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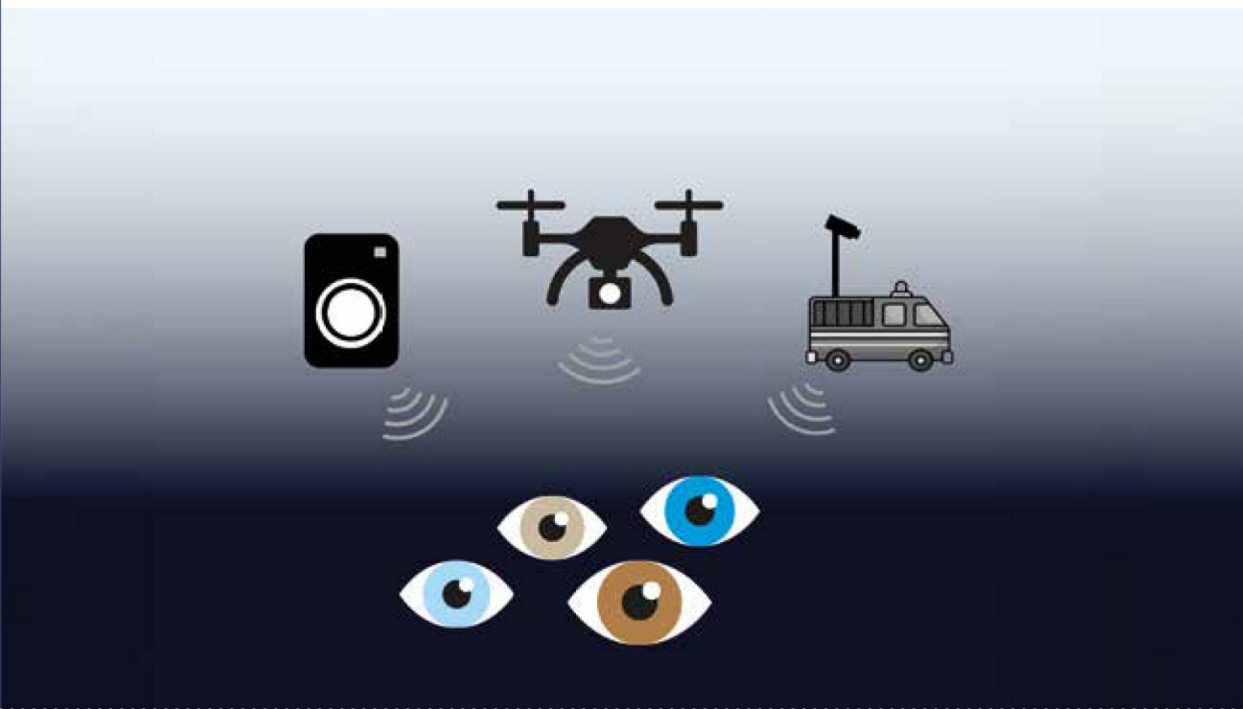
POLITIE & Wetenschap

Bewegende beelden

Een onderzoek naar de meerwaarde van live video voor politiewerk

Sander Flight



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A study into the added value of live video for police work

Sander Flight

Amsterdam, May 2025

POLITIE & Wetenschap

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Foreword

Innovation is an integral part of police work: new products, services and applications are constantly being researched and tested. Some of these innovations are scaled up and widely implemented, while others stop after the laboratory or testbed phase. Video technology has undergone a stormy development in recent years and is now omnipresent in society and also within the police. This book is about a specific application of video within the police, namely live video. It is about the question of whether there is added value in sending images directly so that a police colleague in another location can watch, and sometimes listen in.

The use of live video vehicles, live bodycams and live drones has proven to have added value for police work. This is evident from the dozens of experiments, pilots and test beds discussed in this book. Live video delivers something in two ways. Firstly, the viewer gets a better picture of the situation on site, which increases operational awareness. In many cases, camera images can transfer relevant information faster, more accurately and more completely than verbal communication via a walkie-talkie or telephone. Secondly, it appears that the colleague who is watching can provide support to those who use the camera. By offering this expertise remotely, police work becomes better and more efficient. At the same time, the safety of police officers is increased.

However, this research shows that the potential added value of live video is only realised if a number of preconditions are met. These are four aspects. First of all, the technology must work well, which is easier said than done. Live video is about much more than just the cameras: it is a chain of cameras, connections and a video platform in which every link in the chain is crucial.
Secondly, the legal framework must be in order because the police always operate under the competent authority and must of course comply with all relevant laws and regulations and must and wants to work only within ethical frameworks. Thirdly, there are organizational matters that must be arranged. It is logical that live video only has added value if there is someone on the receiving end who has sufficient time and knowledge to be able to watch in a meaningful way. This poses major challenges in the command rooms and operational centers where verbal communication via walkie-talkie and telephone is still the standard way of working. And finally, live video has psychological consequences: it is important for the police

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employees, just like everyone else, are disruptive to be filmed while working – and that effect is even greater when you know that others can watch directly. Even the best camera will only work if the entire technical and human system around that camera is set up.

This book contains conclusions and recommendations that the police can work on in the coming years. Thanks to this research, we now know how we as the police can work in a meaningful and realistic way on integrating live video into our daily work to make and keep society safer. This will not be a project with a beginning and an end, but a continuous and incremental process that will require knowledge from many different disciplines. We will work on this ambitiously, persistently and with a constant eye on the needs of society in the coming years.

Henk Geveke, former member of the police force management

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Management summary

This book discusses three types of live cameras used by the police: video vehicles, bodycams and drones. The book first describes the experiences with the three types of cameras mentioned separately (part 1) and then discusses the overarching lessons learned (part 2).

Live video is not new to the police: the technology has been in use for about forty years, for example in helicopters and video vehicles of the Mobile Unit. But over the past fifteen years, the technical possibilities have increased enormously: better cameras and compression techniques, more bandwidth and video management systems. This research first addresses the question of whether live video has demonstrable added value for police work (and if so, what). The second question is which preconditions must be met to cash in on that added value. The research is based on dozens of experiments with live video, supplemented with information from a legal and organizational perspective.

Live video can provide added value to the police in two ways. The first way is by sending information from the camera to the viewer. They get a better picture of the situation elsewhere: more operational awareness. The second way is the other way around: from the viewer to the camera. It is possible to offer expertise remotely by providing support from the control room or another viewing location and increasing the safety and effectiveness of the wearer of the camera.

In Dordrecht, an experiment was conducted in 2022 and 2023 with a new type of video vehicle for daily police work in a basic team. The video vehicle was deployed in regular services and could therefore also be used without prior request, as with video vehicles of the Mobile Unit. Chapter 2 contains all information about this experiment. In short, it comes down to the fact that the video vehicle demonstrably provided added value: preventive (de-escalation), reactive (live viewing) and repressive (detection). The legal preparation took a lot of time, but it was successful. The technology worked well according to the users, but the technical specialists were less satisfied. They discovered that the video chain from camera to storage must be treated as a single entity because a focus on separate links in the chain makes the system vulnerable. It also turned out that there was too little technical and functional management available to implement the necessary adjustments, which meant that the vehicle often had to stand still. In legal, organizational and psycho-

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logically many lessons have been learned. Chapter 2 contains the details and the overarching part 2 the broad outlines.

Chapter 3 discusses live bodycams. Two experiments are described: a national practical study of live bodycams in basic teams and a smaller-scale study of live bodycams for police negotiators. The added value of live bodycams has been convincingly demonstrated. The biggest advantage is operational awareness on the part of the observer. Bodycams transmit information better and faster than a walkie-talkie or telephone, which reduces the chance of misunderstandings and miscommunication. But the wearer of the bodycam also experiences added value: the officer with the bodycam has to pass on less to the control room or the commander on site and is therefore free to do other things. The safety of officers is also increased by the bodycams: someone can look 'over the shoulder' and support or warn the wearer of the bodycam. For the negotiators, the live bodycam was the perfect tool to give a commander or colleagues from the fire brigade and ambulance service who were watching a good picture of the situation without disrupting the negotiation. The technology proved to function better than expected: only inside buildings is there usually no good connection, but outside often is. The biggest organizational challenge is to ensure that an observer is available when a live bodycam is used ad hoc. Psychology plays a major role in the bodycam, at least when compared to the two other variants of live video (video vehicles and drones). This is because the bodycam comes very close and for many police officers this is a reason for reluctance. But there are also officers who are very keen to work with it. This mainly depends on previous experiences and on 'soft' factors such as proximity, control and trust between the wearer of the bodycam and the observer. The culture in the rest of the unit also plays a role: there are units where there is relatively much trust to try out new technology and units where that trust is less.

Chapter 4 is devoted to drones. They have also been used for almost fifteen years, but the technology is developing rapidly. Drones have now become an indispensable tool for forensic investigation, public order and covert operations. Drones can provide images in a unique and efficient way, for example during investigations after traffic accidents or in places that are difficult to reach. The technology is now fairly well-organised, although the process in which recorded images are made available for investigations is open to improvement. The legal framework for drones has been worked out, but a number of questions deserve attention. How do you inform people on the ground about the use of a drone? When is there systematic observation and does the use of a drone exceed the limits of Article 3 of the Police Act? Are drones made in China acceptable in terms of information security and ethical considerations? In terms of organisation, it appears that there is sufficient scope for the use of drones for forensic investigation and law enforcement.

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regulated. But there is little room for further development, while that need is certainly there. Drones can also be used for monitoring & security, unobtrusive surveillance and interventions. Navigating outside the pilot's sight is also being investigated. All these matters require national coordination and time, money and support that have not yet been calculated.

In Chapter 5, all insights from the three previous chapters are combined. We no longer look at the three types of live video separately, but at the four preconditions: technology, legislation, organization and psychology. The technology is always a challenge and will probably remain so. The legal and ethical frameworks are reasonably well-defined, but they require constant attention because, in addition to a legal basis, the necessity must also be demonstrable at all times. Organizational problems are mainly to be expected with unplanned use of live video during incidents. This can cause an overload of images in the control room. Centralists will have to be trained in this and procedures must be developed to prioritize the supply of live video. Psychological barriers are particularly present when using bodycams, because they feel the most personal to the users and because they can transmit not only images, but also sound. With video vehicles and drones, the psychological barriers also play a role, but less strongly. Chapter 5 contains various additions and nuances.

Chapter 6 draws conclusions and formulates recommendations. The first conclusion is that live video – at least the three variants examined – has demonstrable added value for police work. It is obvious that even more use will be made of it in the coming years than is currently the case. At least as important is the second conclusion: live video is not scalable like some other technology. Rolling it out without additional guidance does not work, because live video is not only about the hardware, but also about the 'soft' boundary conditions. In order to successfully use new technology within the police, it is essential to understand, appreciate and guide inventions. A practical recommendation is to make structural investments in the infrastructure from which all forms of live video can benefit. It would also be good if the national supporting technical teams always reserved space for further development of new technology from practice.

Finally, suggestions are made for further research to better understand and utilise the added value of live video for police work.

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1. Introduction

1.1 Cause

Between 2015 and 2019, I conducted three studies on bodycams on behalf of the Police & Science.1 In the five years that followed, from 2020 to 2024, I was engaged by the police as a researcher and advisor for experiments with live video. In this book, which I was again commissioned to write by the Police & Science, I share the insights of those past five years. As a result, the insights from the previous studies on bodycams are broadened and deepened. They are broadened because this book is not only about bodycams, but also about live video vehicles and drones. The insights are also deepened because there is a lot of new information about the legal, organizational and psychological context of live video.

The rise of live video
Live video has been used by the Dutch police for about forty years. Two types of live video cameras are probably familiar to many people: helicopters and video cars. The police helicopter and video cars are regularly deployed for major incidents or events. The live images made by these cameras can be viewed remotely in the control room2 or in a separate control vehicle, so that the coordinator can see with his own eyes how the situation is developing. This helps to tailor the deployment of police units to what is needed by scaling up or down.

Over the last fifteen years, live video technology has improved. Many cameras were still analog instead of digital, there were hardly any good compression techniques to reduce the amount of data, and there were hardly any wired

1 S. Flight (2017), The possible added value of bodycams for police work, Police & Science (Political Science 93). S. Flight (2019), Focus: Evaluation of the bodycam pilot, Amsterdam Police Unit, Police & Science (Political Science 93A). S. Flight (2019), Evaluation of bodycams National Unit: Testing ground bodycams Infrastructure Service 2018, Police & Science (Political Science 93B).

2 Actually, control room is not the correct term, because it is formally called the Operational Center (OC). These are the eleven 112 centers spread across the regional units that people in need can call and where the regional deployment of the police is coordinated. However, the term control room is also used regularly in this book. This is primarily because many police officers still use that word themselves.
And a second reason is that live video images are also forwarded to other places than the OC, for example a regional or municipal camera surveillance room or a coordination center in a basic team. All these 'viewing places' are meant by the term 'control room'.

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empty networks with sufficient bandwidth for video. Modern cameras offer higher image quality, today's wireless networks can handle much more data traffic and the video platforms where the images end up to be viewed and stored have developed rapidly. As a result, live video has become part of our daily lives. The introduction of the smartphone has played a major role: many people now take it for granted that they no longer call each other, but have a live video conversation. The police naturally also see the new possibilities of live video and in recent years new types of live cameras have been added to the police toolbox. In addition to the helicopters and video cars already mentioned, which have been around for about forty years, there are also municipal cameras, mobile camera units, drones, bodycams, dashcams and smartphones. The number of cameras per type still varies greatly. Several tens of thousands of executive police officers have a camera in their service telephone, there are two thousand bodycams and about three hundred drones. The dashcam is not yet standard equipment in police vehicles: it is estimated that there are only a few dozen of them in use.

Technology, legislation, organization and psychology

If live video is used during large-scale deployments to provide an overview of the situation, live video can be integrated into normal police work quite easily. A separate control room is set up for command during the deployment. The live images are sent there to be viewed. If live video is also used ad hoc in daily police work in basic teams, things suddenly become a lot more complicated. The growth of live video has significant consequences for the police – and these go far beyond the technology alone.

The legal context surrounding live video is complex. The police are not allowed to simply use live video: this requires a legal basis and an assessment of the necessity. Specific legal frameworks often follow years after the introduction of new technology. Municipal camera surveillance for the maintenance of public order was first used in 1998, but a specific law (article 151c of the Municipal Act) was not introduced until 2006. Automatic license plate recognition was already used by the police around 2004, but a specific legal basis (article 126jj in the Code of Criminal Procedure) was not introduced until 2019. In the absence of a specific legal basis, the police can only rely on overarching legislation and regulations. The most important basis is the general task of the police in article 3 of the Police Act. This article of law is deliberately formulated very generally and therefore does not exactly fit many new technologies. This explains the complexity, because the use of cameras can be based on this basis in certain cases and not in other cases. Ethical questions are also important, because even if a certain form of live video is legally permitted, this does not automatically mean that it is socially desirable for the police to use it. That is why frameworks, legal tests and coordination are needed to protect the privacy of those involved and to prevent excessive use of live video.

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The organizational impact of live video is also very large – especially in the case of unplanned use of cameras in daily police work. If an officer switches on a live camera, there has to be someone on the other end who can watch along. This has consequences for the staffing and working methods in the control rooms. Most communication between officers and centralists still takes place via walkie-talkie and telephone.
Forwarding live video and audio quickly results in an overload of information in the control room. To be able to manage this properly, well-trained centralists are needed, but also protocols for prioritization, information processing and new schedules, so that there is sufficient viewing capacity and sufficient expertise available.
Live video also has special psychological implications compared to other technologies. After all, live video is very exciting: not everyone likes the idea that others can watch and listen to your work. Ultimately, the success of new technology depends on its users: if they don't feel good about it, they simply won't use it. That psychological effect usually doesn't get much attention, but it does in this book.

For a successful application of live video within the police, a lot of attention is needed for technology and also for legislation, organization and the psychological effects. This is what this book is about.

This research can be used by the police to determine which forms of live video warrant additional investment. And the book also makes clear which legal and organizational preconditions are needed to use live video in such a way that it has demonstrable added value for the police and for society as a whole.

1.2 About this research

Research questions
This research is about live video: the real-time use of cameras for police work.
Two questions are central:
- What is the demonstrable added value of live video vehicles, bodycams and drones? for daily police work?
- What technical, organizational and legal preconditions must be met? Are you satisfied to successfully use live video?

The focus is therefore on live video and not on the added value of cameras that only record images so that they can be used later for detection or other purposes. The theoretical framework below describes how live video can provide added value.

Information sources
In this research I base myself on various research methods and sources of information. In addition to studying (scientific) publications and policy documents,

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ments, I have participated in dozens of experiments with live video over the past five years. In this context, I have asked more than a hundred police officers – often in multiple conversations per person – about their experiences with live video. I have also worked shifts to experience in practice how live video works. I have collected information from both sides of the live cameras: the side where the images are made and the side where others can watch. I have also spoken to employees of support departments, such as information managers, privacy officers, innovation teams and members of the Technical Supervision Teams. The information comes from all over the country: all units participated in this research.

Limits
Like any study, this study has limitations. I will mention a few here that affect the scope of the conclusions I can draw.

This research is about live video during daily police work: emergency aid, catering services, large-scale operations, neighbourhood-oriented work. The more specialist police tasks, such as forensic investigation, special interventions, guarding & securing and covert operations, are largely ignored.
This research is about three types of live cameras: video vehicles, bodycams and drones. There are other live cameras in use by the police, such as helicopters and smart phones. To some extent, the lessons from this research undoubtedly apply to those other cameras, but that has not been specifically investigated.
A third demarcation is the limitation to cameras owned by the police. This research does not cover millions of cameras owned by companies and individuals, such as surveillance cameras, smartphones and smart doorbells.
A fourth limitation is the choice of the Netherlands. There are police forces in other countries that have had interesting experiences with live video, but I have not made an international comparison.
The fifth limitation lies in the fact that the effects of live video have only been investigated insofar as it concerns effects on police officers. The perspective of other persons, such as suspects, victims and passers-by who appear in the camera images, is not addressed in this book.

Each of the above points is interesting enough to warrant specific follow-up research.

1.3 Theoretical framework

Live video can work both ways
For this research it is important to understand how live video can contribute to police work. Live video works completely differently than a surveillance camera that only records images to use as evidence later. With live video

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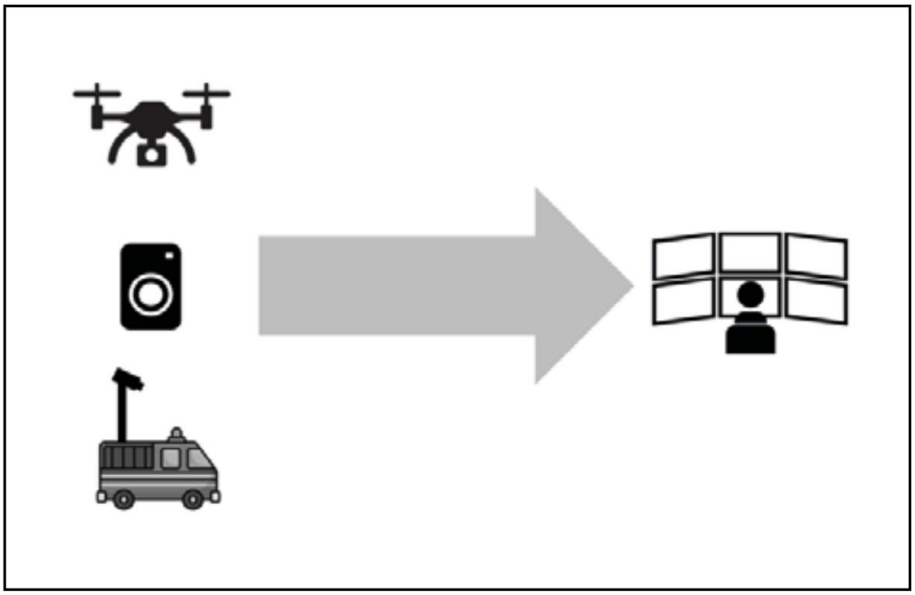
someone can watch the camera images directly. This can provide added value for police work in two ways.

1. Operational awareness
The person watching the live camera images gets a better picture of the situation on site. This increases operational awareness. Police officers on site no longer have to tell what is happening via walkie-talkie or telephone: the person watching can see it with their own eyes and hear it with their own ears. This saves time and prevents misunderstandings. It also ensures that the police on site can fully concentrate on handling the incident, without having to continuously provide an update on the situation.



2. Remote expertise
The second way in which live video can add value to police work is through remote expertise. The police officer with the camera is then supported by a colleague who is watching: the viewer. This could be a centralist in an Operational Centre who can inform other units that are driving about the situation they will encounter when they arrive, without the police on site having to think about it and arrange it. Or the viewer can find out whether anything is already known about an arrested suspect or about a vehicle based on a license plate. Other officials can also be valuable as viewers. For example, think of a specialist who watches an intervention team or a detective who watches when entering a crime scene. Or a detective psychologist who can watch remotely

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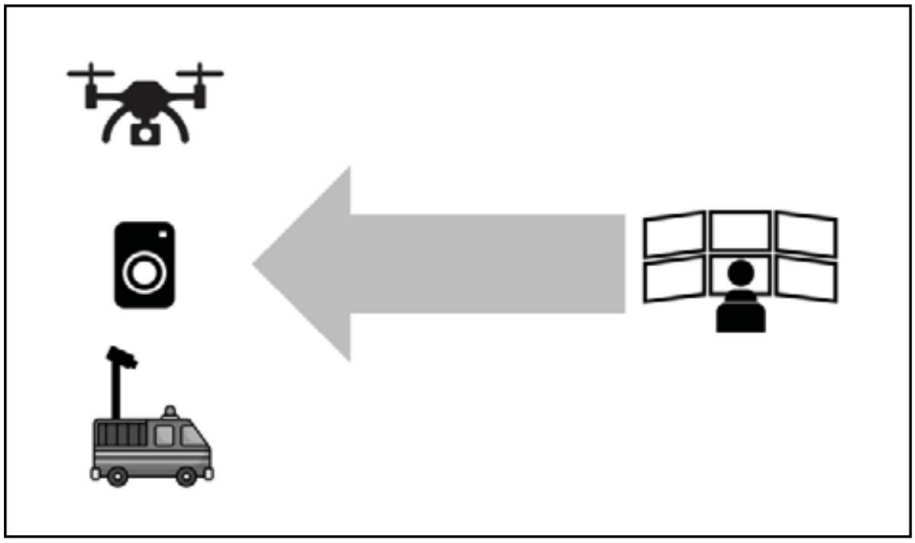
know and listen to interpret behavior and can recommend approach techniques to the wearer of the camera. Expertise is brought to the incident in this way. The colleague with the camera can then concentrate fully on the situation on site and can work more effectively and efficiently.



Cameras can do even more: they can de-escalate and increase the safety of police officers and others. In addition, camera images can be used for training and evaluations. But that also applies to cameras without
live streaming and that is why in this book I focus on the two unique additions of live cameras: operational awareness and remote expertise.

Context determines success

For this research, a second theoretical angle has been of great importance: the context of technology. In his book on intelligence, technology expert and artist James Bridle discusses our relationship with technology:

> 'The history of technology is largely one of willful blindness to the context and consequences of its enactment. Technology is the last field of study to discover its ecology.'3

Technological developments are often considered inevitable or self-evident. But technology is developed by people within a specific social context and is used for specific purposes. A live bodycam, drone or video vehicle is not a neutral technical tool that exists solely to police

3 J. Bridle (2022), Ways of being. Animals, plants, machines: the search for a planetary intelligence, Penguin Random House UK.

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tiework easier or more efficient. These innovations are also social interventions that can fundamentally change police work and thus the place and role of the police in society. In order to give sufficient attention to the context of technology, I have chosen the research method of realistic evaluation.
This method does not seek an answer to the question whether live cameras work, but how they work. In what way and in what situations can live video provide added value for which purposes and who benefits from it? The answer to these questions is much more interesting and ultimately more useful for the police. The answer is also necessary to determine which investments are worth the costs and effort. Hence the attention to the legal, organizational and psychological context of live video.

The unruly police culture

Police work looks different today than it did about fifty years ago. The nature of crime has changed, for example. Modern burglars no longer target homes, but try to break into computer systems and bank accounts. The technology used by the police is changing accordingly. New information and communication technology is in use and artificial intelligence is penetrating into the work of the police.4 Often, it is a few pioneers who are the first to embrace and try out new technology. And this often happens without embedding it in broader work processes and planning. The 'doing culture' within the police is strong and leads to all kinds of small-scale trial balloons spread across the country. According to some, this even results in proliferation that should be curtailed.

But has police work fundamentally changed due to this new environment and new tools? That is very much the question. After all, new technology itself does not force innovation. There are police researchers who conclude that police work has essentially changed very little over the past fifty years, despite digitalization and information technology. The tools are new, but the police have continued to do the same work.5

That may be too extreme a judgment, but it is a widely accepted idea that police culture does not always contribute to innovation. Most police officers assess new technology based on their current frame of reference: 'Will this technology help me to do my current job better?' Many police officers

4 Readers interested in learning more about technological innovation within the police force in general can indulge themselves in the following excellent publications:
L.J. Moriarty (2017), Criminal Justice Technology in the 21st Century, Springfield Illinois. S. Ernst et al. (2019), Learning from technological innovation. 'The technology is not so exciting', Police Academy. CS Koper & C. Lum (2020), Technology in Policing, Cambridge University Press. H. ter Veen, P. Kroes & N. Kop (2023), Bundle forces and celebrate successes, Police Academy. W. Landman (2023), Policing on the horizon. Technology, crime and the future of policing, Police & Science.

5 C. Lum & CS Koper (2017), 'Understanding the limits of technology's impact on police effectiveness', in: Police Quarterly 20(2), 135-136. PK Manning (2008), The Technology of Policing; Crime Mapping, Information Technology, and the Rationality of Crime Control, New York: NYU Press. See also: ER Maguire (2014), 'Police Organizations and the Iron Cage of Rationality', in: MD Reisig & RJ Kane (Eds.), The Oxford Handbook of Police and Policing, Oxford University Press, 68-100.

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workers cherish the methods they already know and that results in a reactive, rather than a proactive approach to innovations. The management of the organization can initiate all kinds of change processes 'from above', but if the culture on the work floor resists, it will not work: 'Culture eats strategy for breakfast'.
Even with the introduction of live video, the question is whether this new tool is a game changer or business as usual. I do not want to claim that it is a desirable scenario, but it would be a game changer if the police no longer went out on the streets in pairs as standard, but solo with a live bodycam. A colleague at the station could then act as a buddy for several colleagues at the same time. That would revolutionize the way the police work. Another example of live video as a game changer is if the police forward live video images directly to a public prosecutor in order to shorten the investigation and prosecution process. Again: these are not necessarily desirable scenarios. They are examples that show how live video not only offers the possibility of carrying out existing police work more efficiently, but that it could also fundamentally change that work. Previous experiences have taught us that the police culture does not lend itself well to such drastic changes. Therefore, this study not only focuses on the 'hard' technical aspects, but also on the 'soft' legal, organizational and psychological factors.

1.4 Reading guide

The first part of this book (chapters 2, 3 and 4) deals with concrete experiences with three types of live video: video vehicles, bodycams and drones. The chapters describe experiments that have been carried out over the past five years. For each experiment, the boundary conditions that were important are described: technical, legal and organisational boundary conditions. The question is then answered whether the form of live video under investigation had demonstrable added value for police work. The aim of the first three chapters is to show the reader how live video works in practice.

Part two of the book deals with the four 'chessboards' on which you have to play with innovations: technology, legislation, organization and psychology (chapter 5). By discussing the three types of live video in their entirety, it becomes clear how these innovations do or do not land within the police. This leads to a number of conclusions and recommendations (chapter 6).

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Part 1 **The practice**

This first part of the book discusses practical experiences with three types of live cameras: video vehicles, bodycams and drones. Each chapter discusses one of the three types of cameras and starts with a short historical overview. Then the experiments that have been conducted in recent years are described. We consistently look at the technical, legal, organizational and psychological preconditions. What is needed to use this technology efficiently, effectively and lawfully? We also look at whether the live cameras had demonstrable added value for police work.

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2. Video vehicles

2.1 Brief history

When the first portable video cameras became available, police agencies in several countries began experimenting with installing the technology in vehicles. In the United States, this began in the 1970s, and by 2005, there were an estimated 17,500 cameras in police vehicles. A nationwide survey of police agencies that used them found that video cameras in vehicles were considered the most widely used and valuable video technology. The cameras were initially purchased primarily to prevent aggression and violence against officers. Later, the cameras were also used to record all traffic stops so that investigations could be conducted after the fact if someone accused the police of discrimination or racial profiling.6 Video cameras were also installed in police vehicles in other countries, including Germany,7 the United Kingdom,8 France,9 and in autonomous police vehicles in Dubai.10

Video vehicles with live images during large-scale operations

One of the first applications of live video within the Dutch police was in video vans during large-scale operations, such as events, football riots or other situations where public order is at risk. Around 1980, such live video cameras were already built into vehicles of the Mobile Unit. The live images were forwarded to a video control van or a command room set up elsewhere where all information, including video images, came together. The commander could then see with his own eyes how the situation developed and adjust the deployment of the police accordingly.

6 International Association of Chiefs of Police (2005), Impact of Video Evidence on Modern Policing: Research and Best Practices from the IACP Study on In-Car Cameras. https://www.bja.gov/bwc/pdfs/IACPIn-CarCameraReport.pdf.

7 A. Boden & S. Giljohann (2017), 'IT Supported Police Work: A Case Study of an Interactive Patrol Car Project in Germany', in: International Reports on Socio-Informatics (Volume 14, Issue 1). https://www.iisi.de/wp-con-tent/uploads/2018/07/2017vol14iss1.pdf.

8 PR Newswire (2024), Lancashire Police Deploy Motorola Solutions. In-Car Video Solution Across Full Vehicle Fleet. https://www.prnewswire.co.uk/news-releases/lancashire-police-deploy-motorola-solutions-in-car-vi-deo-solution-across-full-vehicle-fleet-302264343.html.

9 Imaging & Machine Vision Europe (2024), Integrated number plate recognition for France's police cars. https://www.imveurope.com/news/integrated-number-plate-recognition-frances-police-cars.

10 Police1 (2024), AI is set to revolutionize policing. https://www.police1.com/tech-pulse/ai-is-set-to-revolutionize-policing-are-we-ready.

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Figure 2.1 Mobile Unit video buses

Live video during daily police work
An important feature of the Mobile Unit's video vehicles is that they must be requested in advance. They cannot therefore be deployed ad hoc when an incident occurs. In emergencies, a helicopter or drone can be requested to take images from above, but that is not always a suitable angle and helicopters and drones are not always available. In order to be able to send live video images to the control room in more situations, experiments have been conducted in recent years with the installation of live video cameras in regular police vehicles of basic teams.
One of the larger experiments took place in 2009 and 2010 in the regions of Haaglanden, Rotterdam-Rijnmond and Twente. There, regular police vehicles were fitted with one or more cameras on the roof. In the regions of Rotterdam and Twente, the camera images were only stored in the vehicle itself, so that they could be viewed later at the station and used for investigation or evaluation. In the region of Haaglanden, however, it was possible to send the images live to the control room. This was mainly done during catering services. The vehicle was then placed in a strategic location in the nightlife area and the control room could watch and, if necessary, operate the camer

Figure 2.2 Emergency vehicle in the Haaglanden region with live video (2010)

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The evaluation did not provide a clear answer to the question of whether the live cameras had demonstrably improved police work.11 There were so many technical problems with the cameras that they were used very little. So little that no statement could be made about any effects. It is interesting to hear that, in addition to the technical hurdles, there were other reasons why the cameras were used so little. Half of the users indicated in a survey that they had not received enough explanation to be able to work with the equipment properly. As one employee said:

> 'We had to rely on colleagues who delved into it out of interest. As a result, images were lost that were promised as evidence.'

In addition, a psychological effect also appeared to play a role. Some of the police officers felt they were being watched. These officers only wanted live viewing at the request of the driver of the video vehicle. The fact that the control room could also switch on and operate the camera itself was experienced as highly undesirable. A statement about the value for police work was therefore not possible on the basis of this experiment. But it did clearly show that technology is not the only factor that determines whether live video is a success. That also depends on organizational agreements and psychological barriers.

In 2010, a follow-up study was carried out in the Haaglanden region with a new generation of mobile cameras in six vehicles. Four additional screens were also installed in the control room to improve control and communication. As a result, the technology worked much better than a year earlier. However, the yields were disappointing: they were lower than had been hoped for. The employees in the control room found it difficult to use the live camera images because they often had too little time for this in hectic situations. As a result, the control room had hardly ever worked with the system. The results for the investigation were also limited. This was mainly due to an organisational reason: the detectives were not involved in the project and detectives were therefore not aware that images could be available. This was corrected halfway through the trial: the detectives were then more actively involved. It then became apparent that the images were of little importance for the investigation: the image quality was often insufficient due to technical shortcomings. In the dark the images were unusable and sometimes the cameras were hanging crooked, so the incident was not captured on camera.

All things considered, the conclusion of the evaluation was not positive. The goal of the experiment was to prevent violence against police officers and that goal was not achieved. However, the researchers did note that preventing violence against police officers is not the only thing that live video can be used for. One of the recommendations was to try out more applications in the future,

11 T. van Ham, H. Ferwerda & J. Kuppens (2010), Camera surveillance in motion. Experiences with new forms of camera surveillance at the Dutch police, Bureau Beke: Arnhem.

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such as supervision, law enforcement and detection. It was also recommended to involve the detective department and the control room more explicitly in order to be able to better investigate whether live video provides added value.12

In short: live video cameras in police vehicles are not new. However, for daily police work in basic teams, it had not yet been possible to successfully deploy this technology. This was the reason for the experiment in a basic team in Dordrecht that is discussed below.

2.2 Video vehicle Dordrecht

This section discusses an experiment with a video vehicle for area-based police work in the Drechtsteden Binnen Basic Team in the Rotterdam Unit.
In 2022, the management of the Rotterdam Unit decided to experiment with a video vehicle specifically for daily work in a basic team. This distinguishes this vehicle from the video vehicles of the Mobile Unit that have to be requested in advance. This video vehicle could be deployed ad hoc by the basic team itself. The operation was in the hands of fifteen 'regular' employees in the basic team who received training for this. They simply participated in the regular services in the basic team and as a result the video vehicle could be deployed immediately when it was needed. And if no live video was required or no operator was available, the vehicle could also simply be used as a prisoner bus.

The necessary money and administrative backing for this experiment were provided by the management of the Rotterdam Unit. The technology was coordinated and built under the direction of the pre-development team of the ICT Service of the police.

What is special about this experiment is that it went much further than a technical test. Before the deployment, almost half a year was reserved for thorough legal preparation. Developing and using an appropriate legal framework was seen as an integral part of the experiment. After the legal test and approval by the works council, the video vehicle was deployed for twelve months from August 2022 to July 2023.13

12 T. van Ham, H. Ferwerda & J. Kuppens (2011), Mobile camera surveillance on alert. Effects on violence against the police and the police process in pictures, Bureau Beke: Arnhem.
13 See: https://www.politie.nl/nieuws/2021/december/31/08-camera-in-politievoertuig-in-district-de-mar-kiezaten.html. The experiment is described in an internal evaluation report that was delivered to the management of the Rotterdam Unit at the end of 2023. Much information from that report is reproduced in the rest of this chapter.
names.

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Figure 2.3 Video vehicle Dordrecht and workplace in the vehicle

Technical

The video vehicle has five cameras on the roof: four cameras that make a 360-degree image all around, plus an extendable camera on a mast. That camera on the mast gives an overview image, but can also be used to zoom in. There are two image sensors in the extendable mast: one regular image sensor and a sensor that gives a thermal image and therefore also works in darkness, fog or poor visibility. The cameras record images and the images are also shown live in the vehicle itself.
In addition, there is an option to forward live video to the Police Coordination Center of the basic team or to one of the Operational Centers elsewhere in the country.
During the year of the experiment, a closed app group was used for communication between the project leaders and the fifteen operators who worked with the video vehicle on a daily basis. The app group ensured that all those involved were aware of each other's experiences and could exchange information with each other.
The approximately one thousand messages were also useful for the evaluation. Disturbances and other technical issues were discussed and analyzed for the evaluation. This shows which issues need to be taken into account in the event of a large-scale deployment of this type of video vehicle. Everything is described in more detail in the internal evaluation report so that technicians know exactly which functionalities are needed. The most important technical lessons that are also relevant for other forms of live video are:

'One push of a button'
Firstly, it was found that it is important that activating the video system should be a matter of 'one push of a button'. At the beginning of the experiment, several actions had to be performed to get the camera system working.
This took too much time in the event of incidents and has therefore been simplified considerably. A touchscreen display has also been placed in the front of the video vehicle, which can be used to switch on and operate the camera system.

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Operation without delay

Secondly, the test showed that there is approximately one second of delay or 'latency' when the images are sent via the National Operational Network and only then can they be seen on the screen in the video vehicle. This is not a problem for the remote viewer, but for the operation in the video vehicle itself this proved to be unworkable. The camera could not be operated properly. That is why it was decided to create a direct link between the cameras and a computer with screen in the video vehicle itself. This did require an additional risk assessment for information security.

Higher resolution is not always better

A third lesson learned is that the available bandwidth on the network was insufficient. One solution is to only send one image per second, but then the images are not usable during incidents. The solution was to reduce the resolution from 4K (3,840 × 2,160 pixels) to full HD (1,920 × 1,080 pixels). That resulted in a saving of 75 percent in the amount of data, without noticeably reducing the image quality. Images can also be used perfectly well as evidence in that resolution.

Thermal image difficult

A fourth insight was that the thermal camera did not provide a sharp image. It turned out not to be a problem in the camera: after replacing the camera, the problem continued. It could be solved manually by the operator, but after switching off the camera system, the problem recurred every time by returning to the default settings. Despite adjustments by the camera supplier, installer and vehicle manufacturer, this problem has not been solved.

A video vehicle must be able to do more than just video

The fifth lesson was that the video vehicle must also be suitable for transporting prisoners. The rear of the bus was initially set up entirely as a video control room, but in a basic team, every vehicle is needed. That is why the video vehicle was converted so that it could also be used as a regular vehicle for the transport of ar-remaining wards. The video control room in the rear of the video vehicle was removed and only the workplace in the front of the vehicle remained.

All things considered, the fifteen operators were satisfied with the technology in the video vehicle. Teething problems were quickly resolved and the adjustments were appreciated. However, the technical specialists were less satisfied. The video system is a chain with many links: camera > modem > connection > storage > video management system. If one link fails, the entire system stops working. It takes a lot of time to find out where the problem lies and different suppliers and subcontractors often point to someone else. So an order must be given to a system integrator who is given the responsibility to get the entire system working.

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to obtain and maintain, with a maintenance contract. It also does not work well if the video vehicle has to go back to the mechanic for repairs: then it is not available for a few weeks. In the event of a national introduction, this should be the other way around: the mechanic has to come to the video vehicle, so that the vehicle can be used in the basic team in the meantime. The last lesson was also of an organizational nature: the number of hours that technical and functional managers of the national video network of the police (the National Operational Network and the underlying video management system Milestone) have for innovations is very limited. They are almost continuously busy with urgent deployments and large-scale events. Management of innovations is often given less priority and small adjustments therefore cost a lot of lead time. This point will be returned to in the description of the organization.

Legal

The police are not allowed to use live video without further ado. First of all, there must be a legal basis for this. That legal basis exists: the task assignment from article 3 of the Police Act. But a basis is not enough: cameras are only allowed if they are necessary. It would take us too far afield to go into the operationalization of the concept of necessity in depth for this chapter. This point is discussed in part 2 of this book. In short, it comes down to the fact that it must be proportionate (not shooting a mosquito with a cannon) and subsidiary (there must be no other, lighter instruments with which the objective can also be achieved).

In order to ensure that all legal requirements were demonstrably met, the preparation of the experiment in Dordrecht took a great deal of time. In total, as mentioned, six months of lead time were needed to get the legal basis for the video vehicle in order. That may seem like a major investment for one video vehicle that would be deployed for twelve months, but the documents drawn up are applicable to all police video vehicles. So that already made the investment worthwhile. In addition, the project leaders were right to believe that investigating the legal framework should be an integral part of every experiment. After all, there is little point in developing a new technology if it later turns out that it is not permitted to use that technology due to privacy legislation.

GEB

An important ingredient of the legal basis for this video vehicle was the Data Protection Impact Assessment (DPIA). Shortly before this experiment was to start, the Rotterdam Unit was fined fifty thousand euros by the Dutch Data Protection Authority for the use of video vehicles during the corona pandemic.14 The reason for the fine for the camera vehicles was that a timely

14 See: https://autoriteitpersoonsgegevens.nl/documenten/boete-mobiele-camera-autos-rotterdam. The police appealed the fine, which resulted in a reduction of the fine to thirty thousand euros.
The judge found it disproportionate to impose such a high fine because an infringement was only established for one day and because the chance of recurrence is extremely small. See: ECLI:NL:RBDHA:2024:16324.

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GEB had been drawn up. The police thought that this was not necessary because the camera cars did not pose a high risk to the privacy of those who were filmed. The Dutch Data Protection Authority did not agree: the police should have drawn up a GEB. The fine naturally ensured that the experiment in Dordrecht came under scrutiny and during the preparation of the experiment it was quickly agreed among all those involved that a GEB had to be drawn up and that was done.

In the GEB the camera system is described in the form of a technical description (how does the video system work?) and a functional description (what does it do?). In addition, the legal basis is discussed, including a justification of necessity through an assessment of proportionality and subsidiarity.
All relevant privacy risks are then described: how great is the chance of damage for those involved? Various technical and organisational measures were then developed and implemented for each relevant risk. These measures concerned privacy protection, information security, information provision to those involved and the like. Part of this was requesting independent advice on information security. An important and innovative measure in the GEB was that the fifteen operators who would be working with the video vehicle were all given an explanation of the scope of article 3 of the Police Act.
The DPIA was submitted for advice to the Data Authority and the Data Protection Officer of the police and these recommendations were incorporated. The works council (national and regional) was also informed and asked for its consent.
This consent was given on the condition that the camera images, as recorded in the GEB, are not used to assess the performance of police officers.

Communication: external and internal

Another important point of attention in the GEB was the provision of information about the video vehicle to those involved. This is not only important because privacy legislation requires this, but also because it can increase the preventive value of the video vehicle. The cameras were clearly visible on the video vehicle itself. The retractable camera in particular was very conspicuous and this was also evident from the fact that bystanders and passers-by often made a (although always positive) comment about it. Large stickers were also attached to both sides and the back of the video vehicle with a camera icon, the word VIDEO and a reference to a web page about the video vehicle (also accessible via a QR code) with more information.

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Figure 2.4 The sticker on the sides and back of the video vehicle

The mayor of Dordrecht was informed about the video vehicle that would be driving in the municipality prior to the experiment. The general public was also actively informed. At the start of the experiment, a news item was published on politie.nl,15 including a document with frequently asked questions about privacy. That news item was picked up by national and regional media, including NOS, NU.nl, Algemeen Dagblad and Noordhollands Dagblad. RTV Dordrecht made a news item about the video vehicle that was shown on television and via the internet. In March 2023, the video vehicle was, as already mentioned, converted to also enable the transport of prisoners and even that relatively minor fact received attention in the national media, including Algemeen Dagblad.
In addition, the operators always gave passers-by or bystanders who wanted to know more the opportunity to take a look inside the video vehicle itself to see how it works. According to the operators, all reactions were positive. Not only citizens, but also police officers themselves are captured on the cameras and so they also received a lot of

15 See: https://www.politie.nl/nieuws/2022/januari/28/07-videovoertuig-eenheid-rotterdam.html. And see: www.politie.nl/videovoertuig.

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information about the video vehicle and their rights if they were filmed. To this end, monthly news flashes about the video vehicle were distributed by email and on paper in collaboration with the communication department. The app group showed that these news flashes were very well read and appreciated within the basic team.

Trainings
In order to ensure that all agreements from the GEB would be properly observed, various actions were taken. A unique measure was that all fifteen operators who would work with the video vehicle first received a one-day training. This was a 'button course' to learn how to work with the camera system. The training also included an explanation and discussion of the scope of article 3 of the Police Act.
During the twelve months of the experiment, privacy protection was regularly emphasized, during briefings, in personal conversations and in the app group.
Each individual deployment of the video vehicle had to be substantiated.
To ensure that all operators knew what the rules were, a handy overview was drawn up with examples that clearly show what fits within article 3 of the Police Act and what does not. Discussions with the operators show that the training, personal discussions, briefings and app group worked well.

All things considered, the legal preparations have taken a lot of time, but have also yielded a lot. Not only has the video vehicle benefited from this, other video applications within the police are now also using the drawn up documents and lessons learned.

Organizational
By choosing a specific basic team, there were relatively few organizational hurdles for this video vehicle. The budget was, as mentioned, made available by the management of the Rotterdam Unit, which in this case also meant that the management would come from there. A steering group was set up with members from the management and a working group for day-to-day matters. Just like the rest of the basic team, the members of the steering group received regular updates in the form of a news flash about the lessons learned and any technical adjustments. The most important part of the periodic news flashes were the success stories. They showed what the video vehicle yields in practice. And they offered a perfect approach to once again draw attention to the legal preconditions.
The direct monitoring of the Police Coordination Centre in the basic team also went well. The lines of communication between the police officers on the street and the coordination tower have always been short in this basic team. The video vehicle could therefore be integrated very quickly into the existing working methods. In the case of incidents that were so large or serious that they had to be scaled up to a higher level, centralists and commanders in the regional Operational Centre of the Rotterdam Unit could monitor the incident. That worked less smoothly. So many different information flows come into the Operational Centre that the video vehicle from Dordrecht was a strange

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the duck in the pond. The number of regional deployments was very small. It obviously takes time to get used to it. That getting used to it did not really get off the ground in the twelve months that the experiment was running. The operators in the video vehicle often had to act as a gatekeeper for the deployment of the video vehicle when a request came from the operational centre to forward live images. The operators then assessed whether it was lawful to forward images and sometimes they came to the conclusion that this was not the case. The video operators therefore sometimes formed a kind of brake on the enthusiasm of police officers who were at a greater distance. The employees in the operational centre are used to video images always being lawful: the deployment of a helicopter or drone is only possible after a request has been approved by a manager who weighs up the necessity. Because the video vehicle was deployed without that command structure, that was a new and unfamiliar step in the procedure. It was striking that during the preparation of the experiment, the expectation was the other way around. Some feared that the video vehicle would be deployed frequently and also for incidents that could not justify the deployment of this heavy means. That is why an additional safeguard was included in the GEB: if the operational commander concludes that the assessment of the video operator is not correct, the video vehicle must still be disabled. In practice, it turned out that the other way around was necessary. What did work well right away was scaling up after abrupt escalations of incidents, such as riots after a football match or a protest that gets out of hand. In those cases, the video vehicle was used to give the other units that were arriving, such as the Mobile Unit, a good picture of the situation. As soon as the conflict and crisis management units were on site, the video vehicle moved to the outer ring around the escalation where additional images were made for the SGBO (Large-scale Special Operations Staff) that had been set up.

Psychological

The psychological dimension of live video also played a role in this experiment. It is exciting for everyone to be filmed while working. In addition, this type of video system is extremely suitable for assessing the performance of police officers. Although the images may not be used for this purpose, that does not mean that everyone immediately sends live images with confidence. There is always a period in which people have to get used to the technology and trust has to be built up. That process went remarkably quickly and remarkably well in Dordrecht. There were no incidents in which police colleagues unexpectedly appeared on camera and had difficulty with it. It was actually the other way around: the video cameras gave many police officers a safe feeling because they knew that someone could look over their shoulder. This smooth process and the great confidence in the technology can undoubtedly be attributed to four factors. Firstly, the video vehicle was operated by direct colleagues of those who could appear on camera: they were able to explain well what would and would not happen with the images. Secondly, the images were viewed by staff in the coor-

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the basic team's own dining centre. The lines between the units on the street and that centre are very short. Thirdly, there was a lot of open communication about the video vehicle: in the briefings, in the news flashes and in the app group. Fourthly, it became clear over the months that what was agreed on paper was actually put into practice. The cameras were only turned on when it was really necessary and the images were only used for the pre-selected purposes.

Added value video vehicle Dordrecht

The previous section discussed the technology, legislation and organisation of the video vehicle in Dordrecht. These are the preconditions that must be met in order to successfully deploy this technology. But the crucial question is whether the video vehicle actually provided added value for police work. That is why the evaluation also looked at whether the video vehicle had made a valuable contribution to police work in the basic team. This naturally also concerns the question of whether this video vehicle adds anything to the other types of live cameras that can be deployed, such as bodycams, drones and helicopters.

The video vehicle was deployed an average of two to three times a week in the nine months that it was actually available to the basic team. It turns out that there are three different ways in which the video vehicle added value to police work: preventive, live and afterwards.

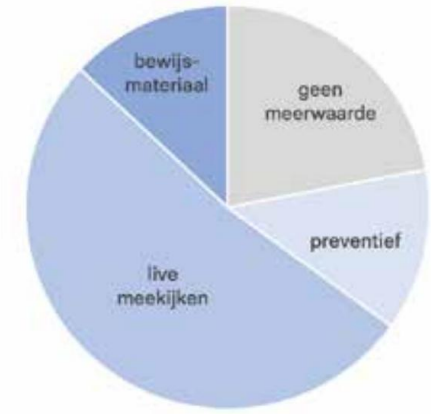

Figure 2.5 Added value of the video vehicle

There were almost forty bets where the added value could be determined. In about a fifth of those bets it turned out afterwards that the video vehicle had had no added value. In almost eighty percent of the bets the video vehicle did have added value:

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Preventive

The mere placement of the video vehicle at (incipient) incidents proved to be valuable in almost one sixth of the deployments. The visible presence of the video vehicle had a de-escalating effect.16 A good example was a neighbourhood dispute in which, according to one of the officers involved, 'half the street' was involved. By placing the video vehicle in the middle of the street, both camps were separated and people suddenly behaved a lot more calmly. Other examples of this preventive effect were noticeable during New Year's Eve and at a ride-out of a motorcycle club. Because people know that they can be filmed, they behave better and listen better to instructions from the police.

Watch live

The video vehicle proved to be valuable in half of the deployments because others could watch live during incidents. A good example was the arrest of an aggressive man by two officers. They had their hands full and were therefore unable to call for assistance via the walkie-talkie. The viewer in the Police Coordination Centre in Dordrecht could see with his own eyes that the situation was getting out of hand and immediately called for assistance. Also when two groups got into a fight after a football match, the commander in Dordrecht was able to watch via the video vehicle and coordinate the deployment of police officers. Live viewing is valuable because the viewer gets a good picture of the situation on site faster and without communication via the walkie-talkie. This allows, for example, extra units to be sent in or scaled down because the images show that the situation has calmed down again.

Evidence

The third way in which the video vehicle added value was by recording camera images as input for further investigation or directly as evidence. This was the case in approximately one in six deployments. One example was an arrest with resistance: the camera images were secured as evidence so that it could be seen afterwards exactly what the situation was and how the officers had carried out the arrest. Another example was a chase of a scooter with two men on it. After the arrest, the question arose during the interrogation whether a firearm had been thrown away during the chase. The images showed that this was not the case. Video images are therefore sometimes valuable in this way too: they can save time because an investigation can be steered in the right direction or because a certain suspect can be excluded from further investigation.

16 If the police use video vehicles at demonstrations, this can have a chilling effect, which may make people afraid to exercise their constitutional right to demonstrate. This does not apply to this video vehicle, because it is not used at demonstrations: the video vehicle is exclusively for unplanned use.

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Unique addition
All things considered, the main conclusion of the evaluation was positive. The video vehicle has a unique added value compared to other types of live cameras that the police can use in a basic team. The fact that the deployment does not have to be planned in advance, as with a riot police video vehicle, is particularly valuable: four out of five deployments were ad hoc and therefore could not possibly have been planned in advance. The technology itself also appears to have added value: the overview images or strongly zoomed-in images that can be made with the extended camera on the mast cannot be made with other cameras. The same applies to the thermal imaging camera on the vehicle: an addition that is normally not available in a basic team. A bodycam works differently because it often only films the person directly opposite the wearer. Drones and helicopters film from a great distance. This video vehicle is exactly at the middle level. The added value was also great when compared to the costs. Compared to other police video cameras, such as drones and helicopters that require a pilot, the personnel costs of this video vehicle are very low. The camera operator is available as an executive police officer during the use of the video vehicle. This not only saves money, but also makes it much easier to complete the schedules.

After twelve months, the experiment was terminated as agreed. After the delivery of the evaluation report, the unit management decided not to continue the experiment. The added value was seen, but the unit management felt that the decision to introduce this type of video vehicle should not be taken per unit, but at a national level. The evaluation report was adopted, the working group was thanked for its good work and the video vehicle was decommissioned. The video vehicle has not been used operationally since then. However, until a decision is made about possible scaling up, the vehicle is used by the pre-development team as an example of innovation during internal police events. The challenges that apply to 'scaling up and rolling out' are discussed in more detail in part 2 of this book.

2.3 Looking ahead

Live video in police vehicles will continue to develop in the coming years. Two concrete developments are already visible and are briefly discussed here.

Video vans conflict and crisis management
In 2023, a proof of concept was started: a practical study into the usability and added value of two new types of video vehicles for conflict and crisis management (CCB). This concerns a new vehicle for video control and a troop vehicle of the Mobile Unit. The experiences with the video vehicle in Dordrecht played a role in the design of the control vehicle. The technical design is

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almost identical: four cameras on the edges of the roof and an extendable mast with a regular camera on it. This vehicle, unlike the vehicle in Dordrecht, does not have a camera that makes a thermal image. The crew vehicle has one camera on the roof. The crew vehicles normally do not have cameras. But these vehicles are often close to the place where police officers are deployed and therefore 'see' what is happening much better than the video control vehicle that is at a greater distance. That is why the idea was to also place a camera on the roof of a crew vehicle. The images are sent directly to the control vehicle.

These two new vehicles were built in 2023 and will be tested in practice in six regional units from mid-2024. Prior to deployment, extensive attention was paid to the legal framework. The data protection impact assessment of these two video vehicles details the measures to protect privacy and information security. Specific attention was paid to the question of when video vehicles may be used during demonstrations. The right to demonstrate is a constitutionally protected right and police video vehicles can be a reason for people not to want to exercise their right. That is why video vehicles are never used during demonstrations in principle. They are only used during demonstrations where it is clear in advance that there is a risk of violence or other disruptions to public order, for example if a counter-demonstration has been announced. In that case, it may sometimes be necessary to use cameras. This risk assessment is made by the competent authority: the mayor or the public prosecutor. Only if the preparatory analysis shows that there is a risk of disruption of public order or criminal acts, such as violence, can video vehicles be scheduled for use during a demonstration. The decision made is recorded in writing in the script that is drawn up for the deployment. During the demonstration, the cameras in the video vehicles are switched off: they are only switched on when necessary. During large-scale operations, the Head of Information (HIN) of the police is responsible for ensuring that only information that may be used lawfully and that is relevant to the situation is requested. This officer decides whether the video cameras may be switched on and records this decision in writing in the live news broadcast of the police. The results of the experiment with these two video vehicles will be known in the course of 2025.

Dashcams

A second development that should not go unmentioned is the dashcam: a camera that is mounted in a vehicle to film the road in front of – and sometimes also behind – the vehicle. Images from dashcams have been made by the police for decades and used for communication with the general public, such as in the television programs Wegmisbruikers or Blik op de Weg. The police themselves also use dashcams for information about police work, such as in videos by the police vlogger. Dashcams are not only useful for communication with the general public: the images can

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can also be used as information for investigations and as evidence. In addition, live dashcams can give the employees in the control room a better picture of the situation on site, for example during a chase.

There are countries where a dashcam is installed as standard in all police vehicles. In the Netherlands, this has not yet been chosen. However, the need for dashcams is great within the police. A quick scan carried out by the police itself concluded in 2024 that there is 'a significant use of dashcams in daily work'.17

Due to the chosen research method it is not possible to say how many dashcams are in use, but there are at least a few dozen. The main purpose for which police officers want to use dashcams is to collect evidence.

There is no national coordination for the purchase and use of dashcams. This is partly because it has never been thoroughly investigated whether dashcams provide added value for the police. There are hardly any evaluations of experiments with dashcams. An exception is an experiment that was held at the end of 2022 in the basic teams Roosendaal and Bergen op Zoom in the Zeeland-West-Brabant Unit.18 The aim was to improve the feeling of safety of police officers, but the evaluation report concluded that the dashcams had not significantly improved that feeling. In fact, some of the employees actually felt less at ease because of the dashcam. It gave them a feeling that they were being monitored: 'It can also work against you.' This was even more true for the audio than for the video, it turned out.

Recording sound was considered 'absolutely undesirable' and for that reason the dashcam was often not turned on at all.

In 2024, an experiment with a dashcam was started in one of the rapid intervention vehicles (SIV) of the Infrastructure Service of the National Unit. Here, a dashcam was chosen that can transmit live video to the control room, so that the police deployment, for example during pursuits, can be scaled up on the basis of good information if necessary. The results of that experiment are not yet available, but it is already clear that - as with all other applications of live video - there are various technical, legal, organizational and psychological barriers to being able to use a live dashcam lawfully and effectively.

17 A draft version of the internal report has been made available for this research (National Police (2024), Dashcam use inventory; quick scan).

18 The basic police care employees in these two basic teams were given four weeks to place their bodycam in a holder behind the windshield of the police vehicle. The bodycam was therefore temporarily used as a dashcam. This was chosen because a legal framework and deployment framework were already available for the bodycams, so that this did not have to be drawn up again. The security of the images had also already been arranged. See: https://www.politie.nl/nieuws/2021/december/31/08-camera-in-politievoer-tuigen-in-district-de-markiezaten.html. An internal evaluation was carried out by the regional Technical Supervision Team in collaboration with the Q-team - a team within the police that conducts experiments to find innovative solutions to complex problems. The report was made available for this research by the researchers (Zeeland-West-Brabant Police (2022), Experiment camera in the police vehicle). The evaluation showed that the dashcams (actually the bodycams) had been used very little. The bodycam did not appear to remain properly in the holder while driving and employees often forgot to turn on the camera during incidents.

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3. Bodycams

3.1 Brief history

Bodycams are used by police in various countries. An international survey in 2015 among 46 police forces in eleven countries showed that bodycams were used by almost half of the police forces.19 In the United States, the number of police forces with bodycams rose rapidly from approximately 9 percent in 2007 to 95 percent in 2016.20 The police in the countries surrounding us also use bodycams on a large scale, including in Belgium, Germany, the United Kingdom and France.21

Small-scale experiments 1998-2014

The first time the Dutch police used live bodycams was over 25 years ago, in 1998. That year, the Mobile Unit on horseback in Limburg conducted a trial with small helmet cameras. The images were sent wirelessly to a command vehicle in the vicinity so that the commander could watch live. The aim was to get a good picture of crowds of people during events, football matches and demonstrations.22 Over ten years later, in 2009, a subsequent experiment with live bodycams was conducted. Bodycams that could record images and sound on the device itself – without watching live – were tested in three regions. However, in the Groningen region, the bodycams also had a live connection to the control room. The conclusion of the trial in Groningen was that nothing could be said about the added value of the live bodycams. Because the bodycams were hardly included because there was no support for them among the staff.23

19 B. Custers & B. Vergouw (2015), 'Promising policing technologies: Experiences, obstacles and police needs regarding law enforcement technologies', in: Computer Law & Security Review, 31: 518-526.
20 Bureau of Justice Statistics (2010), Local Police Departments, 2007, US Department of Justice. M. Maciag (2016), 'Survey: Almost all police departments plan to use body cameras', in: Governing.
21 For a description of the rise of bodycams, see: S. Flight (2017), The possible added value of bodycams for police work, Police & Science (Political Science 93).
22 See: Leidsch Dagblad, 'Police helmets equipped with cameras', May 26, 1998.
23 T. van Ham, H. Ferwerda & J. Kuppens (2010), Camera surveillance in motion. Experiences with new forms of camera surveillance at the Dutch police, Bureau Beke: Arnhem.

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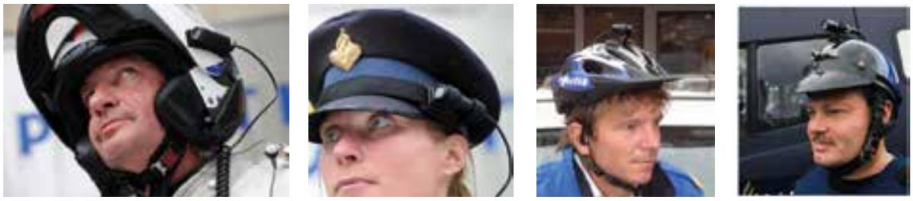

Figure 3.1 Four bodycams around the year 2010 with an external camera on the head

In 2011, the police management decided not to implement bodycams nationwide: the returns did not outweigh the investments. But many regional units thought very differently about this: according to an inventory in 2010, 10 of the 25 regional forces had purchased their own bodycams. A year later, that number had risen to 17 of the 25 forces. Some of these bodycams could also be viewed live. However, no evaluation report was found of these regional experiments, so it is no longer possible to determine what lessons were learned there.

There have also been tests with live bodycams, of which a report has been drawn up. An example is the use of live bodycams during the supervision of the Four Days Marches in Nijmegen in 2014. And in the same year, live bodycams were used during the Nuclear Security Summit in The Hague. The internal evaluation of the police showed that the experiences were very positive. The officers with a live bodycam had more overview and could make better decisions. They also had more self-confidence. The evaluation did raise the question of whether a bodycam is actually the most suitable means of making overview images for local command. In fact, the camera should film from a height of a few metres for that purpose.24 The 2014 study is interesting for several reasons. Firstly, because it shows that there was a lot of support for live bodycams among police officers. That was completely different from five years earlier in Groningen. Secondly, this study showed that live video can contribute to various goals, but that different technology is required for that. If the intention is to provide an atmosphere, a live bodycam with sound is a suitable means. But if the intention is to provide an overview image, for example for crowd management during an event, a drone or helicopter is often more suitable. In short: it depends on what you want to use the bodycam for.

This shows that opinions on live bodycams can change over the years. It also shows that live bodycams are not a replacement for other cameras.

No single type of camera can meet all the needs of the police at the same time: several cameras are needed for this.

24 National Police (2015), Start document Bodycams, National Sensing Program, Bodycams Project. See also: National Police (2015), Information/state of affairs subject bodycam by the NP, National Sensing Program, National Bodycams Project.

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Large-scale experiments 2017-2020

In the years that smartphones were introduced, many police officers noticed that they were regularly filmed by bystanders during their work. In some cases, these recordings were distributed via the internet and sometimes only the fragment in which the police used force was shown. According to many police officers, this gave a distorted image. It sometimes led to the question of why the police had used force 'out of the blue'. The police then had to try to counter this perception by pointing out the fact that there had often indeed been a build-up to the use of force. But that is difficult to prove afterwards if there is no footage of it. That is why many police officers also wanted their own bodycam to be able to show the entire build-up to police violence. And because the police organization did not provide bodycams, some police officers decided to buy a bodycam themselves.

At one point, the number of bodycams grew so quickly that the management of the Amsterdam Unit decided in 2017 to purchase more than a hundred bodycams themselves and make them available to the teams within the unit. At the same time, it was communicated that it was no longer permitted to use self-purchased bodycams. Half of all teams received bodycams and the other half did not. This made it possible to conduct a scientifically sound study into the effects. This showed that bodycams have a strong de-escalating effect on aggression and violence. The safety of police officers improved significantly in the basic teams where bodycams were worn.25 In 2019, the police decided to introduce the bodycam nationwide and purchase two thousand copies and distribute them across all regions. In the first few years, these were bodycams without the option of live streaming: the so-called stand-alone bodycams. However, there were already bodycams on the market that could transmit images and sound directly. The original intention was to also test live bodycams in the experiment that started in Amsterdam in 2018. That trial with live bodycams did not get off the ground: the stand-alone bodycams took up all the available attention and time of the project group.

A later trial at the National Unit in 2018 also yielded no information about the live bodycams. Live bodycams were available here, but they had hardly been used. They remained unused at the police station. An important reason was that the bodycams were unwieldy: they consisted of a few separate parts that were connected to each other with cables. The regular bodycams were much easier to use. But the cables were not the only problem with the live bodycams, as the evaluation showed.26 A psychological factor also played a role.

It made many police officers feel uncomfortable when someone else could watch and listen in on their work. With regular bodycams, that didn't matter: every officer could decide for themselves when the bodycam was turned on and whether a recording would be made. This gives the wearer of the bodycams a sense of control. That

25 S. Flight (2019), Focus: Evaluation of the bodycam pilot, Amsterdam Police Unit 2017-2018. Sdu: The Hague.

26 S. Flight (2019), Evaluation of bodycams by the National Unit. Testing ground for bodycams by the Infrastructure Service 2018, Politie & Science (Political Science 93B), Sdu: The Hague.

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feeling was missing from the live bodycams. This psychological factor played a partly unconsciously important role.

National survey on live streaming bodycams 2020-2022
It has always been clear that bodycams could do more than just the purpose for which they were deployed according to the national deployment framework: de-escalating aggression and violence in interactions between police officers and citizens. Bodycams could also contribute to goals such as detection, intelligence and evaluations. National research into these broader possibilities was conducted from 2020 to 2022.27 The added value of live streaming was investigated in the regional units of North Holland, Rotterdam and Amsterdam. This showed that live bodycams are a very promising technology, especially for large-scale operations, for example during events. There, live bodycams are able to increase operational awareness on the part of the viewer. However, in regular daily police work, such as catering services, emergency assistance or neighbourhood surveillance, the live bodycams turned out to yield little. This was mainly because there was usually no one available to watch the live bodycam images and without a viewer, a live bodycam has no added value. It also turned out that relatively many employees had cold feet. This could be removed by good personal guidance, but there was not always time for that. This national study showed that not only an observer is needed for a successful use of live bodycams, but also explanation, training and guidance of the users to remove the concerns of employees and to actually have the live bodycams used.

3.2 Experiment 1: National survey

All experiments described above showed that live bodycams are very promising in theory, but that (except at large events) it was not possible to use them effectively. That is why a national and large-scale practical study into live bodycams was carried out in 2022 and 2023. The aim was to thoroughly investigate whether live bodycams have added value for police practice. A technical question is central to this: do live bodycams also work well in places where many people are together, such as at an event? This was investigated in practice and in a technical test of different brands of bodycams. In addition, the study addresses the question of which legal, organizational and psychological context is needed to successfully use live bodycams.

Three brands of bodycams were tested in a technical test. In addition, all units could submit applications for live bodycams via their Technical Supervision Team. This resulted in thirty applications. Because the number of bodycams was limited, nineteen applications were honored, spread throughout the Netherlands and in all kinds of situations.

27 S. Flight (2022), Bodycams viewed more broadly. Research into the broader application of bodycams by the police, commissioned by the Sensing Program, National Police.

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ties. The live bodycams have been tested during major events such as the Sinterklaas procession in Hellevoetsluis, World Cup football matches, carnival parades and the local funfair. In addition, live bodycams have been tested in regular police services, such as in emergency aid and during nights out in catering services. The map shows in which municipalities the bodycams have been tested.

Figure 3.2 Locations where the live bodycams were tested for the 2022 and 2023 research

Technical

The first part of the research focused, as mentioned, on the technology. Three different brands of live bodycams were compared. The bodycams were made available free of charge by three companies that the police already had experience with: Axon, Reveal and Zepcam. It is the first time that three bodycams are compared in the same way, at the same time and under the same circumstances.
The test is not just about whether the wireless connections work well. The ease of use of the bodycams themselves is also compared, as well as the video management systems used to view the images.

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Axon Body 3 Reveal K7 Zepcam T3

Figure 3.3 The three live bodycams compared in the technical test

The technical test shows that there are at least several well-functioning live bodycams available on the market: the three bodycams are each positively assessed by the testers. But it is also noticeable that the bodycams differ from each other on a number of essential points. And these differences are not merely technical in nature: they have consequences for the use of live bodycams in practice. The most important differences in design and use are discussed below.

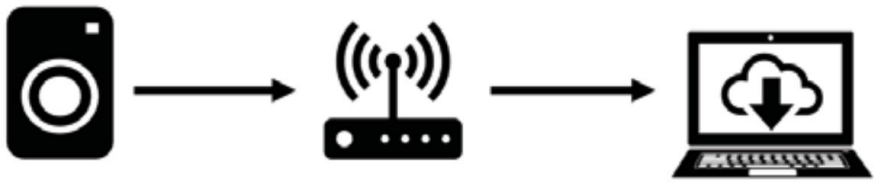

Figure 3.4 The three components of live bodycams: camera, connection and video management system

Camera: the perfect bodycam does not exist

As mentioned, the bodycams appear to differ considerably in a few aspects. Where one supplier opts for a very strong magnet to attach the bodycam to the uniform (so that the bodycam cannot accidentally fall), the other opts for a weaker magnet (so that the bodycam cannot be used as a kind of handle by aggressive citizens). One supplier builds a bodycam with dozens of options, while the other opts for a bodycam with little more than an 'on/off' button. One bodycam has a small screen on the front that acts as a kind of confrontation screen to show what the bodycam sees, the other bodycam is barely noticeable. The test shows that the perfect bodycam does not exist. Every design choice

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it has advantages and disadvantages. What one tester sees as a plus (strong magnet, many options, small screen on the bodycam), another tester may see as a minus (bodycam is too fixed, operation should be as simple as possible, small screen leads to more aggression). All things considered, this test shows that for most employees in daily police practice, simplicity and ease of use are decisive: the simpler, the better. When an incident occurs, the live bodycam must be able to be activated with one push of a button. Additional options and choices can be useful in certain situations, but in the event of an incident there is no time to think about it. The bodycam must also clearly show whether the live connection is active or not. This point will be discussed later in the discussion of the psychology of the bodycam.

Connection: bandwidth often sufficient

The question that most people were concerned about prior to the research was whether the wireless connections were good enough for live bodycams: is there enough bandwidth? Previous experiences during large-scale events had shown that the connections sometimes became too bad for live bodycams when many people were together using the mobile network. The practical tests that were conducted as part of this research showed that this problem was not as big as feared. In less than a fifth of the cases (17%) the connection was bad. In the remaining cases the quality varied (33%) to good (42%). In a few tests it was unclear whether the connection was good or bad (8%).

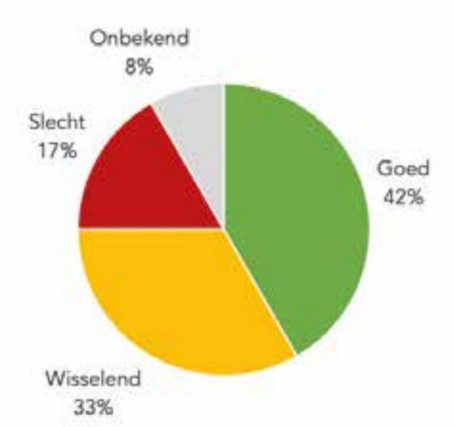

Figure 3.5 Quality of the wireless connection

The connections appear to work particularly poorly when the live bodycam is used inside a building. Incidentally, this also applies – and often to an even greater extent – to the C2000 communication system over which the walkie-talkie traffic runs. When live bodycams are used outdoors, the connections are good in most cases. Especially when the police are on the move, such as when accompanying football supporters.

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ters towards a stadium, at the arrival of Sinterklaas or at a carnival parade, the connections often work well even if there are thousands of people together. That is a surprising outcome, because many thought beforehand that live bodycams would never work during large events.

Video management system: ease of use first
Ease of use and simplicity are also very important on the viewer's side. Spectators are offered information in all sorts of ways and via all sorts of systems: telephone, walkie-talkie, regular cameras, bodycams, drones, helicopters. It works best if all that information is bundled in one place. It is highly undesirable for new devices to set up a separate screen or to have to walk to another workplace. This means that live bodycams (and all other live cameras) will have to 'land' on the same video platform where other camera images are also received. This means that only suppliers of live bodycams should be selected who are prepared to design their software in such a way that it fits under the umbrella of the police systems. In practice, this means that an external cloud made available by the supplier cannot be used.

In addition, it is important that the video management system also immediately stores the live images from the bodycams. Some systems only display the live images without storing them. From the perspective of privacy protection, it may sometimes be desirable not to record images. However, there may also be good reasons to record the images. This offers the viewer the opportunity to review a fragment. This may be necessary, for example, to be able to check the license plate of a vehicle or to be able to look at something that was not noticeable at first with more attention, such as whether someone quickly concealed a weapon or drugs. Recordings also offer the viewer the opportunity to start a criminal investigation file by drawing up a draft version of a report. In the meantime, the wearer of the live bodycam can continue working. The point is that the police must be able to choose whether or not to record images. The software from the supplier must therefore offer this option in any case.

Legal
In legal terms, not much extra work had to be done for the use of live bodycams because the legal framework for regular bodycams had already been developed and established. The bodycams are used on the basis of the task in article 3 of the Police Act and the processing of the data falls under the Police Data Act.
These points are discussed in more detail in the second part of this book. The national legislation and regulations are further elaborated in the Bodycams Deployment Framework for Operational Use. 28 This deployment framework states under which conditions and in what manner the police

28 See p. 9 in the Bodycams Deployment Framework: https://www.politie.nl/binaries/content/assets/politie/onderwerpen/bodycam/inzetkader-bodycams-versie-2.1-categorisation-public-def.pdf.

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may use bodycams. The deployment framework provides space for live streaming by bodycams and that is logical. In terms of privacy protection, it does not matter whether a bodycam only records images or also transmits the images live: both methods are seen as processing police data that must comply with the Police Act and the Police Data Act.
However, in certain cases, a live bodycam may pose specific additional risks to the rights and freedoms of the persons captured, including the police officers themselves. In such cases, it may be necessary to carry out an additional data protection impact assessment to mitigate these new risks. This was not the case in these experiments.

Organizational
Legally, no complicated additional work was required for the live bodycams, as was already apparent. However, in organizational terms, live bodycams appear to be very complex. The main concern is the availability of a viewer: after all, there is little point in sending live images if there is no one who can watch along. This is well arranged for large-scale deployment of the police: then a viewer is available because it was clear in advance that this was necessary. However, if live bodycams are used in regular services, it is not self-evident that a viewer is available. Sending live bodycam images to the centralists in the Operational Center in particular is a challenge. Because these centralists are used to communicating via walkie-talkie or telephone: there are working methods, agreements and training courses that ensure a well-functioning system. For example, it is possible to distribute walkie-talkie traffic over different channels, so that the amount of communication per channel does not become too large. Ether discipline is also important: during incidents, communication is kept to a minimum to maintain peace and keep the lines free in case it is really necessary. With live bodycams, all of this is not yet arranged: there are no comparable protocols and agreements. That is not a major problem if there are only a few live bodycams per regional unit. But if the number of live bodycams grows, this bottleneck becomes many times greater. Then there must be a mechanism to determine which information from the live bodycams should be given priority and which information can wait until a later moment - just as is already the case with an overload of information via walkie-talkie or telephone. However, this problem also occurs with the growth of the supply of live images from video vehicles and drones. That is why this organizational point is discussed in more detail in part 2 of this book.

Psychological
Many police officers feel uncomfortable when they start working with a live bodycam. It is logical that this feeling is stronger with a live bodycam than with a live drone or live video vehicle: the bodycam is worn on the body and therefore comes very close. The idea that one or more others can watch and listen directly during your work does something to you. This psychological effect of the bodycam

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was the reason for the failure of the experiments around the year 2010: police officers simply did not take the live bodycams with them. But the experiments that were held in 2022 and 2023 provide a different, more nuanced picture. There are also police officers who would like to work with a live bodycam. It turns out that this willingness depends on 'soft' factors such as proximity, control and trust.

Proximity

The reluctance to use a live bodycam becomes less as the person who can watch and listen feels closer to the wearer of the live bodycam. This can be in a physical sense, for example if a colleague or commander at the police station watches in the basic team. But it can also be a centralist in the regional or even the national control room at a greater distance. What matters is that the wearer of the live bodycam and the viewer take the time before the service to check in with each other, get to know each other if necessary, test the live connection and agree on the rules of the game they will use for activating the live connection.

Control

The second factor is control: who activates the livestream on the bodycam? There are three possible scenarios.

Wearer decides. In this first scenario, the wearer of the bodycam has full control. Pressing the button on the bodycam establishes the live connection and starts the livestream. The advantage of this scenario for the wearer is that it is not possible to 'secretly' watch or listen in. The disadvantages are that it is impossible to watch with the bodycam in an emergency and that the wearer never knows whether there is actually a viewer available who can watch.

Viewer decides. In this second scenario, the viewer has complete control over the livestream. The connection is opened when the viewer decides that this is necessary. The advantage of this is that it is also possible to watch in emergencies if the wearer of the bodycam does not have the time or opportunity to open the bodycam himself. The disadvantage is that the livestream can also be opened at times when the wearer does not want it to be, for example during a private conversation or toilet visit.

Wearer and viewer decide together. In this third scenario, wearer and viewer jointly have some control. The wearer of the bodycam determines whether the live connection is set up for activation. However, video and audio are not yet forwarded. This only happens when the wearer presses a button on the bodycam and when the viewer then accepts the offered livestream. The wearer of the bodycam sees on the display of the bodycam whether there is a viewer watching. The advantages of this method are that the wearer maintains control and that it is clear to the wearer whether someone is watching. And if the connection has already been set up, the viewer can activate the livestream in an emergency without the viewer asking for it himself.

This third scenario is more complicated than the first two, but is still the optimal variant. The test shows that there are bodycams that do not support scenario three. That is

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so something to consider when purchasing live bodycams. In addition, it is important to describe the procedure in a protocol and practice with it.

To trust

The third ingredient is trust. It is striking to see how big the differences are between police officers. Some want to wait, but there are also police officers who want to try out live bodycams right away. This will partly be an individual characteristic: there are early adopters and employees who join later. But it is not only an individual characteristic: it also differs per regional unit. In certain units there was more enthusiasm to try out live bodycams than in other units. The Limburg Unit was the best example of a unit where there was a lot of willingness to work with live bodycams. That is why no fewer than five of the fifteen experiments were held in the Limburg Unit (Weert, Roermond, Sittard-Geleen, Heerlen and Maastricht). The only logical conclusion is that there is apparently a lot of trust within the Limburg Unit when it comes to trying out innovations. This is probably a combination of an innovative attitude on the work floor, good technical support and support from managers when employees try out new things.

By the way, there is also a psychological effect observable on the side of the observer. Some of the centralists in the control room almost never see with their own eyes what the officers on the street see. That can have two effects. On the one hand, it can ensure that they can do their work better because they gain more knowledge of that side of police work. They see the effect of their choices and can learn from that. On the other hand, it can also cause them to be confronted with traumatic images, such as after a traffic accident or suicide. In certain cases, this can even lead to post-traumatic stress disorder. The police have teams of employees who can support colleagues after shocking events. They must therefore also take into account the impact of live video of intense events on colleagues who are watching.

Added value

Based on all the information collected, the conclusion is clear: live bodycams can demonstrably improve police work. The first and biggest advantage of live bodycams is operational awareness on the part of the viewer. Bodycams can transmit information better and faster than via a walkie-talkie or telephone: the viewer can see the situation with their own eyes. The chance of misunderstandings and different interpretations is therefore reduced. Images say more than words: if an officer on the street reports via walkie-talkie that it is 'very busy' somewhere, everyone can have a different idea about that. The live bodycam enables the viewer(s) to assess the situation themselves. Thanks to the live bodycams, relevant information reaches the right place faster and the viewer also receives information that cannot be given verbally, such as an impression of the situation on site.

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A concrete example that clearly shows the added value was during a chase by two police officers with live bodycams. Thanks to the live images from the bodycams, the commander at the station could see exactly where they were and how the arrest was going. Other units could be sent to the right place to support them without the pursuing officers having to pass anything on via the walkie-talkie. The officers on the street could therefore fully concentrate on the chase and arrest of the suspect. This example also showed how useful it is to have a live bodycam with audio: the officer on the street does not have to pass on via the walkie-talkie what was said because the microphone of the bodycam transmits this. This way, the officers on the street keep their hands free.

Secondly, live bodycams have been shown to increase the safety of officers. This is particularly beneficial in situations where police officers work solo and are the first to arrive at an incident. This is often the case with motorcycle officers or dog handlers. Thanks to the live bodycam, the viewer can look 'over the shoulder' and support or warn the officer in question.

A third advantage is remote expertise. The viewer can support the wearer of the body cam, for example by checking an ID or license plate in the police systems, for example to see if someone has a criminal record or could be in possession of a firearm. The operator in the Operations Centre can have a colleague from the fire brigade or ambulance watch along to give tips in the event of a fire, explosion or collapse hazard, accident or resuscitation. However, the experiments did show that offering remote expertise has not really come into its own yet because it requires a different way of working. The operators will have to be trained and supported in this. But the experiments clearly show that where this has happened, live body cams can also be used in this way to great effect.

In short: live bodycams improve police work by quickly and accurately transferring information, by making work on the street safer and by supporting the bodycam wearer with remote expertise.

3.3 Experiment 2: Live bodycams for negotiators

The paragraph above is about the large-scale national study on live body cams that I conducted in 2022 and 2023. In addition, I also supervised a smaller-scale experiment with live body cams for negotiators. That experiment was so interesting that it is also discussed in some detail here.

When people display confused behavior or threaten to harm themselves or others, a police negotiator is often deployed. Negotiators are also deployed in hostage situations, such as the hostage situation in the Apple Store in Amsterdam in 2022 or in a café in Ede in 2024. The negotiators are deployed very regularly: in 2023 this happened twelve hundred times, so an average of three times a day. Negotiators are educated and trained to be able to do their job well. Their motto is: 'No

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violence, but a conversation' because they try to normalize situations. In order to do that, they must be able to devote their attention to the conversation for one hundred percent. A negotiator does not have time to inform others about the progress of the negotiation. But that information must be shared. Often there is an arrest team ready to intervene and sometimes others such as the fire brigade or ambulance transport must also be kept informed. The commander who coordinates the action must be able to assess whether and when additional deployment is necessary. Normally it takes a lot of effort to send information from the negotiation directly to the commander. The live bodycam makes this extremely easy.

For this reason, an experiment was conducted in 2022 and 2023 with live bodycams for three negotiators. They were given access to a live bodycam and installed software on their own iPad so that they could watch and listen to the bodycam.
Before a negotiation, the negotiator could then establish a live connection between the bodycam and the iPad. The negotiator then gave the iPad to the commander to watch and listen. After the negotiation, the negotiator disconnects the connections and takes the iPad with him again.

Technical issues

In this experiment, all sorts of technical issues were discovered. These are interesting enough to discuss here, but they are especially important because they show how much customization can be needed to use live bodycams for a specific task such as negotiations.

Image and sound
It was essential for the negotiators to transmit not only live images, but also sound. After all, a negotiation cannot be followed based on images alone: it is mainly about what is said. However, it was not yet possible to transmit live audio - this had never been necessary before with other live bodycams.
It took six months to finally resolve this issue. The bodycam supplier said the problem was in the video management system. The video management system supplier said the problem was in the bodycam. The solution, as is often the case, was somewhere in between.

Authorizations closed by default
When a negotiator has a conversation, for example with a confused person, very personal topics often come up. That is why a lot of attention was paid to privacy protection and information security in this experiment. For live bodycams, in principle all Operational Centers could watch. That was neither desirable nor necessary for this experiment. However, it turned out to take weeks to adjust the authorization matrix. This was due to a combination of lack of time and uncertainty about who is responsible for technical and functional support during this type of experiment.

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iPad sleep mode

The live stream of the bodycam goes to the negotiator's iPad, the negotiator gives that iPad to the commander on site to watch. But if an iPad is not operated for a while, it goes into sleep mode. Then the negotiator has to go to the iPad to unlock it again: 'Come and put your thumb down.' That is of course undesirable because the negotiator has to keep all his attention on the negotiation. It is therefore better if the sleep mode is switched off or if the commander is given permission once to watch the video stream on his own device.

One push of a button

It is important for negotiators to evaluate every engagement. That is why it is necessary to save the video and audio of the negotiation. However, live streams from bodycams are not normally recorded, so if the negotiator wants to do so, this must be a conscious choice before the negotiation. At the crucial moment, negotiators do not have time to think about it and so the recordings were never recorded. On closer inspection, the 'one-push-button' approach was therefore chosen: if the bodycam is started now, the live stream is activated and the images and sounds are recorded.

Bandwidth

The bodycam compresses the footage so that it can be sent over wireless networks. For those who watch live, this is not a problem: a lower image quality is often good enough. However, the high image quality may be necessary for subsequent detection. It is possible to upload the bodycam recording to the central and secure storage of the police. However, this requires a connection with sufficient bandwidth. The first time it turned out that uploading a three-minute recording in high resolution would take three hours. This is why this option was hardly used and the high-resolution recordings were deleted.

Carriers

Modern bodycams are worn on the chest and therefore always film straight ahead.
If the negotiator turns his or her head to the side or up, the bodycam does not turn along. This means that the viewer does not see what the negotiator sees. When using live bodycams in regular police services, this is not a problem because the bodycam wearer can calmly tell the viewer what can be seen. But this does not apply to the negotiators: they cannot talk to the commander who is watching because this could undermine the bond of trust with the person they are talking to. The alternative is a small camera that can be attached to a cap, helmet or glasses so that it can follow the movements of the head. Such bodycams do exist, but were not yet available. The question is whether this really adds value or whether it actually disrupts the negotiation too much.

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Battery
A negotiation can sometimes last a day, so it can happen that the battery of the bodycam is empty. The bodycams used in this experiment played a sound fragment in that case: 'Change battery' and repeated that every thirty seconds. In most situations this is not a problem, but for the negotiators it was very disruptive: all attention was suddenly focused on the bodycam. This can have an escalating effect, for example with people who have a psychosis or anxiety attack because they think they are being observed by the government. The talking bodycam then adds fuel to the fire. This yielded two lessons: the battery of a live bodycam must last at least eight hours and the bodycam must offer the option to switch off these types of auditory signals. For the latter, an adjustment to the firmware of the bodycam is required.

No connection
About half of negotiations take place outdoors. There, wireless connections usually work well. But when a negotiator enters a home or other building, the wireless connection is almost always lost.
It would be desirable to implement an alternative via, for example, WiFi or Bluetooth, provided that the security of that alternative can be brought to an acceptable level.

This overview shows that the live bodycams presented eight new technical issues for the negotiators. Some of these are generic issues such as good batteries, but some are also unique challenges for this specific application of live bodycams.
It is likely that other specific applications of live video will also generate unique wishes or demands from end users. This means that space must always be reserved for support by technical and functional administrators.
The latter point will be discussed again later in the 'organisational' section.

Legal
A framework for the regular use of bodycams has been drawn up. The question was whether that framework was sufficient for this experiment. After all, the conversations of negotiators with people who are confused or psychotic contain very sensitive information. The negotiators were very aware of the risks from the start of the live bodycam experiment and therefore several discussions were held to investigate whether the existing legal framework was sufficient.
The conclusion after a thorough inventory was that the existing framework was sufficient. All negotiators who were going to work with a live bodycam were first properly informed of the applicable laws and regulations and of the deployment framework. In addition to the deployment framework, a number of clear 'rules of the game' for the use of live bodycams in negotiations were described. These consisted of an overview of four technical and four organizational protective measures that had to be checked by the negotiator prior to each deployment.

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Organizational

This experiment was prepared and executed by a small number of negotiators who were enthusiastic about the possibilities of live bodycams. During periodic meetings in a working group with three negotiators and three technicians, the plans and experiences were discussed. The negotiators themselves were responsible for informing and instructing the commander on site who could watch and listen. As a result, the experiment was well embedded in an operational sense organizationally.

Less good, as mentioned, was the organization in terms of available technical and functional support. It turned out to be almost impossible to quickly implement specific technical adjustments. The available technical expertise for support of live bodycams is limited and is almost entirely focused on planned events, such as Formula 1 or Sinterklaas processions, and other matters such as risky football matches or demonstrations where live video is needed. The experiment with live bodycams at the negotiators had to be carried out between all those planned events. As one of the technical managers said: 'There are two of us here, but we have enough work for five.' In addition, the negotiators were the odd one out. Technical support is now mainly focused on installing and getting standard equipment up and running in a standardized way. There is no capacity left for technical and functional management during experiments when systems still need to be adjusted.

Psychological

Interesting lessons have been learned about the psychological dimension of live bodycams thanks to this experiment. The initial reaction of many negotiators was reserved: many found it an unpleasant idea that they would be filmed during negotiations. Some also did not see what the possible added value of the bodycam would be: 'I have been doing this work for ten years without a bodycam and it works fine', as one person put it. Others did see that it is useful to give the commander a good picture of the situation, but wondered where the images could end up. There was even someone who thought that the recordings could be requested by anyone on the basis of the Open Government Act.29 Some also wondered whether the collaboration partners, such as the members of an arrest team, wanted to be filmed. In short, there were quite a few obstacles.

But thanks to clear procedures and agreements – which were also recorded in writing – the initial lack of clarity and uncertainty slowly gave way to enthusiasm and support. It is important that wearing a bodycam is not mandatory, but a voluntary choice that everyone can make for themselves. In practice, the positive experiences proved to be predominant. There were even negotiators who noticed a positive effect on their own performance. As one of them said: 'It makes you more professional. It

29 Anyone can appeal to the Open Government Act, but before information is actually made public, it is considered whether this does not have a detrimental effect on other interests, such as the investigation and prosecution of criminal offences or personal privacy (privacy protection). It is obvious that recordings of a negotiation will not be made public.

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has a purifying effect on our own actions.' Also important was the mutual trust between the negotiators and the leader of the experiment. If these conditions are met, it is possible to break down the psychological barrier even in a sensitive setting such as a negotiation.

Added value

The bodycams were used ten times by negotiators in this small-scale experiment. The evaluation of this experiment shows that bodycams have demonstrably added value for negotiators. They have contributed to the safety of the negotiators themselves and also to that of the people with whom they negotiated.
The main advantage of the bodycams is that information about the negotiation can be shared more quickly, completely and richly with those who are not physically present at the negotiation.
The reactions of the viewers were unanimously very positive: 'fantastic', 'phenomenal' and 'really great'. A concrete example of the added value was a negotiation in which not only a negotiator with an arrest team behind him was involved, but also the fire brigade because of the risk of explosion. The commander of the fire brigade could listen in and watch via the bodycam and get a good picture of the relevant matters for the fire brigade. Without a bodycam that would have been impossible.
Not only because the negotiator does not have specialist knowledge like the fire department does, but also because the communication has to go over multiple discs. The negotiator gives information to a buddy, the buddy tells it to the police commander, who tells it to the fire department commander. The body cam skips two links in that chain, which means that the information is not only transferred faster, but also more completely.
Another example was a situation in which a man had barricaded himself in his home and threatened to end his life. The police were called by the neighbours who smelled a strong gas odour and so, in addition to the police, there was also the fire brigade, ambulance service, a municipal employee and someone from Liander to turn off the gas. In such a case, the commander has to make a multidisciplinary plan to manage all parties. This requires a position that is close enough to know exactly what is happening and far enough away to be able to give good and calm advice. The bodycam was the ideal tool for this. Even when it was decided to shoot the windows of the home to let the gas escape, there was 'enormous calm' on the walkie-talkie. In the words of the commander:

> 'It was really phenomenal; I hadn't thought of that beforehand. I hope we can use the bodycam again very soon.'

A third example was a negotiation by a less experienced negotiator. The remote commander who was leading the action could coach the negotiator by advising a different conversation technique.

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Finally, the possibility to evaluate afterwards on the basis of real images also proved to be very valuable. One of the negotiators discovered when watching the recording that his memory of the negotiation was very unreliable. The bodycam showed that the conversation had developed differently than the negotiator thought he remembered. It was also instructive to look back at a quiet moment to see what effect movements or words have on the person with whom the negotiator is having a conversation. Without a bodycam, that kind of information is lost at the moment itself. The bodycam makes it possible to learn from that.

In short: the live bodycam provides demonstrable added value for use during negotiations.

3.4 Looking ahead

After the experiment with the bodycams for the negotiators, it was decided to purchase 75 live bodycams for the negotiators. This will be part of the tender for bodycams that will be done in 2025.

Until then, 15 live bodycams will be temporarily purchased, so that at least one live bodycam is available for negotiations in each unit.

In addition, there are more foreseeable developments in the field of live body cams. First, it is likely that suppliers of body cams will soon only produce body cams with a live streaming option. The police will then not have to choose whether there will be live streaming, but how to deal with live streaming.

A second trend is that bodycams will increasingly be used for purposes other than de-escalation of incidents. Bodycams are used on the basis of article 3 of the Police Act and may therefore be used for maintaining public order, criminal enforcement of legal order and for providing assistance. This trend has been visible for years, but will continue to grow if bodycams can also transmit live images.

A third trend to consider is the possibility of sending live video and audio via a smart phone. This is an application that is not (yet) widely used, but it is logical that many police officers are investigating this, since they can also use it privately. If the intention is to use the service telephone for this, a choice will have to be made whether to do this via the National Operational Network or via other communication networks. It would take us too far to go into this in detail for this book, but the amount of data that is sent over wireless networks will continue to increase exponentially in the coming years, just as it has in recent years.

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4. Drones

4.1 Brief history

Drones were originally developed for military applications, but civilian organizations are now also using this technology, including for police work.30
The previously mentioned international survey in 2015 among 46 police forces in eleven countries showed that drones were used by a quarter of the police forces.31 A more recent overview was not found, but it is likely that this percentage is now higher. An international market research agency predicted a growth of the drone market of approximately fifty percent per year for commercial and civil applications until 2030. This is fueled by relaxation of the regulations for the use of airspace.32

Figure 4.1 Police drone just before take-off

30 Some people do not talk about drones but about unmanned aerial vehicles (UAVs), but in this book I choose the term drones because it has now become established everywhere and is also used more often by police officers themselves.
31 Custers & Vergouw (2015), 'Promising policing technologies: Experiences, obstacles and police needs regarding law enforcement technologies', Computer Law & Security Review, 31: 518-526.
32 ABI Research (2024), Soaring Civil & Commercial Applications Propel Drone. Market to US$123 Billion by 2030. https://www.abiresearch.com/press/soaring-civil-commercial-applications-propel-drone-market-to-us123-billion-by-2030/.

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2010-2017 First drones, first successes

The first time the Dutch police tried out drones was around 2010.
It started with drones from Defence that were used by the police based on a request for assistance. There were also teams in which employees purchased a drone on their own initiative. During one of the first deployments by the East Netherlands Unit, it was an immediate hit: a cannabis plantation was discovered in a corn field. That success spread like wildfire within the police and the number of drones grew rapidly.
According to the early adopters, drones were necessary because they could improve, accelerate and simplify police work. But at the same time, they realised that the police cannot simply use flying cameras. Not only because this violates the laws and regulations on privacy protection, but also because aviation regulations set limits. For example, it is prohibited to fly a drone above built-up areas or around airports. In the early years, there was no national deployment framework that could provide clarity on this: every police officer and every team had to find out for themselves which rules applied to drones.

Within a few years, the number of drones had grown to such an extent that some within the police felt that there was a proliferation that needed to be curbed. One of the most important steps towards a more professional use of drones was applying for an exemption from the Human Environment and Transport Inspectorate for flying drones. The police aviation department received this exemption and from that moment on had to meet a large number of conditions, including a periodic audit.
Another requirement was that the police had to set up an internal supervisory organization to ensure that all drone pilots respected aviation regulations. In addition, procedures were written down and standards were established for the education and training of pilots. Agreements were also made about the maintenance and management of the drones. This was recorded in the Drone Operational Manual.

2017-2021: Testing grounds and strong growth in the number of flights

After obtaining the exemption, the number of police drones continued to grow. However, there was still no support from the police leadership for a national and structural introduction of drones. In order to assess whether the investments in equipment and people would be worth it, it was decided in 2017 to investigate in pilot projects whether drones have added value for police work. The number of drone missions increased from approximately three hundred in 2018 (an average of less than one flight per day) to over two thousand in 2021 (an average of six flights per day). The number of trained pilots increased from sixty to two hundred in the same period.

2021-2024: National embedding

In the spring of 2021, the police force management decided to embed unmanned aerial vehicles within the police force. This meant that each regional unit would have its own drone facility. At the same time, a clear demarcation was provided. Drones were only allowed to be used for three purposes: forensic investigation, public order and covert deployment. Data protection was also given a special status from this

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moment serious attention. A Data Protection Impact Assessment (DPIA) has been drawn up for drones, describing how drones work, the risks they pose to privacy and the measures taken to protect privacy. Structural budget was also made available for drones in all units. The police switched from an incidental innovation budget to a structural multi-year operating budget.

4.2 High flyers

For this research, interviews were held with the national drone project managers and with several drone specialists from regional units. In addition, the police made an internal report on drones available.33 This information makes it possible to determine whether drones have added value for police work. But first, the preconditions that determine whether drones can be deployed successfully are discussed: technical, legal, organizational (including psychological).

Technical preconditions

Each drone has a camera on board and a wireless radio link over which the images are sent. This is necessary to allow the pilot to steer the drone in the right direction. Under normal circumstances, this video link is exclusively between the drone and the console that the pilot operates. There is therefore no standard link with the National Operational Network and the video management system of the police.

In the case of forensic investigation after a traffic accident, live viewing is usually not necessary. In such cases, the drone is used to visualize the scene of an accident for subsequent investigation. However, when a drone is used to maintain public order, it is often necessary for the local commander or the control room to be able to view directly. In such cases, a live connection must be established with the National Operational Network. This is the same network over which the images from the helicopters, video vehicles and bodycams are sent. Once this has been arranged, it is possible to view from an Operational Center anywhere in the country or via another authorized account.

The technical problems that the police encounter when using live drones are similar to those of other forms of live video. For example, the problem of compression also plays a role here. The image resolution of the camera under the drone is often too high to be able to transmit live. So the images are compressed before they are sent via the National Operational Network. If the images that are transmitted live are stored in the video management system, they are also of lower quality than the original that is stored on the drone itself. In some cases, this is not a problem because a lower resolution is sufficient.

33 National Police, High Flyers. The added value and future of unmanned aerial vehicles in the police, Project UAV (version 2.1, July 5, 2023).

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However, forensic investigations often require the highest image quality. These images must subsequently be transferred from the local storage on the drone to the internal network of the police, so that the detectives can start working with them. This is currently done by transferring the images from the drone to an external data carrier by transferring the SD card from the camera to a USB stick, external hard drive or laptop. This method via a copy poses more risks to information security and the integrity of the evidence than data transfer via the closed national network for video. It is better if drone pilots can upload the images with the high image quality in a simple way via a fixed connection, for example by connecting the drone to a fast connection to the video management system upon return to the police station. The previously recorded images in low quality can then be replaced by the same images in high quality. This requires data connections with sufficient bandwidth between all police stations where live drones are used and the underlying national server for camera images. There also needs to be a good system to uniquely identify previously recorded images so that the correct images are replaced. This issue also occurs with other types of live video. It is therefore obvious to tackle this all at once instead of per type of live camera.

Legal preconditions

Systematic observation or not?
The use of drones raises legal and ethical questions. Firstly, the question is – as with other live cameras – within which frameworks the police may lawfully use drones. The basis on which the use for forensic investigation and public order is based is article 3 of the Police Act. This is the same basis as for video vehicles and bodycams. This article of the law offers the police scope to make a limited infringement of the fundamental right to protection of personal privacy. It is not permitted to make more than a minor infringement of fundamental rights on the basis of this article of the law. Systematic observation is therefore not permitted.
But when does a drone provide systematic observation? That question cannot be answered in general: it depends on the circumstances. If a drone flies over a cornfield to see if there is a cannabis plantation there, no people appear in the image and therefore no personal data (and therefore no police data) is processed. In that case, the constitutional right to protection of personal privacy is not violated. However, when a drone is used, people quickly come into the image and then the question is whether that constitutes more than a minor infringement of fundamental rights. The answer depends on all kinds of factors, including the flight altitude and the question of whether the people are identifiable. The way in which the police data is processed may also be taken into account. A drone that is only viewed live by the pilot, without images being forwarded or recorded, infringes relatively little on privacy and can therefore be more lawful. The question of the exact scope of Article 3 of the Police Act is addressed in the

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second part of this book. After all, this is an issue that applies to all cameras used by the police.

Informing those involved

An important legal principle when using cameras is the duty to provide information. People who may appear on camera must be informed about this. With regular cameras, this obligation can often be met relatively easily by placing an information board next to the camera. But with a drone that sometimes flies at great heights, this is much more difficult. The police can place information boards at the location where the drone takes off, but not everyone who appears on camera can see it. Alternatives that have been considered include sending messages via (social) media or, for example, specific lighting on the police drones. The police organised ethical sessions to discuss these topics and to find the best way to inform people. It emerged that communication takes place via three tracks. The drones themselves must be recognisable and there are information boards at the location where the drone pilot is located. Secondly, there is real-time communication via (social) media. Thirdly, general communication about drones (and other cameras) is available on the police website.34

Figure 4.2 Information provision about police drones

Information security Chinese drones

The market leader in drone sales is a Chinese company: DJI. In 2021, more than half of the professional drones sold to business users worldwide

34 See https://www.politie.nl/onderwerpen/drones.html.

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were sold under the DJI brand. In the consumer market, DJI even had more than ninety percent of the world market.35 There is discussion about the security of the images and flight data of DJI drones. This has to do with the fact that this data is stored in the cloud. This concerns flight logs, camera images and sometimes also personal data. It has been shown that this data can 'leak'. Ethical hackers found large amounts of data from DJI drone users on a poorly secured Amazon Web Services server, including flight logs, thumbnails of camera footage showing images of critical infrastructure such as nuclear power plants, and even passport scans.

A second point of concern in terms of information security is that owners of DJI drones have to download software updates from Chinese servers when they turn on the drone. DJI denies collecting user data and has had external audits conducted to investigate information security. Special versions of business drones for governments have also been made with an option for the so-called 'Local Data Mode'. DJI decided to remove the option to sync flight logs in the cloud after an outcry.

However, the concerns have not disappeared. Some government agencies, including the Dutch Ministry of Defense, no longer use DJI drones. In the United States, a general ban on DJI drones is even being worked on – including for private individuals. In 2024, the US House of Representatives passed the Countering CCP Drones Act, which would ban DJI drones from using the radio spectrum.36

An ethical consideration of a completely different nature is the question of whether Dutch government organisations should buy products from a company that is suspected of violating human rights or facilitating cultural genocide. It is not certain whether DJI is indeed guilty of this,37 but there are organisations that want to exclude certain companies from participating in tenders for this reason. The Association of Dutch Municipalities asked a law firm to investigate whether suppliers that contribute to human rights violations or come from countries with an offensive cyber programme can be excluded from tenders. This has led to purchasing conditions and award criteria specifically aimed at camera systems that can be used by governments.38

35 The most recent reliable figures are from 2021 and are based on a survey of almost two thousand respondents in forty sectors and more than a hundred different countries: https://www.dronewatch.en/2021/09/17/business-market-share-dji-decreased-significantly-in-2021.

36 The American Security Drone Act was passed by the U.S. House of Representatives in 2023 and then referred to the Senate. The Senate is still considering the bill at the time of writing (September 2024). The bill placing DJI on the list of prohibited suppliers was passed by the House of Representatives in September 2024. For the current status, see: American Security Drone Act of 2023 (S.473) and Countering CCP Drones Act (HR 2864) at: www.congress.gov/bill.

37 See the research by Follow the money: https://www.ftm.nl/artikelen/de-ogen-van-chinees-staatsbedrive-hikvision-are-everywhere.

38 See: https://vng.nl/sites/default/files/2024-06/20240621-ledenbrief-inkoopvoorwaarden-camerasystemen.pdf.

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The police in the Netherlands has made a different assessment to date and still uses DJI drones. The police know that there are security risks involved, but believe that these can be adequately mitigated. Under these conditions, the police still opt for DJI drones for the time being because of the favourable price-quality ratio.

Organizational preconditions

The way in which the police organise drones has become increasingly professionalised over the years. In 2013, the police force management sent a letter to all units with national instructions for the use of drones. A single national exemption for flying drones was introduced, which was managed by the police Aviation Department, including a national steering group that reported directly to the police force management. A national drone project leader was also appointed at the time, who coordinates internal cooperation and ensures that the police continue to meet the requirements of the Environment and Transport Inspectorate. A management organisation was set up to ensure that the drones are properly maintained and that they work in accordance with the national frameworks.

Management organization

The management organisation is now starting to feel tight: it was set up for sixty drones, but three hundred drones are now in use. This means that choices have to be made in the management activities that 'nationally' does or does not provide. Three objectives have been chosen: forensic investigation, public order and covert deployment. Deployment for other objectives, such as surveillance & security, does not fall under this and therefore additional support must be arranged for this. The national platform for real-time operational video limits its support for drones to planned large-scale deployment. Support for ad hoc deployment of live drones when an incident occurs is not guaranteed. The support from the national Police Services Centre (PDC) is also still fragmented at the moment. The Information Management Service and the Information Provision Service have drawn up a long-term vision and are connecting drones to the national standard facilities in terms of connections and storage for real-time operational video. A management organisation has also been set up for drones that is comparable to that for the police fleet. In the discussion of the connections, it was already noted that it is obvious to bundle investments for all types of live video. Because most themes, such as connections, storage and information security, apply to all video devices and other sensors and not just drones. However, it appears to be difficult to bundle these types of budgets organizationally because there is no single portfolio holder who is responsible for the different types of video cameras and the entire video chain from camera to storage.

Capacity

Another organizational issue that does play a role with drones, but not with video vehicles or bodycams, is the availability of sufficiently trained pilots. A drone works

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very different from a breathalyzer or laser gun that every police officer can use and carry around. Two to three police officers are needed for each drone deployment: the pilot who must have a license to fly, plus – for certain types of drones – a payload operator who operates the camera and ensures communication with the control room. In addition, an observer is needed to keep an eye on the airspace and keep any spectators at a distance. The role of observer can be fulfilled by any officer because no special training is required. The number of pilots is currently the biggest bottleneck that makes it unfeasible to realize a 24/7 drone facility in every unit.
For this, eight pilots plus two instructors are needed per drone. There are not enough trained pilots available for this. An analysis in 2022 showed that – at the pace of the training program at the time – it would take about forty years to train enough pilots for a nationwide drone service.

At present, it is up to each individual unit to make its own assessment of the number of drones and pilots required in the regional drone team. There are, in the words of one of the interviewees, 'ten small clubs' in the regional units. In certain cases, this is not a major problem because many matters can be arranged well at regional level. However, a national approach does of course offer economies of scale for training and having sufficient pilots available. This topic is often discussed in the periodic consultations between the national Unmanned Aviation Team and the regional coordinators. At present, it often occurs that units that require additional drones, for example in the event of large-scale public disturbances, call on the drone team of other regional units.

Psychological

Finally, the question is whether drones, like video vehicles and bodycams, have a psychological effect on the police officers they capture on camera. Do police officers feel they are being watched by drones and are they concerned about what happens to the images? This could lead to drones being used more cautiously than necessary. This aspect does not seem to play a role in drones to date. Police officers on the ground who can be seen apparently do not or hardly get the feeling that they are also being seen. Incidentally, it is conceivable that this will change when drones are also used on an ad hoc basis in basic teams and especially when they fly autonomously. Until then, drones are used for forensic investigation and public order and the psychological barrier therefore plays little or no role there.
On the side of the viewer, this can be different. As was noted earlier in this book with the bodycams, many centralists in the control room are almost never confronted with shocking images. The drones that transmit live video can cause stress and trauma on the side of the viewer and this should be taken into account before a live connection is set up.

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Added value

The added value of drones was investigated in a qualitative study carried out by the police's own unmanned aviation team. A distinction was made between the three domains in which drones are used: forensic investigation, public order and covert. The information was collected by means of interviews with various stakeholders: operational specialists, operational experts, generalists, flight managers, business management specialists, general commanders and the unmanned aviation team leader.

The conclusion of the 2023 evaluation is that drones have become an indispensable tool for forensic investigation, public order and covert deployment. Drones can very quickly provide an image of the situation after an accident, without leaving new traces or destroying existing traces. However, this does not require a live connection, so that added value falls outside the scope of this study. But live drones also provide added value. Drones can provide a good image of a situation and they often do this in a unique way. For example, drones can take images in places that are difficult to access, such as in an area with hazardous substances, behind a fence or on the other side of a highway or river. During events, drones can provide an image of the crowds and thus help prevent overcrowding. After a flood, fire or accident, a drone can very quickly show what the situation is and which places are accessible to the police or other emergency services.

The evaluation report contains several examples that show exactly how this works:

- During a festival with tens of thousands of visitors, for which a lot of police capacity would normally be available, the entire festival site was monitored from above using a drone. This meant that six police officers on the ground were sufficient. They could be deployed quickly and in a targeted manner, which prevented incidents from escalating (and made subsequent investigations unnecessary).

- When riots broke out after a demonstration, the perpetrators disguised themselves so that they were unrecognizable to the police officers on the ground and could not be recognized on the recordings of the fixed cameras. By having a drone follow the perpetrators at high altitude, they could be identified when they removed their face coverings. As a result, they could still be arrested and prosecuted outside of the act.

- After a robbery at a jeweler, a drone was used to monitor all escape routes without having to station a police unit at every intersection. This resulted in a significant saving in police capacity.

- Before a royal visit, a drone reconnaissance could be carried out to see if explosives had been placed somewhere. This allowed the police deployment to be scaled back from four days to one half day.

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Many of the examples are about how drones free up police resources for other purposes. A drone can create a map or 3D rendering of an accident scene in twenty minutes, whereas previously this would have taken ten times as long, especially in traffic accidents where the investigation site can be hundreds of meters long.

On the other hand, drones are less suitable in extreme weather conditions or in the dark. Also nuisance from birds, such as seagulls and large groups of starlings, can make the use of a drone impossible. Weather conditions and other factors appear to cause problems in about ten percent of the cases. Another consequence of using drones is that, as mentioned, at least a pilot and an observer are always required and for certain types of drones also a payload operator. This therefore costs personnel capacity.

A question that is often asked is whether drones can and will replace old technology. This is partly the case, but partly not. This is clearly demonstrated by the comparison of drones with helicopters. Helicopters have the advantage that, unlike drones, they can transport people and equipment. However, helicopters are more expensive and, if used for a long period of time, can also lead to unrest and agitation among citizens who wonder what is going on. And there are also tasks for which drones are more suitable than helicopters, such as flying unnoticed or coming close to an explosive or fire without endangering people. Drones can therefore undoubtedly take over some of the tasks of helicopters, but not all. A one-on-one comparison is not really possible and not always useful, because it involves fundamentally different technology.

The conclusion about the added value of drones is in any case comparable to that of video vehicles and bodycams. Drones have demonstrable added value, but that added value is not cashed in 'automatically'. It only works if the deployment is properly attuned to the situation and if all technical, legal and organizational preconditions are met. These points will be discussed again in part 2 of this book in the overarching discussion of the three types of live video.

4.3 Looking ahead

Drones have been in use by the police for fifteen years, as mentioned. But in some ways it is still new technology. This is because this technology continues to develop and new possibilities are regularly added.
These topics will continue to demand attention in the coming years and require national coordination. The most striking challenges that will play a role in the coming years are listed here.

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Flying out of sight

Currently, only a drone that the pilot can see with his own eyes is flown: visual line of sight. However, it is possible to fly a drone beyond the pilot's line of sight: beyond visual line of sight (bvlos).39 This greatly increases the possibilities of drones, but of course also creates new risks. In April 2024, the police received permission from the Human Environment and Transport Inspectorate to test drones beyond visual line of sight in the East Netherlands Unit.

These drones are used for emergency response and detection, not for surveillance or law enforcement.

Monitoring & Securing

The police guard and protect objects and people. At the moment, areas and routes have to be explored 'on the ground' by employees of the regional Guard & Security departments, for example to see if there are explosives or other risks. That takes up much more capacity than if this were done with a drone.
Many regional units are interested in structurally using drones for these purposes, but there is no budget available for this. The allocated budgets for drones are limited to forensic investigation and law enforcement.

Unobtrusive surveillance

For certain tasks, such as tracking down premises where drugs are produced, drones can also be used inconspicuously. However, this is not permitted within the limited scope of Article 3 of the Police Act, as it quickly results in a form of systematic surveillance. However, even if the competent authority were to decide that systematic surveillance is permitted in a specific case, this would not yet be the case. In many cases, flying must take place outside the pilot's field of vision, which is not yet permitted. In addition, the flight duration for this type of action is so long that a fixed-wing drone is often required. The police do not yet have any drones of this type and must therefore submit a request to the Ministry of Defence in such cases.

Interventions

Drones can also carry something other than a camera. For example, a drone can also be equipped with a microphone and speaker so that it can communicate with people. A spotlight on a drone can be used to support police operations in the dark. The use of violent means is also possible. For example, drones can distribute tear gas (or 'pepper spray') in a very targeted manner. Electro-shock weapons or other violent means can also be attached to a drone. This is not yet possible because a change in the law is required first. However, in technical terms it is relatively easy to realise these types of applications and the need from practice is there. That is why legal and

39 Autonomous flying with drones, i.e. without a pilot, is also technically possible, but the Inspectorate has Environment and Transport the police have not (yet) granted a permit for this.

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operational frameworks need to be established – if only to ensure that drones will not be used for this purpose.

These are four directions in which drones are likely to develop in the coming years. In many cases, a live video connection with the control room is also required to achieve the goal. There is currently no structural capacity available to systematically investigate new possibilities in experiments; not in the regions, but also not at the national counter for real-time operational video. However, the need for the application of drones with new technologies and for more purposes than just public order, forensic investigation and covert operations is very great. This means that the chance of new proliferation is great. In order to prevent proliferation, time and capacity must be made available at a national level to investigate new applications and – if successful – to make them available on a larger scale. The associated legal frameworks, training and instructions must then be explained and monitored at all locations in the country where the new method is used. This aspect is discussed again in the second part of this book.

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Part 2 **The analysis**

In this second part of the book, we take the information to the next level. We no longer look at the three types of live cameras separately. We look for the overarching insights after five years of experimentation. This yields a number of conclusions that apply to all types of live video. We also draw a few general conclusions about the way in which these types of technological innovations land within the police – or not.

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5. The four preconditions

The main conclusion from Part I is that the three forms of live video that have been tested in recent years provide demonstrable added value for the police – provided that the preconditions are met. These preconditions are discussed in this chapter. The substantive chapters contain all kinds of details and nuances, but the main conclusions about the added value are as follows:

The live video vehicle as developed and deployed in Dordrecht proves to be a valuable addition to other types of live cameras that the police can use in a basic team. The added value manifests itself in three ways. Firstly, preventively: incipient incidents can sometimes be de-escalated by simply placing the video vehicle in a visible place. Secondly, live images offer the viewer(s) the opportunity to optimally adjust the deployment of the police on site to what is needed by scaling up or down. Thirdly, it turns out that recordings are regularly important as evidence.

Live bodycams also have demonstrable added value for police work. The biggest advantage of live bodycams is that they can transfer information faster and better than a telephone or walkie-talkie. The viewer can see with his own eyes how a situation develops, which saves time and prevents differences in interpretation. Live bodycams not only work faster and more clearly: they also increase the safety of the wearer of the bodycam. The viewer can, as it were, look over the shoulder and do what is necessary. Finally, the viewer can support the wearer via the live bodycam by offering expertise remotely.
The experiment with live bodycams for the negotiators provides useful additional insights. The commanders who can watch and listen during a negotiation find that the bodycams have enormous added value. These live bodycams increase the safety of the negotiators and of those with whom negotiations are taking place, such as hostage takers and confused or suicidal persons. There is no longer a need for complicated information transfer in several steps, which means that the regular communication channels are much calmer. The live bodycam also offers the viewer the opportunity to coach the negotiator. Finally, images prove to be very suitable for evaluating and learning from efforts afterwards.

Finally, the live drones also appear to provide added value. Drones are now 'indispensable' in forensic investigation, but a live connection is not required for that,

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so that added value is not relevant for this research into live video. But there are also drones that do transmit live images. Drones that are used for maintaining public order provide a unique view of the situation on the ground. Drones can be deployed faster than helicopters, make less noise and are cheaper.
In addition, unlike police officers, drones can also be deployed in hard-to-reach or dangerous places, they provide essential information in addition to ground-based observations and they save a lot of other police capacity.
So drones are not only effective, but also efficient.

In short: the forms of live video examined provide demonstrable added value.
It is therefore logical that the police want and will use these tools more often.
But the experiments also make it clear that the added value of live video is only realised if a number of preconditions are met:

1. Technical. The equipment (camera, plus connection and video management) must work well.
2. Legal. The application must comply with laws and regulations with attention to ethics.
3. Organizational. Live video requires a viewer who can also provide remote expertise.
4. Psychological. If wearers feel controlled, live video raises many questions and worries.

These four issues have been discussed in the previous three chapters per type of live camera. In this chapter we bundle the information and no longer look at the individual camera types, but discuss the four boundary conditions at an overarching level.

5.1 Technology

Links in the video chain

In live video, the cameras themselves are of course of great importance. They must be able to record, store and transmit images and sound in high quality, with a great deal of attention to ease of use. However, the rest of the video chain is at least as important. There must be a wireless connection with sufficient bandwidth that must be well secured. Then the live video (and sometimes the audio) must be received and distributed somewhere on a video platform. That platform must be well secured and at the same time be user-friendly and flexible. The last link in the video chain is the screen on which the live video is shown so that others can watch (and possibly listen in). Only if all the links in this chain are well connected can live video be used successfully. The links are discussed below.

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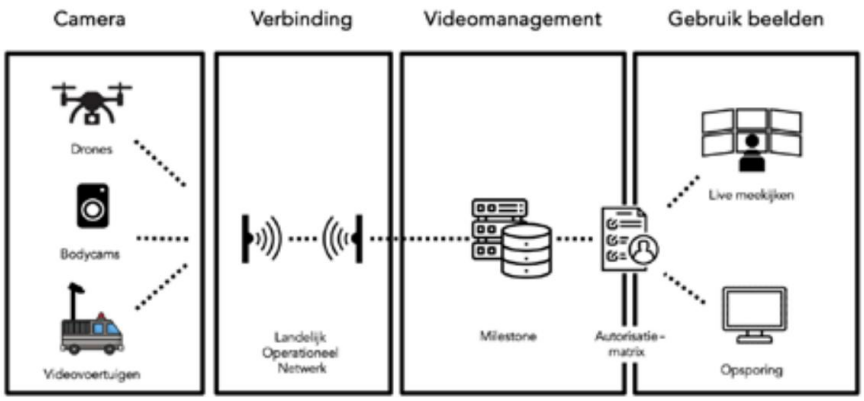

Figure 5.1 Links in the live video chain

Camera

For all live video systems, the ease of use of the camera system is of crucial importance for success. Many modern camera systems offer all kinds of choices and options, but police work is often stressful and then there is no time to think about it and make well-founded choices. Ultimately, most users in practice prefer a camera system that they can activate 'with one push of a button'. That button must activate everything automatically: the connection must be established, the images must be streamed to the video platform and distributed to those who are allowed to watch.

The images must also be automatically recorded for possible later use and must be shielded from unauthorized users.

The second requirement is that the user must be able to see what the camera is doing at all times. Is the camera on? Is the live connection active? Is audio being transmitted or not? Is someone watching? Are the images also being recorded? This information must be easy to read from the camera's control panel. Most camera systems on the market currently only offer part of this information, so the police must pay attention to this when purchasing and configuring live video systems.

Connection

The experiments show that the wireless signal transmission of live video works well in most cases – this is contrary to some stories that are circulating about a lack of bandwidth. There are indeed situations in which it is not possible to establish a connection with the National Operational Network or where the bandwidth is insufficient. But that problem actually only occurs inside buildings. So for the video vehicles and drones this is a much smaller problem than for the live bodycams. For the live bodycams it would be good to investigate alternatives.

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for regular telecom networks, for example by installing signal boosters in nearby police vehicles or by using Wi-Fi or Bluetooth within buildings. The three substantive chapters provide more detailed information. But the most important conclusion of this part of the research is that the problems with the connections and bandwidth are considerably less than expected.

Video management

The police's national video management system, which receives live video streams and then distributes and stores them, is functioning well.
It is a user-friendly system that is scalable if more video streams need to be added. In fact, the only point of concern worth mentioning is that not every camera supplier can or wants to integrate the necessary software on the video platform. As a result, video and audio may not be processed within the police domain, but hosted on an external server. However, the police can impose requirements in purchasing processes that result in only working with companies that can run their applications on the police video platform.

Use images

Live video transmission to authorized viewing locations is technically well organized. It has been common practice within the police for a long time to be able to transmit images from helicopters directly to all regional control rooms, for example. The newer types of live video use that existing technology and that works well. However, there are also new challenges.

Firstly, it is not yet common practice to transmit audio in addition to video. This is also not necessary for helicopters, drones and video vehicles. However, when using live bodycams, sound is often more important than image. Transmitting audio not only has consequences for the software and hardware on the video platform. It also means that all viewing locations must be able to listen in via a loudspeaker or headset. This can quickly result in an unworkable amount of sound, especially in busy control rooms. Almost everyone can monitor ten screens at the same time, but no one can listen to ten audio streams at the same time. A method for prioritisation will therefore have to be developed for this that resembles the prioritisation of information from telephones and walkie-talkies.

Secondly, securing recordings for investigation if they were originally delivered live is not yet a fully developed process. Sometimes, law enforcement officers will not accept a copy because they want to guarantee the chain of evidence. Some of the live video images are not recorded at all. So in those cases, the images have to be retrieved from the source, i.e. from the storage on the camera itself. In cases where video and audio are stored on the central video management system, it often turns out that it takes a lot of time to get the recording onto the internal network drive so that a detective can start working with it. And in many cases, it turns out that this is not

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the original high resolution is saved, but the compressed image quality is transmitted live.

As live video will be used more and more, the police must invest in technology and procedures that are safe and user-friendly. This requires not only hardware and software: this scaling up also requires an increase in the number of technical and functional administrators. This point will be addressed again in the organizational preconditions below.

5.2 Legal aspects

When the police use cameras, a number of laws and regulations must be complied with. This also applies to experiments, because legal requirements cannot be temporarily disabled. The experiments described here show that it takes a relatively large amount of time and energy to comply with laws and regulations. For a one-year experiment with one video vehicle, six months of legal preparation was required. This is partly because the knowledge is not available in the right place. Most experiments are carried out by technicians who have little legal knowledge. They know which general principles apply to police data, but this is not specific enough to be able to assess under which conditions a live camera can be lawfully used in a specific situation. They also do not have enough knowledge and time to be able to draw up a data protection impact assessment themselves.

The legal support staff within the police do have that knowledge, but they often know little about video technology. They are also not used to the small scale and speed of experiments. That mismatch causes a lot of delay and sometimes also frustrations. In a number of cases that is unavoidable because it is part of the law to weigh different interests against each other. But to some extent generic frameworks are possible for the use of live video insofar as the basis, the purpose, the circumstances and the scope of the data processing are comparable. That is what this paragraph is about.

Foundations for the use of cameras by the police

The police may not simply use live video: there must always be a legal basis for it. There are broadly speaking three laws on the basis of which the police can use cameras to perform police duties.40

40 The police can also install surveillance cameras. However, these are not used to perform police duties, but to protect buildings, people or property. The police then use the cameras in their role as owner of a building or as employer who wants to offer a safe workplace. The legal basis for the use of this type of camera is the General Data Protection Regulation ('legitimate interest') and these cameras fall outside the scope of this study. The same applies to cameras used for communication purposes: these images do not fall under the police task and the Police Data Act, but under the GDPR.

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Code of Criminal Procedure

The clearest and therefore most solid foundations for the use of cameras by the police can be found in the Code of Criminal Procedure. The police work under the authority of the Public Prosecution Service for the criminal enforcement of the legal order. Various articles in the Code of Criminal Procedure provide scope for the use of cameras. An example is article 126g, which states that the public prosecutor can order the police to systematically follow or observe someone.
But for the use of live video, which is the subject of this investigation, the route via the Public Prosecution Service is often not feasible. After all, there is not always a concrete suspicion in advance and there is usually no time to obtain an order from the public prosecutor.

Article 151c of the Municipal Act

Article 151c of the Municipal Act is another specific legal basis for cameras. This article of law concerns the mayor: the other competent authority under which the police falls with regard to the maintenance of public order. The Municipal Act offers mayors the possibility to set up camera surveillance for the maintenance of public order. Since the decisions always concern a specific area, this is also in most cases not a feasible route for the use of live video by the police. After all, the police want to be able to use bodycams, drones and video vehicles wherever they are needed. It does not work to limit this to areas designated in advance by the mayor. An alternative could be to designate the entire municipality as a camera surveillance area, but it is clear from the parliamentary treatment of article 151c of the Municipal Act that this was not the intention of the legislator.41 In addition, maintenance of public order is not broad enough for the police: the police also want to use live video if this is necessary for assistance or investigation, and the mayor has no say in this. In short: Article 151c of the Municipal Act – like the Code of Criminal Procedure – is not the most suitable basis for the forms of live video that this book is about.

Article 3 of the Police Act

The most logical basis that remains for the use of live video in daily police work, the type of live camera surveillance that this book is about, is article 3 of the Police Act. This is also the basis on which the use of video vehicles, bodycams and drones is based. Article 3 describes the tasks of the police under the competent authority:

41 A letter from the Minister of Security and Justice stated that the use of flying cameras is a more severe measure than static cameras. Therefore, the use of flying cameras is less likely to be permitted. But the minister also noted that it is not inconceivable that in certain cases the use of flying cameras is necessary to maintain public order. See: Tweede Kamer 2013/14, 26643, no. 298.

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> 'The police have the task, in subordination to the competent authority and in accordance with the applicable legal rules, of ensuring the effective maintenance of law and order and providing assistance to those who need it.'

So the police have two tasks:
• effective enforcement of the law;
• assistance.

The first task is often divided into criminal law enforcement (detection) and public order maintenance. Article 3 is deliberately formulated in very general terms. It does not contain any specific information on the use of technical aids such as cameras. The intention of the legislator was to grant a task-setting authority that is independent of the current state of technology.
Case law teaches us that a general legal basis, such as Article 3 of the Police Act, only allows for a limited infringement of the constitutionally protected right to privacy and other fundamental rights such as the right to domicile.42 The crucial question is therefore where the boundary lies between a limited infringement and a more than limited infringement. That boundary lies in systematic observation. Systematic observation occurs when a more or less complete picture can be obtained of aspects of someone's private life. It is impossible to indicate in general terms when that is the case and when it is not.
A commonly used rule of thumb is that cameras are permitted under Article 3 of the Police Act if they are only used for a short period, for example a few days up to a maximum of two weeks. However, the duration is not the criterion. Because a camera that is only set up for a few hours can indeed provide a more or less complete picture of aspects of someone's private life. This is the case, for example, if a camera can look at the screen of a mobile phone or if a camera films through a window of a house. At the same time, there are conceivable examples of a camera that is set up for much longer than two weeks without providing systematic observation. For example, a camera that films a dead-end road on an industrial estate where hardly anyone ever passes. So it is not about the duration, but about the infringement of personal privacy. Ultimately, only a judge can assess whether a specific case falls within the scope of Article 3 of the Police Act.

This means that the responsibility for substantiating that the work is being done within Article 3 of the Police Act lies with those who use a live camera. Every police officer who decides to use a live camera on the basis of Article 3 of the Police Act must be able to substantiate that decision. That is why reporting after the use of live video cameras is so important for substantiating the legitimacy. For the video vehicle in Dordrecht, it was therefore agreed with the operators that they had to copy the video recordings made after each use of the video vehicle.

42 See: ECLI:NL:HR:1995:ZD0328 (Zwolsman judgment).

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to an incident code that can be found in the police systems. If one of the recordings was later exported to be used for investigation, the reason for that export also had to be recorded in writing. These agreements were taken from the deployment framework for bodycams.43 This deployment framework also states that each deployment of the bodycams must be substantiated in the report after the deployment. This must show that the processing of police data has remained limited in terms of duration, intensity, location and purpose. The obligation to report follows from Article 152 of the Code of Criminal Procedure. This article stipulates that investigating officers must draw up a report as soon as possible of the criminal offence they have investigated or of what they have done or found in the course of the investigation. If prosecution is initiated, the investigating officer must be able to respond effectively to a request from the court to account for each part of the investigation. Only if it is almost certain that information cannot be of importance to the judge's decision, may the drawing up of a report be omitted.44 The assessment of whether the investigating officer was right not to draw up a report is ultimately up to the judge. If it then turns out that the reporting is insufficient, the judge can regard this as a procedural error and take this into account in his final decision. Because it is almost impossible to predict in advance whether a recording made will be used for investigation, in principle a report must always be drawn up after making a recording with a live video camera.
In short: Article 3 of the Police Act can serve as a basis for the use of live cameras under two conditions. The infringement of fundamental rights must be limited to a minor infringement of fundamental rights (no systematic observation) and the assessment of the person who activated the live camera must be recorded in writing in a report.

Data Protection Impact Assessment
Video vehicles, bodycams and drones in most cases record people and therefore personal data are processed. If this happens in the context of police duties, it is police data and the Police Data Act applies to the collected data. In many cases, data processing with cameras poses a high risk to the privacy of the persons involved. In those cases, the Police Data Act requires a data protection impact assessment to be drawn up prior to the deployment of a new camera system. In some cases, with new technology, prior consultation with the Dutch Data Protection Authority is even required before processing may commence.

An important lesson from this research is that it often takes a lot of time to draw up a data protection impact assessment. In order to draw up the data protection impact assessment for the video vehicle in Dordrecht – an experiment that a

43 National Police (2020), Framework for the use of bodycams in operational use, p. 7.
44 See: ECLI:NL:PHR:2010:BL5629.

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year – half a year was needed. The data protection impact assessment for the drones took more than a year in total.
To date, a specific data protection impact assessment has been drawn up for each new type of live video. However, the General Data Protection Regulation offers an interesting opportunity to increase efficiency in Article 35: 'A single assessment may cover a set of similar processing operations that present similar high risks.' The Police Data Act does not contain this phrase, but it is logical and defensible that many similar processing operations with similar risks also take place when processing police data. It makes sense to draw up a generic data protection impact assessment for this. This certainly applies to live video: the privacy risks and protection measures are often identical because the cameras are linked to the same national operational network and police video platform in the same way. It was therefore decided to draw up a generic data protection impact assessment for the part of the processing that is identical: the wireless signal transmission and the storage and distribution on the national video platform. The data protection impact assessment for specific types of live cameras then only needs to address the first steps in the process (the necessity and legality of the use of the camera) and the last steps (the use of live or recorded images). This saves time and is better for the uniformity of risk management and protection measures. Of course, this only applies to live camera systems on the national video platform and not to stand-alone systems with their own connections or another video platform for processing the images.

Filming colleagues
Video cameras are in principle a suitable means to assess the performance of police officers. After all, managers and others can see in the images how police officers perform their work. This means that the live cameras are suitable as a personnel monitoring system. Article 27 paragraph 1 of the Works Councils Act stipulates that personnel monitoring systems may only be introduced after approval by the works council. This has also been ensured in these experiments.

- The video vehicle deployed in Dordrecht was discussed with the central works council. The central works council referred the assessment to the works council of the Rotterdam Unit because the video vehicle would only be deployed in that unit. The regional works council concluded that the video vehicle would not be used as a personnel monitoring system and that therefore no approval was required.
- With the bodycams, the central works council played an important role in drawing up the deployment framework for bodycams. All recommendations regarding the employer's position and the guarantees for police officers were then incorporated into the deployment framework.

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- The data protection impact assessment of the drones states that the drones will not be used as a personnel tracking system. However, because it is theoretically possible to track personnel, the works council's approval was requested. The GDPR committee of the central works council was given a presentation and then stated that from the perspective of the employees there is no obstacle to broad embedding of drones within the police.

If new forms of live video are tested that make it possible to follow and/or assess police officers, the co-determination bodies will have to be consulted again. For the three applications that this study was about, this consent has already been obtained.

Ethics

The police want cameras to be used only if it is ethically responsible. Ethics goes beyond the legal boundaries. Even if something is permitted by law, ethical considerations can still decide not to do it. Ethics is therefore about the question of what kind of society we want to live in and what kind of police fit in with that. To ensure that the police take ethical considerations into account, deployment frameworks and implementation protocols are developed by the Ethics and Privacy portfolio. This portfolio has also drawn up a vision on ethics with four foundations: awareness, expertise, instruments and governance. The outside view is also important and that is why an ethical sounding board group has been set up with external experts, such as ethicists, privacy experts and scientists. A concrete product from ethics is the implementation protocol for the use of facial recognition by the police that was drawn up in 2024. Prior to the use of facial recognition technology, the head of Operations of the relevant unit must submit an application to a committee that carries out an assessment on behalf of the chief of police. After that, a decision is made and – if the decision is positive – the head of operations of the relevant unit can deploy the technology. Supervision is carried out by the privacy officers of the unit and via a corporate audit. There is also a system for monitoring to reflect on the actual deployment and to learn and develop.

As with automatic facial recognition, ethical considerations also play a role in some forms of live video. After a number of ethical sessions with a broadly composed group of participants, the Ethics & Privacy portfolio established a framework for the use of drones. This framework contains six questions about, for example, the legal basis and the assessment of necessity, but also about informing passers-by. No comparable ethics sessions have (yet) been organised for the video vehicles and the live bodycams. However, these forms of live video must of course also comply with the law and the additional considerations as described in the data protection impact assessments. Informing data subjects about the processing of data and their rights is particularly important in this regard.

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5.3 Organizational aspects

The use of live video also has consequences for the organization. In Part 1, various specific examples of this were discussed. The most important insights are summarized here.

Technical support

The current National Operational Network and the video platform work fine for the helicopters and the video vehicles of the Mobile Unit. This live video has been working for decades and the technical support is in order. If a malfunction occurs here, it is resolved within a short time. However, there are hardly any technical and functional administrators available for experiments. As one of the administrators said: 'There are two of us here, but we have enough work for five.' As a result, there is hardly any time to support experiments with live video, as became apparent during the experiments with the video vehicle in Dordrecht and the live bodycams for the negotiators. In Dordrecht, the log files had to be exported to see how often the video vehicle had been deployed. This required a manual action every month that could only be performed by one of the administrators of the National Operational Network. Due to the daily hustle and bustle, this was neglected so often that the log files were not usable for the evaluation. For the negotiators, it was about activating the audio. This required research because it was not immediately clear why it did not work. It eventually took months because the technical administrators did not have the time. If it is decided to use live video more often and in more places, this will require experiments and development work.

This must therefore be accompanied by a corresponding investment in technical and functional support. A live video camera is worthless if the underlying video chain does not work.

Legal support

It turned out that the legal framework for live video is complicated. For this reason, some sectors decide to conduct experiments in a kind of regulatory sandbox where the laws and regulations are temporarily not applied. If the experiment shows that the innovation works, the legal investigation can then be done, is the idea. In its publications, the Dutch Data Protection Authority regularly points out that a pilot or experiment in which police data is processed must also comply with the legislation for police data. This research shows that it is not desirable to regard the legal framework as a formality that still needs to be 'checked' after the experiment. The legal framework must be part of every experiment.

However, most technicians do not have legal knowledge. And most lawyers, on the other hand, have little understanding of video technology. And the lawyers who do have knowledge of video technology often have too little time to supervise experiments. The need for support goes beyond drawing up a

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data protection impact assessment. At least as important is the translation of the legal frameworks into practical work instructions for employees and information provision to those involved, for example in specific privacy statements or a page with frequently asked questions on the police website. The good news is that investing in legal homework also yields a lot. The quality and usability of innovations are increased and it saves time in a possible rollout. As one of the working group members in Dordrecht said: 'It takes a lot of time, but then you have something'.
Ideally, a data protection impact assessment is not a formality that is only interesting for lawyers. It also provides a clear framework for action, contains agreements on training of the operators and contains guarantees that ensure that the agreements on paper are put into practice.

Unplanned work for the control room

Live video itself is not new: the police have been working with live cameras for decades. But for a long time, this only involved cameras that could be scheduled in advance, such as during an event like the local fair, the arrival of Sinterklaas or the Four Days Marches of Nijmegen. During daily police work, such as in emergency aid or during a catering service, it is not yet self-evident that police officers send images directly to the control room. This cannot be properly scheduled in advance because video vehicles, bodycams and drones can sometimes suddenly be needed during an incident. Centralists are also not yet used to live images: they normally receive their information via telephone or walkie-talkie.

They will therefore have to be trained in this and the way they work will have to be partly rethought.
A second organizational challenge is optimizing the offered image material. It does not always add anything if, in addition to images from a video vehicle, images from bodycams, drones and helicopters are also supplied. Choices are then necessary. Adding audio from bodycams also presents a major new challenge in the control room. It is possible to monitor ten screens at the same time, but it is impossible to listen to more than one audio channel at the same time.
This will therefore require prioritising, just as with the intake of telephone traffic.

A third development that requires attention is the provision of remote expertise. At the moment, this is not yet a regular job for most centralists in the control room.
But it is certainly possible to further develop that aspect of live video. Centralists can check a license plate or ID, ask advice from fire brigade or ambulance personnel, prepare footage for investigation, watch a crime scene or show footage directly to a public prosecutor in order to be able to use specific powers. The possibilities are great and the organizational consequences are even greater. The centralists must not only be given the right equipment and training, they must also be given more time to be able to perform these tasks. In other places in the police organization, this saves a lot of time, so it is worth the effort. But in the control rooms it will

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work will fundamentally change as a result and the organization must prepare itself for this.

5.4 Psychological aspects

In the previous section, it became clear that there are major challenges to make everything work well technically, legally and organizationally. But even if all that is successful, that does not mean that live video will be a success. The most important link in a successful video chain is namely the agent with the camera. That employee determines whether the camera is switched on or not and anyone who has ever worked with a live camera knows that a psychological threshold has to be overcome. It is already exciting to record images with a camera, live streaming is even more exciting.

There are early adopters of live video who seem to suffer little from these psychological tensions. They actually find it very pleasant when a colleague can watch live. They are therefore at the front of the line when a new bodycam, drone or video car becomes available. But there are not only early adopters: the group of employees who prefer to wait and see first is many times larger. The experiments show that a lot of attention and guidance is needed in the form of training and daily support to overcome the psychological barriers. It is not self-evident that successful new technology will be used more widely. It is necessary to actively share positive experiences and to cherish the budding confidence in the new technology.

Only then can it be possible to make new technology an integral part of daily police work. This has happened in the past with walkie-talkies and it can also happen in the future with live video. But this will only be possible if police officers feel that they can decide for themselves whether live video and audio are activated and if they know who can watch along. This must be regulated in crystal-clear work instructions and protocols that pay attention to the duties of police officers, but also to their rights. There are cases in which officers have no control over what happens to the recordings they make and they have the right to know in advance what they can expect. This concerns, for example, investigations into the use of force, if a complaint is filed against them or if an investigation is started following a complaint or an integrity issue. Agreements have been made for all these procedures, often with the consent of the works council, which are laid down in, for example, the personnel regulations. In order to remove the psychological barriers, it is important to bring these agreements to attention again and to make it clear that nothing changes in the agreements already made. If an officer is suspected of a criminal offence, authorised investigating officers can request recordings and use them in an investigation. This applies to all cameras and therefore also to live cameras that the police themselves use. This is regulated in the Code of Criminal Procedure. The live cameras do not change this general principle.

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But live cameras can of course lead to new concerns and questions. This was discussed a lot during the deployment of the video vehicle in Dordrecht and the procedural safeguards were explained in the training of the operators. In practice, it turned out that the operators and other colleagues on the street who could be captured on camera were not at all concerned about this point. Because police officers could experience the added value of the video vehicle in practice, everyone was very keen to work with the video vehicle – even the employees who had doubts at first. It is likely that the attention paid to this psychological support led to the employees no longer being concerned. They knew what their rights and obligations were. It was previously noted that there was a remarkable amount of enthusiasm for live bodycams and other innovative applications of live video in the Limburg Unit. There, trust was successfully gained and maintained at a regional level, which shows how important support from the unit management is.

This book also points out the possible psychological effect of live video on the side of the viewers. Those who work in the control room can be confronted with images of, for example, traffic accidents through live video that they were never confronted with before. These effects also deserve attention, for example by thinking carefully about collegial support after shocking events.

5.5 In closing

All things considered, it appears that most of the preconditions were met during the experiments. But everything was done to achieve this by intensively guiding the implementations. And even with all the attention paid to the experiments, it was not possible to achieve everything one hundred percent.

The technology is always a challenge and will likely remain so as new software, hardware and connections are continually being developed. This aspect of live video is never 'finished'.

- The legal frameworks are clear in themselves, but they do require continuous attention. Especially because the necessity of live video often has to be demonstrated per deployment. The ethical discussion about the desirability of live video, for example during demonstrations, or about the desirability of Chinese-made drones, is also still in full swing.

- Organizational problems are especially to be expected with large-scale deployment of live bodycams and drones. This can cause an overload of image material in the control room. Prioritization must be made in the number of video streams (and audio) that can be received simultaneously and the operators must be trained in providing remote expertise.

- Psychological barriers are particularly present when using bodycams because they feel the most personal to the users and because they can transmit not only images but also sound. Psychological barriers also play a role in video vehicles and drones, but to a lesser extent. On the side of the

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With all types of live video, viewers must take into account the fact that operators in the control room may see shocking images that they have not previously been confronted with.

In short: it is possible to meet the four preconditions, but that takes a lot of time and energy. The 'bare' roll-out of new technology is in any case doomed to failure because offering a new device is completely insufficient. Legal, organizational and psychological barriers must always be overcome. This insight leads to a number of conclusions and recommendations in the next chapter.

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6. Conclusions and recommendations

6.1 Conclusions

Two questions were central to this research:

- What is the demonstrable added value of live video vehicles, bodycams and drones? for daily police work?
- What technical, organizational and legal preconditions must be met? Are you satisfied to successfully use live video?

Live video demonstrably adds value to police work

The first research question is answered in the first part of this book. In short, the experiments that have been carried out in recent years show that live video has demonstrably added value for police work in two ways: operational awareness and remote expertise. The video vehicle in Dordrecht worked preventively, live and afterwards. In this way, the vehicle offered a unique added value on top of other types of live cameras that the police can use in basic teams. The live bodycams proved to offer added value because they can transmit information better and faster than via a walkie-talkie or telephone. They also make police work better and safer. The live drones have now become an indispensable means for maintaining public order and in the covert domain. They also provide a good picture of a situation in difficult to access or dangerous places in a unique way. They often provide a considerable time saving compared to traditional methods. In short: the three forms of live video that were investigated demonstrably offer added value for daily police work.

The second research question is more complicated to answer. That is why the answer is given in a number of partial conclusions.

Live video is not scalable

When a technical experiment is successful, it is often suggested to roll out or scale up the technology. This also applies to the forms of live video that this research is about. Small-scale projects need to be rolled out to the entire organization. But live video is not scalable. The concept of 'scalable' comes from the world of automation:

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> 'A process is scalable if you can do a million times more of it essentially by buying a million times more hardware. Google handles roughly five billion search requests per day by having not millions of employees but millions of computers.'45

In this sense, live video is not scalable. It is possible to implement live video on a larger scale, but not if only more hardware is purchased. It is not enough if the police, after a successful experiment with five live cameras, buy fifty thousand cameras and distribute them across all police stations. Live video will only be a success if the soft sides of the innovation are also delivered together with the hardware. These are the legal, organizational and psychological preconditions that this book will discuss continuously.

The scientific literature on innovation supports this idea. Within the police, there sometimes seems to be only one taste for scaling up: 'all or nothing'. But there are at least three variants:46

- Scaling out: an innovation is picked up by other users, but without central control.
- Scaling down: an innovation is stimulated by the central organization, but a lot of room is deliberately left for local decision-making power and authorities.
- Scaling deep: a more erratic process, in which only certain aspects of an innovation are adopted by others who conduct their own experiments.

The experiences with live video show that the top of the police organization in recent years has chosen to scale up by purchasing more equipment. That may work for innovations that require little guidance (new smartphones, office automation, clothing or office chairs), but not for live video.

Barriers hinder implementation

Research by the police academy showed that the average lead time for an experiment to be implemented on a large scale in the police force is almost ten years. Some promising innovations are never rolled out. This research confirms these results and shows that there are three inhibiting factors.
Interestingly enough, none of these have anything to do with technology.

Slow decision making

The client for experiments has a limited innovation budget and therefore cannot scale up. The way in which the police are organised financially does not seem to be able to facilitate innovations from the bottom up. Decision-making at a higher level is therefore required and that is very slow. It can take years before a demonstrably good

45 S. Russell (2019), Human compatible: AI and the problem of control. Penguin UK.
46 M. Wessels et al. (2024), 'Is more really better?' Judicial explorations, vol. 50, no. 1.

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idea at all is discussed at the level where financial and other decisions can be made.

No steering
Many innovations are tested under the wing of a portfolio holder.
This hinders innovations that touch multiple portfolios, which is actually always the case with live video. Live bodycams are related to the portfolios of digitalisation, area-based policing, detection and training. Drones contribute to detection, but also to public order maintenance, surveillance & security and have a strong link with information provision. Video vehicles are necessary for conflict and crisis management, but also contribute to public order maintenance, detection and intelligence. In short: live video often involves three or more portfolios, which makes decision-making on scaling up these types of complex innovations complicated.

Innovation and implementation are separate
Most police officers who are involved in innovations within live video have a lot of technical knowledge. They usually have less attention for legal matters, organizational issues and psychological support of end users.
So when their innovative development work is 'finished', it stops for them to a certain extent. The next step requires completely different skills. The tactical management does not sufficiently realize that there must be a transfer from the experimental team to the scaling-up team. Someone who understands the second phase must already be involved in the first phase to ensure that a successful experiment does not immediately come to a standstill when it is finished.

Preventing overgrowth is not a goal
When the police decide to roll out a certain new technology nationwide, this is sometimes done primarily to prevent proliferation and not because everyone is convinced of its added value. By offering a national standard, such as a bodycam or drone, the idea is that officers will no longer go to a store or website to buy a bodycam or drone themselves. However, preventing proliferation is a negative objective that provides no direction for the use of the innovation. If the only objective is to prevent proliferation and self-purchased equipment, it is much more logical to prohibit police officers from using self-purchased cameras (and to enforce this prohibition through checks). A positive objective is needed, such as improving detection or increasing the safety of police officers. These types of objectives provide direction for innovations and prevent innovation 'rolled out' from above from remaining unused in the closet.

Further development is inevitable
When the police decided to purchase and roll out two thousand bodycams, the instruction was given that the bodycams should be used for

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increasing the de-escalating capacity. Drones were introduced nationwide, but their use was limited to forensic investigation, maintaining public order and covert operations. But bodycams and drones can do much more and it is almost inevitable that employees will also try out these new possibilities.

Bodycams can also be used for detection, evaluations and public communication. Drones can also be used for guarding & security or inconspicuous surveillance. They are promising forms of further development, but when they are introduced, there is often no room reserved for them in time, budgets or expertise. This is a problem for two reasons. Firstly, it ensures that the potential added value of new technology is not maximally capitalised on. Secondly, such a straitjacket leads to police officers who want something different purchasing their own bodycam or drone for those other purposes.

A rollout that is too rigid is therefore a strong incentive for new proliferation that the rollout was precisely intended to prevent.

6.2 Recommendations

Take advantage of the opportunities of live video for police work

The first recommendation will come as no surprise to those who have read this book. The forms of live video that have been investigated demonstrably provide added value for the police. The recommendation is therefore to make more use of them, taking into account the legal boundaries. The video vehicle as developed in Dordrecht provides added value for basic teams. The Rotterdam Unit could facilitate this experiment, but cannot decide on possible national scaling up. So a decision by the police management is required for this. The live bodycams also have demonstrable added value, as became apparent during the dozens of experiments in the country. It is very well possible to use a live bodycam as a stand-alone bodycam. So it makes sense to opt for bodycams with a live streaming option in the upcoming tender that can be switched on or off depending on the purpose. Drones, finally, already receive funding from a national operating budget, but that is not sufficient for a number of the innovative steps that are needed to cash in on the added value of live streaming drones. So here too, a national decision is needed to deploy this technology more widely and more often – of course within the legal and ethical frameworks and only if socially desirable goals are pursued.

Forget the device, focus on the infrastructure

In recent years, the arsenal of live cameras has grown. We see this within the police, but also in society as a whole. There are satellites, helicopters, drones, video vehicles, bodycams, smart doorbells, smartphones and all kinds of other image sensors connected to the internet. The amount of live video and audio is expected to grow at the same pace in the coming years as in recent years. New image sensors will also be added. It is not efficient to have a camera for every image sen-

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sor to set up separate networks and video management systems. A generic infrastructure for sending, receiving, storing and distributing live video is much more logical. If no investment is made in this, there will never be a leap in scale. If investment is made in this, the police can continue for years to come – with the additional advantage that information security becomes clearer and therefore simpler.

Further development as a goal

When introducing new technology, a certain 'leeway' must always be reserved for further development. Police officers receive new devices with all kinds of possibilities and naturally want to try them out. A good example is the use of live bodycams by negotiators. This use did not exactly fit into the generic frameworks and therefore required additional technical, legal and organizational work. It took a great deal of time and effort to realize this because no one had taken into account the possibility that live bodycams could also be useful in other ways. This applies to all live video examined in this book and should therefore be taken into account more in the future.

Stop inventing, start implementing

When many police officers hear the word innovation, they think of an inventor in a lab who occasionally has a brilliant idea. But innovation is not about inventing: it is about successfully scaling up inventions made by others.

This research shows that this requires specific skills that have little to do with laboratory work:

- Understand: what exactly is it about this innovation that 'works'?
- Appreciate: does it provide demonstrable added value for police work?
- Guidance: what is the right technical, legal, organizational and psychological context?

Successfully implementing inventions requires the attitude of a gardener, not a plumber. It requires attention to soil quality, nutrition and cross-pollination. Because there are so many variables involved, implementation is always a matter of years of monitoring and guidance. Many innovations ultimately fail because they are too project-oriented and short-term in nature. This research shows that boundary conditions such as organisation, legislation and psychology should not be seen as factors surrounding technological innovation: they are technological innovation. That is why the recommendation is to invest more in them and to choose an approach that focuses on the long term.

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6.3 Further research

This research offers many new insights and a number of conclusions and recommendations that the police can use for years to come. But of course there is more that could be researched.

Firstly, it would be interesting to see to what extent the recommendations from this research are followed up. And how the new forms of live video 'land' in the units. Such a follow-up research is not only interesting to see whether everything went well: if the research is done in the form of action research, it can also help to create the right context in legal, organizational and psychological terms.

Secondly, this research is limited to the cameras of the police themselves. It would be interesting to investigate the (im)possibilities of using live video from cameras of others. The first step is to connect and use live cameras of other authorities more intensively, such as the fire brigade, defence, customs, coast guard, inspections and municipalities. Some of these cameras are already directly available in control rooms on request via the Live View system. But these are relatively small numbers of cameras, so if there is an incident somewhere, there is a greater chance that it will be filmed by a surveillance camera, dashcam, doorbell camera or smartphone of a private individual. This also presents opportunities for the police to improve its information position. But it also results in technical-organisational and ethical-legal dilemmas. Linking camera systems can increase safety, but can also lead to a society in which we can no longer walk the streets unnoticed.

Therefore, further research could investigate how much real-time image information the police can process and to what extent this is desirable for society as a whole.

A third option for further research is a focus on those who appear on live police video cameras. This includes victims, witnesses, suspects, demonstrators, bystanders, passers-by and residents. What do they think of live video by the police? Do they mainly see the advantages or do they also experience disadvantages? What considerations should be made by the police and the competent authority before live video is used? It is interesting to give those about whom information is collected a role in thinking about the balance between maintaining the rule of law and the constitutional right to protection of personal privacy.

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Executive summary (English)

This book discusses three types of live cameras used by the Dutch police: video vehicles, bodycams, and drones. The book first describes experiences with each of these types of cameras individually (Part 1) and then delves into overarching lessons learned (Part 2).

Live video is not new to the Dutch police. The technology has been in use for about forty years, for example, in helicopters and video vehicles used by riot units. However, the past fifteen years have seen significant advances in technology, including improved cameras, compression techniques, increased bandwidth, and video management systems. This research primarily addresses the question whether live video demonstrably adds value to police work (and, if so, what kind). The second focus is on identifying the prerequisites necessary to realize this added value. The study is based on dozens of live video experiments, supplemented by legal and organizational insights.

Live video can provide added value to the police in two ways. The first is by transmitting information from the camera to the viewer, enhancing situational awareness. The second way works in reverse: from the viewer to the camera, allowing remote expertise to be shared. Remote viewers in a control room or command unit can support the camera carrier, enhancing safety and effectiveness.

In 2022 and 2023, an experiment was conducted in the city of Dordrecht with a new type of video vehicle to be used for daily police work within the unit. Unlike riot unit video vehicles, this vehicle could be used during regular shifts without the need for prior planning. Chapter 2 provides detailed information about this experiment, which demonstrated that the video vehicle added significant value: preventively (de-escalation), reactively (live monitoring), and repressively (investigations). Although legal preparations for the experiment took significant time, they were concluded successfully. The technology performed well according to users, but technical specialists were less satisfied. They found that the entire video chain, from the camera, through wireless connections to the system for video management, needs to be treated as an integrated system. Focusing on individual components made the system vulnerable. Additionally, insufficient technical and functional support resulted in necessary adjustments not being implemented, resulting in frequent downtime. Many lessons were learned regarding legal, organizational, and psychological aspects, detailed in Chapter 2, with broader insights covered in Part 2.

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Chapter 3 examines live bodycams, describing two experiments: a national field study on bodycams in several units across the country and a smaller-scale study on their use by police negotiators. The value of live bodycams was convincingly demonstrated, with the primary benefit being enhanced situational awareness for the police officer receiving the live images. Bodycams convey information faster and more effectively than radios or phones, reducing the risk of misunderstandings and miscommunication. They also benefit the wearer by reducing the need to relay information to the control room or on-site commander, allowing them to focus on the task at hand. Bodycams also improve officer safety, enabling remote support from the colleague watching. For the negotiators, live bodycams provided a clear view of the situation to remote commanders or colleagues without disrupting the negotiation itself. Although indoor connectivity was often poor, outdoor functionality exceeded expectations. With regard to the organizational requirements, it was found to be challenging to have a viewer available for ad hoc use of live video. Psychologically, bodycams are distinct from other live video options due to their proximity to the wearer, leading to varying acceptance levels. Factors such as trust, control, and prior experience influence willingness to use these live bodycams. Organizational culture also plays a role, with some units more open to adopting new technologies than others.

Chapter 4 focuses on drones, which have been used for nearly fifteen years but have seen rapid development. They are now indispensable for forensic investigations, public order shifts, and covert operations, providing unique and efficient perspectives in crash investigations or at inaccessible locations. While the technology itself is well-es-tablished by now, improving the process of making footage available for investigations is necessary. The legal framework is clear, but some questions remain. For example, how do we inform the public about the use of police drones? When does drone use constitute systematic surveillance, exceeding legal boundaries? Are Chinese-made drones acceptable regarding data security and ethical concerns? Organizationally, sufficient provisions exist for use for forensic investigations and public order shifts, but there is little room for further development despite clear demand. Drones could also support police in their tasks in the realm of security, surveillance, and interventi Expanding capabilities such as beyond-visual-line-of-sight navigation requires national coordination, funding, and support currently unaccounted for.

Chapter 5 synthesizes insights from the previous chapters, examining technology, leg-islation, organization, and psychology as overarching themes. Technical challenges are ongoing, and while legal and ethical frameworks are solid, continuous attention is needed to ensure compliance with the law by weighing the necessity of live video deployment in specific situations. Organizational issues are most prominent in unplanned deployments, where live video can overwhelm operators in the control room. Training and procedures for prioritizing live video streams are essential. Psychological barriers are most significant with bodycams due to their personal nature, capturing

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both audio and visual data. These barriers are less pronounced with video vehicles and drones. Chapter 5 offers various refinements and additional insights.

In Chapter 6, conclusions and recommendations are presented. The first conclusion is that live video, at least the three variants studied here, demonstrably adds value to police work. Its use is likely to increase in the coming years. Equally important is the second conclusion: live video is not scalable in the same way as some other technologies are. Deployment without proper guidance is ineffective because live video relies on both hardware and 'soft' factors. Successfully implementing new technology in policing requires understanding, appreciating, and managing the entire system of machine and human. A practical recommendation is to invest in infrastructure benefiting all forms of live video. Additionally, national technical support teams should reserve capacity for the practical development of new technologies.

Finally, suggestions for follow-up research are provided to further understand and leverage the value of live video in policing.

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Appendix 1 **Research accountability**

The findings and conclusions in this report are based on an analysis of information from studies using a wide range of research methods, collected over a period of almost five years. The approach was also somewhat different from many other studies. Therefore, the methodological research justification is included in this appendix.

Action research

To achieve a certain result, a mechanism must be activated in a context that lends itself to it. Much traditional effect research is not aimed at analysing and understanding mechanisms and contexts: it is mainly about the question of whether a goal has been achieved or not. In such research, the researcher does not try to exert any influence on the end result by observing what happens like a fly on the wall. Intervention or adjustment is out of the question, because the results would then not be reproducible in another place or at a time when the researcher is not present to make adjustments. The research model on which this report is based deviates from this sterile approach: I actively supervised the experiments with live video, precisely to ensure that the intended mechanisms are activated and that the context is exactly as it should be.
Pawson and Tilley provide the theoretical justification for this approach.47 Their vision can be summarised very briefly by looking at how most useful knowledge in the exact sciences has been created to date. Suppose you want to know why gunpowder sometimes explodes and sometimes does not. You can then give a hundred bags of gunpowder to a hundred different laboratories and ask them to try to detonate it. Hopefully, one of the laboratories will succeed. The scientific researcher then asks the staff of that laboratory what exactly they did. In this way, you learn afterwards from practice, based on objectively collected facts, how gunpowder works. Pawson and Tilley emphasise the importance of theory and argue that it is much better to approach this type of research the other way around. As a researcher, you can also go into the laboratory yourself and, based on a theory about heat, pressure and ignition mechanisms, create the perfect context that ensures that the intended mechanism is activated. If the gunpowder does not explode, you have two options. Or you adjust your theory (gunpowder explodes

47 R. Pawson & N. Tilley (2017), Realistic Evaluation, Sage Publications: London.

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not) or you repeat your experiment with an even more suitable context (gunpowder must be dry if you want it to explode).
I applied this perspective in this research. I developed a theory about the way in which live video can work. In practice, I then investigated whether the added value is also cashed in. This yielded a lot of knowledge about the different contexts in which live video is used: technical, legal and organizational.
If it turned out that it did not work, I changed the context together with the police officers involved. Then I described the context and the mechanism so that replication is possible in other places and at later times. Based on the experiences of the past five years, I have discovered that this method yields more than a research design in which the researcher is completely absent and in fact deliberately lets experiments fail. Good for science, bad for practice. Researchers must actively participate in order to collect all the necessary information and to remove any obstacles that are actually irrelevant. Research that shows that something had a certain effect is actually not interesting if no substantive explanation is given for the effect. In evaluations that do yield useful information, researchers are actively involved from the start: they closely monitor what happens in practice, ensure that usable figures are collected and monitor the integrity of the research design. Good for science, good for practice.

The experiments

Video vehicle Dordrecht
The assessment of the added value of the video vehicle in Dordrecht is based on a study that used different methods and sources of information. First of all, I consulted all relevant 'paper' sources of information, such as policy documents and the legal analysis that was carried out prior to the experiment.
This information was supplemented with quantitative data on the number of deployments of the video vehicle. For this purpose, the log files of the video management system and the business process system in which users of the vehicle created changes and reports were consulted. In addition, qualitative information was collected in a large number of in-depth interviews. For example, during the twelve months of the experiment, intensive consultations were held with the fifteen operators of the video vehicle and the two 'inventors' of the video vehicle. A separate app group was set up for this purpose in which approximately one thousand messages were shared during the course of the experiment; these were all analysed and aggregated. The research was concluded with in-depth interviews with employees of the pre-development team, a technical manager of the national video platform, the privacy officers of the Rotterdam Unit and the head of the basic team.

Live bodycams
The judgement on the added value of live bodycams is based on a study in which I used different methods and sources of information. During the

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technical test, three brands of bodycams were systematically compared by using actors to re-enact two realistic scenarios using a number of scripts: an arrest and an informal conversation. This was done both indoors and outdoors on the street in order to properly test the connections. The three bodycam systems were assessed on pre-made forms (a number of grades plus space for explanation) by both the wearers of the bodycams and the onlookers who could see and hear the quality at the police station. Fifteen employees from five regional units participated in this. I analyzed and aggregated the forms in order to be able to make substantiated statements about the technical performance and user experiences.

In addition to the technical test, I supervised nineteen experiments in police practice from September 2022 to March 2023, spread across the country. The method can best be described as action research: active participation by the researcher who watches and walks along in the experiments. After each deployment, I conducted short interviews with three categories of police officers: technicians, wearers of the bodycams and those who had watched live. In three cases, I also had a conversation with the manager who coordinated the deployment of the units with live bodycams.

In total, I spoke to fifty people – always within one or two days of the deployment to ensure that the experiences were still 'fresh'. In addition, I went to the experiment location twice to walk along and see with my own eyes how the live bodycams were used and what that yielded. I analyzed all qualitative information and aggregated it into two clusters: major events such as carnival or a World Cup football match and deployment during regular services, namely in emergency aid or during catering nights. In addition, I consulted twice before and after with the sensing user group, which consists of sector heads (investigation, national unit and regional units) and business experts at national level. I also included their input in the assessment of whether bodycams have demonstrably delivered added value.

Negotiators

The small-scale pilot with live bodycams for negotiators has been less thoroughly researched than the other forms of live video in this report. It only involved ten deployments of the bodycams. After each deployment, I conducted an in-depth interview with the wearer of the bodycam and – in half of the cases – with the person who could watch and listen remotely. In addition, I held bimonthly consultations with a small core team consisting of the national coordinator of the negotiators, three negotiators and two technicians. This qualitative information was aggregated to arrive at an assessment of the added value.

Drones

The added value of drones was investigated in a qualitative study carried out by the police's own unmanned aviation team. A distinction was made between the three domains in which drones are used: forensic investigation,

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public order and covert. The information was collected by means of interviews with various stakeholders: operational specialists, operational experts, generalists, flight managers, operational specialists, general commanders and the team leader unmanned aviation.

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Appendix 2 **Reading Committee**

The draft version of this book has been read and commented on by a reading committee. The members did this in a personal capacity and from their own expertise.

Robin van den Boogaardt, police, Information Provision Service: operational innovation advisor

Peter Cnossen, police, East Netherlands Unit: national drone project manager (until 2023)

Dick Knol, police, Information Provision Service, pre-development: strategic advice
to sour

Wouter Landman, independent police researcher and advisor
Peter van Os, police, Central Netherlands Unit: negotiator
Peter Teekman, police, East Netherlands Unit: national drone project manager (from 2024)

Birgit Vredendaal, Police, Staff, Police Management, Data Authority: strategic advisor on legislation and regulations

This research was supervised by Adriaan Rottenberg from the Police & Science Committee.

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