Article

A Closed Circuit Technological Vision: On *Minority Report*, event detection and enabling technologies

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Abstract

In a combined analysis, we investigate how the movie *Minority Report* can inform and nuance the vision of technological capacities that we identify in event detection literature. The vision in *MR* of an effective, pre-emptive and preventive technopolitics reflects important areas of event detection research, but it is also a vision for which the movie has become a common cultural reference. While they express similar conceptions of surveillance and technological potentials, *MR* also becomes a resource for discussing the broader 'techno'-culture of event detection, showing how surveillance systems are imbued with cultural assumptions and preferences, most notably that technology has strong enabling capacities. By juxtaposing *MR* and event detection research, we thus demonstrate that it is an important analytical task to understand the assumptions on which such systems are constructed, as well as their social and political implications.

Introduction

In a recent funding campaign, 'Because I am a Girl', the NGO *PlanUK* (PlanUK 2012) set up an advanced event detection system on a busy street in London. The system targeted advertisements on a screen at pedestrians, based on automatic detection of their gender as they passed by. The project received significant media coverage, often referring to the system as evoking a 'magical', or 'the future is here' moment (Morrison 2012).

As a research field, *event detection* aims to develop such advanced IT systems (not the least to improve on existing CCTV systems) so as to make them capable of detecting persons, things and actions in order to facilitate and make more efficient a machine or a human response. Event detection is thus concerned with optimising surveillance by improving and automating the execution of three tasks normally performed by security analysts who, according to surveillance technology engineers Hampapur et al. (2005), must

keep track of 'who are the people and vehicles in a space?' (identity tracking), 'where are the people in a space?' (location tracking), and 'what are the people/vehicles/objects in a space doing?' (activity tracking).

(Hampapur et al. 2005: 38)

Ideally, a computer system would be able to accomplish all three tasks. Currently, however, while computers excel at identity tracking and location tracking, they are equally bad at determining what people and things do and especially, *why* they do what they do. Perceiving activities and relating

information about them to ‘space’ and ‘identity’ in a meaningful way poses one of the most important current challenges to research in event detection.

As may be expected, *crime* receives a lot of attention in the field. Research goals range from designing algorithms and building systems for forensic purposes (Ballan et al. 2011) to developing systems able to detect future events and prevent them from happening. Several research projects and groups around the globe currently express this ambition, including *Intelligent Surveillance Systems* (ISS), a research group based at the CCIT centre, Queen’s University of Belfast (BBC News 2009). The explicit goal of ISS is to develop a system, which will ‘reduce crime and anti-social behaviour on public transport systems’ and even create a ‘sterile crime-free zone’ (Miller et al. 2010).

This vision of a crime-free space bears resemblance to how the sci-fi movie *Minority Report* (2001) (*MR*) depicts a future, murder-free society. Like in the field of event detection, and especially projects like ISS, identification, tracking, targeting, and preventive intervention are integral to the vision in *MR* of an effective, pre-emptive and preventive techno-politics, a vision for which the movie, in turn, has become a common cultural reference. As such, in *PlanUK*’s press release and the following media coverage, *MR* was indeed frequently referenced both as an illustration of how the system worked and, as mentioned above, to evoke a sense of awe and futurism; of sci-fi ‘about to become sci-fact’ (Morrison 2012).

In this paper, we explore *MR* as a resource for discussing event detection as part of a broader ‘techno’-culture of surveillance, research and development¹. Combining analyses of a fictional movie and of factual discourse in event detection research, this article is neither primarily a film analysis nor an analysis of the broader issue of event detection. Rather, we highlight particular aspects of *MR* in order to understand event detection; we investigate how *MR* can inform and nuance our understanding of a vision of present and future technological capacities that we have identified in event detection literature. Our claim is that *MR* and event detection express similar conceptions of surveillance and technological potentials, but when further scrutinised, *MR* also provides an expansive set of commentaries to such conceptions, in contrast to how the movie was invoked in relation to *PlanUK*. Often, *MR* is read as a (dystopian) representation of (inevitable) technological innovation. Like *1984*, *MR* can be understood as a cultural artefact warning against a totalitarian state-industrial-military complex. For better and for worse, this makes it another ‘yardstick by which to measure how we live now and where societies are heading’ (Marks 2005: 236). As an alternative to this type of reading, we suggest that in particular two aspects of *MR* add complexity to our understanding of a current cultural imagery across popular culture, event detection and technological R&D.

MR can help us understand the assumptions on which such systems are constructed, as well as their social and political implications. Furthermore, it enables us to discuss how to analyse new forms of interaction between humans and these highly advanced—to most of us literally impervious—technological systems.

This paper is structured as follows: First, we briefly discuss how Surveillance Studies may engage with popular culture. Second, we present previous readings of *MR* as well as our own, where we pay special attention to, first, the movie’s depiction of the hybrid, conglomerate nature of the surveillance system and second, how the movie discusses the relation between ‘knowledge about the future’ and ‘the present’. Following this, we bring our reading of *MR* into play with important ideas in event detection literature, particularly the aforementioned ISS project that aims to use event detection to create crime-free zones. We end the paper by discussing event detection as an expression of a dominant Western conception of technology as *enabling* (Strathern 1996), most noticeable in its circular or self-referential appearance.

¹ For a discussion of possibilities and limits of using a popular cultural artefact as a ‘lateral’ (Maurer 2005) or ‘inter-reflexive’ analytic device to understand aspects of an ethnography, see (Gad 2012). In this case we deploy *Minority Report* not because it emerged directly from the field event detection, but because it assists reading empirical material on event detections as expressions of a (techno-) culture.

Popular culture and Surveillance Studies

In research fields like media studies or aesthetics, popular cultural artefacts (e.g. fiction, movies, television) are generally considered useful analytic devices for diagnosing contemporary society, practices, mentalities etc. Even though popular cultural artefacts might have a more ambiguous status in Surveillance Studies, they may also benefit from such analytical readings of popular culture (Hansen 2009, Pold 2010), not the least because popular cultural products and common conceptions of surveillance ‘feed off and inform each other increasingly in a media-saturated environment’, as David Lyon states (2007: 157). In a similar vein, Gary Marx argues that experiences of surveillance are partially (in)formed by popular cultural artefacts, which in turn can teach us about the experience of surveilling as well as that of being surveilled (Marx 1996: 193). In so far as cultural products influence how people interact with ‘real’ surveillance, ‘a particular challenge [for Surveillance Studies] lies in linking the cultural images of surveillance to social, political, economic, and technical factors’ (1996: 194f).

The circulating, anticipative and experiential effects of popular cultural products make them interesting. Yet, the generative aspect—that they may be translated into political agendas and technological R&D through which they circulate further—makes it increasingly relevant to investigate both ‘what sorts of surveillance are portrayed in [popular culture...] and [...] how popular culture influences surveillance’ (Lyon 2007: 142). Such work could obviously include reception analysis and ethnography, but also revisiting, re-specifying, contextualising or repositioning influential cultural images of surveillance. For instance, Lyon describes Orwell’s *1984* (Orwell 1949) as ‘a worst-case scenario against which other, less dire, situations are measured’ (Lyon 2007: 142). Culturally speaking, *1984* is characterised and positioned through its analytic and communicative qualities; it may shape discussions of the dangers of developing a totalitarian state, including how to avoid it, but the broad cultural reception of *1984* suggests that it could work as a circulating societal imaginary or ‘a beacon’ in such discussions.

The benefit of analysing the popular in order to acquire some analytic distance from *too* literal interpretations of *1984* or other dominant images of surveillance, such as Jeremy Bentham’s *Panopticon*, is also pointed out by surveillance researchers Albrechtslund and Dubbeld (2005). In our view this analytic move is important in so far as it opens up new directions for research and sensitises our concepts towards the empirical (Blumer 1954). If scrutinising popular cultural products can aid in gaining an analytic distance from the ideal types and common cultural images of surveillance (e.g. in the way popular cultural products dramatize and exaggerate them), this could potentially also add needed complexity to public discussions of surveillance practices and phenomena.

A recent edited volume in *Surveillance Studies* investigates the dramatic expansion of CCTV use around the globe (Doyle, Lippert and Lyon 2012). Two contributions demonstrate that an important aspect of this growth is the development of ‘smart’ or ‘intelligent’ CCTV-systems (Ferenbok and Clement 2012, Lippert and Wilkinson 2012). As suggested in the present paper’s title, we identify a kind of ‘self-referentiality’ inherent to this development: despite being almost already a thing of the past (Ferenbok and Clement 2012), the belief in the preventive capacities of *closed* circuit television is still alive even if many argue that it is flawed (Gill and Spriggs 2005; Doyle, Lippert and Lyon 2012: 2). Indeed, the current development of ‘smart’ CCTV and event detection highlights how deficiencies in current technological systems easily become translated into design potentials and new investments (both cultural and monetary). In this sense, the technological vision inherent to CCTV development can seem almost self-propagating, or ‘closed circuit’. It is the aim of the paper to investigate this through juxtaposing ideas in event detection literature and *Minority Report*. Yet even if *MR* is often used to invoke a sense of an automated and effective surveillance system, in our view the movie could also be interpreted in additional ways.

With these points in mind, we now present some readings of *Minority Report* and our own. Following, and based on this reading, we will engage with selected themes in event detection research. As we will claim,

it is possible to interpret *MR* as an illustration of the *impossibility* of controlling the future, precisely because any envisioning is a result of complex, non-determinant procedures and because envisionings may influence the very future they present (MacKenzie, Muniesa and Siu 2007). Thus, however, the movie also illustrates that it may only become more important to understand such visions as they do indeed influence which futures it is possible to imagine and thus construct.

Minority Report: plot and scholarly readings

Minority Report is based on Philip K. Dick's short story (Dick 2002 [1956]), as are several other popular dystopian movies: *Blade Runner* (1982), *Total Recall* (1990) and *A Scanner Darkly* (2006). In our view, Dick's fictional universe could be characterised with the term 'ontological uncertainty'; basic things like 'nature', 'reality', 'humanity', 'technology', or 'sociality' are ambiguous and prone to change in meaning. In *MR* such an uncertainty forms the backdrop of a story that poses several questions without answering them.

As mentioned, *MR* depicts a future murder-free society. A special police unit, the 'Precrime-department', maintains this state of affairs. 'Precrime' (which both means 'before crime', cf. pre-, and is an acronym for 'prevent crime') is an organisation of humans, part-humans and technologies able to predict and prevent murders from happening. The plot initiates when the police chief of Precrime, John Anderton (Tom Cruise) is identified as a future murderer. Throughout the movie he struggles to prove his innocence while his former colleagues seek to apprehend him.

Among other things, the depicted system is dependent on the ability to locate every citizen at all times and for this purpose identification and tracking technologies are ubiquitous. Iris-scanners, which are also used for commercial purposes, are everywhere. Society is depicted as bleak and controlled, although by whom is not quite clear. *MR* depicts a range of potential uses and conceivable dangers of intense, high-tech surveillance, and the movie has indeed been interpreted as illustrating a variety of ethical, sociological, philosophical, political and aesthetic themes.

Depicting a situation where criminal intent is *all* that matters, *MR* has been interpreted as a philosophical exercise (Friedman 2003; Huemer 2010) and as an illustration of important issues in law and criminology, such as constitutional rights or the weight of 'intention' and 'action', respectively, in contemporary sentencing. Both Capers (2009) and Lyon (2007) connect *MR*'s success to the aftermath of 9/11. Capers argues that *MR* prompts critical thinking with regards to the ways in which law and law enforcement have already become messy practises. Lyon further argues (2007: 149) that the interplay between surveillance and pervasive brand placement in *MR* portrays a future 'hypermarket' facilitated by means of massive surveillance and registration (see also Elmer and Opel 2006). In this sense, *MR* depicts a Kafka-esque society where it is impossible to know who exactly is in charge (the state, the market, huge corporations, the military, or a mix of them all), and where 'consumption' and 'security' are inseparable (see e.g. Kammerer 2004).

Shapiro (2005) also relates the popularity of *MR* to contemporary far-reaching surveillance initiatives (see also Stückrath 2011) seeking to manage populations and 'foresee' actions through scrutinising huge streams of data. Bigo (2006) argues that especially problematic is the belief that 'the Intelligence services has a grammar of "futur antérieur"' (2006: 61), which leads current politics to become a 'world of fiction' where technologies are consistently seen as incontestable and reliable, even if technical methods like 'profiling' are easily questioned as reliable means for predicting behaviour.

That even a totalitarian state produces possibilities of resistance is another way of understanding *MR*. Kammerer interprets *MR* as a vision of the infallibility of technology because it only problematizes human faults and (mis)interpretations (Kammerer 2004). In Kammerer's view, Anderton only overcomes the system by completely trusting it, by 'uncovering its inherent antinomies and contradictions' (470) (see

also Novell 2009). Conversely, and following Deleuze's analytic/diagnostic move from 'disciplinary societies' to 'societies of control',² Shapiro (2005) argues that when he acquires a new set of eyes in order to subvert the surveillance system and flee, Anderton evolves from being a suborned body controlled by the state apparatus to becoming a subversive body. However, Novell (2009) argues, an essential condition for Anderton's flight is that he was a key component of the system and thus knows exactly how it works. Following *MR*'s focus on the power of (controlling) vision, the movie is also seen as an argument that we need to be critical of the very act of seeing (Friedman 2003, Schwartz 2011).

Comparing *MR* to the panopticon, Elmer and Opel (2006) argue that *MR* reflects the ethics and politics in a 'survival society' based on pre-emptive management and control in which a predetermined inevitable future 'requires military and police action' (2006: 144). Referring to the 'surveillance surge' after 9/11, Murakami Wood situates Dick's oeuvre in the McCarthy era that also staged future events as inevitable unless the police took pre-emptive action. As Murakami Wood suggests, by being 'an unorthodox and anachronistic mixture of old, new, and yet-to-come; existing, possible and imagined' (Murakami Wood 2009a: 49), Dick illustrates the ambiguity or hybridity of past, present, and future in any such future vision. Murakami Wood further describes Dick's oeuvre as a predominantly metaphysical project, however also as a critique of 'surveillance society' (Murakami Wood 2009a: 49, 57). To Murakami Wood, Dick's works present a much stronger social critique than is found in the concerned discussions of the supposed 'invasion' of privacy; even if *MR* is routinely referenced here (e.g. Weber 2006).

As is evident from above, *MR*'s way of depicting a future society of preventive technologies has been analysed in many ways with respect to the way it depicts a society pervaded by technologies and politics of surveillance. In the following, we discuss two themes in *MR* that we find particularly important when discussing the field of event detection. The first is an illustration of prevention as the achievement of a complex assemblage of humans, semi-humans, and technologies.³ The second theme is how the movie discusses the relation between the present and knowledge-about-the-future. How does knowledge about the future affect the present and hence 'itself'?

*Precrime: a hybrid assemblage*⁴

As mentioned, even if *MR* is often used to invoke a sense of or a discussion of an automated and effective surveillance system, in our view the movie actually tells a somewhat different story. The opening scene depicts how the Precrime system works as a very specific combination of competencies, distributed between humans and technologies, which enable it to foresee the future and act accordingly. The prediction system is a composition of several interdependent parts and processes: (1) three super-sensitive and heavily drugged individuals called pre-cogs or oracles able to foresee future events, (2) a computer able to sort the oracles' visions and identify when a murder will occur as well as the name of the perpetrator and, finally, (3) policemen working in a special control room where they interpret the images presented to them by the computer.

In the opening scene, police chief John Anderton (Tom Cruise) is summoned by an alarm announcing an upcoming murder. Using the images provided by the oracles, the computer has determined that a man will inevitably kill his wife upon discovering her extramarital affair. Anderton rushes to the control room and begins interpreting the images presented to him by the computer. Provided with the name of the murderer and the time of the murder, Anderton's job is now to locate the future crime scene. The scene cuts back and forth between Anderton piecing together the clues in the control room and his team hurrying towards

² Societies of control are based on modulation, coding procedures, and databases, rather than disciplining subjects in Foucauldian 'enclosed spaces' (Deleuze 1992).

³ Our approach draws its inspiration from empirical philosophy (Mol 2002) or 'post Actor-network Theory' (Gad and Jensen 2010, see also Gad and Lauritsen 2009).

⁴ See Haggerty and Ericson (2000) for a discussion of surveillance as Deleuzian assemblage.

the crime scene. The scene peaks narratively, when Anderton grasps the husband's arm at the exact moment where he is about to murder his wife with a pair of scissors. During the nerve-racking scene, Anderton interacts smoothly and elegantly with the precrime computer but he also draws on his cultural knowledge: he notices that the house of the murder has a certain architectural style, which puts him on the track of five rare identical neighbouring houses. Just a few seconds before the murder would be committed, the computer, in turn, helps him decide which of the five houses to enter.

This scene illustrates how the prevention succeeds as a result of a complex interplay between humans, semi-humans (the oracles) and nonhumans, and as such the preventive system is a hybrid form. The oracles even personify the hybridity of the system. Constantly under the influence of heavy sedatives, and permanently hooked up to the computer system, their ability to foresee the future, we learn, is due to their mothers' drug addictions. The oracles thus embody a kind of hypermediated immediateness: they intuitively see future events because they are both technologically mediated and uncultivated—they are explicitly portrayed as hybrids of nature and (techno-) culture, hybrids that are again part of the larger assemblage, Precrime.

In Precrime, technology thus only makes sense because it is integrated with the hyper mediated intuition of the oracles as well as with the policemen's cultivation. Precrime works in so far as computers, humans and semi-humans are simultaneously able to make use of each other's competencies. It is thus precisely as a specific composition of humans and technology that Precrime and its mystical, effective and augmenting effect emerge. However, responsibility and accountability are still ascribed to humans only, while technology is depicted as neutral, as exhibited in the following dialogue:

Anderton: There hasn't been a murder in 6 years. There's nothing wrong with the system. It is perfect.

Critic: [simultaneously]—perfect. I agree. But if there is a flaw, it's human. It always is.

(*MR* 0:26:31–0:26:39)

In *MR*, prevention is a complex event produced by the interplay between humans and technologies, while both are bestowed more traditional roles in terms of accountability of the preventive measures and their consequences.

Present future(s)

As mentioned, the plot of the *MR* initiates when it is announced that Anderton will become a future murderer. Since Anderton does not know the predicted victim, Mr Crow, he immediately develops a conspiracy theory, animating him to flee in order to find Crow and unravel the conspiracy.

Halfway through the movie Anderton finds Crow in a setting identical to the one revealed to him in the prediction. Present is also one of the oracles, Agatha, who Anderton kidnapped when he discovered that she had delivered a 'minority report', a foresight different from the other two oracles, according to which Anderton will not commit murder. Yet, face-to-face with Crow, Anderton realises that Crow may be responsible for the disappearance of his son six years ago. As predicted, Anderton thus decides to shoot Crow, but Agatha convinces him that he has a choice not to. However, Crow wishes to be killed because he has been promised that his family will then be taken care of, and he unexpectedly grasps Anderton's hand holding the gun thus shooting himself. On the surface, the event thus appears identical to the prediction.

The scene thematizes if an individual can influence the future, particularly what happens when knowledge about the future emerges in the present, while leaving this question open for interpretation. On the one hand, we witness that Anderton, in spite of his choice not to kill Crow, is implicated in his death, so the outcome of the situation is exactly as predicted. On the other hand, we experience developments in the

Anderton character: as new pieces of information are added, his understanding of the situation as well as his range of possible actions change. Through realising that he is not the only one making choices, these actions teach Anderton (or the viewer) that an individual may to *some* extent influence the future even if it has been foretold. By understanding that the meaning of a foreseen future is not determined, Anderton is thus socialised. The complex relationship between the foreseen and its actualisation is—as we described at the beginning of the article—mirrored in event detection where identification and location tracking makes it possible to anticipate events, while the *meaning* of these activities remain opaque, ambiguous and open for unforeseen interventions by other actors.

The movie also claims that predictions may have important performative effects in the present regardless of whether they come true or not. This is epitomised in the final scene of the movie where the director of precrime (Max von Sydow) is exposed as the mastermind of the conspiracy in a dual attempt to strengthen Precrime and cover up a murder he has committed himself. As he is about to shoot Anderton, the murder alarms go off and Anderton uses his newly acquired insight to present to the villain an impossible predicament: if he chooses to commit the murder as predicted, he will save Precrime but he will be arrested. Yet, if he chooses not to shoot, Precrime will be terminated because the system cannot be allowed to fail in a prediction, not even once. Choosing a third option, the villain commits suicide, proving both that people do have a choice and that the prediction system is fallible.

This scene underlines how the outcome of any given situation is dependent on what information is presently available (to whom) and how this information is trusted. It also highlights how adding even small pieces of information may change the whole picture (as any crime novelist and reader surely knows). Thus the predicament depicted by *MR* resembles what political scientist and psychologist Herbert Simon named ‘bounded rationality’ (Simon 1991). According to Simon, individuals act rationally but their choices are always conditioned by their limited knowledge. *MR* depicts how even very limited new information about the future can be decisive even if the future is only superficially or imprecisely predicted—if the information is trusted, there is no need for details and rigour. Furthermore, the future and the present are presented as a hybrid conglomerate, or as described by Murakami Wood, as an ‘anachronistic mixture of old, new, and yet-to-come; existing, possible and imagined’ (Murakami Wood 2009a: 49).

MR thus also depicts how information is never neutral and often hard to refuse (Strathern 1999). In relation to surveillance this raises questions regarding the infrastructures through which information is shared (or not) and regarding the principles of this sharing. In *MR* it makes a huge difference that Anderton acquires knowledge about his *own* future compared to the way he dealt with information about other predicted perpetrators, who he hunted down without ever questioning the system. On the one hand, *MR* supports a view of preventive surveillance technology as inhabiting a kind of self-fulfilling prophecy as Anderton is hurled into the series of events only because he gains access to the prediction. On the other hand, the movie seems to claim that gaining knowledge about the future is exactly why a prediction can be (partly) avoided.

In relation to new surveillance systems, *MR* underscores that it matters how a surveiller may or may not share knowledge about possible futures with potential criminals and not least how authorities picture what kinds of ‘intentions’ one can read out of citizens’ ‘actions’. New event detection systems can be imagined through the lens of *MR* to facilitate a range of policy strategies, ranging from straightforward entrapment to ‘teaching citizens to behave’ before they cross the line.

Event detection

Based on this reading of *MR*, in what follows we discuss some themes at the intersection between surveillance and event detection. Although, as Ballan et al. (2011) have pointed out, the research area of

event detection encompasses a wide range of fields (from the use of sensors in interaction design, over surveillance, to technology assisted wildlife preservation (Al Machot et al. 2011)), the majority of event detection research is concerned with crime and surveillance.

With event detection, a (perceived) growing need for security often figures as the primary argument for developing new technologies. In some papers, societal needs for security and imagined future technological capacities are explicitly depicted as research goals and challenges, while in others these are stated as matters of fact in order to argue for exploring, for instance, abstract problems in visual data analysis. Two arguments for prioritising research in surveillance technologies frequently reoccur: event detection research is, firstly, depicted as a strong response to a growing demand for more efficient surveillance because, secondly, technology in the field is rapidly becoming cheaper and more accessible (see e.g. Ma, Liu and Miller 2010, 2011 and Kieran, Weir and Yan 2011). For instance, Kieran, Weir and Yan stated that ‘with the coming of the 2012 London Olympics, surveillance will play a much more crucial role than ever before in the UK’ (Kieran, Weir and Yan 2011). While this statement is not controversial in itself, it seems to rely on a underlying premise—that surveillance will make the event safer and therefore we need to develop even more technologies that can be used in future events.

As mentioned, in the ISS project the ultimate goal is to create ‘a sterile crime-free zone’ (Miller et al. 2010). The researchers in ISS publish extensively at conferences like *Advanced Video and Signal Based Surveillance*, focused on exploring technical solutions for surveillance (such as sensors, signal processing, data management and biometrics). According to the website for the research centre, the finished system will represent ‘a quantum leap in capability [that] will greatly increase the likelihood of offenders being caught, a major factor in crime prevention’ (CSIT 2009b)—the premise obviously being that crimes will be prevented when potential perpetrators realise that they will inevitably be caught. Many other papers on event detection systems feature equally strong visions. The purpose of event detection can thus be envisioned as anything from making public transport by bus safer, as in the ISS project, to no less than an important part of the Global War on Terror (Gupta et al. 2011).

Related to our reading of *MR* we will discuss three interconnected aspects of event detection and the ISS project. First, we will highlight the composite nature of event detection; how event detection is also, like the Precrime system in *MR*, a hybrid achievement. Second, we notice how the field imagines that information about the future can be used to affect the present. Finally, we will discuss the ‘self perpetuating’ ‘closed circuit’ vision of technology with always *enabling* capacities, a vision which can be seen as expressed both by *MR* and the field of event detection.

1: A surveillance assemblage

Event detection systems are often described as composed of three parts (sensors, algorithms and humans) that contribute with different competences: *sensors* sense visual, heat, sound and location. *Algorithms* calculate and classify—based on either scenarios (Piciarelli and Foresti 2011, Medioni et al. 2001) or probabilistic abnormalities (Piciarelli and Foresti 2011). *Humans* are presented as capable of assessing, reasoning, and combining the information provided. Often, a system will contain several layers of technology calibrated to alert a human operator when perceived necessary (e.g. Hampapur et al. 2005, Medioni et al. 2001).

One main problem is that the same type of event can occur in many different ways, making its recognition a difficult task (Piciarelli and Foresti 2011). Furthermore, as (Ballan et al. 2011) state, every system is highly domain dependent and calibration to the context is crucial: cameras need to be attuned to their environment, humans need to learn to operate and ‘sense’ the system and the event detection algorithms are required to be domain specific—they need to be ‘trained’ as parts of a specific setup in order to work as intended.

This difficulty in constructing a well-functioning event detection system also has to do with issues of generalizability and robustness, a relatively well-addressed problem in relation to the design of surveillance systems: for a computer, it is difficult to couple real-world actions with symbolic scenarios and vice versa (Medioni et al. 2001, Ko 2008). Researching automated action recognition, Marszałek, Laptev and Schmid (2009) demonstrate this point by using the same descriptive algorithms on, respectively, real-life datasets and movie scenes. Ballan et al. (2011) conclude that the study shows that ‘descriptors trained over Hollywood movies dataset do not perform as well on videos of the real-world dataset and vice-versa’ (Ballan et al. 2011: 287). This also means that it is very difficult (if not impossible) to ‘train’ these systems in settings that differ from the actual, particular setting in which they are to be deployed. In this way, the systems are very fragile and sensitive to changes in what they are supposed to measure.

Finally, the physical features of technology constitute a problem in the creation of a well-functioning assemblage: in order to be useful in a real-world situation, surveillance technology must be small, cost-efficient, and use as few resources (bandwidth, power) as possible (e.g. Al Machot et al. 2011). The ISS project reports that every bus is likely to contain 18 cameras and several microphones (Miller et al. 2010). For a system like this to make sense beyond the laboratory, technology needs to be cheap and durable.

Similar concerns appear in *MR*, although in the movie many of the current technological deficiencies have been solved: the technical side of Precrime functions because of the department’s access to technologies that can be deployed everywhere. Unlike in current event detection research, in *MR* everything works smoothly and we never see that the technical side needs to be calibrated; eyes are smoothly scanned everywhere, people are automatically identified and all automated agents or drones do their job correctly and efficiently. However, the technology still relies on other competencies like the pre-cogs and human police officers, and thus it still struggles with figuring out the meaning of people’s actions. Even in *MR* there is an underground market for cheating the system (cf. Anderton’s new set of eyes), so in this highly controlled society human police officers are still needed to provide those competencies that computers do not deliver.

Although it is not always explicitly addressed, in event detection—like in other areas of research and development in technology—there is a constant renegotiation of what counts as human and technological competencies. The surveillance assemblage is dependent on both humans and technology but the relationship between the two changes when they or the surroundings change. In *MR*, the relationship between the three parts of Precrime seems to be stable until Anderton is called out as a potential killer and the subsequent actions bring forward the problems of the system setup. So in *MR*, as well as in systems like ISS, the roles in the relationship are less fixed than it would seem. In order to understand the event detection field we thus need to revise any conception we might have of humans and technologies as entities that belong to two separate domains. In dealing with this topic, both philosopher of technology Don Ihde (2002) and actor-network theorist Bruno Latour (1994) point to a well-known controversy, which in an American context is related to the question of the legal possession of weapons: do guns kill people (technological determinism) or is it people who kill people (social determinism and technological instrumentalism)? Neither Ihde nor Latour believe that technologies are autonomous or neutral but they do not propose that humans are in control of technology either. Latour suggests that compositions of humans and technologies equal the emergence of new actors with new capabilities, which they do not possess by themselves. Similarly, Ihde suggests that technologies are multi-stable (see Ihde 2002: 106ff); according to this understanding, a gun can become a hammer, a decoration on the wall or a deadly object (see Gad and Jensen 2009), all depending on the way its affordances as an object are perceived and used in a given situation.

Following this, our reading of *MR* clarifies that when it comes to understanding event detection we also need to pay close attention to how competencies are conceived and redistributed between people and things in future surveillance systems.

2: Information of the future as performative in the presence

Another central theme in *MR* is the question of how a prediction might change future events. What are the effects of new knowledge: will it make the projected future more or less possibly, likely or inevitably to happen?

The idea of being able to change future events by predicting them is central in event detection research where many seek to develop CCTV to become an active agent instead of a passive recorder. Words like preventing, predicting, influencing and changing are used whenever a paper talks about using surveillance technologies proactively. In 2007, there was still a long way to go, according to Dee and Velastin (2007), who surveyed research on event detection and concluded that ‘much remains to be done in [...] building systems that could make sense of human behaviour’ (Dee and Velastin 2007: 340). This was already the situation in 2001, where Medioni et al. (2001) aimed to make a semi-automatic prediction of the future: ‘The ambitious goal here is to automatically process video streams [...] to infer whether they present a threat that should be signaled to a human operator’ (Medioni et al. 2001: 873). And it is still the case in Wiliem et al. (2012) who, through ‘proposing an automatic suspicious behaviour detection’, aims to solve the problem that ‘existing video surveillance systems are still not at a stage where they can be used for crime prevention’.

Several projects in event detection work on expanding the capabilities to, among other things, ‘detect hostile intent’ (Ko 2008: 1) in order to see ‘patterns of activities or events, for standoff threat detection and prevention’ (2008: 7). Coetzer, van der Merwe and Josephs (2011) argue that ‘Proactive decisions, such as pointing a camera, or sending security personnel to the right location in time, can be made, saving precious minutes or even seconds that could just give the upper hand’—a phrasing that reminds us of the opening scene in *MR*. Kieran, Weir and Yan also use words like predict, influence and prevent for the aims of their research and state that ‘our future work will be to automatically [...] prevent any unwanted (or antisocial) events from happening’ (2011: 12).

None of the papers, to the best of our knowledge, go further into details with regards to how, where and by whom these interventions would be made. What they would mean for the about-to-become perpetrator, for the operator, or for society as a whole is very rarely, if at all, discussed in these papers. It is, however, in itself interesting that all state that undesired events could be prevented if only the automated systems were smarter and able to predict behaviour, but only very few of the papers suggest solutions as to how that would be done. One exception to this rule is the ISS project: all papers have well-described scenarios that at least address how it would be possible to intervene in developing undesired events (e.g. Ma, Liu and Miller 2011). Yet, even here one could argue that the underlying assumption is that above all, the about-to-become perpetrator is a *rational* actor with whom you can reason.

Like other event detection projects, the ISS project argues that using event detection as an active agent will change the interplay between surveillance technologies, surveillance staff and possible offenders: ‘by alerting security analysts in real-time so that they can stop or prevent the undesirable behavior’ (Miller et al. 2010). One of the ways of detecting potential emerging criminal behaviour is through analysing live streams from cameras and setting system alarms based on indicators such as ‘a person falling’ or ‘a group of young men loitering’ (Ma et al. 2009: 385).

The ISS project suggests that a two-way audio-visual link should be mounted in buses so that detected potential criminals can be alerted to the fact that they are under surveillance before they proceed to actually commit a crime (Miller et al. 2010). In contrast to *MR*, ISS seems to view potential perpetrators as

humans with a choice, rather than as ‘suspects’ who have to be surveilled until they inevitably make a mistake (Ma et al. 2009). However, it is also possible to understand the vision of the two-way link more narrowly as part of a general effort to make technology as effective as possible. Regardless, in event detection, like in *MR*, it seems pivotal to determine who is in control of information and what the principles are for sharing it. The ISS project imagines that the information obtained should be used in a benevolent manner, but it is easy to imagine how such supposedly trustworthy information might be used in a range of other ways for other interests. What if an individual was mistakenly identified and subsequently called out as an offender on a public bus? How would that affect the bus in that situation and the individual in other situations?

One of the aspects addressed by *MR* is that the future is principally open-ended—*especially* when or if we are given access to information about possible outcomes and consequences of what we are about to do. From this perspective, it is imperative to discuss how these (automated) preventive technologies work in concrete situations.

To us a paradox appears: on the one hand the systems are imagined to change the present (people’s intentions) by anticipating the future (because we know your intentions and who you are, we assume that you will stop your criminal behaviour). On the other hand this regulation of the present is dependent on the fact that the future/present unfolds as foretold by the system. This means that ‘the future’ is both the system’s conditions of possibility (anticipating criminal acts) and its ‘conditions of impossibility’ (because the future might—and to some degree even should—diverge from what is prototyped, classified and ‘foreseen’).

Enabling technologies: a Closed Circuit Technological Vision

I suspect that above all they [Euro-Americans] take for granted, that *given the technology* they can do anything. [... Technology] is ability made effective.

(Strathern 1996: 49)

A common assumption is, as mentioned, that when fully developed and when used and tuned correctly, technology will be efficient in preventing crimes (e.g. Kieran 2010). None of the systems we have read about are even remotely close to reaching this fully developed state, and no papers claim that they are. What also characterises many papers, however, is the expression of a wish to start moving systems out of the controlled laboratory and deploy them ‘in the wild’, in order to start overcoming certain human deficiencies. In one of the most cited papers on event detection, Gutchess et al. wish to lay the groundwork for making reliable systems that can overcome ‘the inefficiency of manual surveillance and monitoring systems’ (Gutchess et al. 2001). Ten years later, the argument is almost identical: ‘even the most vigilant humans miss important information that could ultimately contribute to unfavorable consequences’ (Moore et al. 2011).

This view of technology, as something that will eventually help us overcome our deficiencies, reflects a recurring assumption about technology in the Western World. As argued by social anthropologist Marilyn Strathern in the quote above, such assumptions are strongly connected to expectations of augmentation, the idea that technology enhances and expands the scope of human action. Such a vision is noticeable in the field of ubiquitous or pervasive computing, as exemplified in the writings of the field’s founding father Mark Weiser:

Suppose you want to lift a heavy object. You can call in your strong assistant to lift it for you, or you yourself can be made effortlessly, unconsciously stronger and just lift it. There are times when both are good. Much of the past and current effort for better computers has been aimed at the former; ubiquitous computing aims at the latter.

(Weiser 1993: 76)

This ubiquitous computing vision is, in turn, remarkably similar to visions in several sci-fi TV-series and movies (Bell and Dourish 2013) and is also commonly found in design research, even if it is an expectation that has never been met: '[t]he vision of augmentation—a future where our meetings with each other and the world are smoothed by technology, a world that heroic engineers will deliver at our door step is amazingly persistent' (Bell and Dourish 2007: 142). The popularity of Weiser's text could be because the very general and yet unattainable vision sounds alluring and feasible, which then affects how investments are made in technological R&D.

Similarly, in event detection, papers rarely discuss the current value of CCTV systems. Instead, current flaws figure as an argument for conducting further research; the preventive efficacy of surveillance, and the promises of such research might be challenged by most studies of current CCTV systems but this is simply translated into a positive. Moore et al. (2011) explicitly state that the many reports displaying the current deficiencies of preventive CCTV have not undermined expectations of technology's potential for development. This statement indicates that in the field of event detection 'the future' is used as an interpretative frame, which subsequently allows the assumption 'that certain problems will simply disappear of their own accord', as Bell and Dourish state with regards to technology research in general (2007: 134).

More specifically the ISS project expresses the belief that—given time, research, and sufficient resources—technology will not only work but will also become infallible (Ma et al. 2009). For many researchers it is unusual to talk about infallibility, but considering the success criteria for preventive technologies it is actually quite (techno-) logical, as also put forward by Jensen (2006): in so far that the success of preventive technologies is measured in terms of how certain events *do not* occur, then even if they do occur it can always be argued that things would have been considerably *worse* without the specific preventive technologies. In some sense preventive technologies can thus never completely fail. Thus, the idea of preventive technologies fits almost too well with the persistent view of technology as enabling and with current pre-emptive state politics as discussed in our reading of *MR*. It appears as a *closed circuit technological vision* also in the sense that the final 'proof' of effectiveness can always be displaced into the future—the 'once-technology-is-good-enough' argument. As has been noticed in Surveillance Studies, it is hard to shake beliefs in specific technologies once this belief has been established: '[the] belief in the efficacy of technological "solutions" far outstrips any evidence that technical devices can be relied upon to provide "security", and thus it can almost seem like "the presence of high technology speaks for itself, somehow guaranteeing its own effectiveness" (Lyon 2007: 147).

Conclusions

MR can be seen as a reiteration of the idea that technologies will soon possess remarkable preventive capacities and as such the movie and event detection seem to have much in common. We do not claim that event detection research imagines possible futures directly through popular cultural artefacts or that such artefacts represent what such research might lead to in the future. The ISS project, for instance, is highly unlikely to lead to a bleak and dystopian future as depicted in *MR*. Still, by juxtaposing *MR* and event detection research it becomes clear that it is an important analytical task as well as an important research, political and democratic problem to investigate how surveillance data is transformed into information about the future and how this is shared and used, and what imaginaries are involved and what they legitimise. Who has access to the information and who has the right to act on it? Who participates in the design of the systems through which it is obtained and constructed? As our argument drawn from *MR* on the hybrid nature of surveillance shows, different compositions, choices of algorithms and visualisations lead to different observations. Questioning how surveillance technologies inhabit and perceive the world as an assemblage of competencies and assumptions where all actors are part of the perceptive qualities of

the technology is thus also important. As we have argued in this paper, systems become imbued with cultural assumptions and preferences, and in the case of event detection, one of these basic assumptions is clearly that technology has strong enabling capacities.

This further highlights that CCTV systems do have (cultural) effects, no matter whether they have ‘actual’ or ‘causal’ effects on crime prevention, and no matter if critics take exception to their continued use. For instance, when the efficacy of CCTV on crime has been challenged in the Danish context, the argument has often changed into a matter of whether or not people *feel* safe if CCTV is around (TrygFonden and Research-Lab 2011 and Maltesen 2011). Thus, this is another source fuelling a closed circuit technological vision of technology as enabling—it seems like the discourse on technology is continually able to find new areas of applicability if the original aim or purpose is undermined.

The homepage of *Intelligent Surveillance Systems* used to depict a map of the world as a series of 0’s and 1’s, thus almost suggesting that the world can be fully computationally mapped (CSIT 2009a). In contrast, however, the practical scope and consequences of the projects are likely to be much more limited. Systems break down; only extremely expensive systems are effective and even when successful, future users will transform their meaning. Perhaps ‘the nature’ of technological visions can be blamed for this: being abstract and unachievable, they are able to continue to act as visions, although very closed circuit! Naturally, this in turn creates a certain recursivity with(in) Surveillance Studies—it seems very unlikely to become less important to investigate relations across society, technology and popular culture in both the near and the far future.

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