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A MATTER OF FACTS

Mapping Materialisations of Digitally Mediated Knowledge in the Police

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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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