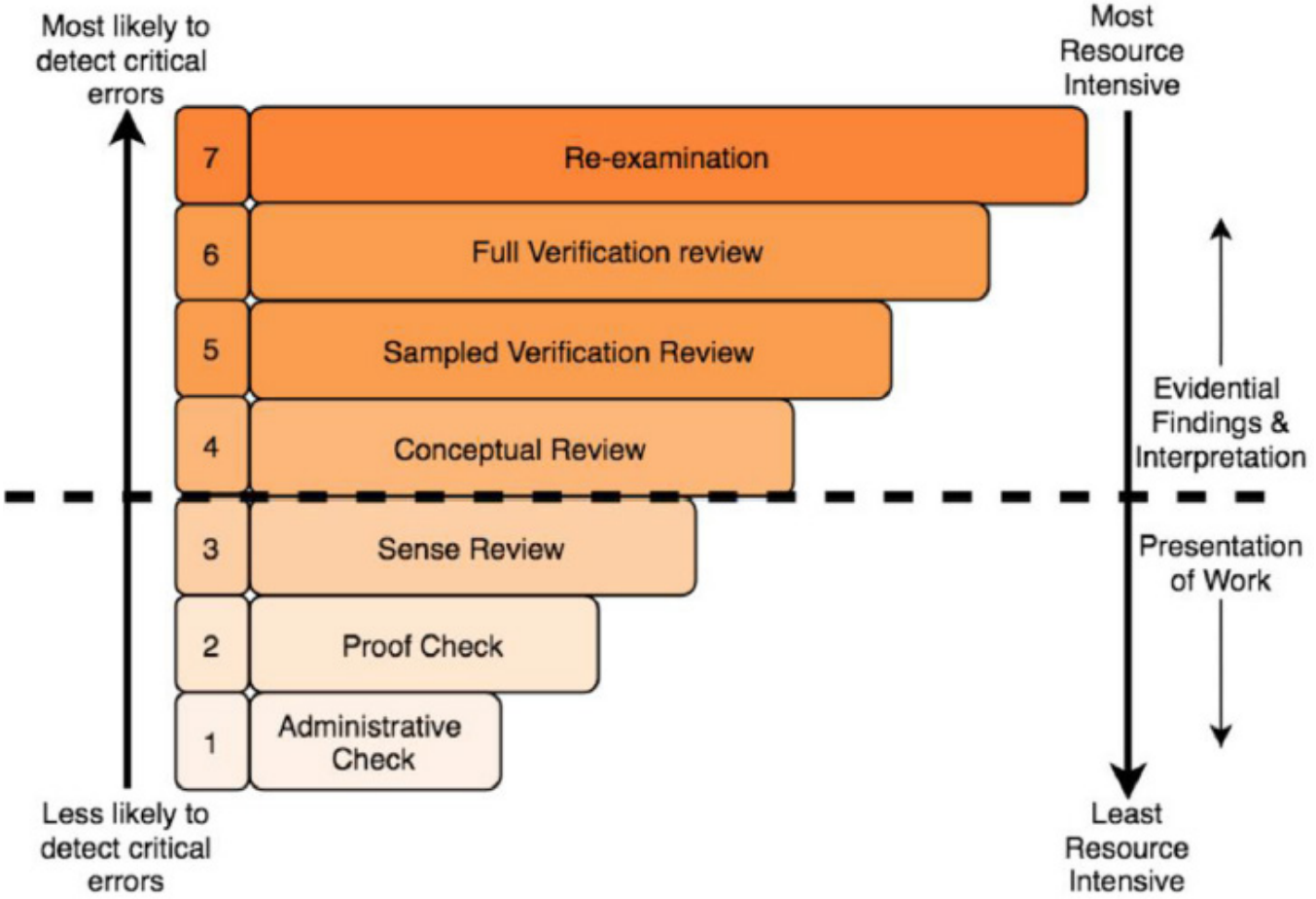

Figure 1: The Peer Review Hierarchy for Digital Forensics, as presented in Sunde & Horsman, 2021.

The Hierarchy is supplemented by the DFR Checklist designed to support the review process. Participants were also provided with a Norwegian version of the DFR Checklist and the Guideline explaining the purpose of each DFR Checklist item (see Figure 2).

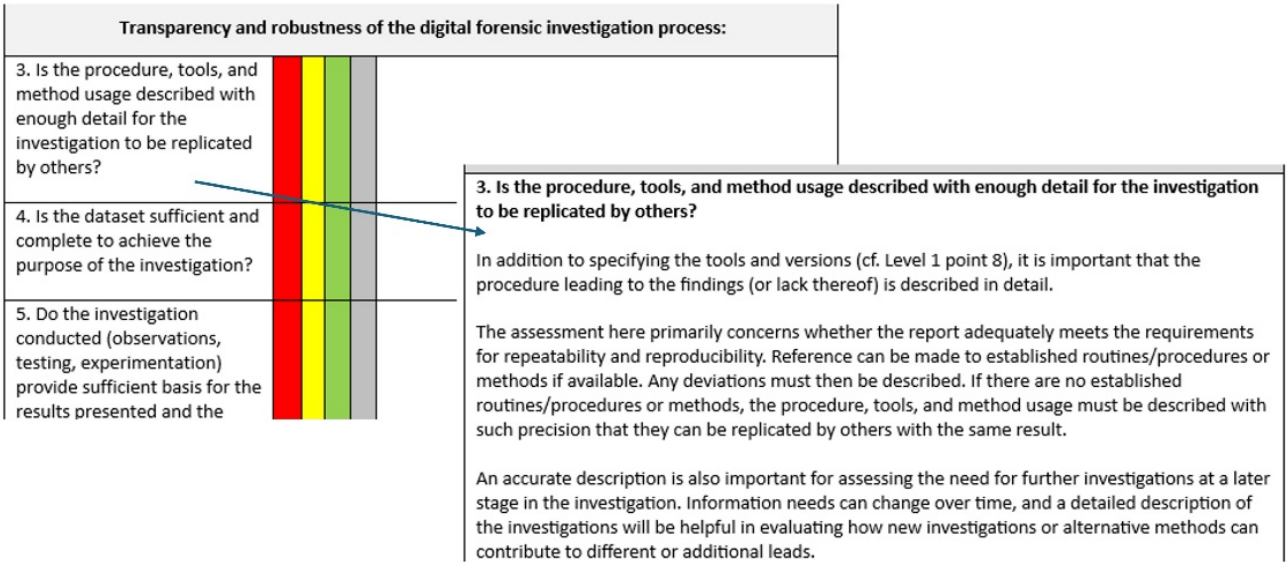

Figure 2: A DFR Checklist item and its elaboration in the Guideline (author's translation).

The Hierarchy is structured across seven levels, starting with an administrative check, followed by a spelling and grammar check, a sense review, and a conceptual review of reports. It progressively advances to include the verification of selected or all findings. The highest level involves a new comprehensive, independent analysis.

At the second workshop, the participants were invited to evaluate the DFR Checklist and provide feedback. This collaborative effort aimed to address potential challenges, such as unfamiliar concepts, ambiguities, or discrepancies from established digital forensic practices. Some minor adjustments were made based on matters raised by the practitioners. For example, a checklist item on hypotheses was revised to reflect that practitioners typically receive mandates or questions rather than predefined hypotheses. Consequently, the DFR Checklist item was modified from 'Are the overarching hypotheses forming the basis of the analysis described?' to 'If the analysis is hypothesis-driven, are the overarching (at the offence level) hypotheses forming the basis of the analysis described?' (author's translation). Redundant items were removed, and some new ones were added to enhance the DFR Checklist's comprehensiveness. After this process, all digital forensic units involved in the workshops were invited to participate in the trial phase of the Quality Control Project, which was designed to test the DFR Checklist in actual digital forensic casework. This initiative aimed to provide participants with hands-on experience in the roles of peer reviewer and reviewee, fostering a deeper understanding of the DFR Checklist dynamics. Additionally, digital forensic leaderswere given the opportunity to enhance their proficiency in coordinating and facilitating these activities. The application of the DFR Checklist and associated Guideline was considered an important step to examine and *de-scribe* (Akrich, 1992) whether its social motive of enhancing the quality of digital forensic analysis and reporting within the criminal justice system was realised, and to identify any misalignments.

After the workshops, seven digital forensic units, representing national (n=1) and local levels (n=6), agreed to participate in a trial aimed to implement the DFR Checklist for structured peer review of digital forensic reports. Participants were instructed to focus their peer reviews on Conceptual review, corresponding to Level 4 in the Hierarchy, which incorporates Levels 1-3. The trial lasted for six months, during which a total of 28 digital forensic reports underwent review. DFPs serving as peer reviewers (n=11) reviewed between one and five reports each during this period (Sunde & Dahl, 2023:24). Of these, five had acted as both reviewers and reviewees, receiving feedback on their own reports, while one had exclusively acted as a reviewee.

After the trial phase, semi-structured interviews were conducted with the digital forensic unit leaders (n=7) and DFPs (n=13) participating in the trial, with informed consent. The interviews, lasting 50 to 70 minutes, covered their experiences with quality control before and during the trial phase, with a particular focus on how they utilised the DFR Checklist and Guideline, their familiarity with mistakes and near-mistakes in cases involving digital traces from their own districts or special bodies (Norwegian: særorganer), and their attitudes towards digital evidence, quality, and legal security. The interviews were transcribed and analysed using a reflexive thematic analysis approach as outlined by Braun and Clarke (2006; 2019). To explore the different interpretations, two interviews were independently coded by two researchers, followed by a review and discussion to assess whether independent coding enriched the interpretations and insights from the data, in line with the concept of

'member reflections' (Tracey, 2010). The interviews were first coded with thick descriptions, which were then condensed into themes. The themes, which included checklist use, feedback, prior peer review experience, error detection, practice modification, identified development needs, items of tension, and time/resources were merged into broader themes such as document use, becoming of matters, and misalignments, which are also reflected in the structure of the analysis (Section 4). Quotes from DFPs are annotated as (P), and quotes from leaders as (L).

3.1 Reflexivity

The research was driven by the author's strong commitment to enhancing the quality of digital forensic reporting practices. The author was directly involved in translating and adapting the DFR Checklist and Guideline to the Norwegian language and context, as well as playing a central role in the workshops and interviews. It was therefore important to carefully consider the potential tendency to emphasise positive experiences and outcomes while underrepresenting constraints and unintended consequences during the analysis of the trial phase of the Quality Control Project. To address this, Akrich's recommendation to focus on misalignment and breakdowns proved invaluable. This approach facilitated a more balanced understanding of the Checklist's social role by critically examining both its potential benefits and limitations.

4. Analysis

The first part of the analysis focuses on the DFR Checklist as a document, examining its properties in Section 4.1 and its embedded moral, legal, and professional motives in Section 4.2. The analysis then shifts perspective from the checklist itself to the sociomaterial practice, exploring interviewees experiences with how the DFR Checklist functioned as a tool for raising matters in Section 4.3. This is followed by an analysis of misalignments between the checklist's intended purposes and actual outcomes, along with their consequences in Section 4.4. The final part of the analysis in Section 4.5 adopts a broader perspective, discussing the role of the DFR Checklist within the wider justice system. Finally, a conclusion is offered.

4.1 From informational artefact to performative genre

Reijers et al. (2017:5775) identify common properties of checklists, including representation, prescriptiveness, scope, abstraction, and audience, along with type and behavioural relation as common properties of checklist items. These properties form the basis of the first part of the analysis, assessing whether the DFR Checklist characteristics align with Reijers et al.'s findings.

TABLE 1

Scope	Property	Selected values
Entire checklist	Representation	Paper, poster, mechanical, electronic, vocal
	Prescriptiveness	Do-list, call-do response
	Scope	Systems engineering, human performance
	Abstraction	Normal, abnormal, emergency
	Audience	Individual, group
Checklist items	Type	Check, score, multiple choice, branched, interrogative
	Behavioral relation	Arbitrary, strongly sequential, weakly sequential, parallel

Table 1: Checklist properties identified by Reijers et al. (2017:5775).

As noted, the Hierarchy included the DFR Checklist covering each Hierarchy level, with between three and eighteen items to assess. The DFR Checklist was accompanied by the Guideline explaining the purpose of each item and providing examples of how information should be presented in the report. The DFR Checklist items addressed matters such as the investigative process, the recommended format, structure and naming conventions, the presentation of findings, and any insufficient, erroneous, or potentially misleading information in the report. The primary objective of the DFR Checklist was to assist the peer reviewer in conducting effective quality control, identifying insufficient documentation, flaws, or misleading information, and providing an opportunity to correct these issues before the report was forwarded to the investigation team and potentially influenced the subsequent investigative decision-making (Sunde & Dahl, 2023).

In light of the property typology identified by Reijers et al. (2017) (Table 1), the DFR Checklist was *represented* as a digital Word document. This allowed multiple usage options for the DFPs: it could be printed completed in writing, or kept on the computer, and filled out digitally. The interviews revealed that this flexibility enabled the reviewers to adopt it according to their personal preferences for conducting reviews.

The DFR Checklist's prescribed use followed a *do-verify* approach, where actions were first done and then checked, as opposed to a *call-do* approach, where actions are first called and then performed (Reijers et al, 2017:5776). The DFR Checklist items prompted the reviewer to assess the report by asking questions, as shown in Figure 2, a speech act classified as directives (Cooren, 2004:384). Examples of DFR Checklist items were:

- Is the dataset adequate and complete to achieve the purpose of the analysis?
- Does the analysis conducted (e.g., observations, testing, experimentation) provide a sufficient basis for the results presented and the conclusions drawn from them?
- Are any reservations, uncertainties, or limitations related to the methods and/or tools described?

For the complete list of items in the DFR Checklist at Hierarchy level 4 (Conceptual review), see Appendix.

A checklist's *scope* can be categorised into two approaches: a comprehensive systems engineering approach, resulting in a detailed list with a high number of items, versus a shorter, less-detailed human performance approach (Reijers et al, 2017). This property reflects the values and expectations of a checklist's power – its inscribed *imaginaries* (Kaufmann, 2023: 35, further examined in Section 4.3.1). The systems engineering approach assumes that human error can be avoided by checking all aspects of the task, while the human-centric approach acknowledges that human error cannot be entirely eliminated and that an overly extensive list may lead to improper use or rejection of a checklist altogether. The DFR Checklist leaned towards the human-centric approach, lacking the detail to cover all reporting aspects and inviting the peer reviewer to use professional discretion in evaluating the gravity of issues.

The *abstraction* property concerns whether real-world phenomena are explicitly addressed through a checklist, with Reijers et al. (2017) identifying normal, non-normal, or emergency situations as key values. The DFR Checklist aligns with the non-normal abstraction value, as it was designed for all reports resulting from a digital forensic analysis. Feedback from workshops and interviews indicated that DFPs produce very few analysis reports, with many analysis tasks, including reporting, now largely handled by general investigators. This combination of a task that is both complex and infrequent increases the risk of mistakes, thereby highlighting the DFR Checklist's utility as a safety net that aids memory and ensures that important aspects are included in the report to achieve a sufficient level of quality.

Concerning the *audience* property, the DFR Checklist was designed for individual use rather than group use, as each item includes one scoring box and one comment field. However, the DFR Checklist retains the inserted text and scoring for the reviewer when providing feedback and for the reviewee when implementing suggested changes in the report.

Reijers et al. (2017) identified type and behavioural relation as properties specific to checklist items. They found that a checklist could comprise multiple item *types*. The DFR Checklist was designed as a combined *scoring* and *interrogative* checklist, prompting a series of actions. First, the peer reviewer is invited to evaluate and score the matter reflected in the item. According to Reijers et al. (2017:5777), this item type is commonly used for evaluation, which aligns with the purpose of the DFR checklist. This property prompts the user to assess certain aspects of the report and classify them by severity.

The DFR Checklist used a colour-based classification system with criteria explained in text. *Red* indicated critical error, *yellow* indicated a less severe error or an issue needing improvement, and *green* indicated sufficient quality. The *grey* option signified an issue that was not evaluated or deemed irrelevant (Figure 3). The DFR Checklist introduction provided guidance on how to use this colour-based annotation system.

	The report contains critical errors or misleading information that must be corrected.
	The report contains ambiguities, minor errors, or deviations from applicable templates, procedures, principles, and methods that should be corrected.
	The report is assessed to maintain a proper and sufficient quality (level 5-6: the findings are verified).
	Not evaluated or not applicable.

Figure 3 Excerpt from the DFR Checklist providing guidance to the colour coding (author's translation, Sunde & Dahl, 2023, Appendix 1:1).

Scoring based on categories of gravity not only raises issues but also conveys *exigence* (Miller, 1984:158). The score classifies the severity of the error and the urgency for correction. Colour carries stereotypical associations and is used for persuasion: red signifies danger, yellow caution, and green clearance (Courtis, 2004:269). The colours red, yellow, and green were deliberately chosen due to the association with traffic lights, a familiar system, as confirmed by interviewees who frequently referenced this analogy.

Each DFR Checklist item included a field for reviewer comments, corresponding to the *interrogative* item type, which is used for offering feedback (Reijer, 2017:5777). This field allowed reviewers to justify their scoring and elaborate on what needs to be done, serving as an extension of the reviewer's memory. When forwarded to the reviewee, it ensures that the matters remain 'lively' until resolved through adjusted reporting. An additional interrogative item at the end of the checklist prompted reviewers to summarise the report's strengths and weaknesses, providing overall feedback to the reviewee.

The final checklist item property is *behavioural relation*, which refers to an affordance that dictates the order of checklist use. The item properties in the DFR Checklist were strongly sequential by level, meaning that a Level 4 Conceptual review also includes Levels 1-3. However, within each level, items could be assessed in any order, as long as all were eventually assessed. Interviews and discussions during the workshops indicated a low level of standardisation in the digital forensic reports due to the lack of a common template, so the checklist was not ordered according to an expected report structure (see also Section 4.4.2). Allowing flexible item use was thus a crucial affordance for the checklist's applicability in the

current non-standardised state of digital forensic work. For example, some reports placed conclusions at the beginning, while others placed them near the end, making a strictly sequential checklist impractical.

In summary, the DFR Checklist aligns with the genre-specific properties identified by Reijers et al. (2017). From the performative genre perspective, the DFR Checklist is more than just an instrument or information artefact; it is a document with agency that influences the actions and behaviour of the peer reviewers. The DFR Checklist affords certain behaviours and restricts others by directing questions to reviewers, inviting them to score and justify both good and inadequate reporting practices, and summarising the overall evaluation for the reviewee. It retains the evaluation for both the reviewer and reviewee, supporting the delivery of precise feedback while ensuring all issues are addressed in the report. Designed as a matter-raising device, the DFR Checklist is intended to prompt evaluative activities by peer reviewers and to play a crucial role in co-producing the review process. Its aim is to foster more coherent reports and minimise errors and miscommunications.

4.2 Governing moral, legal, and professional matters

The DFR Checklist's items not only reflect central professional principles in digital forensics, but also incorporate moral values, legal requirements, and key human rights principles. Bazerman's (1997) work illustrates how checklists function not only as procedural tools but also as frameworks for enforcing accountability, communication, and compliance. He demonstrates this through an analysis of airline pilots' checklists:

> The airline pilot's checklist before takeoff structures talk with the copilot, navigator, and ground crew; enacts directives from the legal and regulating bodies overseeing flight; establishes a record of actions taken by the flight crew; and provides a task oriented frame for interpreting other recordings of conversation and instrument readings. (Bazerman 1997:296)

Similarly, in digital forensics, the DFR Checklist structures tasks and guides adherence to ethical and legal standards. Akrich (1992:816) explains that designers' choices in technology development involve decisions about what is delegated to a machine (or checklist, in this case) versus human judgement. This delegation, termed the "script," shapes not only user actions but also moral behaviour.

The Checklist was designed to safeguard compliance with ethical and legal frameworks as well as widely accepted digital forensic methodologies, guiding reviewers to identify potential biases and knowledge gaps. While some issues are classified through set criteria, others require the reviewer's discretion, combining both technical and ethical judgment.

For example, the universal human right to the presumption of innocence is operationalised in DFR Checklist item 4.13: "If the analysis is hypothesis-driven, are the results described in light of at least two competing hypotheses, including one that supports innocence/non-criminal activity?" (author's translation, Sunde & Dahl, 2023, Appendix 1:6). This item *directs* (Cooren, 2004:384) the reviewer to ensure the report respects this principle by providing clear and actionable criteria. Similarly, ethical considerations are addressed in item 4.16: "Has the investigation and report writing been conducted in line with relevant criminal procedural rules and ethical guidelines?" (author's translation, Sunde & Dahl, 2023, Appendix 1:7). This underscores the reviewer's responsibility to verify compliance. The DFR Checklist also enforces digital forensic methodology, as exemplified in item 4.3: "Is the procedure, tools, and method application described in sufficient detail to enable replication of the analysis by others?" (author's translation, Sunde & Dahl, 2023, Appendix 1:5). This reflects the principle of repeatability (e.g. International Organization for Standardization, 2015). Items such as these underscore the need for co-production between the DFR Checklist and the reviewer's domain-specific expertise. The DFR Checklist can serve as a prompt, but it cannot encapsulate all necessary knowledge.

Furthermore, the DFR Checklist emphasises comprehensive descriptions, transparency in procedures and practitioners' expertise, and the assurance provided by a second opinion from a qualified reviewer. These values align with what Koehler et al. (2023:1) describe as an evolution within forensic science, from trust in the examiner to trust in the scientific method, where peer scrutiny and review is a central part.

4.3 The checklist as a matter raiser

By examining the checklist properties identified by Reijers et al. (2017), alongside the concepts of affordances, speech acts, and visual rhetoric, we gain insight into what the DFR Checklist can do and the behaviours, reflections and interactions it can trigger. Further analysis aims to understand the role of the DFR Checklist in the emergence of issues beyond their formal properties, or, as Asdal and Reinertsen (2022:152) put it, "how they matter for practice – and in practice".

4.3.1 Steering the evaluation focus

As Kaufmann (2023:35) explains, "imaginaries refer to explicit or implicit preconceptions and expectations about matter." This concept applies directly to the DFR Checklist's role in digital forensic reports, where it steers their evaluation focus towards specific issues. For example, a recent study demonstrated that checklists guide the peer reviewers of child interviewers' performance by structuring their observations and shaping the feedback they provide (Brubacher et al., 2024:10, 13).

The DFR Checklist similarly directs the reviewer's analysis by prompting questions, scoring, and comments. By doing so, it ensures a thorough assessment of present report content and highlights any absent but relevant information. As a practitioner noted, assessing absent but relevant information had not previously been common practice:

> In terms of feedback as we practice it, we typically receive the report as a Word document, and then we go through and insert comments on the issues that are in the report. Issues that are not there, such as a bit more specificity about hypotheses, or one's own knowledge about the case, or expertise - if it's not there, we haven't had a tradition of - hey, shouldn't there have been a point here? (P3)

Without the structure provided by a checklist, and as supported by cognitive psychology's *feature positive effect* (Sainsbury, 1971), reviewers may focus on present information to the detriment of noting crucial omissions. A practitioner illustrated this issue:

> For example - this relates to the mandate, purpose, and mission. Yes, people usually write the purpose, but the mandate should perhaps have been much clearer and should have been brought forward. I've noticed myself - can you just look at this computer, and then the mandate isn't clear, and you end up doing... and it just becomes a mess. So, the mandate is important to be clear, and maybe it's not something that has been used so much generally in the places I have worked. So, throughout the process, I have highlighted many issues that I myself have not thought about, but which I see are extremely important, that should be included. (P1)

This aligns with findings from Jahren (2021) and Bauge (2023), which indicate that, before the Quality Control Project, peer review was primarily limited to grammar and spelling corrections. The interviews in this study reflect a similar trend, with a practitioner noting: "It's quite a standard read-through, with abbreviations, grammatical errors, and phrasing. So, I think it's very good. And it's something we already do" (P7).

The DFR Checklist's structured criteria enabled reviewers to evaluate essential aspects beyond language issues. Participants noted that this shift allowed them to assess more substantive elements, such as methodology, tools, and inferential validity. Yet, participants also noted that this expansion introduced social challenges, especially when critiquing colleagues' expertise or judgement, as illustrated by a practitioner:

> I think I would have had a knot in my stomach. Also, first of all, I would have thought, is it my technical competence that judges this as wrong or is it actually the other person. Because then it becomes, I don't know, it would have been a bit scary, I think. (P6)

The interviews showed that the DFR Checklist and Guideline provided explicit criteria that reviewers could use to justify their assessments, which alleviated the social challenge and discomfort of giving critical feedback. It also legitimised evaluations by prompting questions that might otherwise be avoided, enabling more robust feedback on substantive aspects of the report. The study suggests that checklists may help reviewers overcome social boundaries, legitimising the evaluation and feedback.

4.3.2 Classification of error

The study showed that the DFR Checklist played a crucial role in triggering the classification of deficiencies and flaws in reports. According to Bowker and Star's (1999) framework, classification systems like the DFR Checklist are designed to organise knowledge and influence how information is interpreted within specific domains, reflecting the power dynamics and cultural norms of the institutions that create them. During the trial phase, interviews revealed a pattern: while 'green' ratings were common, no reports avoided scoring in the 'red' or 'yellow' categories. Most issues fell within the 'yellow' category, highlighting areas for improvement, such as unclear distinctions between evidential findings and their interpretations or insufficient detail in mandate descriptions. A practitioner explained the interpretation of this grading distinction:

> Green means that no changes are needed, and it can be done the same way in future reports. Yellow, however, is somewhat in-between, it indicates something I would like to see changed or that isn't explained clearly enough. Ideally, I would want it improved in future reports, or, if this report isn't yet final, I would recommend changing that part by adding more information, removing something unnecessary, or clarifying points that aren't well explained. (P8)

In contrast, 'red' scores identified severe issues, including incorrect conclusions, missing information about the origin of findings within the dataset, and lack of verification of dataset authenticity. When critical errors like these were identified and annotated in the checklist, the reviewee was required to take corrective actions before finalising the report, as described by a practitioner:

> You can mark it in yellow and still let it pass. [...]. My impression was that if something is marked in yellow, you can, if you don't have the chance to improve it or can't investigate further, consider yellow as perhaps good enough, whereas anything marked in red needs to be addressed and changed to green regardless. (P4)

Both reviewers and reviewees emphasised that resolving critical errors is imperative, which underscores the value of a classification system aiding in identifying such errors. However, while most flaws were manageable on a case-by-case basis, systemic-level issues, such as methodological errors or software defects, required broader action. These issues extend beyond individual report corrections, necessitating systemic-level corrective actions to prevent further propagation. The interviews indicated that software errors were common, and a practitioner highlighted this challenge:

> Yes, the software can have errors. [Anonymised software], particularly in relation to phone locations, decodes and presents a lot of location data incorrectly because an iPhone retrieves location data from areas the phone hasn't actually been in. These locations show up in the software, and some investigators rely on this data, which leads to completely inaccurate results. (P1)

When such flaws were discovered, practitioners typically alerted all DFPs, as described by a practitioner: "We have channels on [Anonymised] and [Anonymised], which are direct and nationwide" (P5). This underscores how the DFR Checklist not only brings attention to individual report deficiencies but also highlights issues with implications for the whole digital forensic community in the Norwegian police.

In summary, the study shows how the DFR Checklist, when applied in digital forensics, raises key issues beyond procedural guidance, shaping evaluative practices by drawing attention to both available and missing information. By structuring the review process, the DFR Checklist helps identify and address significant methodological, legal, and ethical concerns, thereby ensuring higher standards in forensic reporting. It serves not only as a practical tool but also as a mechanism for enforcing professional and legal norms.

4.4 Identifying misalignments

Following Akrich's (1992:207) advice, the identification of disagreement, negotiation, and the potential for breakdown offered insights into the Checklist's performativity. The further analysis focuses on instances where checklist usage diverged from its intended purpose.

4.4.1 Mediator of transparency

The interviews reinforced findings from Jahren (2021) and Bauge (2023), indicating that digital forensic examinations are largely conducted by individual examiners without a standardised procedure guiding technical analysis or reporting. This autonomy results in reports that represent a curated version of events as perceived and mediated by the DFP, incorporating their specific terminology and preferred level of detail (N. Sunde, 2022). Although DFPs are expected, due to professional principles, to document their investigative practices transparently, research shows these descriptions are often inadequate (N. Sunde, 2021; Stoykova et al., 2022).

Without a standard, *transparency* in reporting becomes a matter of negotiation during peer review, and the interviews revealed divergent attitudes towards this matter. Some practitioners limited report detail, particularly regarding tools, methods, and qualifications, due to concerns about report length and the risk of creating opportunities for 'noise' by defence attorneys in court. Others valued thorough documentation, arguing that detailed descriptions are necessary for effective scrutiny and to demonstrate their expertise. The following account illustrates transparency practices in negotiation at one unit:

> What we found was that I was generally bad at documenting the tools I had used, how to document version numbers, and how I presented it. And it goes back to [...], you shouldn't just present tables and results. This was illuminated to us through the checklist, that there were insufficient descriptions that made it unclear what I had done. At level 4 item 3, are the procedures for tools and method usage described? I had described a little, but definitely not enough for it to be understandable or reproducible. So, we talked a bit about how we should present it, how much, so we start discussing - yes, is it necessary in this report, and then we naturally concluded that yes, it is necessary in any report because you never know when problems may arise later. If there's a tool that has an issue in a specific version, you need to know which one it is regardless of how big and heavy the report is or if it's a small and light one. (P4)

Through reaching a shared understanding, practices can align, and the DFR Checklist becomes what Akrich (1992:221) refers to as "instruments of knowledge" for the DFPs. Discussions among reviewers and reviewees are essential for stabilising the knowledge needed to classify deficiencies and errors in reports, and the DFR Checklist seems to help stabilise the transparency matter during the trial. However, as reporting standards and legal requirements evolve, transparency practices may require continual renegotiation.

4.4.2 Triggering development

The behavioural flexibility (see Section 4.1) allowed for an adaptive review order within the DFR Checklist levels, a critical affordance for reviewing non-standardised reports. However, the lack of a cohesive report template also hindered efficiency in the review process, as described by one participant:

> If we had had a template, it would have been easier and much quicker because then we could have gone directly to the item where something should have been placed. For example, the conclusion and how it's written. Instead of having to search for conclusion points throughout the entire report, we could have gone directly to that item. (P8)

This need for standardisation was noted in the checklists, with remarks like "no current template or report structure" highlighting areas for improvement. Consequently, the necessity for a standardised template became evident, leading some units to develop local template versions. As one practitioner explained: "But we're actually in the process of picking and gathering the best elements from several reports to create a template. That's what we're working on now" (P5).

Interviews showed that in one police district, the ability to uncover flaws through checklist-based review had led to a procedural change, systematically reminding report authors to request a review. This procedure had been integrated into the existing system for organising criminal investigations, with the aim of making peer review the norm rather than the exception.

The trial also revealed development needs for expertise. Conducting peer review requires expertise that extends beyond digital forensic skills. The feedback meeting emerged as a crucial social space for ensuring that the reviewee fully understood the issues and for discussing optimal solutions, and some interviewees expressed a desire to learn how to cultivate a strong feedback culture that promotes learning and continuous improvement. Several interviewees emphasised the

importance of training in delivering feedback, recognising that poor communication or inadequate responses could strain professional relationships. A practitioner explained:

> We don't receive adequate training in either giving or receiving feedback effectively. So, I mean, there was some training a while back, but I think it's something we could all benefit from refreshing and focusing on a bit more. (P9)

A scoping review by Dahl et al (2023) showed that peer feedback conducted in relation to workplace learning programs can be used to improve individual performance, motivation, and job satisfaction among police officers. Given that feedback skills typically fall outside the scope of standard digital forensic training, incorporating targeted training to develop these competencies would be a crucial step towards improving peer reviewers' ability to meet the objectives of the review process. These developments underscore the transformative capacity (Asdal, 2015) of the DFR Checklist if implemented in the peer review process, not only in improving digital forensic reports but also its potential in triggering and driving systemic change.

4.4.3 Systems integration

As previously noted, the checklist *representation* property offered users flexibility, allowing them to either print it for manual annotation or complete it digitally. However, interviews revealed concerns about its integration with existing systems. Poor integration with established workflows is a common issue with checklist representation and scope (Reijers et al., 2017:5779). In one unit, the DFR Checklists detachment from their standard peer review workflow led to a misalignment. Participants in this unit did not score or comment directly on the DFR Checklist; instead, they used it as a reference while relying on the 'track changes' feature in their word processor to suggest adjustments and place comments. Interviews revealed that in this context, the DFR Checklist was seen as a more tedious and less valuable add-on compared to units without an established peer review process prior to the trial. Their evaluation focus remained on the report itself, with the DFR Checklist only serving as a backup tool, as noted by one practitioner:

> I've basically just used it as a kind of cross-reference, something to check if there's anything I should look for when reviewing the report, or if there's something I might have missed that the checklist can remind me to consider (P2).

Consequently, the DFR Checklist lost its ability to categorise errors by severity. This demonstrates that established workflows become actants that shape user behaviour. Effective checklist integration would require a re-scription of the workflow, which interviews indicated was not fully achieved during the trial.

This example underscores the importance of recognising established workflows as integral organisational matters that must be carefully mapped and considered when introducing a new procedure. Integrating the DFR Checklist into existing document-handling systems could streamline the digital forensic process by eliminating the need to manage an additional standalone document, enhancing both efficiency and usability.

4.4.4 Positive outcomes of audience misalignment

Not all misalignments with intentions lead to negative outcomes. Regarding the *audience* property (Reijers et al., 2017), the peer review process was expected to uncover flaws in the reports and facilitate improvements. It was also anticipated that the review process would enhance individual reports and promote learning among the reviewees, improving future reports based on peer feedback. However, a notable discovery was the impact on the reviewers themselves. Several reviewers reported that using the DFR Checklist in the review process encouraged them to reflect on their own investigative and reporting practices, leading to adjustments in their approach for future work. Some even used the DFR Checklist while composing reports during the trial phase, ensuring compliance and pre-empting potential feedback. One practitioner explained: "This has in a way given me a bit more guidance for the reports I have written after I joined this project, where I have now incorporated it into my reports" (P1). Another stated:

> Yes, I've actually revised my own report template after reviewing this checklist. What I've done now is to divide the conclusion into two parts. The first part presents the objective findings, where I summarise the evidence found, and in the next part, I clarify that this is my interpretation based on the objective findings and what I believe they convey to us. (P8)

This illustrates that an unexpected use of the DFR Checklist led to positive change. The reviewers' use of the DFR Checklist as a reminder signifies their belief in it as a change agent.

In summary, the study reveals how checklists in digital forensics, while useful, can misalign with their intended purpose if not properly integrated into workflows. Staffing issues and a lack of peer reviews in some units underscore the challenges of adopting new procedures. The DFR Checklist, designed to ensure transparency and accuracy in reporting, also highlighted the need for additional competencies like feedback delivery. While the DFR Checklist aided in uncovering deficiencies and prompted systemic changes in some units, it was underutilised in others due to workflow misalignment, demonstrating the need for better integration and standardised templates.

4.5 Checklist's role in the justice system

The Quality Control Project focused on enhancing the internal mechanisms of the digital forensic discipline, aiming to elevate the quality of digital forensic analysis and reporting practices. In a broader context, digital forensics is one of several key entities within the criminal justice system that influence the outcomes of criminal investigations and protect the legal rights of parties involved. This

study demonstrates that implementing a checklist-based peer review process not only highlighted errors and miscommunications in real casework but also sparked important discussions on digital forensic investigation and reporting practices.

However, while the DFR Checklist has proven effective in many respects, it is not without limitations. As Bowker and Star (1999) argue, classification systems like checklists are inherently situated and shaped by the context of their creation. This means that they may inadvertently reflect and reinforce certain assumptions, values, or biases embedded in the discipline. For instance, while a checklist can standardise practices and foster accountability, it might also constrain flexibility, leading practitioners to prioritise compliance over critical thinking or innovation. Additionally, checklists risk being interpreted as comprehensive or authoritative, potentially masking areas of ambiguity or uncertainty in forensic science.

The DFR Checklist is publicly available in the project report (Sunde & Dahl, 2023), which invites broader scrutiny and input from both internal and external police stakeholders. This availability can contribute to mitigating these risks. Increased scrutiny was anticipated by practitioners, and one noted:

> And I think we'll encounter this more in the future, counter-experts in court, for sure. So having that support, knowing that the work has actually been reviewed by someone with equivalent or higher expertise, provides reassurance that it's solid. I believe that's important. (P9).

Also, leaders shared this view:

> I think the time is coming to an end when you can present a report and expect it to just go through. […]. But now, many defence lawyers or hired consultants are coming in to quality-assure the reports that are submitted. For any doubt is good doubt, and it should be eliminated. But it's not just that, it's also crucial that if work is conducted, it safeguards legal security, because the trust we have from the public relies on legal security and the fact that we're doing high-quality work. (L3)

However, this openness also necessitates ongoing evaluation and revision to ensure that the DFR Checklist remains relevant and reflective of evolving standards and expectations within both digital forensics and the wider criminal justice system. The DFR Checklist must navigate diverse stakeholder perspectives, which can lead to tensions between universality and adaptability. Acknowledging these challenges is essential to leveraging the checklist as a tool for both quality assurance and critical discourse.

Publicising the DFR Checklist and extending its availability beyond the digital forensic discipline could empower stakeholders to scrutinise and challenge digital forensic results that might otherwise remain opaque. This broader circulation enhances insight into what a digital forensic report should include and improves the capacity to critically evaluate practices and outcomes. The transition from blind trust in experts to trusting the scientific method (Kohler et al., 2023), necessitates societal understanding not only of the method itself but also of its practical application. By being publicly available, the DFR Checklist can act as a means for the co-production of legal security, fostering mutual engagement between stakeholders and the forensic community.

5. Conclusion

This study enhances the understanding of digital forensic practice by offering a nuanced case study of how the DFR Checklist shapes forensic practices within the justice system. Drawing on perspectives from STS and Actor-Network Theory, the research demonstrates how the DFR Checklist, as a sociomaterial device, functions not merely as a procedural tool but as an actant in the co-production of transformation and development. The findings highlight that checklists do more than guide actions; they performatively enact the standards, values, and norms inscribed within them, thereby exerting agency in the production and shaping of forensic knowledge.

The DFR Checklist materialises professional, ethical, and legal standards, embedding them into the daily practices of DFPs. This performative role demonstrates the capacity of checklists to bridge the gap between abstract principles of forensic science and the concrete realities of forensic report writing, aligning output with broader institutional and societal expectations. This framing challenges the view of checklists as static, neutral instruments, positioning them as dynamic agents serving an important role in co-producing forensic outcomes.

While the DFR Checklist effectively guided actions and directed the evaluation focus of reviewers, the study revealed that its utility was constrained by systemic factors, including the necessity for standardized templates, consistent procedures, and seamless integration into existing workflows. On the human side, the checklist depends on the expertise and professional judgement of reviewers. As a result, it cannot guarantee quality but serves as a valuable tool to foster a systematic and focused evaluation of critical aspects essential for achieving sufficient quality.

A notable limitation of this study is that it did not directly examine whether and to what extent the peer review led to improved quality of the reports. This limitation arises because the study relied on the accounts and perceptions of the interviewees rather than an independent evaluation of the reports themselves. As a result, while the findings provide valuable insights into how the peer review process was experienced and its perceived impact, they do not offer objective evidence of measurable improvements in report quality. Moreover, since the interviews were conducted shortly after the trial period, they do not confirm the checklist's continued use beyond the

trial. Future studies are needed to assess whether the implementation of the peer review process is sustained over time, and whether the checklist-based peer review led to improved reporting quality.

Limitations notwithstanding, this study contributes to the literature on performative texts and genres by showing how the DFR Checklist functions as a genre that shapes interactions, decisions, and the very production of forensic evidence. Its ability to raise matters - to make visible what might otherwise remain obscured - reinforces its critical role in the sociomaterial assemblage of digital forensic practices. Through this lens, checklists are not just tools but sites of negotiation where professional discretion, legal requirements, and organisational norms converge and are enacted.

In conclusion, examining the role of the DFR Checklist in digital forensic work has advanced the understanding of the performative nature of checklists and offers a nuanced perspective on their transformative capacity (Asdal, 2015) in forensic practices. The study invites further exploration through research into how other sociomaterial devices function within forensic and broader organisational contexts, opening new avenues for understanding the interplay between technology, materiality, and human agency in professional settings.

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References

Akrich, M. (1992). The de-scription of technical objects. In W. E. Bijker & J. Law (Eds.), *Shaping technology/building society: Studies in sociotechnical change* (pp. 205-224). MIT Press.

Asdal, K. (2015). What is the issue? The transformative capacity of documents. *Distinction: Journal of Social Theory, 16*(1), 74-90. https://doi.org/10.1080/1600910X.2015.1022194

Asdal, K. & H. Reinertsen (2022). *Doing document analysis. A practice-oriented method*. SAGE Publications.

Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.

Bazerman, C. (1997). Discursively structured activities. *Mind, Culture, and Activity, 4*(4), 296-308. https://doi.org/10.1207/s15327884mca0404_6

Bauge, R. K. (2023). *Risks and quality control in Norwegian Police's digital forensics process: The digital forensics examiner's tightrope walk* (Master's thesis, NTNU). https://hdl.handle.net/11250/3079082

Bowker, G. C. & Star, S. L. (1999). *Sorting things out. Classification and its consequences*. MIT Press.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Braun, V. & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative research in Sport, Exercise & Health, 11*(4), 589–597. https://doi.org/10.1080/2159676X.2019.1628806

Brubacher, S. P., Kirkland-Burke, M., Gates, V. & Powell, M. B. (2024). Investigating a train-the-trainer model of supervision and peer review for child interviewers in Canadian Police Services. *Journal of Police and Criminal Psychology*, 1-15. https://doi.org/10.1007/s11896-024-09696-5

Cervantes Mori, M. D., Kävrestad, J. & Nohlberg, M. (2021). Success factors and challenges in digital forensics for law enforcement in Sweden. Presented at *7th International Workshop on Socio-Technical Perspective in IS development*, Trento, Italy. https://www.diva-portal.org/smash/get/diva2:1622611/FULLTEXT01.pdf

Cohen, S. (2013). *Digital Forensic Evidence Examination. 5th edition*. Fred Cohen.

Cooren, F. (2004). Textual agency: how texts do things in organizational settings. *Organization, 11*(3), 373-393. https://doi.org/10.1177/1350508404041998

Cooren, F. (2020). Beyond entanglement: (Socio-) materiality and organization studies. *Organization Theory, 1*(3), 263178772095444. https://doi.org/10.1177/2631787720954444

Courtis, J. K. (2004). Colour as visual rhetoric in financial reporting. *Accounting Forum, 28*(3), 265-281.

https://doi.org/10.1016/j.accfor.2004.07.003

Dahl, O., Damen, M.-L., Bjørkelo, B., Meling, C. P. & Jensen, M. R. (2023). The role of verbal peer feedback in the police: a scoping review. *Vocations and Learning, 16*, 227-250. https://doi.org/10.1007/s12186-023-09316-z

Douglas-Jones, R. (2019) Getting inside ethical review: Anxious bureaucracies of revelation, anticipation and virtue. *Critical Public Health, 29*(4), 448–59. https://doi.org/10.1080/09581596.2019.1591615

Druglitrø, L. (2022). Procedural care: Licensing practices in animal research. *Science as Culture, 31*(2), 235–255. https://doi.org/10.1080/09505431.2021.2025215

Gibson, J. J. (1977). The theory of affordances. In R. E. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing: Toward an ecological psychology* (pp. 67–82). Lawrence Erlbaum.

Horsman, G. & Sunde, N. (2020). Part 1: The need for peer review in digital forensics. *Forensic Science International: Digital Investigation*, 35, 301062. https://doi.org/10.1016/j.fsidi.2020.301062

Innes, M., Brookman, F. & Jones, H. (2021). "Mosaicking": cross construction, sense-making and methods of police investigation. *Policing: An International Journal, 44*(4), 708-721. https://doi.org/10.1108/PIJPSM-02-2021-0028

International Organization for Standardization. (2015). ISO/IEC 27042: 2015 I*nformation technology - Security techniques - Guidelines for the analysis and interpretation of digital evidence*. Last reviewed and confirmed 2021.

Jahn, J. L. (2018). Genre as textual agency: Using communicative relationality to theorize the agential-performative relationship between human and generic text. *Communication Monographs, 85*(4), 515-538. https://doi.org/10.1080/03637751.2018.1481986

Jahren, J. H. (2020). *Is the quality assurance in digital forensic work in the Norwegian police adequate?* (Master's thesis, NTNU). https://hdl.handle.net/11250/2781174

Kaufmann, M. (2023). *Making information matter. Understanding surveillance and making a difference*. Bristol University Press.

Koehler, J. J., Mnookin, J. L. & Saks, M. J. (2023). The scientific reinvention of forensic science. *Proceedings of the National Academy of Sciences, 120*(41),1-10. https://doi.org/10.1073/pnas.2301840120

Knuuttila, T. (2005). Models, representation, and mediation. *Philosophy of science, 72*(5), 1260-1271. https://doi.org/10.1086/508124

Latour, B. & Woolgar, S. (1979/1986). *Laboratory life: The construction of scientific facts* (2. edition with a new subtitle). Princeton University Press.

McGuire, M. R. & Renaud, K. (2023). Harm, injustice & technology: Reflections on the UK's subpostmasters' case. *The Howard Journal of Crime and Justice, 62*(4), 441-461. https://doi.org/10.1111/hojo.12533

Miller, C. R. (1984). Genre as social action. *Quarterly journal of speech, 70*(2), 151-167. https://doi.org/10.1080/00335638409383686

Miller, C. R. (2015). Genre as social action (1984) revisited 30 years later (2014). *Letras & Letras, 31*(3), 56-72. https://doi.org/10.14393/LL63-v31n3a2015-5

National Police Chief's Council. (2020). *Digital forensics science strategy*. National Police Chief's Council (NPCC). https://www.npcc.police.uk/SysSiteAssets/media/downloads/publications/publicationslog/2020/national-digital-forensic-science-strategy.pdf

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization studies, 28*(9), 1435-1448. https://doi.org/10.1177/0170840607081138

Reedy, P. (2020). Interpol review of digital evidence 2016-2019. *Forensic Science International: Synergy, 2*, 489–520. https://doi.org/10.1016/j.fsisyn.2020.01.015

Reedy, P. (2023). Interpol review of digital evidence for 2019–2022. *Forensic Science International: Synergy, 6*, 100313. https://doi.org/10.1016/j.fsisyn.2022.100313

Reijers, H., Leopold, H. & Recker, J. (2017). Towards a science of checklists. In T. Bui & R. Sprague Jr (Eds.), *Proceedings of the 50th Hawaii International Conference on System Sciences*. University of Hawaii, United States of America, pp. 5773-5782. Downloaded from: https://eprints.qut.edu.au/102784/23/102784.pdf

Sainsbury, R. (1971). The "feature positive effect" and simultaneous discrimination learning. *Journal of Experimental Child Psychology, 11*(3), 347-356.

Searle, J. R. (1979). *Expression and meaning: Studies in the theory of speech acts*. Cambridge University Press.

Seberger, J. S. (2018). The affordances of inscribed mediations: Troubling the subject/object dichotomy in knowledge production. Proceedings of A Body of Knowledge – *Embodied Cognition and the Arts conference CTSA UCI*. 8.-10. December 2016. Downloaded from: https://escholarship.org/content/qt5pq1d76d/qt5pq1d76d.pdf

Stoykova, R., Andersen, S., Franke, K. & Axelsson, S. (2022). Reliability assessment of digital forensic investigations in the Norwegian Police. *Forensic Science International: Digital Investigation, 40*, 301351. https://doi.org/10.1016/j.fsidi.2022.301351

Sunde, I. M. (2021). «Effektiv, tillitvekkende og rettssikker behandling av databevis»: En straffeprosessuell utredning om ransaking, sikring og beslag i data. Submitted to the Ministry of Justice and Public Security 18 June 2021. PIA. https://hdl.handle.net/11250/2762721

Sunde, N. (2021). What does a digital forensics opinion look like? A comparative study of digital forensics and forensic science reporting practices. *Science & justice, 61*(5), 586-596. https://doi.org/10.1016/j.scijus.2021.06.010

Sunde, N. & Dahl, O. (2023). Erfaringer fra Kvalitetskontrollprosjektet: Kan sjekklistebasert fagfellevurdering bidra til læring og økt kvalitet på datatekniske rapporter? [Experiences from the Quality Control Project – Can checklists as tools for peer review and feedback contribute to learning and improved quality in digital forensic reports?]. PHS Forskning 2023: 7. https://hdl.handle.net/11250/3108116

Sunde, N., & Horsman, G. (2021). Part 2: The Phase-oriented Advice and

Review Structure (PARS) for digital forensic investigations. *Forensic Science International: Digital Investigation, 36*, 301074. https://doi.org/10.1016/j.fsidi.2020.301074

Sunde, N. (2022). Unpacking the evidence elasticity of digital traces. *Cogent Social Sciences, 8*(1), 2103946, https://doi.org/10.1080/23311886.2022.2103946

Tracy, S. J. (2010). Qualitative quality: Eight "big-tent" criteria for excellent qualitative research. *Qualitative Inquiry, 16*(10), 837–851. https://doi.org/10.1177/1077800410383121

Vincze, E. A. (2016). Challenges in digital forensics. *Police Practice and Research, 17*(2), 183–194. https://doi.org/10.1080/15614263.2015.1128163

Weber, R. (2022). Making infrastructure into nature: How documents embed themselves into the bodies of oysters. *Communication Design Quarterly Review, 10*(3), 33-45. https://doi.org/10.1145/3507870.3507875

Appendix

DFR Checklist items for Level 4, Conceptual review (author's translation, Sunde & Dahl, 2023).
1) If the analysis is hypothesis-driven, are the overarching (at the offence level) hypotheses forming the basis of the analysis described?
2) If the analysis is hypothesis-driven, have relevant sub-hypotheses (at the activity and source levels) been developed based on the overarching hypotheses or the mandate/assignment?
3) Is the procedure, tools, and method application described in sufficient detail to enable replication of the analysis by others?
4) Is the dataset adequate and complete to achieve the purpose of the analysis?
5) Does the analysis conducted (e.g., observations, testing, experimentation) provide a sufficient basis for the results presented and the conclusions drawn from them?
6) Are any reservations, uncertainties, or limitations related to the methods and/or tools described?
7) Is there a clear distinction between descriptions of findings and interpretation/evaluation of those findings?
8) Are the findings described accurately?
9) Is it clearly indicated: - which specific seizure the findings are associated with? - where within the dataset the findings logically point to, making it clear where in the dataset the findings are located?
10) Are the findings related to the substantive context in which they were discovered?
11) Are negative findings (i.e., what was searched for but not found) described?
12) Are visual aids, such as tables, figures, or other objects aligned with the purpose of the report?
13) If the analysis is hypothesis-driven, are the results described in light of at least two competing hypotheses, including one that supports innocence/non-criminal activity?
14) If the report contains a conclusion: - are the results, circumstances, and rationale behind the concusion described? - is there consistency between the conclusion's strenght and findings it is based upon? - if terms indicating evidential strenght are used, are these adequately explained, or is a recognised framework for such descriptors referenced?
15) If an assessment of the evidential strength of findings has been conducted, is it in accordance with an applicable standard/framework for evaluative opinions?
16) Has the investigation and report writing been conducted in line with relevant criminal procedural rules and ethical guidelines?
17) Does the report specify whether, or to what extent, the digital forensic investigator can be considered independent in conducting the analysis and reporting?
18) Has information potentially supporting innocence or mitigating circumstances for the suspect been actively sought, and is the result described in the report?

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FROM CRIME SCENES TO DIGITAL SPACES

A mundane object's journey through forensics

by Maja Vestad

Ordinary objects can assume exceptional significance when discovered at crime scenes, providing valuable information for investigations while also offering insights into the routines of daily life and human behaviour – aspects that may contrast with the extraordinary circumstance of the crime itself. In this article, I follow the forensic journey of one such mundane object – a sock – that does not fit the pattern of other evidence in an investigation. The article zooms in on the moments in which the sock transmutes from ordinary to forensically informative through technological interactions that capture, document, and encapsulate its meanings. I argue that in forensic contexts, meaningful information necessitates a transcendence from material to digital spaces, in which a singular object is represented as multiple entities. This shift presents a unique lens through which to observe and understand process of knowledge production in investigatory police work.

Keywords: Knowledge production, forensic evidence, crime scene investigation, materiality

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Introduction

"Inanimate objects, do you have a soul?" (*Objets inanimés, avez-vous donc une âme?*), asks Violette Morin (1969, p. 131, in Hoskins, 1998, p. 8). The question pertains to the nature of existence and consciousness of that which lacks biological life. What do we make of the items that surround us as temporal witnesses to our actions, and especially those items that relate to crime? In a similar vein, Chris Gosden (2005) asks, "What do objects want?". The question of *wanting* can be interpreted several ways; as what the object (as an actant) wants from "us" (and whether *we* do, or can, provide that). It is also a question of how objects influence the actions and beliefs of others; can objects have preferences about how others act towards it? If so, how is that expressed? Objects are social in that they influence, shape, connect, and integrate with practices (see Mol 2002; see also Lundgaard 2023; Vestad, 2024), and an object can be "socially *powerful* [when it] lays down certain rules of use which influence the sensory and emotional impacts of the object" (Gosden, 2005, p. 193, emphasis added). Thinking of objects as socially apt and powerful actors raises questions about the implications for our relationship with the inanimate world, and of how we perceive and interact with the objects that surround us. In this article, I address how the crime scene investigators understand objects' evidential values, and how they work to create investigative knowledge from crime objects.

To explore how knowledge about forensic evidence is produced in practice, this article takes as its point of departure an evidence examination in which an object (a sock) appears as different from other objects collected at a crime scene. It is the task of investigators to explain the significance of this sock, effectively bringing to light what it 'wants'. Indeed, investigatory policing and forensic science are concerned with material objects due to the information they potentially carry; DNA traces recovered on clothes, fingerprints left on door handles, footprints imprinted into floorboards, fibres and hairs collected from vehicles, and other physical traces that can inform and lead to actionable knowledge for the police. The objects on which forensic traces rest hold the potential to inform complex narratives about crime (see Kruse, 2016; Lynch et al., 2008). In the aforementioned examples, the clothes, door handles, floorboards, and vehicles become entangled with the forensic realm, too, and are collected, moved, documented, analysed and stored as trace-carriers and crime objects. While forensic traces originate from spaces investigated as potential crime scenes, the trace-carriers, i.e. crime objects, have pre-existing histories. Beyond serving as mere carriers of traces belonging to their respective owners, they embody their own distinct historical accounts and genealogy (see Daston, 2000; Hoskins, 1998).

Mundane objects are items that "are familiar to us and they are our familiars, in the sense of belonging to our households" (Clark, 2013, p. 155). Following Clark, "[e]ven when they are representatives of violence, we regard objects with presumption because they are lodged in the most ordinary nooks and crannies of our lives" (ibid.). In becoming part of a legal chain as potential evidence, mundane objects carry dual representation of violence and normalcy and become objects of forensic interest (Kruse, 2016), or *forensic objects*, as they are described in the following. The process by which objects *transition* from mundane, everyday items into potential forensic evidence with a function in investigatory knowledge production has received limited scholarly attention (Kruse, 2010; 2015; Sutton-Vane, 2020). The present study therefore explores the intersection of the mundane, everyday nature of objects and their sudden significance in the forensic context.

The article begins with an overview of the theme of object transmutation, and an introduction to the concept of absences and presences as discussed by Law and Singleton (2005). It then explores and unpacks how the presences and absences generated by (mundane) crime objects lead to investigatory knowledge. To do so, I draw on observation data that illustrates in detail the journey of a sock in a crime investigation. The sock is introduced into the investigation as mundane and of less relevance to the investigation than other objects. A discovery on the sock sparks its transition into the realm of meaning, which entails interaction with various investigatory techno-practices that seek to understand and capture it. The sock eventually transitions out of the realm of meaning when its digital counterparts replace it as active, living agents. In the final section, the making of meaningful mundane objects is discussed.

Object transmutation

In this section, I explore how mundane objects transmute into a forensic material culture, within which they inform about more than themselves. In forensics, items of evidence are *knowledge objects* (cf. Knorr Cetina, 2001). For objects to be informative, they must be interpreted through some form of lens, such as forensic expertise. Expertise, however, is in continued change given new scientific discoveries, technological developments, and changes to practice, which means that an object can signify different meanings across time. The recent development of highly sensitive and sophisticated forensic technologies, for instance, attests to the changing meanings and applicability of DNA evidence, which in turn contributes to new discoveries about objects in the forensic realm (Kaufmann and Vestad, 2023; RISEN Project, 2020; Toom, 2020; Wienroth and Granja, 2024). Due to such developments, the meaning of crime objects can continue to evolve also after a case has closed. A question emerging from this trend relates to

unlocking both the information that rests within crime objects, as well as the traces that the forensic process leaves upon objects in return.

In the museum of evidence from the case of Lindy Chamberlain, Biber (2018) notes how objects that were initially understood as "evidence of bad, sloppy science [later became] evidence of something else; the afterlife of the Chamberlain case, in which they prove that a miscarriage of justice rested upon these tiny contested fragments" (2018, p. 12).[1] Indeed, crime objects tend not to inform only about individual cases, but also about the cultures of knowledge that have defined them in the past. There are also objects that have been, if only briefly, knowledge objects in the realms of crime. Sutton-Vane (2020), for instance, posits that a trunk used for storing a body, which now sits at a criminal justice museum, wants "recognition that it was designed simply as a utilitarian object which had been misappropriated and redefined" (2020, p. 292). By suggesting that objects that have been part of criminal investigations want recognition, Sutton-Vane points to the significance of understanding the complex narratives and evolving meanings associated with these objects. Also perhaps more pressingly, that they are ordinary, innocent, and have been 'misappropriated' by becoming merged with the forensic process. The observation suggests too that there are clean and dirty states (see Douglas, 2002) – the utilitarian and the misappropriated – between which objects, like people, may move or be moved, and furthermore, that this process is made possible by forces external to the object, which convolute and change the meaning of it (see Alberti, 2011). Crime and the forensic process disrupts these objectual histories. By becoming associated with something unwanted, objects undergo a transformative process, transitioning from the realm of the ordinary into something much more speculative, possibly tainted by the circumstances of the crime (Biber, 2018; see also Black and Shera, 2017).

Numerous initiatives address the question of what to do with objects that are left behind after crimes, atrocities, natural disasters, and war. Many such objects become museum artifacts, made into visual displays for remembrance and educational purposes (see e.g., Biber, 2018; Fahre, 2023; Whitehead, 2015). Confiscated financial criminal assets can be redistributed back to local communities affected by organised crime (De Vita and Ragozino, 2015; Djordjevic, 2022). Similarly, there are debates about re-using confiscated properties and vehicles for specific local restoration projects in EU countries, with ideas such as "converting mafia-owned villas into socio-cultural arenas, holiday accommodation for disadvantaged people, rehabilitation centres for drug addicts and enabling law enforcement agencies to use confiscated luxury cars" (Vallini and Council of Europe, 2022, p. 2; see also Council of Europe, 2023). These objects are not only objects collected from crimes and crime scenes, but 'crime objects' in the sense that their misappropriation remains part of their social identity (Biber, 2018; Sutton-Vane, 2020; Vallini and Council of Europe, 2022; Whitehead, 2015). Here, the historical account and transmutation are key to the meaning and social power of these objects.

Not all objects related to crime are transmuted through restoration. Many crime objects are returned to their owners, destroyed, or retained by law enforcement. Some are stored by the police in case they need to be re-analysed and re-used in re-trials (McCartney and Shorter, 2019; Shorter and Madland, 2019). In being brought back to the forensic present, objects are re-identified – becoming evidence of something else than they initially were – and repurposed (see also Hoskins, 1989). Sutton-Vane's (2020) observation of the trunk "wanting recognition" further suggest to us that it is the human gaze that gives the object its identity, and that it is a necessary component to make the object social. As such, it is also the human gaze that re-identifies it. The gaze is, of course, "never innocent" (McCorristine, 2015) and crime objects "acquire new meanings as they pass through the hands of different practitioners, custodians, and collectors" (McCorristine, 2015, p. 2; see also Alberti, 2011a). It is through this exchange, the "post-mortem journey" (Alberti, 2011b, p. 4) that pieces of human biology can transmute into a forensic material culture. The confluence of both mundaneness and crime within these objects is what "makes them particularly difficult to interpret" (Sutton-Vane, 2020, p. 293).

In relation to crime, we tend to focus our attention on that which is remarkable because the mundane is not in itself captivating. However, there are "extended chains of causality … from the mundane to the dramatic" (Enloe, 2011, p. 448). It is common for ordinary objects become evidence of something else in the investigatory context (Clark, 2013). Mundane objects can be weaponised, politicised, and used to speculate about crime. As such, the mundane is not 'pre-political' but sites of power (Enloe, 2011). Studying the roles of mundane objects and phenomena in investigatory structures, systems, and dynamics, is such an entry point into understanding how they inform about more than themselves. The interpretations that mundane objects inspire when entering the forensic realm can be conceptualised as presences and absences, which is explored in more detail in the following section.

1 The Chamberlain case was a highly publicised 1980s Australian criminal investigation. Lindy Chamberlain was convicted in 1982 to life imprisonment for the murder of her newborn daughter, Azaria, whom she claimed was taken by a dingo, a wild dog, while they were camping. In 1986, Azaria's clothing was found near a dingo lair, leading to Lindy's 1988 exoneration. Biber (2018) examines the evolving interpretations of the forensic evidence from the case.

Presences and absences

This article sets out to explore how the concept of meaningful knowledge is constructed by key actors in the forensic realm. I approach this task by deploying the perspective of a singular entity (a mundane object) to describe a system (knowledge production in the crime sciences). This is also to say that the crime sciences pertain to parts – monads – that are networked to make up a whole. In order to comprehend a system or a whole, to whatever capacity, it can be useful to examine the part (see Latour et al., 2012) that for the purposes of this study is a mundane object in transmutation. Focusing on an individual object and describing gradually what it does to other actors and what it is subjected to, is useful to understand the systems and practices it is part of. Furthermore, by examining the interplay between the presences and absences that singular objects generate, we may gain better insights into meaningful knowledge production in the forensic realm. For example, the existence of a DNA trace without an established owner generates an absence of an identifiable person and face, giving rise to an unknown and imagined *other* (Jong and M'Charek, 2017). The absence of a known identity influences crime narratives and shapes practice: awareness that the unknown could be anyone, anywhere, and so on. Additional discoveries in turn generate new imaginaries and remove the possibility of others.

This perspective has a home in Law and Singleton's (2005) metaphor of presences and absences. They state, "to make things present is necessarily also, and at the same time, to make them absent" (Law and Singleton, 2005, p. 342). In other words, 'messy objects' appear like 'fires' (ibid.) that convolute the space they are in and that may signify different meanings depending on who interprets them, and how. Messy objects pollute ordered space (Douglas, 2002) and exploring the presences and absences they generate allow us to see clearer that they are indeed fire objects "that cannot be narrated smoothly from a single location" (Law and Singleton, 2005, p. 348). To exemplify, DNA on a door handle makes present the possibility of an interaction between the DNA owner and the door handle. A further possibility of the DNA owner opening and closing the door is also made present, and so forth. Although the action (opening or closing) is less material than the DNA trace, it is a possibility that has been made present, and remain as an 'absent present' that shapes how investigators work with: a) the object of a door handle, and b) the knowledge base that the investigation consists of. Further, Law and Singleton posit that "we cannot understand objects unless we also think of them as sets of present dynamics generated in, and generative of, realities that are necessarily absent" (2005, p. 343). Messy objects, about which various explanations and interpretations exist, are 'ontologically dirty knots' (Toom, 2020) that have transformative capabilities and are "never finished [but] constantly evolve through being associated with ever more objects and subjects" (Toom, 2020, p. 362; see also Holtrop, 2018).

The article examines how an object generates presences and absences that manifest into concrete practices. While the aim is to explore the construction of meaningful knowledge within an epistemic culture, it is not to ask '"who is *this* actor? Answer: *this* network"' (Latour et al., 2012, p. 593), but to explore how objects transmute throughout the forensic context. In other words, the focus is not on outlining a sequence of forensic processes, but to illustrate and discuss how mundane objects both influence and are influenced by the forensic process. Understanding the interconnectedness of present and absent realities underscores their transformative capabilities within forensic investigations. This theoretical perspective offers a framework to understand the dynamics of object transmutation in the production of meaningful forensic knowledge.

Methodology and access

The findings in this article draw on a fieldwork observation conducted at a Norwegian police station. The Norwegian Centre for Research Data (SIKT) approved of the data protection plan, while the police district approved the data collection plan and granted access to visiting, interviewing, and observing crime scene investigators at work. Access is key to conducting effective fieldwork and extends beyond bureaucratic processes, which I will discuss in the following.

Before I was allowed to observe, I was interviewed by the lead officer on the case about how the data would be used. They were careful to stress the importance of data protection because of case sensitivity. The aim of collecting observation data was not to discuss sensitive details of a case, such as parties involved, but to learn about the process of producing knowledge. The data that is presented in this article has therefore been thoroughly anonymised, and any potentially identifiable details about the case, the police district, and the investigators have been removed.

I spent several days at the police station, was present in the crime lab and was allowed to examine items up close. I wore the same protective gear as the investigating officers wore, was asked to assist in some procedures, and my name and title was entered into the lab report. Participatory observation data has offered a different impression of the work investigators do compared to interview data. Those impressions became relevant to my understanding of the various capacities of the investigating officers and the tools they use. Similarly, information about scents, sounds, textures, lights, and visuals, are factors that observation data offers to the overall impression of the procedure undertaken (Ingold, 2013;

Mason and Davies, 2009; Rhys-Taylor, 2013; Seremetakis, 1996). Consequently, incorporating observations of sensory details into the assessment was useful to understand the profession being studied and their navigation of objects and technologies in the forensic realm.

It is worth considering for a moment, however, the different ways in which officers understand their role as participants in scientific studies and what that entails (see Cram, 2018). The presence of observers, especially in places, institutions, or situations that are excluded from the public, is a peculiar situation, and can impact the behaviour and interactions of those present (ibid.). Fieldwork in the sphere of policing tends to reflect "what professionals [the police] consider important and thus what they do" (Souhami, 2018, p. 206). Uncovering the dynamics of how those factors influence the outcome requires mindful and careful critique. Consequently, access to the field also entails a continued critical engagement with the site under study as well as to the collected data afterwards, and a particular reflexivity by the observer. Epistemic boundaries (Gieryn, 1983) and the challenges of translating knowledge across and between epistemic cultures (*translation work*) need to be continually addressed by researchers entering epistemic cultures characterised by expertise (Knorr Cetina, 1999). Forensic expert Niamh Nic Daeid stresses the power of communication in addressing the problem of knowledge transfer between scientists of different fields, exemplified as "I'm not sure that you understood what I think it was that I just said" (EAFS, 2022). I approached this potential translation gap by relaying answers back to the participants in my wording and by persistently requesting elaborations.

Observation notes were taken by hand on a notebook during the examination. The observation notes captured descriptions of the processes conducted by the investigators, the tools utilised (descriptions of tools and technologies), visual and contextual aspects (descriptions of scents, sounds, textures, and lights), quotes and conversation topics (what they said and communicated to each other, and how they described the process to me), as well as analytical keywords (which I wrote down as preliminary analytical interpretations). The handwritten notes were extensively written out after the observation, adding to the notes that were written during the observation. Sensitive information regarding the case and the participants studied, such as their identities, were never registered in the notes. While the findings in this study are based on one examination, it illustrates aspects to be considered when exploring how knowledge is constructed for the police through forensic processes. The next section analyses how meaning is created through forensics, drawing on the written empirical material.

A journey through forensics

In the following, ethnographic vignettes are used to illustrate how forensic examination, interpretation, and communication about a sock leads to knowledge about both crime and everyday behaviour. The analysis is divided into the subsections "becoming", "being" and "after" forensics. When the object becomes forensic, it becomes a node through which to identify investigatory possibilities and problems. It prompts technological interaction that further establishes the object as forensically meaningful. Towards the end of the project, however, after documentation, the object itself is no longer meaningful, but is made redundant: lesser to its digital counterpart. The section shows how the physical entity of the object enters and leaves the realm of knowledge production, and how the digitally contingent meaningful transition influences that which becomes knowledge for the police.

Becoming forensic

> During an early morning laboratory session, I observe a team of crime scene investigators as they document forensic evidence collected from the scene of a violent crime. Their objective, as one investigator says, is to thoroughly examine and verify each minute detail on the items of clothing collected from the scene. The clothes from the upper body are the most crucial because they can relate the most information about the event. Their work for the day is described as a routine procedure, and they expect to be done in half a day. (Observation notes)

Routine procedures that are frequently undertaken may be experienced as mundane to the actors involved. It is described as a standard routine procedure. The officers appear relaxed, and they have an idea of the time it will take to conduct the examination. While appearing to be routine, relaxed, and mundane, these movement are in fact careful choices of materials, objects, movements, and tools that are entirely crucial to the procedure;

> A cardboard box of items is brought out from a storage room. One investigator notices that this box is marked with a reference number, [type of crime], and "crime scene". They carry the box back into the storage room, and enter again with a new box, marked with the same reference number, [type of crime], and "deceased". The box contains paper bags and smaller cardboard boxes. Printed photographs that physically contextualise each item are laid out on a table. The images reveal a square room and a person, both saturated with blood. There are footsteps in the blood surrounding the person. (Observation notes)

While the investigating officers make each of these practices appear regular, they are expressions of ideal practice in this age of forensics. An age in which both attention to contamination risks and which other items (tools, technologies, persons) are present and which are not, are crucial and embedded into the practices of an expert culture. Cardboard, for instance, may be kinder to

DNA than plastic is for long term storage (Waite, 2014), keeping it from moving around too much. If DNA moves (e.g., "slides" off an item), the cardboard collects it and is more likely to keep it in a non-destructed state that allows it to be examined later. These materials, and the practices of moving them, may appear unimportant outside of this context, but at the crime scene they are carefully considered decisions resting on bodies of epistemic experience, knowledge, and cultures that have found it critical to the performance of forensics. The investigators are taking the necessary precautions for all the steps to follow:

> In turn, the investigators lay items upon the table to measure and photograph them. These items have been hung to dry, are stiff, and partially torn. A bloody sweater, a pair of bloody pants. The lead investigator stops at a sock, puzzled, and says, *"there's very little blood on this sock"*. The team gather around for a closer look and indeed the sock is remarkably clean. They photograph both socks next to each other visualise their differences. One sock appears in its original grey colour while the other is of a darker brown shade. New questions seem to emerge, prompting discussions surrounding possibilities such as whether the deceased had one foot elevated while bleeding (*"would that be possible?"*) or whether the sock was put on them at a later stage (*"what could be the purpose?"*). (Observation notes)

The discovery of an item that does not match their expectations represents a key element in the construction of meaning – not only about the individual item, but about all of the objects that have been collected from the scene. When items appear decontextualised, they disrupt (Douglas, 2002). The physical appearance of the sock cannot be explained through the evidence it was collected alongside. It lacks correlation because the rest of the items are so distinctly recognisable as crime objects. One sock, however, has none of those traits. It is clean, dry, whole; ordinary. What is more: it contradicts with the perception of the extraordinary. It is precisely its cleanliness – lack of expected dirt – that makes it stand out in this context as 'matter out of place' (Douglas, 2002). From the data the investigators had prior to this examination, the sock was not of major relevance to the event. The discovery, however, lead to direction because it made present new possibilities.

This part of the forensic examination exemplifies how something gains interest and *becomes* forensic because of how the question of what "becomes present in its absence" (Law and Singleton, 2005, p. 346) unfolds into concrete practices. The absence of correlation through the appearance of the sock gives the investigation pause, and new questions emerge that need further forensic examination. I argue that this is how the mundane, ordinary object becomes meaningful. The methods, tools, and interactions that make up the forensic experience are discussed in the next section.

Being forensic

The core aim of the investigators is to explain the traces that emerge from crime objects. When something stands out from a collective group of objects that seemingly belong together, each such object prompts or generates absences and presences in the form of alternative pasts and futures. Alternative pasts appear as suggestions for explanations (a foot is elevated), each of which are discussed ("would that be possible?"). Alternative futures appear in the investigators' practical relationship to the crime objects present in the room. These discussions both direct and lead to decisions about resource utilisation and management. The mundane object is at this point a forensic object with a distinct history that has to be accounted for. A broad range of tools are available for those practices:

> First, a mannequin is brought out from the corner of the room. The investigators dress the mannequin in a white forensic cover-all suit of the same type as they are wearing. Loose paper is tucked into the suit to replicate the body type of the deceased. The clothes from the crime scene are then put carefully onto the mannequin. White paper sheets are tucked underneath the dark jacket so that the holes in it appear more visible to the camera. An investigator explains that they will upload the photos to their shared computer folders. (Observation notes)

Items in a cardboard box, a paper bag, or on a table are de-contextualised and examined individually to bring to light information about the events, persons, bodies, and subjectivities it represents. Items have been removed from their original context (a person, a place, a time), and are used for other purposes than they were initially intended to. Dressing a mannequin in the clothes of the deceased is a way to bring their original function to light. Moreover, the above exemplifies a forensically material culture in which "very personal things [are] frozen very publicly in time" (Sutton-Vane, 2020, p. 283), namely for the purposes of digital documentation and archiving:

> The investigators decide to re-examine some of the other pieces of clothing with additional tools. A tablet is gathered from the cupboards. It is wired and connected to camera lenses. Its screen indicates through black and white tones if the camera captures the presence of blood. A scan of the pair of pants brightens up the screen and there is no doubt that what looks like blood is indeed blood; it has been confirmed by the device. When pointed to the dark brown sock, the screen is bright. When pointed to the grey sock, the screen is *less* bright. The scanner captures photographs that are added to a digital folder. Thumbnails are visible at the bottom of the screen. (…)
>
> A human blood rapid detection test kit is then used to liquify and test some fibres from the sock. Liquid is dropped onto a yellow square on a thin piece of cardboard paper. The colour blue confirms the result, which the investigators make note of on a notepad. (Observation notes)

These additional tools make information available about crime objects in various formats. For example, the singular node of *blood*

comes to to be represented in multiple forms. Narratives about the blood present as dry flakes on the tabletop that can be collected with tweezers; a blue spot on a small piece of cardboard; as the visual separation of socks documented by multiple cameras; and as bright light on a tablet screen. These information formats each become proof of the presence of blood, which is no longer a singular, binary possibility, but knowledge that is amassed and reconfirmed. At the same time, the presence of blood is interconnected with and dependent on the capacities of tools. Investigators may therefore use various tools to reconfirm results as a way to check the accuracies of the technologies they have chosen to use (see Vestad, 2024). Forensic investigatory technologies also work to make absences, for instance the imaginaries of an elevated foot or the narrative of putting the sock on the foot after the event, which was later ruled out via validating technologies. Through technologically mediated interaction, knowledge about the object is captured and made explainable. It fits with the other objects and is made meaningful.

After forensics

An examination is an attempt to make an object function alongside other evidence. In that space, the object is also a nexus for various resources such as technologies, time, staff, expertise, and digital platforms (Kruse, 2016). The object is meaningful because it provides knowledge when mediated through technologies, human interaction, and communication. While this occurs, duplicates of the information are created that in turn are digitised either manually by the investigators, for instance as words written into a report, or directly through the capacities of the technology, such as a camera. When traces are collected from the object, the digital information becomes the active agent, and the material object itself recedes to the background:

> The objects are packed carefully back into cardboard boxes when the investigators are satisfied with their examination and documentation. The paper covering the laboratory table is crumpled and thrown in a bin bag. Many pairs of plastic gloves are disposed of, as are the white suits. The cardboard boxes are carried into a storage room a few doors down and the door is locked. (Observation notes)

Once a material object has been secured, examined, documented, and preserved as evidence in a crime scene investigation, it is carefully placed in a sealed or closed room to protect its integrity and prevent potential future contamination. As material objects are put away, they have transitioned from active players in the investigation to becoming witnesses of past practices. They join a collection of similar items, where their significance and potential future usage within the realm of forensic archives and potential re-evaluation in the face of new information or advancements in forensic techniques, is uncertain.

We see here "the problem of when an object ceases being human" (Fonseca and Garrido, 2019, p. 5), that is: the blurred "distinction between human remains and trash" (ibid., p. 3). There is a social type of contrast between clothes on a mannequin and clothes in shelved cardboard boxes. The former brings to light the functions these clothes have had, along with imaginaries of their role in and witnessing of the event under examination. The latter treats the clothes as residue. This blurred distinction is particularly visible when human biological material is no longer treated solely as so, but is discarded, becoming irrelevant, no longer handled, treated, or seen. I suggest here that this constitutes a reductionist turn in the transmutation of the object in two ways. First, the object no longer carries the everyday, familiar nature of mundaneness. As a forensic object, it was touched by various liquids, photographed by special cameras, and in other ways subjected to the tools and practices that constitute investigatory forensics. The characteristics that identified it as mundane are no longer dominant to its identity.

Secondly, the object is no longer itself meaningful because digital doubles (Haggerty and Ericson, 2000) exist. The object later takes space in a shadow-world of the forensic where it awaits other, unspecified usage, redistribution, final disposal, or archive. While the physical object remains confined within a restricted environment, the information extracted from it takes on a new trajectory and continues to evolve. The documents (e.g., photographs, reports, notes, recordings) replace the object, which has been made absent. These actual objects "were simply, briefly, drawn into a parallel narrative" (Sutton-Vane, 2020, p. 285) that is later told through documents that are categorizable, searchable, amendable, and can be duplicated and shared. The digitised information diverges from the material object itself and is integrated into the broader body of investigation materials. The course of the investigation then continues by referring to this digital documentation, which is added to digital folders, appears in court, and is described in the verdict for the public and in the media. The digital documents are processed further and shared with others who establish meaning and narratives for it to be a part of, which entails a contingency on relations to the digital and to other digitised objects for meaning to exist, that in turn are equally as contingent on it.

Concluding discussion: from mundane to meaningful

In its everyday context, the mundane is background, blurry, unremarkable, something "(more or less) taken-for-granted" (Olsen, 2010, p. 8). It does not stand out as noticeable. Instead, other objects and phenomena stand out from that which is mundane. The mundane easily goes unnoticed when it sits next to something flashier – such as the torn, bloody objects that at first appeared more valuable in the investigation discussed above. That does not, however, mean that the mundane is less influential in this context – nor that 'flashier'

objects are more relevant to explain the case, although that may be an assumption, as was the case in the investigation described here. Nevertheless, the observations above challenge the perception of the mundane as unremarkable and demonstrates its influential role in providing insights about crime, events, and behaviour. Mundane objects are often overlooked in their everyday context because they appear 'pre-political' and unimportant, but that is a simplification of their transformative power (Enloe, 2011). In a forensic context, mundane objects are 'memorial devices' (Clark, 2013) that carry dual representations of violence and normalcy, providing insight into broader social conditions and human behaviour as well as highly temporal complexities of crime. As these objects enter the forensic realm, I suggest, their mundaneness becomes meaningful because they bring complexities to light, which is discussed in the following.

In any forensic setting, ordinary becomes extraordinary, precisely because of the forensic setting. When mundane, material objects are entered into the forensic realm, they do so as potential bearers of information. This information takes the form of hypothetical presences and absences (Law and Singleton, 2005) that, when discovered, shape the course of the investigation. This only occurs, however, when objects *break* from what is expected, either "by disturbance or interruption, causing them to 'light up' and become noticeable in ways that they were not before" (Lowe, 2018, p. 7; see also Olsen, 2010, p. 23). Objects that appear as 'matter out of place' (Douglas, 2002) demand attention given the logics of the forensic context, which requires that the presence of traces on objects are explained. In the analysis above, the break occurred when investigators placed a pair of socks on a table, under bright lights, and saw differences between them. Their subsequent examinations of the out-of-place sock were attempts to make it matter-in-place.

What is particular about mundane objects, as opposed to dramatic objects, is that they bring along contextual information related to their mundaneness. Objects entering the forensic realm not only re-present through their presence forensic facts, evidence, and knowledge for the police, but also fragments of daily life not directly related to the crime (Farrell, 2022). This duality of representation introduces an inherent complexity to the analysis of such objects (Sutton-Vane, 2020). They generate both presences of violence and of normalcy. Moreover, they signify an interference with the domestic space (Farrell, 2022). In the example above, a sock is both a signifier of violence that occurred in its presence, and of everyday life: socks were worn and used to walk on a floor that existed in a home in which someone lived. Forensic examination of mundane objects thus not only reveals information about the crime but provide insight into the broader social conditions in which it occurred. Indeed, crime objects make present information beyond the crime itself.

Absent, in the case studied here, are events, persons, bodies, and subjectivities of crime. At the police lab, only singular objects removed from the crime context are studied (at first). Present are rulers, cameras, bright lights, forensic procedures, and expert knowledge. Nevertheless, the event, the person, their body, and their rationales are what the analysis of the object is intended to inform about. The discovery of a seemingly bloodless sock transformed the case, albeit momentarily. Amongst items that fit one another due to their visible appearance, the sock did not fit, and had to be made to fit before the investigation could continue. The way that traces are interpreted generates other absences (e.g., narratives that are excluded) and other presences (e.g., leads to new discoveries). These possibilities, in following Law and Singleton, "appear from the point of view of the [trace], as othered realities that both do and do not belong" (2005, p. 345).

Crime scene materials gain scientific status and value once they enter the context of an investigation. As scientific objects, they are briefly ontological entities (see Daston, 2000). By conducting various tests, such as DNA analysis, fibre testing, scanning, and photography, these objects become intertwined with the production of forensic facts and knowledge. They are entangled in practices that can appear as mundane routines to outside observers but are rooted in expert knowledges. What is more: following the view of Knorr Cetina (2001), when crime objects are the focus of the investigators, their use and utilisation of tools merges with the experts to make a practice. The performance of forensics makes obsolete the otherwise clear separation between the individuals performing the practice, their technologies, and the crime object. What is particular about contemporary forensic investigations is the role of digital technologies as part of practice, not only in the moment of examination, but as a means to archive knowledge and turn that knowledge actionable. As illustrated above, material objects recede into the background after they have been digitally documented. The digital counterparts enter into other complex networks, systems, and processes, and come to represent the meaning of the object in relation to those other entities. The transformation from a material object to a digital representation allows for a different form of integrated interaction with other crime objects. Digital forensic technologies therefore encompass a key role in the making and maintenance of meaningful forensic knowledge. The object – having transmuted into an evolving digital entity that can later be revisited, reanalysed, and inform – is an object that "appear[s] to have the capacity to unfold indefinitely" (Knorr Cetina, 2001, p. 190).

Mundane objects link the unknown to the well-known, the incident to everyday existence, and highlight through their presences the complexities of scientific knowledge, crime, human behaviour, and epistemic practices. Mundane objects transmute under the forensic lens, after which they are objects with scientific biographies (Daston, 2000). Transmutation occurs when removed from their normal, everyday context and entered into a sterile, bright, clean forensic environment, in which they become highly visible. Their significance and meaning begins to transform due to the capacities

of forensic technologies and practices and within the narratives and interpretations generated by investigatory expertise. By making other entities present or absent, they become meaningful. A transcendence into digital realms, where systematisation, maintenance, archive, analysis, and relations to other entities is possible, is necessary for meaning to become actionable knowledge.

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References

Alberti, S.J.M.M. (2011). *Morbid Curiosities: Medical Museums in Nineteenth-Century Britain*. Oxford: Oxford Academic. https://doi.org/10.1093/acprof:oso/9780199584581.001.0001

Alberti, S.J.M.M. (2011). Introduction: A Parliament of Monsters. In *Morbid Curiosities: Medical Museums in Nineteenth-Century Britain* (pp. 1-24). Oxford: Oxford Academic. https://doi.org/10.1093/acprof:oso/9780199584581.003.0001

Biber, K. (2018). Evidence in the museum: Curating a miscarriage of justice. *Theoretical Criminology*, *22*(4), 505-522. https://doi.org/10.1177/1362480617707950

Black, P., & Shera, P. A. (2018). Stained evidence: blood, semen and matter on the clothes of Kennedy, Lewinsky, and Margiela. *The Australian Feminist Law Journal*, *40*(1), 135–146. https://doi.org/10.1080/13200968.2014.931906

Clark, L.B. (2013). Mnemonic Objects: Forensic and Rhetorical Practices in Memorial Culture. In Silberman, M., Vatan, F. (eds) *Memory and Postwar Memorials. Studies in European Culture and History* (pp. 155-173). Palgrave Macmillan. https://doi.org/10.1057/9781137343529_9

Council of Europe (2023). Reply to Recommendation 2229. https://pace.coe.int/en/files/30019

Cram, F. (2018). Perceptions of me, conceptions of you: Refining ideas of access to, and 'acceptance' within, the police organisational field. *Policing and Society*, *28*(3), 360-374. https://doi.org/10.1080/10439463.2016.1183001

Daston, L. (Ed.). (2000). *Biographies of scientific objects*. University of Chicago Press

De Vita, G.E. & Ragozino, S. (2015). Social reuse of confiscated goods to Camorra: civic activation and collective goods. Conference paper. *Citta 8th annual conference on planning research and Aesop public spaces & urban cultures annual meeting*. FEUP OPORTO

Djordjevic, S. (2022). Resilient Balkans: Social reuse of confiscated assets. Global Initiative. https://globalinitiative.net/wp-content/uploads/2022/02/GMFA-Social-Reuse-of-Confiscated-Assets-Eng.pdf

Douglas, M. (2002). Purity and danger: An analysis of concepts of pollution and taboo (1st ed.). Routledge. (Original work published 1966)

EAFS. (2022). Get a sneak peak of the plenary speeches (part 2). LinkedIn. https://www.linkedin.com/posts/eafs-2022_eafs2022-activity-6906525166944546816-47dN?trk=public_profile_like_view

Enloe, C. (2011). The mundane matters. *International Political Sociology*, *5*(4), 447–450. https://doi.org/10.1111/j.1749-5687.2011.00145_2.x

Fahre, L. (2023). The Oslo July 22 Center's new site and exhibit: A place for remembrance and education. *South Central Review*, *40*(2), 119-132. https://doi.org/10.1353/scr.2023.a915861

Farrell, E. (2023). Crime in the nineteenth-century Irish home. *Women's History Review*, *32*(4), 455-473. https://doi.org/10.1080/09612025.2022.2126623

Gieryn, T. F. (1983). Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists. *American Sociological Review*, *48*(6), 781–795. https://doi.org/10.2307/2095325

Gosden, C. (2005). What do objects want? *Journal of archaeological method and theory*, *12*(3), 193-211

Haggerty, K.D., & Ericson, R.V. (2000). The surveillant assemblage. *The British Journal of Sociology*, *51*(4), 605-622. https://doi.org/10.1080/00071310020015280

Holmes, H. (2023). *The Materiality of Nothing: Exploring Our Everyday Relationships with Objects Absent and Present* (1st ed.). Routledge. https://doi.org/10.4324/9781003130093

Holtrop, T. (2018). 6.15%: Taking Numbers at Interface Value. *Science &*

Technology Studies, 31(4), 75–88.
https://doi.org/10.23987/sts.56743

Hoskins, J. (1989). On losing and getting a head: warfare, exchange, and alliance in a changing Sumba, 1888–1988. *American ethnologist, 16*(3), 419-440

Hoskins, J. (1998). *Biographical Objects: How Things Tell the Stories of People's Lives*. Routledge

Ingold, T. (2013). *Making: Anthropology, archaeology, art and architecture*. Routledge

Jong, L., & M'charek, A. (2018). The high-profile case as 'fire object': Following the Marianne Vaatstra murder case through the media. *Crime, Media, Culture, 14*(3), 347-363.
https://doi.org/10.1177/1741659017718036

Kaufmann, M., & Vestad, M. (2023). Biology and Criminology: Data Practices and the Creation of Anatomic and Genomic Body 'Types.' *Critical Criminology, 31*(4), 1217–1232.
https://doi.org/10.1007/s10612-023-09732-6

Knorr Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Harvard University Press

Knorr Cetina, K. (2001). Objectual practice. In T. R. Schatzki, E. Von Savigny, & K. Knorr Cetina (Eds.), *The practice turn in contemporary theory* (pp. 184–197). Routledge.

Kruse, C. (2010). Forensic evidence: Materializing bodies, materializing crimes. *European Journal of Women's Studies, 17*(4), 363–377.
https://doi.org/10.1177/1350506810377699

Kruse, C. (2015). *The social life of forensic evidence*. University of California Press

Latour, B., Jensen, P., Venturini, T., Grauwin, S., & Boullier, D. (2012). 'The whole is always smaller than its parts'–a digital test of Gabriel Tardes' monads. *The British journal of sociology, 63*(4), 590-615

Law, J., & Singleton, V. (2005). Object Lessons. *Organization, 12*(3), 331-355.
https://doi.org/10.1177/1350508405051270

Lowe, P. (2018). Traces of Traces: Time, Space, Objects, and the Forensic Turn in Photography. *Humanities, 7*(3):76, 1-18.
https://doi.org/10.3390/h7030076

Lundgaard, J. M. (2023). Reassembling operative policing: The introduction of drones in the Norwegian police. *International Journal of Police Science & Management, 25*(3), 313-323.
https://doi.org/10.1177/14613557231184693

Lynch, M., Cole, S. A., McNally, R., & Jordan, K. (2008). *Truth machine: The contentious history of DNA fingerprinting*. University of Chicago Press

Mason, J., & Davies, K. (2009). Coming to our senses? A critical approach to sensory methodology. *Qualitative Research, 9*(5), 587-603.
https://doi.org/10.1177/1468794109343628

McCartney, C., & Shorter, L. (2020). Police retention and storage of evidence in England and Wales. *International Journal of Police Science & Management, 22*(2), 123-136.
https://doi.org/10.1177/1461355719891741

McCorristine, S. (2015). The Dark Value of Criminal Bodies: Context, Consent, and the Disturbing Sale of John Parker's Skull. *Journal of Conservation and Museum Studies, 13*(1).
https://doi.org/10.5334/jcms.1021220

Mol, A. (2002). *The body multiple: Ontology in medical practice*. Duke University Press.

Morin, V. (1969). L'objet biographique. *Communications, 13*(1), 131-139.

Neale, A. (2020). *Photographing crime scenes in twentieth-century London: microhistories of domestic murder*. Bloomsbury Publishing.

Olsen, B. (2010). *In defense of things : archaeology and the ontology of objects*. AltaMira Press.

Overholtzer, L. and Robin, C. (2015). 1 The Materiality of Everyday Life: An Introduction. *Archeological Papers of the American Anthropological Association, 26*, 1-9.
https://doi.org/10.1111/apaa.12057

Rhys-Taylor, A. (2013). The essences of multiculture: A sensory exploration of an inner-city street market. *Identities, 20*(4), 393-406.
https://doi.org/10.1080/1070289X.2013.822380

RISEN Project (2020.) *The Risen Project*.
https://www.risen-h2020.eu/

Seremetakis, C. N. (Ed.). (1996). *The senses still*. University of Chicago Press

Shorter, L., & Madland, G. (2019). 'Let them have it!' A review of the retention and storage of, and access to, material post conviction in England and Wales. *Medicine, Science and the Law, 59*(4), 223-231.
https://doi.org/10.1177/0025802419857850

Souhami, A. (2020). Constructing tales of the field: Uncovering the culture of fieldwork in police ethnography. *Policing and Society, 30*(2), 206-223.
https://doi.org/10.1080/10439463.2019.1628230

Sutton-Vane, A. (2020). Murder cases, trunks, and the entanglement of ethics: The preservation and display of scenes of crime material. In A. Adam (Ed.), *Crime and the construction of forensic objectivity from 1850* (pp. 279-301). Palgrave Histories of Policing, Punishment and Justice.

Toom, V. (2020). Ontologically dirty knots: The production of numbers after the Srebrenica genocide. *Security Dialogue, 51*(4), 358-376.
https://doi.org/10.1177/0967010620902008

Vallini, A., & Council of Europe. (2022). How to put confiscated criminal assets to good use? Committee on Legal Affairs and Human Rights, draft resolution.
https://assembly.coe.int/LifeRay/JUR/Pdf/TextesProvisoires/2022/20220405-ConfiscatedAssets-EN.pdf

Vestad, M. (2024). The persistent attractions of low-tech: Challenging the efficiency paradigm of forensic technology. *International Journal of Police Science & Management, 26*(2), 292-301.
https://doi.org/10.1177/14613557241231164

Waite, C. (2014). Forensic exhibit packaging: Paper or plastic, the potential for DNA degradation. [Master's thesis, University of Huddersfield]. University of Huddersfield Repository.
http://eprints.hud.ac.uk/id/eprint/23526/

Whitehead, C. (2015). Time and place, truth and proof: The 22 July Information Centre. *Nordisk Museologi, 2*, 162-177.
https://doi.org/10.5617/nm.3057

Wienroth, M., & Granja, R. (2024). Dissolving Boundaries, Fostering Dependencies. the new Forensic Genetics Assemblage. *Science, Technology, & Human Values, 0*(0).
https://doi.org/10.1177/01622439241266055

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LONGING AND LACKING

Pasts, presents, and futures in municipal crime prevention technology

by Katarina Winter

This article examines the intersection of three key developments in global north societies: the growing emphasis on (in)security and fear of crime, the expansion and pluralization of policing, and the increasing digitalization of crime policy arenas. Focusing on the implementation of "System X", a leading Swedish crime prevention technology, this study explores how these trends manifest in daily municipal work. Employing the concepts of articulation work and sociotechnical imaginaries, the analysis reveals how expectations of System X are socialized and materialized in practice.

Findings demonstrate that public officials legitimize System X by contrasting its promise of future evidence-based crime prevention with a rejected "unsystematic past". Their daily often extremely time-consuming work, navigating both practical challenges and expectations of new technological solutions, reinforces their commitment through discursive and material vouching for System X. This implementation process involves a dialectic of anticipation and everyday challenges, with broader securitization discourses driving fear of crime, simultaneously capitalizing on techno-optimism. Challenges in this way constitute a presupposition for the work in that they legitimize the relevance of imagining the systematic future.

As a sociotechnical imaginary, security technologies like System X intersects with larger worldmaking and wider trends in plural policing and security markets. The implementation requires the public officials to exist in the past, present and future simultaneously, transforming imagined goals into meaningful present-day practices. This dynamic underscores the need for critical analyses of how optimism-driven technology co-exist with, and potentially obscures the complex realities it aims to address.

Keywords: Plural policing, Digitalization of crime policy, Municipal crime prevention, Articulation work, Sociotechnical imaginaries, (In)security markets

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Introduction

This article situates itself at the intersection of three key developments in recent decades within global north societies. First is the growing emphasis on issues of (in)security and fear of crime (Hermansson 2019; 2022; Brandén 2022; Sahlin Lilja 2021; Ahmed 2004; Lee 2007; Boutellier 2004; Lee 2007; Stanko, 2000),). Second, such changes drive a focus on increased order and control (Lee 2007), motivating an expansion and pluralization (when policing activities are carried out by multiple governmental, private, and local actors beyond traditional policing actors) of policing (Bayley & Shearing 1996; Loader 2000; Boels & Verhage 2016; Søgaard & Houborg 2017; Hansen Löfstrand 2021; Ellefsen 2021). Third, running parallel to these processes is the increasing digitalization of crime policy arenas, and the dual techno-utopian and techno-dystopian expectations entangled in visions of new digital solutions.

Internationally and nationally, the digital ambitions of governments have enabled the introduction of new predictive and preventive technologies into crime policy, positioning them as politically contested yet prominent features. In Sweden, the emphasis on matters of (in)security is reflected in public debate as well as in new crime policy initiatives and measures. For example, this includes expansion of camera surveillance to increase public safety and tackle gang-related violence (Regeringen 2025). Concurrently, digitalization is enthusiastically embraced in Sweden's policy goal to become 'the best in the world at utilizing the opportunities of digitalization', as set by the Swedish government (Regeringen 2017).

Research at the intersection of digitalization and policing has primarily examined technologies used in direct law enforcement, from the US 1990's introduction of systems like COMPSTAT (Walsh 2001; Weisburd et al 2003; Bratton & Malinowski 2008) to a range of digital tools, algorithmic systems, and intelligence led, predictive, digital, data-driven or smart policing approaches (Ratcliffe 2016; Ferguson 2017; Lomell 2017; Fyfe, Gundhus & Rønn 2018; Kaufmann 2019; Kaufmann et al. 2019; Brayne 2020; Hälterlein 2021; Fest et al. 2023; Egbert & Leese 2021; Leese 2023; Egbert, Galis, Gundhus & Wathne 2024; Galis, Gundhus, & Vradis 2025; Galis & Karlsson 2024). Digitalization of policing also extends beyond law enforcement into domains such as municipal crime prevention, regions, housing companies, and so on, which involves new responsibilities, collaborations, and actors (Fest et al. 2023). The pressure and expectations on municipalities are expected to increase further with the introduction of new Swedish legislation (SFS 2023: 196) mandating municipal responsibilities for crime prevention.

Drawing on a case study of municipal implementation of the leading crime prevention technology in Sweden – referred to as 'System X' – this study explores the intersection of increasingly security-focused societies with pluralized and digitalized policing. Specifically, it examines the introduction of System X by analyzing how the expectations of its producers and users are materialized in daily municipal work. The empirical material includes interviews with municipal public officials responsible for implementation, along with relevant documents, website information and digital observations. Theoretically, the study is informed by the concepts of articulation work (Star 1991; Strauss 1985) and sociotechnical imaginaries (Jasanoff 2015) focusing on both visible and invisible, as well as social and material, aspects of daily municipal technology implementation. The analytical lens centers on how imaginaries of the past, present, and future are integral to the establishment of System X.

Situating crime preventive technologies

Swedish crime prevention has transformed, mirroring changing perception of crime from primarily a social issue to an individual one (Gallo & Svensson 2019; Branteryd et al. 2021). Increasingly, the focus has moved toward potential future risks rather than actual criminal activities, signaling a move from a post-crime to a proactive pre-crime society; a preventive paradigm prioritizing pre-emptive and security logics (Zedner 2007; Lomell 2017). This aligns with the broader transition of safety and security from welfare-based assurance of safe living and working conditions to an arena marked by insecurity and fear of crime (Hermansson 2019; 2022). Such transitions distribute responsibilities to both private security actors and local arenas, tendencies described as dimensions of plural policing (Bayley & Shearing 1996; Loader 2000; Boels & Verhage 2016; Søgaard & Houborg 2017; Hansen Löfstrand 2021; Ellefsen 2021). As a result, safety has become equated with eliminating insecurity, to some extent explaining the rising expectations on municipal crime prevention and private firms supplying digital tools for these efforts. While research exists on municipal crime prevention (see e.g., Hörnqvist 2001; Andersson & Wahlgren 2022; Brandén 2021; 2022), public sector digitalization (e.g., Nordesjö, Ulmestig, & Scaramuzzino 2024; Kaun, Larsson, & Massu 2024), and digitalization of public space and smart city initiatives (Laufs 2022), there is a gap in studies addressing the intersection these domains. Specifically, research exploring the expansion and practical application of technologies into the broader crime prevention domain, particularly regarding municipal involvement, is limited.

Framing this convergence of security responsibilities as a digital-plural policing complex, situates the study at the edge of digitalized policing research. Increasing scholarship from Criminology, Sociology, and Science and Technology Studies (STS) has explored the purchase and adoption of digital technologies in law enforcement that work to analyze the "where and when" of future crimes (Kaufman et al. 2019; Bennett Moses & Chan 2016; Egbert & Leese 2021; Leese 2023). While it should be mentioned that digitalization could also be necessary to *preserve* police work (see, e.g. Weisburd et al, 2003 on the use of COMPSTAT to improve but maintaining traditional policing functions), studies inspired by STS

have continuously engaged with policing and futures (e.g. Gundhus, Skjevrak, & Wathne 2022) and how digitalization transforms police work (e.g. Chan 2003; Egbert & Leese 2021). For example, a greater reliance on technology increases the distance to the street-level and to citizens, what Terpsta, Fyfe and Salet (2019) have termed the 'abstract police'. Transformation of police work also takes place through everyday data practices that create criminal futures that inform crime prevention (Egbert & Leese 2021; Leese 2023). Other studies show how digital platforms are performative, embedding ideologies and ontologies that reshape police organizations and practices (Galis & Karlsson 2024). Resistance to new technologies is another theme in the literature (Gundhus & Wathne 2024, Brayne 2020, Egbert & Leese 2021). For example, Brayne's (2020) study of how police uses big data and surveillance technologies in their daily work shows that many police organizations describe themselves as technologically advanced, yet do not fully adopt new technologies.

Besides showing the transformation and/or resistance involved in digitalization of law enforcement, studies emphasize risks related to technology use in law enforcement, including how technology shapes our perspectives on what knowledge is considered relevant, what activities to focus on, and from where to gather information on such activities (Gundhus et al. 2022). For example, Ferguson (2017) has shown that governments rely on certain analytics to reduce crime and optimize resource allocation, risking to oversimplify realities and prioritizing easily measured outputs such as arrests and criminal rankings, and labelling of neighborhoods while overlooking more complex, qualitative aspects of policing, like police-community interactions.

Moreover, Diederichsen (2019) has argued that when new types of policing technologies are generalized (in Diederichsen's case: intelligence policing), this changes the nature of policing itself. Although technologies like automatic license plate recognition or face recognition are meant to target terrorism or organized crime, they risk turning the relationship between citizens and policing actors into an antagonistic one. This shifts the social relationship, that is foundational for policing practices, to one where citizens are transformed into potential criminals. Bias, inclusion, and exclusion embedded within these technologies pose further concerns, (Bennett Moses & Chan 2016), risking the creation and reinforcement of patterns in certain crime data (while overlooking other data). These patterns can impact definitions (Kaufman et al. 2019), decision-making (Bennet Moses & Chan 2016), and practices (Brayne 2020; Zuboff 2019; Eneman et al. 2020), with implications beyond everyday policing that may violate human rights (Egbert & Leese 2021).

Technologies not only transform police work but also extend beyond traditional law enforcement into broader arenas, reflecting the pluralization of policing (Bayley & Shearing 1996; Loader 2000). This expansion is characterized by the increasing procurement and utilization of similar technologies by various actors involved in security provision. By applying STS perspectives to the digital-plural policing complex, on digitalization of policing when studying such pluralization, the study embraces a sensitivity for the interplay between technology and society, such as how mundane practices create criminal futures (Leese 2023), as well as how our possible futures become locked to certain worldviews.

Case, material, and analytical framework

Alongside increasing repressive measures, Sweden has seen a significant expansion of crime prevention in recent decades, in particular on the local level (Andersson & Wahlgren 2022). Crime prevention in Sweden is organized on a national, regional and local level, with a growing emphasis on municipalities' as central to implementing national strategies, and as key stakeholders in the procurement and implementation of new technologies. Despite certain differences, Nordic countries share similarities in crime prevention, including national bodies supporting local efforts, commitment to police collaboration, and strong municipal autonomy. Compared to the UK's and partly Denmark's more police-led approaches, Sweden grants its municipalities greater autonomy partly due to social services' role in addressing juvenile offenders. Sweden further stands out with recent legislation mandating local crime prevention (SFS 2023: 196), aiming for structured, systematic efforts nationwide (Skr. 2023/24:68). According to the Swedish National Council for Crime Prevention (Brottsförebyggande rådet, BRÅ), the law requires municipalities to produce situational pictures of local crime through knowledge-based mapping, root-cause analysis, and needs analysis.

The study explores the everyday work involved in the implementation of System X, marketed as Sweden's first and largest tool for systematic, knowledge-based crime prevention and security work, based on qualitative data collected between 2022 and 2023. Ethical approval was obtained from The Swedish Ethical Review Authority (grant no 2022-02333-01). System X offers capabilities such as reporting and mapping activities contributing to insecurity. It provides "advanced analysis" based on criminological research, directs and evaluates interventions based on this analysis, and feeds back results to decision-makers and citizens. Besides the analysis based on reporting, the system provides additional analytical possibilities using demographic data and police statistics to perform comparisons of geographical differences when it comes to crime and insecurity. The rationale of the system is that these analyses deliver situational pictures making crime prevention more knowledge based, systematic, and efficient, thereby reducing crime and increasing security within the geographical areas related to its users: primarily municipalities, but also housing companies, and the police.

Despite the company's extensive descriptions on websites and the like, little is known about its specific functionalities. Although the descriptions are lengthy, the texts mainly contain a repeated message of the company's product as a knowledge based, systematic solution for more efficient crime prevention and security work. Moreover, the company frames System X as produced through 'scientific knowledge' and an enabler of collaboration, as requested by Swedish national authorities. The founder of System X holds a professorship at a Swedish university, and this expert role is emphasized in promotion materials and in news articles.

Municipal enthusiasm for System X was evident when I proposed interviews. Already in our initial e-mail correspondence, several interviewees emphasized that they highly value digital crime prevention and security work and research about it. The study comprises interviews with municipal public officials responsible for implementing the System X, observations of their interaction with the system, and analysis of relevant publicly accessed material (e.g., websites, news articles, public events, YouTube promotion films, instruction manuals, protocols, and other documents). Municipalities were selected based on publicly available information about their work on crime prevention and security. They varied in size, geography, and implementation stage, yet public officials' work was relatively uniform, likely due to the structure and control of the implementation process. While the sample is limited, observations provide indicative insights into similarities and differences in municipalities' experiences with System X.

I made requests via e-mail in which I introduced the study to specific actors responsible for crime preventive work. In some municipalities, additional interviewees were identified locally through network selection generation within the same municipality. In total, 17 interviews with 20 individuals from 13 municipalities were conducted, including three larger and ten smaller municipalities. 15 were individual interviews while two were group interviews, including, one with three public officials and another with two interns. Semi-structured interviews allowed officials to discuss meaningful aspects of their everyday work with System X. The interview questions ranged from investigating the background of the public officials and their general work tasks, to their perspectives on and practical experiences of working with System X. All interviews were recorded, transcribed, and anonymized.

Data was coded using the Nvivo software program. An open coding strategy was applied initially, following Charmaz (2006) grounded theory approach. This detailed work was iterative, keeping an eye on the empirical level of interviewees experiences while remaining sensitive to potential theoretical insights or associations. Initial open coding highlighted 'time' and 'expectations' as central themes, prompting a focused coding phase to explore variations, contradictions, and coherence regarding these themes, and how they were both ascribed to and infused by the technology as well as by articulations of past, present, and future. After this initial open coding and sorting of the material, I turned to sociotechnical imaginaries (Jasanoff 2015) and articulation work (Strauss 1985; Star 1991) to stimulate and elevate the analytical process.

Surrounding all technology are continuously changing networks of actors that either enable or hinder its establishment. Technology is in this way "thoroughly enmeshed in society" (Jasanoff 2015: 8). One way to deal with this enmeshment is to approach the coproduction and interaction of System X and municipalities as happening through sociotechnical imaginaries. Sociotechnical imaginaries bridge binaries between real/imagined, objective/subjective, and structure/agency by articulating "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 2015: 10).

However, translating these collectively imagined futures into practical realities is neither straightforward nor a linear movement from point A to point B. It requires coordination between actors and activities, which inherently involves complex entanglements of translation, communication, and coproduction – a process I approach as articulation work (Strauss 1985; Star 1991)

Articulation work centers attention on who performs the work, whose contributions are visible or invisible, and which work is acknowledged. In other words, it raises the question of 'Who are all the people working on a given production' (Star 1991: 281). Here, 'the given production' refers to the movement of the technology from the producer outside of the municipality to the inside, along with the associated activities. 'All the people' includes not only prominent figures like System X's developers and public officials responsible for the implementation, but also less visible human and non-human actors, such as reporters (actors responsible for reporting and logging activities related to insecurity into System X), the system itself, as well as the beliefs, values, and discourses associated with it.

I analyze System X's implementation as a socio-technical imaginary with interconnected actors, beliefs, and practices, with articulation work central to the analysis (Star 1991). This approach frames implementation work and System X itself as an evolving process where past, present, and future are not separate but interacting forces.

Past dismissals, present challenges, and future promises

When describing the work with System X, the public officials expressively engage with expectations anchored in the past, present, and future. The past is dismissed as unsystematic, without direction or opportunity, offering no right to amend. The present, on one hand,

is the main challenge but, on the other, holds few promises, as no final results are expected yet. Instead, the promises are directed towards a bright future, envisioning knowledge-based and systematic activities grounded in yesterday's hopes.

The establishment of System X thus relies on a sociotechnical imaginary that legitimizes the technology despite, or, as we will see, even due to the disjunctions experienced in the present everyday work. Below, these aspects are presented in three themes: *The past need for a knowledge-based future system, Present hard work while longing for the future*, and *Visiting the future with yesterday's hopes*. The entanglement of past, present, and future phases is evident in the approach of sociotechnical imaginaries, in the analytical experience of dealing with the material, as well as in the headlines derived from these reflections. Nevertheless, there are differences between the sections. The first theme engages with how a collective imaginary of a systematic future necessitates a consensus on an undesirable past, and how this, in turn, relate to both material and discursive implementation work. The second theme elaborates on how imaginaries empower manual and time-consuming efforts of the present to co-exist with established routines outside system X. The final theme explores two ways of handling the "future present", where the unsystematic past is recontextualized, reflecting large differences in imaginaries while reflecting similarities between the practical realities of these differences.

The past need for a knowledge-based future system

One of the most common sentiments among the public officials was distancing themselves from the municipalities' previous work on security and crime prevention. Specifically, they highlighted two main issues. First, interviewees described that the mapping and collection of information on relevant activities data, as well as its analysis, took place in an unproductive and unsystematic way, often through randomly sent e-mails. Second, they argued that much knowledge was confined to, and thus dependent on, a few reporting individuals, making it difficult to obtain a broader picture and a more extensive knowledge base. In contrast to this past, System X was portrayed as an easing solution:

> *IP4: This is more systematic and knowledge-based, since they [the reporters] can report into the system, everything is collected in one place, which simplifies the work for those analyzing the information.*
>
> *I: So how was this done before?*
>
> *IP4: Actually, through e-mails or meetings. Mostly e-mails, and not systematically. More like by chance, running into each other, or something happens, and they send an e-mail. But here the aim is for a more continuous effort, which we didn't have before.*

Descriptions of data collection occurring unsystematically and sporadically via e-mails, excel files, or causal encounters, were emphasized by nearly all public officials. Accounts of the past were often framed with empathy – we didn't know any better – alongside a hint of dismissal: luckily, now we do. As IP14 explains, the previous actors 'did a very good job, but nothing was documented […] So what is the effect? When I speak to politicians, is it established in gut feeling or actual knowledge?'. Actual knowledge is required for many reasons, distinguishing the present work from the unsystematic past of 'gut feelings' and channeling it into effective measurement of outcomes.

The dialectic of the unsystematic past and the systematic future motivates necessary changes in the municipalities. Moreover, the decision to implement System X brings about changes in the composition of public officials. Those responsible for implementation are often new to the work environment. In some municipalities, these new recruits were already familiar with System X, having been former students of the system's founder. Consequently, they have limited knowledge of traditional workflows but more experience with the new system. Because they were not part of the municipality's past operations, they readily dismiss previous workflows as inefficient. Similarly, when more senior officials are involved, they are either recruited from other departments within the municipalities, or, if they have prior experience with the municipality's past crime preventive work, they also articulate distance from it. For example, they frame themselves as long-time advocates for these changes and argue that progress was delayed due to slow action by the organization, national authorities, or leading politicians. This stance aligns with municipal officials' general approval of the new national mandates (SFS 2023: 196) on statutory municipal responsibilities in crime prevention. Many municipalities had already begun undertaking work aligned with the new law, such as conducting fear of crime surveys and creating situational pictures in cooperation with the police.

Technology is often viewed in terms of what it can contribute relative to user needs. Rather than clarifying the needs, the past work is presented as reflective of the system's solution. Since many municipalities are in the early stages of implementation, there is yet to be concrete evidence on the system's success or the changes brought by its implementation. Instead, public officials collectively assert that the system will, in time, enable evidence-based and systematic crime prevention and security work. This is a shared promise among separate local municipal actors and the company behind System X. Public officials further attribute the system's promises to the founder's academic expertise and experience; some interviewees even refer to him as the evidence-base himself. Moreover, there is a strong sense that System X effectively addresses new national mandates. There are few competing systems, so procurement choices were minimal, though this might change in the future. Although new systems are emerging on the market, System X is still widely acknowledged as the top choice, both by its competitors (as per my correspondence with representatives from other companies) and municipal actors. Some local initiatives are mentioned, though even actors using these alternatives affirm System X as the leading and credible solution.

System X is thus the longed-for, easy-to-use, evidence-based, effective, and needed knowledge object. Just as the municipalities'

crime prevention needs are vaguely specified, the system's knowledge, functionality, and capabilities are similarly unspecified. Concrete descriptions of system benefits often dissolve into claims of its 'ease of use'. The fact that multiple actors can log information is one of the few specific features highlighted as 'easy'. While specific features remain vague, 'knowledge' is consistently emphasized as a central benefit of the system. For instance, the company organizes 'knowledge seminars' and conferences aimed at public officials involved in crime prevention or security interventions within municipalities, housing companies, security firms, emergency services, or the police, promising 'inspiration, new knowledge, dialogue, networking, and development'. Public officials validate such initiatives, often framing them as benevolent support activities. The knowledge seminars are 'entirely free of charge' (highlighted three times in a single invitation) webinars in which existing and prospective customers can 'just listen and have a coffee or participate actively and ask questions'. While this knowledge is emphasized as free, the seminar subtly indicates that access to 'more knowledge' is available through purchasing various packages.

A notable observation is the near alignment between national guidelines for local crime prevention, System X's descriptions in the producer's materials (web pages, seminars, information campaigns, etc.), and municipal officials' accounts of System X. The focus on and need for a knowledge-based support system is collectively affirmed by municipal and System X actors alike. Knowledge is both essential and invaluable, and the work cannot proceed without it. The same statements (or variations thereof) found on the company's website are echoed in interviewee descriptions and municipal protocols. For example, the webpage contains numerous affirmations of System X's effectiveness, knowledge-based and collaborative benefits. These claims are articulated through quotes from in-house actors (mainly the CEO and the founder), and through customer endorsements. Such 'voicing' (Myers 2004; Winter 2019a) effectively frames the system as a constructive and productive technology for future municipal crime prevention and work. Public officials repeat nearly all arguments from the website, thereby performing not only material but also discursive implementation work. This work is mainly verbal, but also textual, presented in documents (e.g. meeting protocols, strategy and administrative documents) introducing System X, often as bullet points reiterating System X's own framing of its future relevance.

In summary, regardless of whether public officials have personal experience of the municipality's past, they collectively create a consensus of a desirable future (Jasanoff 2015), and, equally, a collective imaginary of an undesirable past. The unsatisfactory work of key actors also belongs to the past. National actors and/or politicians lag behind but they are finally recognizing the value of municipal work leading the way forward. There is a sense of municipal relief: Finally, they are meeting our standards. The articulation work that contributes to the collective imaginary in System X's implementation also involves verbal work on imaginaries. Public officials vouch for the technology as functioning and effective even before it has been fully implemented and tested. This vouching is a form of witnessing (Shapin 1984; Barry 1999; Collins 1988, Winter 2019b) occurring "pre-practice", situating System X within a materially unreachable yet discursively realized future. In the next section, I will further explore these high hopes through diving into the present.

Present hard work while longing for the future

The public officials' 'present' is heavily centered on hands-on, manual tasks. First, they invest substantial effort in identifying relevant actors to serve as reporters. Second, they need to train these reporters, to use the system correctly. Third, they work to ensure that the reporters continue their reporting. Finally, they must review and analyze the reports, to compile a knowledge base for collaboration meetings focused on situational pictures. IP1 describes the first of these tasks as follows:

> *The big challenge right now is to obtain information. We need information regarding the urban environment, unsafe places, insecurity-inducing events, citizens' opinions, you know. We need our employees, in home care or the like, people who are out and about in the community you know. We have many employees so we have people [to perform reports]*

Reporters are generally those in roles that enable them to observe and report relevant activities, mainly within public space. They often include staff working outside the core municipal management, such as in schools, home care, and social services. Regardless of how long officials had been working with System X, the work with reporters remained a daily and intensive task. Follow-up interviews confirmed that recruiting new reporters is still a central work task, requiring time-consuming efforts and face-to-face interactions with potential candidates. This in-person approach is critical in subsequent steps as well, particularly for educating the reporters, and following that, getting them to continue the reporting through encouraging their ongoing participation. According to the public officials responsible for the implementation, this is time worthwhile spending, as meeting onsite with reporters eases the educational aspect of reporting. IP4 explains, 'We have tried doing it digitally at times [...] but it is much more difficult to help them digitally'.

The risk of reporters ceasing their participation is a persistent challenge for most municipalities. A recurring reason is that reporting falls outside the reporters' official responsibilities, and, therefore, is not part of their daily job tasks. Consequently, encouraging reporters to continue their reporting assignments involves much more than oversight and control; public officials invest time in motivating, engaging, and giving feedback, activities that also affects the company itself. Initially, the company did not address reporters directly, treating them as a natural friction free part of the work with System X. However, this has substantially shifted, with the company now addressing reporters directly on its website with phrases like, "Important information for you as a reporter", "You are very important!", "Your reports ARE very important" (the word 'important' appears nine times in the same text).

The continuous threat of decreased reporting underscores the potential conflict between the ideal of a systematic flow of reports and the everyday challenges officials face. Few public officials, however, interpret this as an actual problem. Instead, they display patience, acknowledging that systematic reporting will take time. This envisioned, systematic future remains on the horizon, even as they recognize that municipalities may lack fully structured systematic information for some time. Even when challenges arose in incorporating reports into the system over time, there was minimal conflict with this vision. The 'verbal vouching' described in the previous section is thus complemented by manual efforts, a material manifestation of the collective belief in System X as a marker of progress.

The final step involves analyzing the reports to create situational pictures in collaborative meetings. Gathering data is one thing, but officials argue that the analysis stage is essential, without it, the information lacks meaning. The unsystematic past – systematic future dialectic discussed earlier is echoed here as the gap between a future with a robust reporting volume available for systematic analysis and a present that accepts the current absence of such order and results.

Daily work is thus marked by efforts to recruit, train, and motivate reporters and to some extent coordinate reviews, analysis, and situational picture meetings. By affirming the current lack of results, officials justify their "work in progress" logic, allowing for the beginner's position. This position is quite convenient as it reduces pressure to meet specific outcomes: 'We're just in the beginning [...] we are rookies' (IP1) is a common sentiment that reinforces that while the municipalities have taken action (we are finally doing something), they are not yet fully accountable. There is, therefore, an understanding that nothing need be fully operational yet. No one can (at least not yet) demand or expect that everything is already set.

Zooming in on the daily work on implementation of this seemingly straightforward, knowledge-based, and efficient system reveals a process that is hands-on, time consuming, fairly manual and inherently social. It involves face-to-face physical activities to locate, train, and motivate reporters.

Situational picture meetings are regarded as essential in municipal work, aligning with national guidelines and valued by the public officials themselves. These meetings serve as both the goal and the justification for the significant time and resources spent on reporting. The meetings offer opportunities for collaboration, representing the purpose for which the reports are collected. Yet, there are also a long-standing part of municipal processes, with well-established collaborative routines already in place. While some municipalities rely on System X information in these meetings, others use data from alternative systems (such as the police system Hobitt) and manually organized situational information. These meetings are described as effective and essential collaborations, largely unaffected by System X's presence or absence. Public officials do, however, express a desire to integrate System X more fully into these meetings, potentially as a unifying platform that centralizes data from multiple systems.

The verbal vouching of future progress is thus complemented by manual and material efforts in the tangible present undertaken by the public officials or the reporters. While there are clear disjunctions between the belief in the future system and its current practice, they co-exist without conflict. This demonstrates how "imagination is crucial for action" (Jasanoff, 2015), that is, the imagined future legitimizes the hard work of the present. The current efforts even co-exist with established and seemingly well-functioning routines outside System X. Nevertheless, the company's shift in communication – now addressing not only costumers but also reporters directly – also suggests the opposite: that action is crucial for imagination. The manual work experiences of the difficulties of reaching and engaging reporters have now become an issue for the company to address, marking a departure from its earlier determination on envisioning beliefs in a systematic future. Time will tell if this tension will affect the 'future present'.

The contrast between new actors (public officials implementing System X) and existing actors (municipal staff, becoming reporters, police and other collaborators) also becomes apparent. Potential reporters often prioritize other duties, and the police use their own systems. The following section will engage further into this contrast by examining the future as experienced by those who have worked with the system for an extended period.

Visiting the future with yesterdays' hopes

As the previous sections have highlighted, there is a prevailing realization of a belief that System X will eventually bring greater efficiency and a knowledge-based approach to crime prevention and security work in the future. Given the relatively short time the system has been in use, it is understandable that much of its potential is placed in the future. Visions of an increased number of reporters, expanded reporting activities, and deeper analysis of reports make the current, often challenging, work meaningful. When visiting municipalities that had used the system for a longer time, I explored these public officials' 'present' as the 'future' that previously interviewed officials' had anticipated. For example, officials just beginning implementation expected future activities like collecting zero reports (i.e., reporting the absence as well as the presence of activities) or adding new modules to the system (e.g. demography data sets, police statistics, or fear of crime surveys). These features were already in place in municipalities that had been using the system for some time. However, when it came to the systematic reporting envisioned for the future, it often remained a challenge. When I, so to speak, was visiting the future, either through interviews with public officials who had been working with System X for a longer while, as well as follow-up interviews with those previously identified as 'rookies', it was clear that while the number of reporters had grown in some cases, there were ongoing challenges in increasing number of reporters, maintaining reporter engagement, and consistently receiving reports in the system.

The lack of a systematic approach to handling reports involved three main aspects: an insufficient volume of reports to create

systematic knowledge, variations in practices where some actors continued to use alternative systems or email-based reporting, and a lack of comprehensive analysis of the reports. Consequently, reports were far from being produced systematically. Public officials adopted two different approaches to addressing these issues in the future present. The primary approach was to maintain faith that the system would ultimately reach its full potential. This meant that even though the anticipated future practices of systematic expansion and reporting were not yet in place, optimism regarding the feasibility remained:

> *IP15: We can't really find the structure [for some of the reporting]*
>
> *I: Why is that?*
>
> *IP15: Because we haven't been persistent enough.*

This interviewee leaned on the belief that greater persistence will lead to success, and that 'we' could establish structure through more determined work. There was little room for challenging perspectives with this approach. When I asked IP15 for further clarification, they described a few internal obstacles that they expected the system to eventually resolve within the system. The phrase 'within the system' has a dual meaning; challenges were seen as manageable within the public officials' existing knowledge horizon, and as issues that the system, aligned with this horizon, would address. For example, when the desired quantity of reports was not achieved, the promised systematic analysis was instead performed on data from modules and add-ons of available data sets from the police, Statistics Sweden (SCB), and other resources.

The second approach viewed the problems as outweighing the solutions. This alternative approach was held by one municipality that had ended its collaboration with System X. The official from this municipality describes several difficulties:

> *IP13: Another difficulty has been getting other actors to report within the system. [...] Instead of reporting through the system, they sent us emails, which has essentially led us having several parallel systems to manage.*
>
> *I: you mentioned returning to email-based reporting?*
>
> *IP13: Well, it's not really returning; we never actually stopped [using email for reporting]; it has always been in use. [...] We'lll never be able to convince them to use System X. It would just add a lot of extra work; it's not realistic. This multiplicity of reporting systems makes this digital tool itself... become less, lose some of its utility."*

IP13 made it clear that the previous methods – receiving information via emails and other reporting systems – had always coexisted with System X, and persuading other actors to adopt a single system was considered unrealistic. While other municipalities acknowledged the challenges of engaging reporters and managing alternative systems, they did not question who the relevant reporters, or the relevant systems were, always framing System X as the prioritized solution. In contrast, according to IP13, the reality consists of a wide array of actors (housing companies, the police, the business sector, citizens) who were already engaged with their own reporting systems:

> *IP13: The variety of digital systems that exist... There's an inflation of digital systems. While they offer some benefits, they also require additional resources to manage them. Since there are so many, they naturally don't overlap. They have different purposes, principles, goals, senders, payments and resource owners.*

Not only the work but also the necessity of the system itself was thereby questioned: Is there truly a need for yet another system? During my interview with IP13, the municipality was in the early stages of ending its collaboration with the company behind System X. This decision was influenced by the perceived lack of ease offered by System X, and by the diversity of available technologies already in use across different sectors. Additionally, IP13 argued that the system failed to capture the complex reality by avoiding the specificity required to understand details in reports, both in terms of geography and content, reflecting critiques in the literature on digital policing regarding the risk of reinforcing inequality or structural biases (e.g., Kaufman 2019; Egbert & Leese 2021).

Besides illustrating the variety of available technologies, IP13 and other officials also showed diverse visions of available futures. While IP15 and others believed that persistence could achieve a systematic use of a single, general system, IP13's inflation perspective reflected skepticism, interpreting the inflation of systems as evidence of the impossibility of achieving such uniformity. For them, this led to discontinuing rather than expanding System X. Two key aspects of the unsystematic past are at play here. First, while other officials described email reporting as unsystematic work, IP13 saw it as a functional way to obtain relevant information both then and now: 'we never stopped'. Second, while IP13 positioned System X as part of the municipality's past, other officials considered it as the pathway to a systematic future, legitimizing the current unsystematic present as a necessary stage. For them, System X not only belongs to the future, it also offers the future.

The situational picture meetings and collaboration between the municipality and the police are pushed as the tangible potential outcome of systematized work and the implementation of System X. In this way, the eventual success or failure of systematized reports appears almost secondary. When I ask IP13 about the future, they made it clear that situational picture meetings would continue without System X, aligning with new legal requirements on producing situational pictures in collaboration. Thus, while the imaginaries held by IP13 and other municipalities differ dramatically, the practical consequences of these differences on their ambitions and goals remain minimal.

Discussion

Kaufman (2019) has argued that understanding the national and global implications of new technologies, as well as the agency that accompanies them, requires analyzing their local practices. Such an approach sheds light on the specific expectations, practices, and actors surrounding these technologies. By focusing on municipal public officials responsible for implementing crime prevention technologies, this study highlights these officials as a new group of municipal 'data professionals' (Fest et al. 2023) operating outside traditional law enforcement. By examining how these officials manage the practices and expectations surrounding System X – a leading system in Sweden's crime prevention and security work – the analysis contributes to the broader discussions on digitalization and the pluralization of policing, especially in how everyday work and expectations are intertwined with visions of the past, present and future.

Viewing the work with System X through the lens of a sociotechnical imaginary reveals how imagination fuels action: it shapes the everyday meaning-making in challenging implementation work as well as produces worldmaking where future hopes are bound up with pasts (Jasanoff 2015). Public officials legitimize System X and its related work by rejecting an unsystematic past and, concurrently, investing in an enthusiastic belief in the promise of evidence-based, systematic crime prevention. Although the company, public officials, and recent legislation (SFS 2023: 196) respectively and collectively envision the system as the solution, realizing these expectations remain an ongoing challenge with systematic analysis still a distant goal. Daily work is laborious and sometimes inconsistent, involving significant time spent on identifying, recruiting, and encouraging reporters, and keeping them engaged. Rather than creating conflict, however, public officials' discursive and material vouching for System X enable these challenges to underscore the officials' sustained commitment to System X, positioning it as a bridge between ambition and pragmatic use. Consequently, encountered and ongoing challenges in constitute a presupposition for the work in that they legitimize the relevance of imagining the systematic future. Their work requires them to exist in the past, present and future simultaneously, transforming imagined goals into meaningful present-day practices. In this way, I also attend to how collective imagination avoids conflict through building consensus (Jasanoff 2015) around System X.

The belief in better, more efficient, and systematic futures is crucial yet delicate, depending on trust in progress. Some futures were possible to 'visit'. In municipalities with a longer experience of System X, progress in terms of change was apparent – although often in areas like integrating additional modules rather than expanding the volume of reporters and reports. The use of existing databases from agencies such as the police allows System X to deliver 'systematic analyses', though the focus of such analyses diverges from the intended causal analysis. At the same time, this was a crucial activity to enable analyses within the system. Such 'knowledge thrifting' practice, or the repurposing of existing data, aligns with broader trends where private actors repackage public data as part of their offerings (field correspondence, 2024).

As key technology recipients, municipal officials provide crucial insight into how new technologies become institutionalized through knowledge co-production (Jasanoff 2004). Notably, these data professionals', whether or not they had prior affiliations with the system's founders, often express loyalty to System X and its providers, emphasizing the expertise associated with it. This does not mean that implementation takes place without co-production, but rather, that such allegiance and enthusiastic belief (see also Winter 2019a) are pivotal to coproduction. Unlike other STS insights on implementation as a matter of translation and transformation, System X implementation might be better described as processes of 'dubbing', reflecting the simplistic techno-optimism characterizing public sector digitalization in general.

But it is not the public officials who perform simplification. Rather, it is the system developers who create simplification through complexity. They ornament the system with a visually complex costume, drawing from high-profile, non-specific concepts such as "evidence-based", "systematic", and 'collaboration' (as seen in the national guidelines). The potential risk is that such simplifications may undercut the complex social problems that require nuanced solutions, fostering premature optimism about 'evidence-based expertise', even before any evidence exist. Given these techno-optimistic pitfalls, further critical examination of digital policing technologies is warranted to uncover potential weaknesses and blind spots (McGuire 2020; Chan, Sanders, Bennet Moses and Blackmore 2022; Bennett Moses and Chan 2018; Browning & Arrigo 2021; Ferguson 2017). In line with Chan, Sanders, Bennet Moses, and Blackmore (2022), scrutinizing the 'political nature of data practice', remains crucial. For example, through examining how the 'constructed nature of police intelligence become sanitized' and the political choices that accompanies it becomes invisible and black-boxed (cf. Jasanoff 2017). The material and discursive vouching of evidence-based knowledge and practices that surround System X, sanitizes the implementation process and the potential political nature, and moreover, it produces a success of the evidence even before concrete evidence substantiates it. The idea that what is talked about as knowledge is what counts as knowledge is brutally illustrated here. The contemporary crime policy and public debate in Sweden, marked by fear of crime and/or (in)security discourses underpin this enthusiasm. Consequently, System X is not only a case of local world making. As a sociotechnical imaginary it intersects with larger worldmaking and wider trends in plural policing and expansion of crime prevention and (in)security market. Previous research has shown that exaggerated focus on future threat scenarios without a robust theoretical and empirical grounding risks policy interventions based on weak assumptions, potentially

promoting increased control measures (Flyghed 2002; 2005; Nilsson 2008). In this context, while technologies are partly sanctioned by threat scenarios, these technologies and their entwined imaginaries of control, are also legitimized by optimistic beliefs in technology as a benevolent tool of plural policing.

Diedrichsen (2019) highlights that intelligence-led policing can drive policing standards toward antagonistic relationships between citizens and policing actors. This raises questions about the legitimacy and ethical foundation of such technologies, as well as on researchers' responsibility to examine the world-making of technologies. As crime and security discourse increasingly leans on imaginaries of digital and efficient futures, solutions with narrow scopes sidelining complexity about crime, safety, and insecurity. In such imaginaries, only the technology as such is allowed complexity. Although technologies used within certain police institutions, territorial border practices, or public transport allow for considerable complexity, studies have also shown deficits in the advancement of technologies (Chamard 2006) and the organizations that use them (Brayne 2020). System X does not inherently add complexity, partly because the lack of reports blocks the possibility to perform more intricate analyses, but also because System X offers but a narrowly defined future, limiting possible visions of municipal crime prevention to specific metrics and formats. Instead, it is the everyday social reality that provide complexity: in finding and motivating relevant reporters, in realizing there are other systems, in allocating time and resources invested. Other studies have explored how everyday data practices transforms police work and shape policing futures (Egbert and Leese 2021), through creating criminal futures that inform crime prevention (Leese 2023). While these studies also argue that mundane practices are understudied in criminological research, the current study adds to this discussion that futures in policing encompass not only criminal scenarios but also positive imaginaries. These positive imaginaries legitimize the everyday mundane work, and are simultaneously coproduced between this work and the actors involved in implementating the new technology.

As Jasanoff and colleagues have shown, imaginaries can be both plural and singular, but a full socio-technical imaginary takes shape when the 'vanguard vision' (Hilgartner 2015) is adopted collectively (Jasanoff 2015: 10). System X, initially a singular imaginary, becomes collectively adopted through the continual reinforcement of public officials, not despite the difficulties with systemic work and number of reporters, but also *because* of these difficulties. They are hindering and meaning-making actors at the same time as the difficulties in the present legitimize the future, but they also make the company to adjust to them. Thus, 'shared understandings' of social life and social order take place through 'advancement in science and technology' (Jasanoff 2015). An advancing system both affects the realities and work within local levels, but are also affected by this very work to be able to continue to advance. Moreover, municipalities are increasingly enrolled by the state as responsible for crime preventive action, and the new law (2023:196) will engage new actors, ways, and arenas (schools, housing companies, et cetera) adding to the indeed complex social reality of working with crime prevention. In response to new legislation, security companies are now adjusting their products to align with these emerging responsibilities, signaling a shift toward municipalities as primary platforms for security technologies.

It is no surprise that securitization discourses escalate both legislation and a focus on crime and security in the public sector, or that private actors engage with this discourse and with municipalities as the future platforms for their market. Nevertheless, the societal acceptance of this development is noteworthy. Whereas Jasanoff identifies co-existing optimistic and pessimistic visions of technology, this case study finds that System X's implementation process thrives on a dialectic of anticipation and everyday challenges, with broader securitization discourses driving fear of crime and suspicion also feeding on techno-optimism. This dynamic underscores the need for rigorous and critical analyses of how optimism-driven technology co-exist with, and obscures the complex realities it aims to address. Vestby and Vestby (2021) call for an 'open conversation' on policing technologies despite its (sometimes) specialized nature. This paper adds to this call by emphasizing the need to acknowledge both the (sometimes) simplicity of policing technologies and the simultaneous specialized nature of the social.

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References

Ahmed, S. (2014). *The cultural politics of emotion*. Edinburgh: Edinburgh University Press.

Andersson, R., & Wahlgren, P. (2022). Local crime prevention work: Cultivating a political profile at a municipal level. *Crime Prevention & Community Safety, 24*(1), 78–92. https://doi.org/10.1057/s41300-021-00133-x

Barry, A. (1999). Demonstrations: Sites and sights of direct action. *Economy and Society, 28*(1), 75–94.

Bayley, D. H., & Shearing, C. D. (1996). The future of policing. *Law & Society Review, 30*(3), 585–606.

Beckett, K., & Sasson, T. (2000). The war on crime as hegemonic strategy: A neo-Marxian theory of the new punitiveness in US criminal justice policy. In S. Simpson (Ed.), *Of crime and criminality: The use of theory in everyday life* (pp. 61–85). Sage Publications.

Bennett Moses, L., & Chan, J. (2018). Algorithmic prediction in policing: Assumptions, evaluation, and accountability. *Policing and Society, 28*(7), 806–822.

Boels, D., & Verhage, A. (2016). Plural policing: A state-of-the-art review. *Policing: An International Journal, 39*(1), 2–18. https://doi.org/10.1108/PIJPSM-05-2015-0069

Branteryd, F., Gallo, C., Brown, E., & Svensson, K. (2021). Crime victims, immigrants and social welfare: Creating the racialized other in Sweden. *The British Journal of Criminology*.

Bratton, W. J., & Malinowski, S. W. (2008). Police performance management in practice: Taking COMPSTAT to the next level. *Policing: A Journal of Policy and Practice, 2*(3), 259–265.

Brayne, S. (2020). *Predict and surveil: Data, discretion, and the future of policing*. Oxford University Press.

Browning, M., & Arrigo, B. A. (2021). Stop and risk: Policing, data, and the digital age of discrimination. *American Journal of Criminal Justice, 46*(1), 298–316.

Chan, J. (2003). Police and new technologies. In T. Newburn (Ed.), *Handbook of policing* (pp. 655–679). Willan.

Chan, J., Sanders, C., Bennett Moses, L., & Blackmore, H. (2022). Datafication and the practice of intelligence production. *Big Data & Society, 9*(1).

Chamard, S. (2006). The history of crime mapping and its use by American police departments. *Alaska Justice Forum, 23*(3), 4–8.

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. Sage.

Collins, H. M. (1988). Public experiments and displays of virtuosity: The core-set revisited. Social Studies of Science, 18(4), 725–748.

Diderichsen, A. (2019). Spreading intelligence. *Intelligence and National Security, 34*(3), 409–420. https://doi.org/10.1080/02684527.2019.1553705

Egbert, S., Galis, V., Gundhus, H. O. I., & Wathne, C. T. (2024). The platformization of policing: A cross-national analysis. In Policing and Intelligence in the Global Big Data Era, Volume I: New Global Perspectives on Algorithmic Governance (pp. 349-392). Cham: Springer Nature Switzerland.

Egbert, S., & Leese, M. (2021). *Criminal futures: Predictive policing and everyday police work*. Routledge.

Ellefsen, R. (2021). Prevention of radicalization as an emergent field of plural policing in Norway: The accelerating role of militant Islamists. Nordic Journal of Studies in Policing, 8(1), 1-23.

Eneman, M., Ljungberg, J., Rolandsson, B., & Stenmark, D. (2020). Governmental surveillance: The balance between security and privacy. *UK Academy for Information Systems Conference Proceedings*.

Ferguson, A. G. (2017). The rise of big data policing. New York University Press.

Fest, I., Schäfer, M., van Dijck, J., & Meijer, A. (2023). Understanding data professionals in the police: A qualitative study of system-level bureaucrats. *Public Management Review*, 1–21.

Flyghed, J. (2005). Crime-control in the post-wall era: The menace of security. Journal of Scandinavian Studies in Criminology and Crime Prevention, 6(2), 165-182.

Flyghed, J. (2002). Normalising the Exceptional: The Case of Political Violence. *Policing and Society, 13*(1), 23–41. https://doi.org/10.1080/10439460220000005608

Fyfe, N. R., Gundhus, H. O. and Rønn, K. V. (2018). Introduction, in H. O. Gundhus, K. V. Rønn and N. R. Fyfe, eds, Moral Issues in Intelligence-led Policing, 1–22. Routledge.

Galis, V., & Gundhus, H. O. I., & Vradis, A. (2025). Critical perspectives on predictive policing: Anticipating proof? Edward Elgar.

Galis, V., & Karlsson, B. (2024). A world of Palantir: Ontological politics in the Danish police's POL-INTEL. *Information, Communication & Society, 27*(13), 2438–2456. https://doi.org/10.1080/1369118X.2024.2410255

Gallo, C., & Svensson, K. (2019). *Victim support and the welfare state*. Routledge.

Gundhus, H. O. I., & Wathne, C. T. (2024). Resistance to platformization: Palantir in the Norwegian police. *Information, Communication & Society*, 1–19. https://doi.org/10.1080/1369118X.2024.2325533

Gundhus, H. O. I., Talberg, N., & Wathne, C. T. (2022). From discretion to standardization: Digitalization of the police organization. *International Journal of Police Science & Management, 24*(1), 27–41.

Gundhus, H. O. I., Skjevrak, P., & Wathne, C. T. (2022). We will always be better than a spreadsheet: Intelligence logic and crime prevention in practice. *European Journal of Policing Studies, 6*(Online First).

Hansen Löfstrand, C. (2021). Marketization in a state-centred policing context: The case of Sweden. *European Journal of Criminology, 18*(6), 899–917. https://doi.org/10.1177/14773708198829O5

Hälterlein, J. (2021). Epistemologies of predictive policing: Mathematical social science, social physics, and machine learning. *Big Data & Society, 8*(1), 20539517211003118.

Hörnqvist, M. (2001). Allas vårt ansvar i praktiken: En statligt organiserad folkrörelse mot brott. *Department of Criminology, University of Stockholm*.

Jasanoff, S. (2004). The idiom of co-production. In *States of knowledge* (pp. 1–12). Routledge.

Jasanoff, S. (2015). Future imperfect: Science, technology, and the imaginations of modernity. In Dreamscapes of modernity:

Sociotechnical imaginaries and the fabrication of power (pp. 1–33).

Jasanoff, S. (2017). Virtual, visible, and actionable: Data assemblages and the sightline of justice. *Big Data & Society, 4*(2), 1–15.

Kaufmann, M., Egbert, S., & Leese, M. (2019). Predictive policing and the politics of patterns. *The British Journal of Criminology, 59*(3), 674–692.

Kaufmann, M. (2019). Who connects the dots? Agents and agency in predictive policing. In *Technology and agency in international relations*. Taylor & Francis.

Kaun, A., Larsson, A. O., & Massu, A. (2024). Automation scenarios: Citizen attitudes towards automated decision-making in the public sector. *Information, Communication & Society.* https://doi.org/10.1080/1369118X.2024.2375261

Laufs, J. (2022). Crime prevention and detection technologies in smart cities: Opportunities and challenges (Doctoral dissertation, UCL).

Lee, M. (2007). *Inventing fear of crime: Criminology and the politics of anxiety*. Willan Publishing.

Leese, M. (2023). Enacting criminal futures: Data practices and crime prevention. *Policing and Society, 33*(3), 333–347.

Lilja, H. S. (2021). The emergence, establishment, and expansion of fear of crime research in Sweden.

Loader, I. (2000). Plural policing and democratic governance. *Social & Legal Studies, 9*(3), 323–345.

Lomell, H. M. (2017). Investigation or instigation? Enforcing grooming legislation. In *Moral issues in intelligence-led policing* (pp. 43–61). Routledge.

McGuire, M. (2020). The laughing policebot: Automation and the end of policing. *Policing and Society, 31*(1), 20–36.

Myers, G. (2004). *Matters of opinion: Talking about public issues.* Cambridge University Press.

Nilsson, A. (2008). Kan man förutsäga brottsligheten? In S. Alm & J. Palme (Eds.), *Fjorton perspektiv på framtiden*. Institutet för Framtidsstudier.

Nordesjö, K., Ulmestig, R., & Scaramuzzino, G. (2024). Saving time for activation or relationships? The legitimation and performance of automated decision-making for time efficiency in two street-level bureaucracies serving poor and unemployed clients. *Nordic Social Work Research, 14*(2), 209–221.

Pinch, T. J., & Bijker, W. E. (1984). The social construction of facts and artefacts: Or how the sociology of science and the sociology of technology might benefit each other. *Social Studies of Science, 14*(3), 399–441.

Ratcliffe, J. H. (2016). *Intelligence-led policing* (2nd ed.). Routledge. https://doi.org/10.4324/9781315717579

Regeringen. (2025). Kamerabevakning i brottsbekämpning och annan offentlig verksamhet – utökade möjligheter och ett enklare förfarande (Prop. 2024/25:93). Justitiedepartementet. https://www.regeringen.se/rattsliga-dokument/proposition/2025/02/prop.-20242593

Regeringen (2017). Regeringens skrivelse 2017/18:47 Hur Sverige blir bäst i världen på att använda digitaliseringens möjligheter – en skrivelse om politikens inriktning.

SFS 2023:196. Kommuners ansvar för brottsförebyggande arbete. (Swedish statute).

Skr. 2023/24:68. Barriers against crime: A social preventive strategy against criminal networks and other criminality. Justitiedepartementet.

Shapin, S. (1984). Pump and circumstance: Robert Boyle's literary technology. *Social Studies of Science, 14*(4), 481–520.

Star, S. L. (1991). The sociology of the invisible: The primacy of work in the writings of Anselm Strauss. In D. R. Maines (Ed.), *Social organization and social process: Essays in honor of Anselm Strauss* (pp. 265–283). Aldine de Gruyter.

Strauss, A. (1985). Work and the division of labor. *Sociological Quarterly, 26*(1), 1–19.

Søgaard, T. F., & Houborg, E. (2017). Plural policing webs: Unveiling the various forms of partnering and knowledge exchange in the production of nightlife territoriality. In Moral issues in intelligence-led policing (pp. 183-203). Routledge.

Terpstra, J., Fyfe, N. R., & Salet, R. (2019). The abstract police: A conceptual exploration of unintended changes of police organisations. *The Police Journal, 92*(4), 339–359.

Vestby, A., & Vestby, J. (2021). Machine learning and the police: Asking the right questions. *Policing: A Journal of Policy and Practice, 15*(1), 44–58.

Walsh, W. F. (2001). COMPSTAT: An analysis of an emerging police managerial paradigm. *Policing: An International Journal of Police Strategies & Management, 24*(3), 347–362.

Weisburd, D., Mastrofski, S. D., McNally, A. M., Greenspan, R., & Willis, J. J. (2003). Reforming to preserve: COMPSTAT and strategic problem solving in American policing. *Criminology & Public Policy, 2*(3), 421–456.

Winter, K. (2019a). Experiences and expertise of codependency: Repetition, claim-coupling, and enthusiasm. *Public Understanding of Science, 28*(2), 146–160.

Winter, K. (2019b). Everybody knows? Conversational coproduction in communication of addiction expertise (Doctoral dissertation, Department of Sociology, Stockholm University).

Zedner, L. (2007). Pre-crime and post-criminology? *Theoretical Criminology, 11*(3), 261–281.

Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs.

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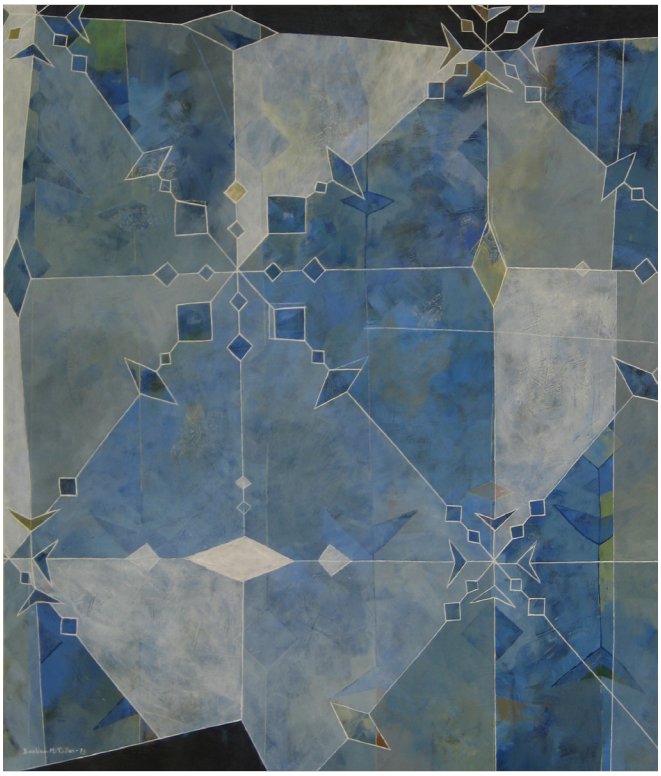
ABOUT THE COVER ARTIST

Barbro Maria Tiller

Mønster 6 is painted by visual artist Barbro Maria Tiller (b. 1953). Tiller is educated at the Trondheim Academy of Fine Art and works from her studio at Lademoen Kunstnerverksteder. She works with collages, printmaking, painting, and drawing, as well as larger concept-based projects.



"Mønster 6" by Barbro Maria Tiller