TAB
OFFICE OF TECHNOLOGY ASSESSMENT
AT THE GERMAN BUNDESTAG

Observation technologies in the field of civil security – opportunities and challenges

Source: lightwise/123RF

TAB-Fokus no. 28 regarding report no. 190 June 2022

Summary

- Observation technologies are becoming increasingly important in the field of civil security. The range of applications is wide and varies from video surveillance in crime-prone areas and searches on the Internet in the run-up to and during major events to the covert collection of data from smartphones to investigate serious crimes.
- Besides the intended security gains, technologised observation practices always have societal impacts as well. The focus of public and political debates is on possible psychological effects on the people observed. However, the state of knowledge regarding this issue is still limited.
- So far, only little attention has been paid to possible effects of using these technologies on security actors. However, undesirable effects on the technology users can also even reduce the gain in security.
- In police observation practices, it is often difficult to strike a balance between the security needs of society as a whole and individual freedoms. In this context, it seems to be necessary to enhance the proportionality assessment.
- For actors in research and development, for the legislature and for actors in civil security, there are many options for shaping a target-oriented and societally viable approach to observation technologies.

What is involved

Observation technologies expand the human ability to perceive and assess risks, dangers or damage in many ways. Accordingly, technologies in the field of civil security are becoming increasingly important, both because of their extent of being already disseminated and used and because of their development potential with regard to new and extended applications.

In parts of science, politics and the public, however, the (increasing) use of observation technologies is also viewed in a critical light. Questions are raised about the actual security benefits, the proportionality of many deployment practices is doubted, and there are fears of undesirable effects of using the technologies on the people being observed.

In the TA project, the opportunities and challenges of deploying observation technologies in the field of civil security were analysed in depth. For this purpose, the (possible) fields of deployment were identified in their diversity as well as critically reflected and presented with regard to their technical, legal and social complexity.

Wide range of applications for observation technologies

Thanks to rapid developments in the fields of sensor technology, computer science and information technology, a wide range of observation technologies are already being used in civil security practice, and new and extended fields of application are constantly being added. Basically, a distinction can be made between sensor-based and data-based technologies: Sensor-based observation technologies detect certain physical or chemical properties of the real world and process the measured quantities into information that can be easily interpreted by humans. Data-based observation technologies gather and analyse information from the digital world. Possible observation spaces are the Internet, telecommunications services and infrastructures as well as information technology end devices such as PCs or smartphones.

Client
Committee on Education, Research and
Technology Assessment
+49 30 227-32861
bildungundforschung@bundestag.de

Topic initiative
Committee on the Interior and Home Affairs; Committee on Education, Research and Technology Assessment

Selected areas of application for observation technologies in the field of civil security

Video observation

Among sensor-based observation technologies, video observationplays a prominent role. It is used in public spaces (e. g. in crime-prone areas) by the police, but for the most part by other public and private actors (e. g. in public transport) to detect dangers or, for example, to protect against vandalism and theft. However, scientific evidence for the benefits of video observation for combating crime is still lacking, because scientific evaluations carried out so far have shown contradictory results. There is still a need for research with regard to this issue.

Automated observation technologies

One consequence of the rapid spread of video observation is a steadily accumulating mass of image data, the management of which by security actors is increasingly reaching its limits. This is why algorithm-based procedures are gaining in importance which are intended to support human observers with regard to an analysis and interpretation of video images. One example is automated facial recognition, which could be used in the future to search wanted people in real time e. g. at large railway stations. However, it is extremely difficult to make any predictions about the security benefits of such applications. In addition to the technical recognition performance, context-dependent factors such as the behaviour of wanted persons or the implications of using the technology for police operation practice play an important role here, but there is still little knowledge available.

Acoustic locating devices

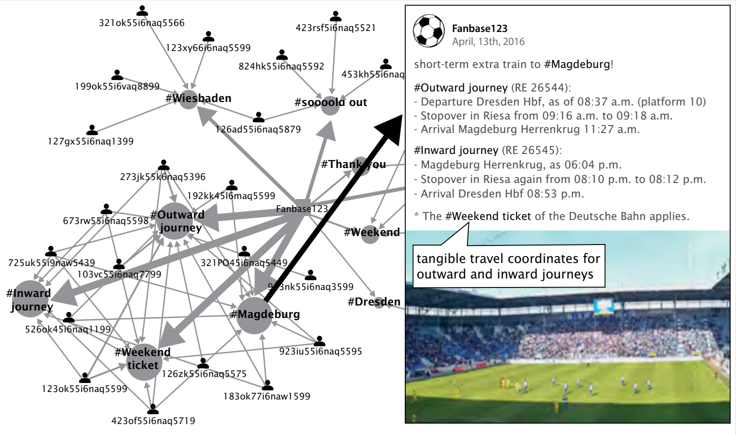
Ground microphones – distributed e. g. on the debris of collapsed buildings to search for trapped or buried persons – are an example of acoustic observation technologies. The location of the trapped or buried person is determined by the positions of the microphones that receive the strongest signals of sounds such as cries for help or knocks.

Internet observation

Security actors are dependent on keeping up with changing communication patterns. It is common practice for police authorities to monitor relevant websites or social media profiles before and during major events in order to gain situation-specific information for the planning and execution of operations. Criminal investigation departments focus on monitoring the Internet activities of suspicious persons or violent groups. User-generated Internet content can also be an important source of information for police and non-police emergency services in the event of unexpected major emergencies. As it is the case with video observation, the challenge here is also to cope with the large amounts of data. Within the framework of Social Media Intelligence (SOCMINT), intensive work is currently being done on supporting software solutions that can record, visualise and analyse data (partially) automatically.

Source telecommunication surveillance

The target object of observation based on information technology is data that a person has entrusted to an electronic system. Thus, for example, the police are allowed to intercept the telecommunications of suspects in order to prosecute serious crimes (e. g. murder). However, communication services with end-to-end encryption are increasingly posing problems for law enforcement agencies, as this also allows criminals to effectively protect their communications. One approach is to observe the data prior to the encryption process, i. e. while it is still on the target person's end device (source telecommunication surveillance). For this, however, special monitoring software must be secretly installed on the target system, which can be done remotely, e. g. by exploiting open software vulnerabilities on the end device. This is why there are concerns that security agencies might keep the existence of software vulnerabilities secret – in order to be able to use them for observation purposes for a longer period of time. However, this would represent a potential threat to IT security as a whole.



Fanbase123
April, 13th, 2016

short-term extra train to #Magdeburg!

#Outward journey (RE 26544):
- Departure Dresden Hbf, as of 08:37 a.m. (platform 10)
- Stopover in Riesa from 09:16 a.m. to 09:18 a.m.
- Arrival Magdeburg Herrenkrug 11:27 a.m.

#Inward journey (RE 26545):
- Magdeburg Herrenkrug, as 06:04 p.m.
- Stopover in Riesa again from 08:10 p.m. to 08:12 p.m.
- Arrival Dresden Hbf 08:53 p.m.

* The #Weekend ticket of the Deutsche Bahn applies.

Figure above: pixinoo/123RF; Figure below: Illustration by TAB based on Munich Innovation Labs GmbH with picture materials from Goodway (CC-BY-SA-4.0)

Insufficient research into psychological and social effects of technologised observation

Wide spreading observation practices might also affect people who themselves have not given any reason for the observation. For these individuals, adverse effects on mental health and behaviour are assumed. However, it is difficult to provide scientific evidence of such effects, because the phenomenon of observation in a social context is very complex. So far, only video observation has been relatively well researched. Accordingly, the presence of video cameras can lead to increased self-awareness – which may be perceived as unpleasant – and behavioural modifications in the form of avoiding observed areas are also possible. However, the current state of research also suggests that these effects should not be overestimated. Moreover, habituation effects seem to crop up relatively quickly.

Possible psychological and social consequences of observation practices that take place without the knowledge of those affected have become the focus of scientific attention only in the wake of the Snowden revelations in 2013. Potentially affected persons can hardly comprehend whether or not, when and by whom they are being observed. The only thing one is conscious of is the possibility that one might be observed. Initial studies show clear indications of behavioural adjustments or restrictions on individuals' own actions as a result of (covert) state observation on the Internet or in electronic communication. However, it remains questionable, whether these findings – which have been obtained almost exclusively in the context of observation practices by (foreign) intelligence services – can also be transferred to police observation practices (in Germany). Currently, there is still a great need for research in this field.

Unwanted impacts on technology users might reduce security gains

Possible effects of the deployment of observation technologies on security actors using them and their institutions have hardly been researched scientifically so far. Furthermore, they play only a minor role in political and public debates. In other security contexts, however, it has been shown that undesirable effects on technology users might – under certain circumstances – counteract the goal of increasing security by using a higher level of technology.

From aviation, for example, the effect is known that excessive confidence in the performance of safety technology can lead to negligence and a decrease in situational awareness among users. Observation technologies are also often said to be technically superior to human observers, e. g. automated facial recognition in terms of speed and reliability for the identification of wanted persons. However, if security actors lose awareness of the limitations of observation technologies, this can lead to technology-based recommendations for action being accepted without any reflection. Moreover, security-relevant situations that are not recognised by the technology used might also be overlooked by humans.

It becomes clear that when considering and deciding on the (future) use of observation technologies, possible implications for security actors must be adequately taken into account. For this, knowledge about such effects must be expanded.

Difficult balance between security and freedom

Especially police observation practices regularly affect privacy guarantees protected by fundamental rights. This often results in a sensitive tension between security needs of a society on the one hand and civil liberties of individuals on the other hand. To date, this conflict is still a core issue of the – sometimes very controversial – public and political debates regarding the essential functions of the state and the legitimacy of the (observation) means used for this purpose.

In order to clarify the tension between security and freedom, the principle of proportionality is one of the central instruments. This principle requires that any encroachment upon fundamental rights by the state pursues a legitimate purpose using suitable, necessary and proportionate means. However, the example of technologised observation shows that these criteria – at least according to their current application practice – are partly too vague to be able to decide on the proportionality of police observation measures also according to societal assessment standards. For example, a means is considered to be suitable in the constitutional sense as soon as it helps to achieve the desired success potentially or at least in individual cases. Though, police observation measures fulfil this prerequisite quasi automatically, provided that the technical and functional efficiency of the respective observation technology is given. However, this does not say all that much about the suitability of the observation measure for combating crime, since the practical security benefit depends not only on technical criteria, but on many other factors, such as e. g. the respective social application contexts or the behaviour of the persons observed.

In this context, it seems to be necessary to enhance the proportionality assessment. Possibilities for doing this are discussed in the TAB report.

Political options for action

Options for shaping and supporting a target-oriented and socially viable approach to observation technologies in the field of civil security exist in the phases of developing, introducing and using the respective technologies. Accordingly, the addressees are actors in research and development, thelegislator as well as actors in civil security who use the technologies operationally.

Thanks to the corresponding funding structures (i. a. the German Federal Government's framework programme »Research for Civil Security«), the actors in the field of research funding have significant opportunities to exert influence in order to help determine the goals and priorities in civil security research. Currently, in accordance with the approach of integrated research, usually interdisciplinary project consortia are funded in order to include socio-scientific aspects as early as at the technology development stage. This is to be welcomed because it increases the chances of a successful and socially viable use in practice. It is important to emphasise, however, that the approach of integrated research will not make redundant social science (impact) research beyond individual interdisciplinary projects in the field of technology development. Important research desiderata result from the knowledge gaps identified in the TAB report (e. g. evaluation of security benefits, psychological and social effects of technologised observation, possible impacts on technology users).

It is up to the legislator to create the legal framework conditions for the introduction of new observation practices that are relevant to fundamental rights – and in this respect also to ensure a fair balance between security and freedom. This is why options for action for the legislator are primarily seen with regard to an enhancement of the proportionality assessment. For example, in order to improve the possibilities for suitability assessment regarding police observation practices, additional assessment methods would have to be developed alongside technical and functional suitability criteria. These methods would have to be applicable to the respective tangible deployment scenarios and make it possible to consider technical, legal, socio-scientific and ethical assessment dimensions in an integrated way. In this context, it is important that the review of the proportionality of state monitoring practices is not understood as a one-off commitment during the legislative procedure, but as an ongoing task.

TAB report no. 190

Beobachtungstechnologien im Bereich der zivilen Sicherheit – Möglichkeiten und Herausforderungen

Claudio Caviezel, Leon Hempel, Christoph Revermann, Saskia Steiger

BÜRO FÜR TECHNIKFOLGEN-ABSCHÄTZUNG BEIM DEUTSCHEN BUNDESTAG

Claudio Caviezel
Leon Hempel
Christoph Revermann
Saskia Steiger

Beobachtungstechnologien im Bereich der zivilen Sicherheit – Möglichkeiten und Herausforderungen

Endbericht zum TA-Projekt

Juni 2022
Arbeitsbericht Nr. 190

Website of the project

www.tab-beim-bundestag.de/en/observation-technologies

Project manager and contact

Dr. Claudio Caviezel
+49 30 28491-116
caviezel@tab-beim-bundestag.de

The mandate to regularly put technologised observation practices to the test also addresses actors in the field of civil security. In daily practice, there are optimum conditions to evaluate the actual security benefits and to identify at an early stage possible undesirable effects of using the technology. Moreover, another important option for action consists in taking confidence-building and transparency-promoting measures. Especially covert police observation practices – in combination with insufficient knowledge about observation technologies, the legal requirements and limits of their use as well as the actual extent of their practical application – might trigger concerns among citizens that are partly based on false assumptions and are therefore unfounded. However, understanding and transparency are necessary preconditions for an informed societal agreement about a target-oriented and at the same time acceptable use of observation technologies in the field of civil security.

The Office of Technology Assessment at the German Bundestag (TAB) advises the German Bundestag and its committees on questions of scientific and technological change. TAB has been operated by the Institute for Technology Assessment and Systems Analysis (ITAS) of the Karlsruhe Institute of Technology (KIT) since 1990. It has been cooperating with the IZT – Institute for Futures Studies and Technology Assessment and VDI/VDE Innovation + Technik GmbH since September 2013. The Committee for Education, Research and Technology Assessment decides on TAB's work programme, which also includes subjects proposed by other parliamentary committees. The standing »TA Rapporteur Group« consists of the Chairman of the Committee Kai Gehring (Bündnis 90/Die Grünen), and one member from each of the parliamentary parties: Dr. Holger Becker (SPD), Lars Rohwer (CDU/CSU), Laura Kraft (Bündnis 90/Die Grünen), Prof. Dr. Stephan Seiter (FDP), Prof. Dr. Michael Kaufmann (AfD), Ralph Lenkert (Die Linke).