Machineries of Knowledge Construction: Exploring the Epistemic Agency of Digital Systems in Policing

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Abstract: Understanding the contours and dynamics of police knowledge production necessitates consideration of not only the roles of organizations and humans but also the various technologies that are employed by the police. This article explores two digital technological systems used by police control rooms in Norway, namely their internal system for call handling, control and command and Twitter, the social media platform. The control room is understood to be an epistemic culture (Cetina, 2007), and we elucidate the systems as machineries of knowledge construction. Using Adams & Thompson's (2016) novel framework for interviewing digital objects, this article scrutinizes how digital systems shape and define what becomes knowledge, uncovering and exploring how such systems have epistemic agency. The origins of the systems—one police-developed, the other not—have laid the basis for the systems' affordances and the epistemic cultures they work within. Whilst one works as a mostly friction-free system based on, and enhancing, internal police logics, the other is disruptive, laying a foundation for others to criticize and challenge the actions and logics of the police.

Keywords: Epistemic agency, actor-network theory, control rooms, Twitter, police systems

1 Introduction

This paper explores digital machineries of police knowledge production. We study two different software systems, both used by police emergency control rooms in Norway. In professional practice, humans and technologies co-produce knowledge (Jasanoff, 2004), and police emergency control room practices aim to fulfil a specific duty within policing, which is to answer and assess calls and to allocate and guide police units during operations (Lundgaard, 2021). Most staff in Norwegian control rooms are police educated, holding three-year bachelor's degrees in policing. The Norwegian Police Service is a single force; hence, the 12 control rooms in the different police districts have similar organizational

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structures, and their functions, legal regulations, computer systems and technologies are the same (Lundgaard, 2021).

The two systems in question are the internal police system used for call handling, incident logging, control and command, called *Politioperativt System* ("operative police system"; PO), and the social media platform Twitter, used by the control room to inform the public and media about incidents. We explore the implications that digital technologies have in the "becoming of knowledge," which refers to how something becomes known and what it means to know. Drawing on Karen Knorr Cetina's theoretical notion of *epistemic cultures*, we explore these systems as *machineries of knowledge construction* (Cetina, 2007), scrutinizing their history, design and affordances as well as the active role they play in police knowledge production. Inspired by actor-network theory (Callon, 1990; Latour, 2005; Law, 2007), the systems are understood here as having agency; through affordances in their designs and functions, they shape knowledge production in both intended and unintended ways. We use Adams and Thompson's (2016) actor-network-inspired methodology for our analysis, conducting what they called *interviews with digital objects*. Professional practices are shaped by both digital and non-digital things (Adams & Thompson, 2016, p. 1), and digital systems play a fundamental role in the becoming of knowledge. This is also the case in control rooms, where *knowledge* has different connotations tied to concrete events, such as knowing what is happening and what the response from the police should be. In contemporary policing, digital systems play a key part in the mutual exchange between incident knowledge and general knowledge, since the discretion that guides decision-making draws from knowledge based on categorizations derived from historic information and searchable incident logs.

We ask how these systems work in knowledge production, understanding them as having *epistemic agency.* Epistemic agency is usually linked to human agents (Elgin, 2013), and the focus on the human factor is arguably prevalent in policing studies. Here, we argue that technologies also act as 'legislating members of a realm of epistemic ends: they make the rules, devise the methods, and set the standards that bind them' (Elgin, 2013, p. 135). Therefore, police researchers should empirically study such systems in the same way as we study humans and organizations. Our aim is to explore these digital technologies to gain a better understanding of how they contribute to the making of rules and standards in the construction of police knowledge and to understand the role of the systems within a wider context.

2 Theoretical Framing: Epistemic Cultures and Machineries of Knowledge Construction in Policing

This article uses Karen Knorr Cetina's (2007) notion of epistemic cultures to explore the epistemic agency of PO and Twitter. Her notion was coined to capture the cultural aspects of scientific knowledge production, showing that what gets defined as scientific knowledge is produced by 'specific practices, arrangements and mechanisms bound together by necessity, affinity and historical coincidence' (p. 363). Epistemic culture describes the micro-practices of a bounded environment such as a science lab or, in our case, a control room, where PO and Twitter are actors taking part in knowledge production. Cetina highlighted the importance of not only studying the construction of knowledge but also the machineries of knowledge construction and the construction of these machineries (Cetina, 2007, p. 363). Here, the digital systems are explored as such machineries.

In policing studies, the concept of epistemic cultures has previously been applied to the study of investigations, to forensics and to the judicial system, highlighting knowledge processes driven by the production of evidence (Kruse, 2020; Machado & Granja, 2019). This article diverges from this perspective in two ways. First, we study the digital systems by conceptualising them as actors, and second, we focus on their role in operational and incident-driven policing in which the control room takes part. Control rooms could not exist without technologies, and the role of technology has been at the centre of much of the research on them (Lundgaard, 2021; Manning, 1992; Shearing, 1984). As technologies can be as ruling as the law (Jasanoff, 2004), understanding the role they play in policing is of vital importance. Hence, we focus on the impact not of humans or organizational structures but of technologies, highlighting 'the complex connections between platforms, the users that employ them, technologies that drive them economic structures that scaffold them, and institutional bodies that incorporate them' (Bowling et al., 2019, pp. 220–221). New technologies often promise efficiency and cost-effectiveness in policing (Ariel, 2019; Lum et al., 2017; Manning, 1992) and are linked to intensified management and the performance measures of personnel (Ericson & Haggerty, 1997, pp. 348–349), but they can also have both intended and unintended consequences embedded in them.

As the police have legal authority to range problems and situations and intervene in them (Bowling et al., 2019, p. 8), scrutinizing the basis on which they make their decisions is imperative. Technologies shape police practices (Günal et al., 2008; Hughes et al., 1994; Mcmaster, 2013; Manning, 1988; Shearing, 1984; Whalen, 1995; Williams, 2014), as do digital systems (Ericson & Haggerty, 1997; Williams, 2014), but what forms of epistemic agency exist within the technologies, and how do they shape knowledge? By approaching this issue using perspectives from actor network theory (Latour,

2005; Müller, 2015), the agency of non-humans, such as the technologies in question, can be explored, elucidating how they act, shape and define police knowledge production and policing.

Cetina presented the notion of knowledge cultures as a refinement to the idea of a 'knowledge society', which she claimed '[tends] to see knowledge as a component of economic, social, and political life" (Cetina, 2007, p. 370). With the notion of 'knowledge cultures', she turned this around, viewing economic, social and political life as part of particular knowledge cultures. Knowledge is not only a part of sections of society but also a force that shapes society at large (Cetina, 2007). This is relevant to our argument, since knowledge production is not necessarily restricted to bounded epistemic cultures. When the police use public platforms such as social media, they create passages to the public. Here, the knowledge created within the epistemic culture of the control room becomes part of knowledge production that appear on more distributed locations—what Cetina termed *macro-epistemics* (Cetina, 2007, p. 367). In the following, we use the concept *meshwork* (Ingold, 2008) to describe how complex entities come into being through control room practices—both how PO makes passages within the epistemic culture of the control room and how Twitter enables passages out into macro-epistemics, effectively creating a meshwork connecting different types of knowledge practices and logics.

The concept of meshwork is similar to that of *assemblages*, described by DeLanda (2016) as both the act of putting things together and the outcome of such acts, defining an assemblage as 'an ensemble of parts that mesh well together' (DeLanda, 2016, p. 1). Whereas Adams and Thompson's methodology referred to both these concepts, for the purposes of this article, we choose the concept of meshwork to highlight that knowledge and meaning come into being through interwoven passages between the actors in the control room and beyond, both human and technological (Ingold, 2008, p. 10). In this sense, the epistemic agency of the two systems can be discerned in the ways they create passages and move pieces of information within various police practices and between the police and the public sphere. As this article will show, these movements are not singular and linear but multiple and simultaneous, constituting a complex meshwork whose interwoven lines of movement constantly co-produce what gets status as knowledge. While the control room can be understood as an epistemic culture, the larger notion of 'policing' and 'the police' as part of society can be operationalized within the notion of macro-epistemics, whose centring objective might be defined as 'law and order' yet whose overarching meaning beyond this is continuously contested and redefined based on context. This distinction provides a contextualization of how the agency of the two systems has effects within the meshwork, as they provide passages within and between the epistemic culture of the control room

and the macro-epistemic culture operationalization of the police as well as outwards into myriad other macro-epistemics coexisting online.

Within policing, the two systems are clearly different. A major distinction is that PO is a police-developed system for internal police use and Twitter was developed by a large corporation and is used by 'everyone'. This distinction reflects the divide between the internal and external dimensions of policing, though these dimensions stem from the same practices in control rooms. Giacomantonio (2015) highlighted the borders within police organizations, showing how much police work is in fact invisible to external agents. Here, the two systems are representatives of the front- and backstage divide in policing (Sheptycki, 2017), where PO is indeed invisible to the public and Twitter is not. The divide is also visible in research on the police use of social media, where one can discern a line between the internal use of social media as a presentation of the self and its implications for community engagement (Bullock, 2016; Bullock et al., 2020; Goldsmith, 2015; Ralph, 2021; Wood, 2020) and how the dynamics of social media platforms affect policing from the outside, enabling the public to distribute their own versions of events or the police's version (Clark et al., 2017; Ellis, 2020; Schneider & Trottier, 2012).

The epistemic agency of the two systems is linked to ethical aspects of technologies in the police. Several dilemmas embedded in policing are also highly relevant in the socio-technical parts of policing, such as questions of transparency (Flyverbom, 2019; Kaufmann et al., 2018; Lundgaard et al., 2022), accountability (Chan, 2003) and biases, both in decision-making (Fussey et al., 2021) and in digital systems (Babuta & Oswald, 2019; Brantingham, 2018; Knox et al., 2015). The information in the systems end up having either an external or an internal role (Sheptycki, 2017), which Bowling et al. (2019, p. 32) linked to questions of accountability and oversight in policing. Essentially, normative and ethical questions originate at such a point that 'all relationships which have a power dimension are political, […] policing is inherently political' (Bowling et al., 2019, p. 15). Here, we show how such dimensions are embedded in digital systems, and in doing so, we draw upon Miller (2021), who pointed to a need for normative assessment of the values that arise from the materiality of technologies, emphasising that these 'values […] are so effective because they are often hardly empirically recognizable' (p. 59). Thus, an empirical examination of technologies is crucial to the understanding of policing and its dilemmas in a digital age.

3 A Methodological Approach: Interviewing Digital Systems

To explore digital systems as machineries of knowledge production (Cetina, 2007), we use Adams and Thompson's (2016) innovative methodological framework for *interviewing digital objects*. In line with the central argument from actor network theory, they emphasized the agency of both humans and non-humans (Callon, 1986; Latour, 2005; Law, 1986) and provided an outline for interviews with material and digital objects, rather than with the humans who use them. This article is based on such interviews with PO and Twitter by catching glimpses of their actions as they perform and mediate with and between humans in and beyond the control room.

The central difference between interview and observation as research methods is that as researchers, we treat material from interview as our interpretations of other people's experiences, while data from observations are our own experiences of interpreting a situation. In this sense, the interviews with the systems have parallels with database ethnography (Burns & Wark, 2020; Schuurman, 2008) but were conducted based on the researchers' experiences of observing the systems in previous research projects. This study builds upon Lundgaard's (2021) control room ethnography, where she studied the interactions of humans and technologies (including PO and Twitter) in decision-making processes, and Flinterud's study of the police's use of Twitter within its larger societal context (for more elaboration of the methods and practicalities of this research, see Lundgaard, 2021 and Flinterud 2022). In this article, we draw on our knowledge of these relations to highlight the agency of the systems. Here, we explore the PO training database that Lundgaard (2021) had access to and the guidelines for its use, and we draw upon Flinterud's (2022) computational analysis of police tweets and close reading of interactions on Twitter. The insights from these works were the basis on which the interviews with the systems were conducted.

Adams and Thompson (2016) proposed eight heuristics, all representing different perspectives and approaches, and each summarizes concrete questions to ask a digital object. They presented the heuristics in two sets. The first set of four allow for an analysis of the object. The first heuristic is to *gather anecdotes* by focusing on how the object came into being. The second, *following the actors*, highlights the relationship between humans and the object, taking the social surroundings into account. The third, *listening to the invitational quality of things*, focuses on affordances embedded in the object. Since it requires different data material, and it is not relevant for our argument, the fourth heuristic, *studying breakdowns, accidents and anomalies*, is not part of our analysis.

The second set of heuristics centres the object within the larger contexts and meshworks in which they work. Heuristic 5, *discerning the spectrum of human–technology–world relations*, connects the objects into larger meshworks, reminiscent of how Cetina (2007) described the relationship between epistemic cultures and macro-epistemics. Heuristic 6, *applying the 'laws of media'*, asks which human capacities the object mimics, and how, while heuristic 7, *unravelling translations*, draws attention to the connections and how an object creates and works within a larger context. This is closely related to heuristic 8, *tracing responses and passages*, which sheds further light upon meshworks and the movements within them.

We created an interview-guide based on the 28 questions following the heuristics. To use the classical interview method as an analogue, we began by performing interviews with the systems separately and then followed up with a comparative 'focus group interview' where both the researchers and the systems were present. In practice, the interviews were performed with a spreadsheet, in which the answers were systematized in rows following each question. The analysis was then developed through hours of discussion and co-writing, detecting overlaps and discovering aspects of conceptual similarities and distinction. The final analysis is presented in three parts, moving from the ground up by looking at the systems' individual histories, their affordances in use in control rooms and their role in the larger societal context.

First, we present the becoming of the systems and the context in which they function; second, we explore the systems' affordances; and third, we analyse how information from the systems flows through multiple meshworks, elucidating their epistemic agency.

4 Origins and Contexts

This part of the article presents the systems, their becomings, their development and the socio-technical meshworks of which they are part. When mapping these connections and relations, we use questions from Adams and Thompson (2016) as we *gather anecdotes* (heuristic 1) to describe how the two systems became part of the police control room and *follow the actors* (heuristic 2), presenting the main materialities and socialities surrounding them.

4.1 Becoming and Advances

PO and Twitter are both types of software but have come into being in different ways. PO is a computational system used by control rooms for call handling and dispatch that was developed for logging, overview and supervision and to help in assessments and decision-making during current and

planned incidents and operations. In the system, calls are registered and assessed and become police operations; information from multiple sources is assembled; and the control and overview of patrols and other police units are facilitated. PO is a quite an old computer system, first tested during the 1993 UCI Road World Championships in Oslo and then rolled out to the Norwegian Police during and after the Olympic Games at Lillehammer in 1994. Though there have been continuous plans for a more modern replacement, PO plays a decisive part in today's control room practices and is fully integrated into control rooms' work, such that it is hard to imagine how the tasks would be conducted without it. This co-production between humans and non-humans (Jasanoff, 2004) is emphasized because the control rooms in Norway have been merged and now manage an increased number of operations, consequently becoming even more dependent on the technology's assistance in providing oversight (Difi, 2019; Lundgaard, 2021).

PO has many functions and features that are described in its substantial, 215-page manual. It is a legacy system, an old system that continues to be developed because it fills a particular function in the organization, even if the technology in many ways is outdated (Cohn, 2019). Since the police's IT unit owns and develops the system, adjustments and advances can be the result of experienced needs of frontline staff and management as well as of organizational changes and technological advances. The changes may be new functions and checkboxes; tools for planning; altered connections with other computer programs, databases, or maps; or links to various communication technologies. Over time, PO has also become a massive registry, storing all previous incident logs, including information about the people, addresses and vehicles connected to these incidents. In doing so, knowledge has been constructed and stored. The information can be retrieved and used by the management for statistical and managerial purposes as well as by the control room, which often uses previous logs and searches for names, addresses and vehicles, looking for information that may be relevant to current incidents with scarce information. Prior records can be used as knowledge when they include addresses connected to previous operations as well as people who have been involved in high-risk cases or who are registered in numerous logs of a specific kind. This knowledge can be perceived as relevant or at times prove to be deceitful, since logs remain stored without any subsequent quality control (Lundgaard, 2021). These practices highlight PO's integration into the control room knowledge practices and disclose that the system is based on, and further materializes, existing police logics.

Twitter's development history is quite different. It was launched in 2006 during the second stage of the internet, Web 2.0 (O'Reilly, 2007), with the advent of more user-friendly platforms for communication and sociality, also framed as platform capitalism (Burgess & Baym, 2020; Srnicek

2017). Initially, it was intended for personal updates on thoughts and everyday activities and mostly used by people in the technology community (Burgess & Baym, 2020, p. 5–6). As it gained popularity, a choice had to be made about how to make the platform profitable, resulting in several changes towards platform capitalism (Srnicek, 2017). These were done by utilizing user data for commercial gain, almost completely shutting out the third-party developers of connected apps and centralizing platform development at the Twitter Corporation. From this point on, the development of Twitter depended on a balance between securing capitalist growth and keeping the user base content.

The control room in Oslo Police District started using Twitter in 2011, and the other districts followed. As the backdrop of this were changes to police radio communication systems, which went from using an open radio that anybody could listen to (albeit not legally) to an encrypted system, creating a perceived need for easily informing the news media. Today, the police's Twitter accounts have many followers and are well known among the public. Initially, the use was not regulated, but in 2018, a 28-page guideline for the best practice of Twitter use within the control rooms was introduced (Flinterud, 2022, p. 15). Through Twitter, the police established a passage to the public sphere for knowledge that had mainly been contained within the epistemic culture of the control room.

The fact that these two software systems are owned and operated differently is central to understanding their agency. While the police own and have developed PO, Twitter is a commercial enterprise over which the police have no power beyond that of a regular user. Where the development of PO is linked to the needs of the police's internal user base, Twitter balances several concerns, where *user* refers just as much to advertisers as to people with registered accounts (Zuboff, 2019). The police will never be in control of Twitter in terms of the interpretation or trajectory of the information they provide. And while PO operates within one defined epistemic culture in which the purpose of the system is relatively consensus based, Twitter represents an intricate meshwork where several macro-epistemic agents co-exist (Flinterud, 2022), since messages are distributed widely and extensively through algorithmic means, extending the mostly consensus-based PO into a sphere with multiple opinions about what exactly becomes known through the police's tweets.

The practical work of the control room is dependent on the production and use of 'information-knowledge' (Cetina, 2007, p. 368). The term describes an epistemic attitude where relevance is tied to a singular incident—an attitude necessary for performing the core tasks of the control room. PO's epistemic agency becomes visible in this context as a computer system where incidents are recorded and constructed and from which searches for archived information are retrieved to shed light upon

current incidents or are used for statistics and management. There is also another dimension here, in line with Cetina's argument, in that information-knowledge gets used up because 'usage changes the conditions of relevance for what counts as knowledge and information' (Cetina, 2007, p. 368). In other words, PO is an agent that assists in creating knowledge about current events, but its agency is also visible in retrospective knowledge production (Lundgaard et al., 2022).

Twitter has, as described, come into this meshwork from the sidelines. As used in the control room, Twitter is directed outwards, turning operations into publicly known incidents with specific intentions. The chief of operations, who decides when and what to publish, will often consider whether an incident is a purely private matter or if it is relevant to the public; if those in the vicinity should keep a distance or choose a different route; or if an incident is high on the agenda, such as to show that a certain matter, like hate crime or driving under the influence, is being taken seriously. Often, the wish is to inform news media and reduce their urge to call the busy staff, although messages can still end up generating calls. Thus, Twitter is used for efficiency, albeit possibly with the opposite result. The control room holds the power to define incidents and, to a certain degree, control what incidents are reported in the media. As incidents enter Twitter, their meanings translate into knowledge shaping public perceptions of police work in general that does not necessarily align with the police's perceived knowledge. Information-knowledge running smoothly through the systems of the control room and among those who read police tweets as a source of information can create friction when translated by critical agents. For example, privacy advocates may react negatively to information they believe can identify individuals or people critical of the current drug policies may react because a tweet states that someone has been detained due to the use or possession of drugs. This contrast between what happens to the same information in consensus-orientated PO and controversy-orientated Twitter highlights how the systems' epistemic agencies, namely their ability to create specific knowledge, are linked to their origins as systems in cooperation with human usage.

4.2 Socio-Material Surroundings

Technological systems are used in concrete contexts, and this section looks at the two systems' socio-material surroundings to understand how 'people, objects, ideas, discourses, and events gather and do as an assemblage', in line with the second heuristic of Adams and Thompson (2016, p. 40).

When one officer receives a call and creates an incident log in PO, the log can be read by police colleagues in the control room and elsewhere. A different control room officer can then assess the log and decide what actions to take, and the district's patrols can follow the log and get updated

information as they approach the incident. Once on site, they may also record new information. In PO, most registrations and logging are done by humans, though some information is also recorded automatically, such as telephone id (phone number or IMEI), the geographical location of emergency calls and various timestamps. The system also enables the retrieval and addition of information about persons and vehicles from several other registries. There are also some automatic connections out of PO, such as to maps and various internal police databases, but other passages are dependent on human actions.

Twitter, on the other hand, is an open platform on which anyone can register, post and interact. Here, the police are only regular users and have no impact on its software development or dynamics. The user base varies extensively and is not limited by organizational or geographical borders. When setting up an account, users are invited to define their identity and their intent. The company Twitter claims openness through an optional verification system, though it also opens for anonymity and identity play. On Twitter, police information is available to the public in more than one sense. As a system within the control room, tweeting is an informational practice. However, the epistemic agency of a tweet arises from its materiality as it makes its passage into the macro-epistemic meshwork, where the meanings it might acquire are decided by the entanglement of humans and algorithms and not by police authority.

PO allows and connects only internal police users, while 'everybody' can be connected to and use Twitter. This distinction is important for our argument; while PO establishes a homogenous police-internal meshwork, Twitter establishes one that is heterogeneous and extensive. PO and Twitter have a mutual starting point, namely control room practices, but as the information is sent into different spheres, the initial incident-driven practices end up creating different types of knowledge. In PO, police logics dominate, since the police itself has designed the system, and police officers decide what and how to record. On Twitter, power and exclusions are distributed, and impact is dependent on specific passages in the meshwork, sometimes resembling echo-chambers. Here, the police's power is limited to when, what and how to tweet, and the future life of a tweet is beyond the police's control. In sum, following the actors and exploring who and what is acting shows us that these systems become a significant part of the epistemic culture of the control room, and through them some actors become powerful and others not.

5 Affordances

In the first part of our analysis, the systems were presented, namely, their becoming, and their socio-material surroundings. In the following, we go deeper into the affordances of the systems. Affordances are qualities and possibilities presented by systems that influence how people engage with them and use them to engage with their environments (boyd, 2011, p. 39). In technologies, there can be intended inscriptions made by humans to ensure the desired use of the object (Latour & Woolgar, 1986), but they can also lead to unpredicted practices (Callon, 1990, p. 132). Focusing on affordances, we accentuate the epistemic agency of the systems by analysing micro-practices that arise in the use of the systems and also by exploring what the systems invite and discourage, what they enhance and what they render obsolete. This reflects Adams and Thompson's (2016) third heuristic, listening for *the invitational quality* of the object; the sixth, *applying the laws of media*, where they proposed mapping the human capacities that a system mimics; and also, in part, the fifth, *the mapping of the human–technology–world relation*s in which the technologies engage, which will be further explored in the final part of this article.

5.1 Micro-Practices and Human Capacities

The affordances of the systems are embedded in their designs and functions and can be seen in their associated micro-practices. The primary micro-practices are computer-based registering/writing and cognitive practices of categorizing and information reduction, that is, practices formed in the interaction of humans and technology (Srnicek, 2014). Micro-practices are also linked to questions of what human capacities the technologies enhance, extend or amplify as well as the opposite, that is, what they render obsolete and what human capacities are diminished, attenuated or forgotten (heuristic 6; Adams & Thompson, 2016, p. 65).

The police use PO and Twitter with the intention of producing information, albeit for different purposes. PO was initially a digital notebook for control room officers. In small control rooms with only one or two officers present and covering districts with fewer incidents, this meant that the information in PO was mostly an extract of the information in the minds of singular officers. Current control rooms are all larger than this, making PO a necessity to maintain oversight. PO has thus become what Srnicek (2014) called a cognitive assemblage, as computer apps make substantial amounts of knowledge collective and distributed, instead of being limited by the individual human brain (Srnicek, 2014, p. 45). By sorting and storing information, the system greatly extends human mental capacities and memory. This is structured in accordance with the perceived needs of control rooms. Thus, its categories and

functions are materializations of existing police logics, technological answers to articulated needs from users or management, making PO a contributor to framing operative policing, emphasising the institutional logics, needs and work methods.

Technologies are also managerial tools (Ericsson & Haggerty, 1997). Many of PO's functions and affordances illustrate how the police want the work to be carried out, with predefined categories and checkboxes that must be chosen of filled in a distinct order, while other parts of the system are flexible and allow for discretion and free text. As many calls initially provide limited and uncertain information, such flexibility is necessary. Here, the human actors, the police officers, become a defining part of the decision-making. In this way, one of PO's main affordances is *scaffolding,* that is, structuring and assembling the working processes and the at times messy information that the control room deals with as a way of 'offering to help frame thinking, intensify perception, or enhance action' (Adams & Thompson, 2016, p. 40). This scaffolding helps human actors sort and make sense of the various pieces collected by providing a structure. And, since PO is no longer only a notebook for current incidents but also a knowledge database that stores historical information that can also be used for analysis, evaluation and planning, it retains epistemic qualities. These changes illustrate the process through which the storage of information-knowledge belonging to the incident-driven practices of the control room becomes reused as more general knowledge in a different context. The move from singular to collective micro-practices is afforded by *retrievability*; that is, information is stored and made possible to recollect in current or later incidents, investigations and various managerial practices. In this way, retrievability not only enhances the work of the control room but also encourages the use of PO as a knowledge base for different purposes.

In the control room, most tweeting is done by the chief of operations. From the control room's point of view, its practice on this platform is seemingly over when the chief of operations sends a tweet into the Twittersphere, except for informative updates (e.g., tweeting that a previously missing person is located or that a road has been reopened aften a traffic accident). Twitter offers *informability*; it is a simple, open platform filling the police's need to inform the public. As a technology, Twitter enhances simplification, the ideal that a complex incident can be distilled effectively into just a few signs. Twitter's informability enhances the police's voice to the public, if not quantitatively (since most calls and incidents do not end up on Twitter) then qualitatively, in the fact that the police's presence takes up space in the public consciousness. The police's use of Twitter is thus a very police-like voice—loud and clear. In this sense, tweeting is a micro practice within the meshwork of the control room, but it is not integrated into the work of solving incidents. Twitter is not necessary for the primary work of the

control room but is used for its convenience in spreading short-form messages widely on an open platform, offering *spreadability* (Jenkins et al., 2013). This micro-practice requires a specific form of information reduction hinging on police discretion, but an inherent effect of spreadability is that the messages also become subject to interpretation on the receiving end. The recipients are not only curious human followers looking for information; tweets are also received by the platform's algorithms and distributed according to rules attuned to advertising needs (Flinterud, forthcoming). Those reading a tweet are not necessarily familiar or in agreement with the epistemic culture of the control room, and so what kind of knowledge the tweet disseminate becomes a matter of interpretation.

The police do not control who their audience is on Twitter, and here the epistemic agency of the platform becomes most visible. Its algorithms decide how a tweet is sorted and distributed based on rules that do not take the police's needs into account, removing the possibility of making the control room on Twitter work as a general information system or a notice board. Thus, even if informability is the affordance that draws the control room to use Twitter, spreadability most clearly describes the epistemic agency of Twitter as a public platform, as tweets are spread beyond the police's control. This fragmented reception elucidates the division between information and knowledge and the fact that knowledge in these processes should be seen as becomings, and not as fixed. From the incident-driven police's point of view, the content of the tweet equals knowledge, an understanding overlapping with that of the recipients looking for information. If the police tweet that a road is closed due to a car accident, people in the traffic jam reading the tweet can feel that they now have knowledge about the situation and its assumed trajectory. For those reading from a critical point of view, however, information does not equal knowledge. Should the police also mention that the driver is suspected of substance abuse, a critical reader of the tweet may read it from the point of view that the truthfulness of the description of the incident is subordinate to underlying values and ethics, such as a potential privacy breach actualizing assumptions of police indiscretion. As such, a tweet becomes knowledge not about the incident but about the police's values or attitudes. Through its spreadability, Twitter has the agency to turn information into different kinds of knowledge.

5.2 Invitational Qualities

So far, we have established that the agency of these two systems arises from different affordances, where scaffolding and retrievability are most central to PO and informability and spreadability are central to Twitter. A common aspect is that both technologies invite information reduction and, to a certain degree, categorization, that is, interfaces with boxes constructed to register a specific type of information. We now look at what it is that the systems invite their users to do.

PO invites users to turn into writing perceptions and oral stories told by callers regarding a situation. Lundgaard (2021) described this sensemaking process, where call handling means turning at times unclear information into written stories to assess and sometimes make into the subject for police intervention. Turning calls into information and information into action involves categorization and classification, a critical form of information reduction. In PO, there are checkboxes and existing lists of categories from which operators must choose, the most important being the categorization of the type of incident and the priority given. The categories vary; some are narrow and precise, such as 'fire in apartment building' or 'robbery in public place', while others are general and vague, such as 'control, person' or 'traffic, various'. Vague categories are often applied when the information received is uncertain. The categorization of the priority of an incident, resulting in PO placing an incident assigned high priority on top of the list of ongoing events, signals its importance to those monitoring PO (see Lundgaard, 2021, for more). The technology invites staff to choose between various categories, but at the same time, it requires choices. Free-text boxes invite officers to type freely, but this text is not categorized or sorted in any way by PO itself, consequently keeping the information in the background, while the categories stand out as short narratives of the incident and its importance. In practice, these free-text fields vary greatly, both because of individual preferences and capacities and because of the variation in the calls received (Lundgaard, 2021). There is no distinction between different data (e.g., between the content of a call, assessments made by the operator and the decisions taken), and though there is no barrier to writing down uncertainties, the design does not explicitly invite it. Some practices are therefore defined by individuals, teams and organizational factors, and the system allows for such practices. PO is a shared system that invites teamwork and information sharing aiming to construct a reduced, but mutual, understanding of the incident and the actions needed.

Establishing guidelines for the use of Twitter specifically in the control room setting indicates that the openness of the platform invites uses that are not compatible with the preferred public presence of the police organization (Flinterud, 2022, p. 15). Twitter as a platform was not originally created for dialogue and has had a long history of changes to accommodate the fact that people immediately started using it to talk to each other (Burgess & Baym, 2022). At the time the Norwegian Police became active on Twitter, in 2011, dialogue and debate were the main uses, yet the descriptions on the police accounts expressed their intent to *not* engage. There are now several functions in place to accommodate dialogue, such as the reply function, likes, the algorithmically sorted feed, personal messages and the opportunity to follow others, although the main tweet box itself does not automatically invite discussion. The police's Twitter accounts have many followers, yet they only follow a few accounts, mainly other police and public services and institutions, underlining that police Twitter

is not focused on dialogue and interaction with the public. By not relating to the algorithmically sorted feed where dialogue occurs, the police also abstain from relating to Twitter's invitational features for discussions and thus show that Twitter as a system also accommodates a pure informational presence. In isolation, the streamlined account pages of the control rooms appear to the reader as a neatly sorted notice board. This presence stands in stark contrast to the controversy that their singular tweets, severed from this neat presence by the algorithm, sometimes cause in the Twittersphere.

6 Messy Knowledge in Complex Machineries

So far, we have focused on describing the systems and exploring their affordances, emphasizing the importance of scrutinizing the agency of digital systems as co-constitutive of the epistemic cultures they are part of. In this last part of our argument, we move on to asking what kinds of knowledges the systems co-create and how such knowledge travels. We use Adams and Thompson's (2016) fifth heuristic, focusing on *the human–technology–world relations*, as well as their proposal for researchers to be *unravelling translations* (heuristic 7) and to *trace responses and passages* (heuristic 8) within the relations. Vital here is what happens with the information in the systems once stored and when the police operation is over. In other words, when the systems become machineries of a type of knowledge production not initially intended. Data from PO can form the basis for statistics, investigations and future incident assessments, while stories from Twitter can become part of public discourses on policing, crime and risk. Hence, the affordances of the systems have practical and ethical consequences.

Conceptualizing the systems as epistemic agents invites us to explore their roles in the movement of information, how they facilitate the spread of information that is translated into other parts of policing and society. They are both materializations of existing structures, and in turn, they structure information and information processing. As shown, there are multiple passages in the police systems, some automatic and some dependent on the acts of humans. The interactions between the systems and the humans using them are joined with things and events surrounding them, which in turn create new things, events and knowledge, albeit in different areas. PO draws operative policing together into one structure, where messiness and complexities become manageable entities. In PO, information is both collected and distributed, albeit, with a few exceptions, always within the borders of the police organization. In control room practices, there are passages between the control room and its technologies and other parts of the police. Police use of Twitter turns passages into macro-epistemics, where the control room's translations of complex incidents are spread as simplified messages that the

police will act and do what needs to be done, but where the subsequent life of the tweet is beyond the control of the police. When we explore these passages, we can also better understand the epistemic agency of the systems, distinct from that of humans, and how the logics embedded in them shape actions, decisions, discussions and ideas elsewhere at the other end of the passage. PO becomes part of the structured logics of policing and the police's narratives of the content of their work, and tweets become part of public opinion and debate. Thus, the systems and their affordances can shape societal understandings of incidents, policing, crime and risk.

Cetina (2007) emphasized that contemporary knowledge society is characterized not only by epistemic cultures but also by macro-epistemics, systems that enable distributed knowledge production. These are often dependent on digitally connective systems that distribute information across what has traditionally been seen as fixed boundaries but that are also part of the larger meshworks of knowledge production. Within the control room, PO has the agency to both spread information to the relevant actors in the organization and to collect information in the control room. These passages and lines of movement overlap and interact in creating information-knowledge about incidents, and as registered information, they later become potential passages co-constituting overarching processes. Control rooms' use of Twitter marks the passage from the control room to the public sphere. While the information from PO to Twitter is the result of massive information reduction, condensed messages move into a meshwork in which even a few words can take on significant meanings. Within the macro-epistemics of Twitter, the few words chosen can take on multiple meanings, depending on the contexts within which these meanings arise.

Within the epistemic culture of the control room, PO runs mostly as a smooth machinery, and translations (Callon, 1986) are hard to discern. To exemplify, in one observed incident, a woman called the emergency line and said her neighbour was working with a chainsaw, disturbing her children's naps. When she asked him to be considerate, he told her off while holding the running saw. She found him threatening; in the call, her voice was shaking. When recording the incident, the operator categorized it as 'noise' and gave it a low priority, and hardly any information was written down. Noise during daytime is not considered a police duty; therefore, no patrol was sent. As the written information was scarce, no one questioned why it was not categorized as 'threatening behaviour', which would most likely have resulted in a police response. Each act of registering, each search of the database and each connective signal making information available on the devices of the officers in the field contributes to giving a case a slightly new meaning or reinforcing an assumption, which is what Lundgaard and Gundhus (2024) called a *digital game of Chinese whispers*. When a control room

operator receives a call, its content is translated into text by a human, and this text is further interpreted by other officers. Since information reduction takes place during these processes, there is a risk that the various actors will fill in the gaps with their own experiences, assumptions and considerations. Should the information travel further, into investigations, intelligence analysis, statistics or elsewhere, the number of factors influencing the translations increases. To examine the translations requires close observation, as they are carried out by humans and technologies working within a similar police logic.

Twitter, on the other hand, is a disruptive platform on which translations are more apparent. As we have seen, tweets leaving the control room are significantly condensed, but they are then translated within a heterogeneous meshwork of recipients—some looking for concise information, and some looking to question or criticize the police. For example, when Oslo police tweeted that they were on their way to an apartment building due to what was described as 'a dry boil' [a kettle boiled dry], and then updated their message to say 'The smoke was caused by food preparation […] We found some drugs, for which charges will be pressed[2], the responses to the tweet showed that it had been interpreted in different ways. Some interpreted it a job well done, with a fire prevented and illegal narcotics confiscated at the same time. Others read it as evidence of police misuse of power, questioning if such tweets might deter vulnerable people from calling the emergency line in potentially life-threatening situations. While the control room uses Twitter to inform the public about events, the passage a tweet makes are decided by a complex combination of algorithms and humans with all sorts of intentions and expectations and translations into multiple knowledges, many diverging radically from that intended by the police (Flinterud, 2022).

The avenues that the information from the control room can take when entering Twitter highlight that these are not clear-cut, undisputable facts but epistemically loaded expressions. For knowledge production to be understood as *facts* and *objective information* strong enough to be presented in court, the police strive for a form for information constituted by an understanding that it is possible and desirable that they can confirm what *really* happened and that PO should help document facts. Within the macro-epistemics on Twitter, however, these meanings fragment. Hence, objective information has a specific meaning in the epistemic culture of the control room, which is not challenged by PO as a system because this system is produced by and within the epistemic culture that

[2] https://twitter.com/oslopolitiops/status/1513106894168248328

it in turn takes part in re-producing. However, when what counts as knowledge in this epistemic culture enters Twitter, the knowledge construction within the control room appears as consensus seeking, supporting the immediacy of incident-driven policing but omitting the wider effects of police acts. In this understanding, identifying the passages of police tweets in the meshwork of Twitter shows how the practice of tweeting might be seen as a democratizing oversight function performing reflective work that PO does not have room for. PO's epistemic agency reaches wide within the organization, developed in line with specific internal needs. Twitter's epistemic agency is open for the expression of conflicting opinions, reaching far beyond the intentions of the tweeter in the control room.

7 Concluding remarks

This paper has explored how PO and Twitter, two software systems used by police control rooms, play an active part in constructing and defining knowledge production among the police and in society. We argue that such systems have epistemic agency, that they structure and shape professional practices and processes of knowledge construction. This agency is a result of the systems' historical, organizational and practical origins and elucidates how the technologies can both challenge and enhance the epistemic cultures in which they operate.

The two systems reflect an important divide in policing, what Scheptycki (2017) called its front- and backstage, where information ends up having either an internal or an external career. PO is invisible to the public, and its affordances enhance and materialize police logics. Twitter's audience is the general public, consisting of actors belonging to distributed macro-epistemics, where the police knowledge produced in PO is translated on the basis of different logics. Thus, PO constructs an implicit agreement based on what operative policing is and how it should work. Twitter's agency, based on its openness, such knowledge multiple.

The differences arise from the systems' origins and development, their socio-material surroundings and their affordances and invitational qualities. Our exploration has shown how these aspects are also representations or normative and ethical dimensions in policing as such. Studying the systems can reveal classical dilemmas related to (lack of) transparency, embedded biases, accountability and trust issues, all central topics to contemporary policing. As Miller (2021) argued, although values arise from the materiality of technologies, we rarely recognize them as such, since they are embedded in the technologies in ways that make them less visible. Using Adams and Thompson's (2016) framework for analysing digital objects has proven to be a successful path to make these values visible.

One common aspect of the systems is that their life in policing may be coming to an end. For PO, the question of a much-needed replacement for the 30-year-old system seems to be ever-present and continually promised, although an actual replacement is yet to happen. Norwegian police plan to stop using Twitter and develop their own platform for sharing information. While this is a response to relevant concerns about commercial platforms, it is important to also ask what will change from such a move. The incorporation of a new internally developed system will introduce a new epistemic agency, most likely following the logics of PO more clearly than that of an open, independent platform.

Emphasizing the agency of specific systems is a way of highlighting the effects of policework, not only as enclosed machineries within epistemic cultures but as parts of a meshwork co-constituting knowledges that has ripple effects throughout society. While the presence of the police on Twitter is rightfully criticized, the platform's openness has also invited critical scrutiny of policing, highlighting that police logics might differ from public opinion. Although this criticism might not affect the police directly, the passage of police knowledge into the public has incited an increased awareness of policing.

As the police put new systems into use or continue to develop existing ones, the scrutiny of them is pertinent for researchers to understand contemporary policing. Due to their epistemic agency, it is crucial to explore and analyse these systems to fully understand what shapes policing as digitalization continues to be a driving force in society.

8 Literature

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