The future role of technology in policing
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If one is going to discuss the future of the police, one has to take into account the structure of the society they exist in and serve. It is a kind of sociological truism today that our societies (at least the western ones) are moving from their industrial machine-age to some kind of information-age. It remains to be seen whether this description is sufficient to embrace the entire current social processes, but what is quite certain is, that our whole civilization, its organizations and our social life are permeated by technology. Everything indicates that this process will continue and even accelerate. Social control in general and the police as an institution are no exception from this transformation. But far from stating a technological determinism and rejecting a pure 'technical' understanding of technology, I rather would like to approach technology as a social factor.

In the following I want to discuss some aspects of the role technology will or could have in the future of policing. I will start by considering the relationship between police and technology from a social science point of view. To illustrate the significance technology has for present police performance and options, I will give a short synopsis of the current police-relevant technologies and some of their applications. Instead of arguing which technology is to be the most effective or promising one for police ends, I will consider the factors and processes influencing the real diffusion of technology in future policing.

I. Questioning technology in and for police work: Trivial, worth considering, crucial?

Police are (apart from the military) probably the state agency the functions and structure of which are most affected by technology. The idea of police

without the different types and levels of technical artefacts is now-a-days hardly imaginable. The use of patrol cars, radio equipment or computerized data has become common and it could be seen as nothing more than a simple copy of society's general technological development and level of use. The police have been used to applying technology for decades and there is actually nothing spectacular about it. But if we want to understand what technology means for the police as an institution and as a social actor in society, we have to question the 'normality' of the relationship between police and technology.

Considering technology as a social factor, which is formed by historical social forces and moulded by interests on the one hand, and which has significant impacts on and consequences for social processes and procedures on the other, we have to state that the relationship between police and technology is a specific and socially significant one.

Specificity

In speeches or publications police authorities often emphasize the importance of technology for their current and even more for their future work. Technology is mainly addressed as a bare tool or instrument in executing the police-task and it is sometimes mentioned that it is no end in itself. At the same time it is declared that the success of policing depends to a large extent on the implementation and use of up-to-date technology, and it is often proclaimed as a 'weapon' against crime[2].

Indeed, since the introduction of patrol cars and radiotelephony there have been a lot of technical innovations which have been utilized and adapted for police purposes. We have to think of computers, data networks, satellites or DNA-fingerprinting, to mention only a few. Some social control technologies today available have got a remarkable push to their evolution from the police themselves (for example, voice-analysis, automated fingerprinting, etc.). But beyond the (modest) functional perspective to do the police job more conveniently and/or efficiently, sometimes the options of technology evoke fantasies on a new way of policing, and even a new type of police. Especially Horst Herold, a former President of the German *Bundeskriminalamt*, realized the potentials of modern technologies and developed in the Seventies a clear vision and distinctive philosophy of a technology-based and prevention-centred police. Essential parts of his ideas have been the primacy of the scientific fact-proving evidence over testimony in criminal cases and even more important, society-wide data-collations of all crime and justice-related areas, which would enable the police via computer to create a self-steering and self-optimizing justice-system (see, for example, Herold, 1986). Although he is retired now, and it is difficult to find other protagonists of his radical and bold vision today, the technological progress has brought this approach a little closer to reality. From

a social science perspective the key-categories to understand the affinity of police to technology are information and power.

Police work as information work A large, perhaps essential part of the task of the police is information-work. Police have to gather and produce information about minor and major deviancy, to understand what is happening, to intervene if necessary, and to create a certain type of knowledge about facts, people and people's behaviour. Depending on the different historical and national circumstances, this character of policing has been more or less obvious. Foucault (1977) described this process in a broader scope of disciplinary mechanisms.

There are a number of problems with information work for the police: the first is a qualitative one, the problem of detection. How do the police get to know about all feasible offences? Mawby (1981) referred to this as the problem of 'overcoming the barriers of privacy', especially if there is talk about proactive policing. There are physical as well as political and cultural barriers for the 'will to know'. A further complication is that someone has to decide whether a certain behaviour or event (or its data-phantom) is to be seen as illegal. But data without context does not provide information, and information without an adequate theory does not produce any knowledge. This problem is likely to grow in a society the interactions of which (and their related deviancy) are becoming more and more (in terms of information) 'virtual'. Proactive orientation and preventive strategies are very dependent on a successful access to the sources of information about actions 'at their early stage', but it could turn out as crossing bridges before coming to them. The second problem is of quantitative nature: given the situation that police (or other agencies of social control) keep a close eye on people's behaviour: how can they tackle the growing torrent of information? Here we are confronted with the problem of the economy of information. The answer to this problem is: automation, which stands for more technology.[3]

That is the reason why technology has become such a major issue in the discussion about police: technology (especially advanced information and communication technology) opens the door for more efficacy and effectiveness in generating, processing, distributing and analyzing information about real and potential deviancy.

Technology as power-amplifier Technology enables — in general.[4] Its use provides the means for certain types of action and action-results, which would not be achieved or only with a much greater effort without it. Conceiving power as the option to be able to do or to cause something, technology reveals its characteristic as power-amplifier.

The police is a power-organization and it is therefore natural that it looks for ways of empowerment. Advanced technology does indeed provide new

possibilities, capacities and abilities for the police.[5] In terms of power, and understood in a social science perspective these are:

- the power to recognize,
- the power to ask,
- the power to know, (and as result)
- the power to act, (respectively)
- the power to prevent.

To refer again to Foucault: 'power' is not a basically negative phenomenon; it is rather productive and constructive. The evaluation of its impact and effects on the social structure is dependent on (historical and social) perspectives and interests. On the other hand, the fact of the matter with regard to technology is that it is not just an instrument or tool. It is not as neutral as the machete in the jungle — for instance, if we are talking about technology and police, its characteristic as a power-amplifier for them has to be stressed.

Significance

In a democracy all issues of power are important and should be subjected to public discourses. As I have already argued, the relationship between police and technology is a matter of power. But besides the importance of this item in terms of pragmatic policies and civil rights, the affinity of police and technology is a central point of interest for a criminological perspective on social control, because the introduction of technical innovations into the police not only affects their way of functioning and their performance, but also their public appearance and their social impact on society. Furthermore, we can understand developments within the police as a model for general processes in the area of social control.

The interrelation of police, power and technology is in fact an older item.[6] But since we have been faced with a wave of technological innovations mainly based on microelectronics, a new dynamism has come into this social field. Because of the dynamism there have been consistent considerations about what is happening to policing and social control by the emergence of the 'new technologies'. In recent years there have been a number of conferences dealing with the question of police and technology, where policemen and social scientists had visualized and discussed the ongoing development and its consequences. For example an international conference about 'New technology and Criminal Justice'[7] was held in Montreal (Canada) in 1987 and the German BKA (*Bundeskriminalamt*) organized in 1989 a conference entitled 'Technology in the service of crime fighting'.[8]

There seems to be a growing concern in social sciences, in law and in certain parts of the law enforcement community itself to understand and to evaluate the significance of technology for police-work. Naturally the perspectives and conclusions are quite different. While members of the social control agencies stress the new opportunities of technology and the abilities they offer to them, academics rather emphasize the unforeseen effects and side-effects. In both the American and the German debate privacy and/or data-protection-questions have been brought up by technology's possibilities for police ends. Although much more could be said about these items, I will pass over them here and try to emphasize the socio-structural aspect.

Among others,[9] the sociologist and police-researcher Gary T. Marx from the USA has broadly discussed the intentional and unintentional consequences of the ongoing development of technology within the police and social control in general by using the term of 'the new surveillance' (Marx, 1988a). His and the research of others make me emphasize that technology — its development and its use in certain organizations — is a social factor and has impacts on society and the implementing organization itself, which have to be described in sociological categories, not only in technical or functional ones.

II. Police — technology

What technology for what police?

The inherent problem in talking about police and technology in a general way, as I have done up to now, is a lack of differentiation.[10] In view of the role of technology in policing and its future development one would be forced to distinguish on the one hand the various tasks and competencies of different police organizations and departments and, on the other hand, the different types and characteristics of technology the former make use of. Supply, demand and real implementation of technology differ from areas of responsibility and allocation of tasks. There are other technical options for the traffic police than for special investigation units, forensic departments or riot squads. Each sector has its specific affinity to the use of technical devices, and the general technological options have to be suited to the prevailing working conditions. The intensity and vigour of this process are very different too; one will find very technically sophisticated police departments besides police officers still typing their protocols on Second World War typewriters. Much more than this paper would be necessary if I were to discuss the different aspects of the diverse relationships of police areas to specific technical opportunities in detail. Instead I will illustrate the situation by giving a few significant examples.[11]

Applications

The use of some technologies by the police (patrol cars, radiotelephony, etc.) can today be taken for granted. Even computers are no sensation any more. But there is still a difference (at least regarding public attention) between widespread types of technology — we could call some of them traditional or low-tech solutions and others high-tech answers which are still in a more experimental state of use.

- *'Artificial intelligence' support for criminal investigations.* The FBI reports of the benefits it gained from several deployed knowledge-based 'expert-systems', which provide — as it is said — 'experiential knowledge, analytical and reasoning processes of our most competent investigators and prosecutors' and had supported FBI's programs effectively (Committee Hearings, 1991, p. 23). The analyzing of social networks or other multidimensional and complex information can today hardly be done without the support of sophisticated software and high-performance computers. The attempt to 'automate' investigation-expertise could profit from the world-wide industrial efforts in research and development to give machines a kind of human skill.

- *DNA-fingerprinting.* Forensic technology owes one of its greatest progress achievements to the development and broad availability of a scientific gene-technology method to identify unequivocally a person by the individual sequences of his cell-material. A small sample of tissue taken from the crime scene and compared with that of a suspect is enough to positively identify or exclude individuals. Because this method has found some acceptance in the court rooms the time may not far away when '... a criminal who cannot leave a scrupulously clean crime scene might be advised just to sit and wait for the police' (Herrera and Tracey, 1992, p. 238).

- *Electronic borders.* Safeguarding a border against illegal crossing has been a question of fences and manpower (patrolling with vehicles or on foot) for a long time. The combination of fences with different types of sensors will replace or reduce the costly deployment of frequent patrols. In a recent attempt German authorities are trying to safeguard parts of the eastern border by installing radar, infrared and heat-detecting devices, in order to catch (and deter) illegal immigrants and refugees heading for the more wealthy and supposedly less dangerous western countries. What has been in use for small defined areas (such as company ground, military terrain) seems to be practicable on a bigger scale now.

- *Machine-readable identity cards.* In the lasting Israeli-Palestinian conflict the mandatory use of machine-readable identity cards for Palestinians earning their money as workers in Israel, seems to have been successful as a mass-control method at the border of the occupied areas since its introduction. The data of the card is read by pistol-like hand-held devices and can be delivered to a central computer, where movements can be documented and analyzed. A more futuristic (but no more only science fiction) version of automatic identification would be the implantation of person-encoded chips under the skin. This technology is available and already in use for animals.

- *Automatic vehicle identification (AVI).* Automobile traffic is one of the growing problems of the techno-civilization. Besides its ecological aspects we are facing the difficulties of traffic regulation and traffic offences. Miniaturization of chips and mastering their automatic recognition by transmission even for fast moving objects, has opened up the way for AVI. By using encoded and personally assigned chips (transponder) and automatic check-stations the access to inner-city areas or toll-roads can be controlled. Additionally, the movements of the vehicle can be tracked and documented and it is technically no problem to add automatic speed checks and distribution of tickets. Systems are in work in several states now and are planned in some other (see Jenkins, 1992; Martin and Scott, 1992).

- *Satellite-tracking.* Another advancing technology is the use of satellites. By use of transmitters hidden in contraband sending signals to a satellite, police could track its movements and transport way. The originally military Global-Positioning-System (GPS) is now available for commercial use. For example, security firms offer the tracking of bank- or valuable transports. Recently it was reported that the European Community has employed satellites to detect subsidy fraud by farmers concerning their report of fallow land.

- *Electronic monitoring of offenders.* The electronic monitoring of offenders is today a widespread means for sanctioning offences and to regulate prison population in the USA (Schmidt, 1988). The core idea is to connect a device to a person's body which can be used as an identification/ verification instrument (via telephone or radios). As long as the person wears the apparatus it can be checked, whether the person is at his allocated place or his movements in a defined area can be tracked. Although the system was invented nearly 30 years ago and is now mainly used in the penal systems, the options for police purposes are obvious.

In order to understand the impact of technology on the police and on social control it can be helpful to use a (very) simplified model which differentiates typical functions of policing (and social control), and to try to classify the different 'social control technologies' accordingly.[12]

This simple model sketches the procedure in a rough way: The first step in the process of policing (after a norm has got its legal force) is to detect violations of the rules. This could happen in a reactive (report from the public) or in a proactive manner. Proactivity and prevention are dependent on some form of (i) observation and surveillance. Following that, (ii) identification is an important point of the procedure: who is it, what is his name, what do we know about the person? To a great extent the process of policing is a matter of (iii) information processing, i.e. to register, store and retrieve data, and to transform this data and related information by combining and analyzing them into some kind of knowledge. To initiate and co-ordinate these activities there is need for (iv) communication, (v) organization and administration. The result is often an (vi) intervention or action. This could be a formal or informal co-operation with another bureaucracy or a direct activity or operation. The latter is connected with the option of (vii) transportation and mobility.

The current available technologies support and improve the functions and courses of these procedures or enable new ways of implementing them. It is not possible in this article to go into every technology in detail. Table 13.1 (a selection of the most important technologies in use of police-forces, ordered by function-classes) gives an idea of the range, variety and sophistication of technology in the service of the police. All these technologies on their own have to be seen as powerful and effective tools for the police. They are even more potent when they are assembled in integrated systems — then their characteristic as 'power amplifiers' can be multiplied.

III. Increased technification of the police — an interacting of social forces

Considering the state-of-the-art technology and looking back on the development in the last decades, we could expect that the process of introducing technology into policing (and social control generally) will continue, bringing more and more sophisticated technology into the forces and increasing the quantitative as well as the qualitative level of technology in the police. But the truth is that things are more complex, the relationship of police and technology is not simply linear. If one would like to predict how far technology will determine the future of policing, one has to consider driving and counter forces in the ongoing process of technification.

Table 13.1
Typology of police technology

1. Surveillance and detection technologies
- Video
- Photography
- Bugs
- Directional microphones
- Sensors and detectors (infra-red, heat, motion, etc.)
- Night vision aid
- Laser radar (Lidar)
- Transponder
- Polygraphs
- Satellite scanning

2. Identification technologies
- Automated fingerprinting
- Access control systems (bio-metric, via code and/or chip)
- Speaker recognition and voice analysis
- Machine compatible identity cards
- DNA-fingerprinting
- Automated image recognition (video search)

3. Information processing technologies
- Computers (mainframe and PC's)
- Databases (documentation, retrieval, computer matching, computer search, computer analysis)
- Analysis-supporting software and expert systems

4. Communication technologies
- Telephone
- Emergency and intrusion alarm systems
- Radio telephone
- Video printers
- Computer networks

5. Organization and administration technologies
- Control centres
- Office technology

6. Intervention technologies
- Weapons
- Protection equipment
- Water-cannons
- Clearance vehicles
- Armoured vehicles
- Robots

7. Technologies for mobility
- Cars
- Trucks
- Launches
- Helicopters
- Bicycles
- (Horses)

Regarding the catalytic factors one could differentiate between those determinants centred in the police as an organization (i.e. a bureaucratic system with its own logic) and those coming from the society as the 'organizational environment'.

Driving forces

Following the official statements and publications, the police's assessment of the current situation is commonly characterized by concerns about increasing organized and border crossing crime (drug trafficking etc.), new types of offences (such as computer or environmental-crime), generally growing crime rates and simultaneously shrinking percentage of cases solved, and social conflicts swelling up to unrest, all resulting in new challenges and high workload for the police and its organizations. One could have the impression of a widespread 'deborderization' of all potentials of deviant behaviour, which causes a high pressure onto a police expected (or pushed) to be the key for the solution.

As a result we can find widely held orientations and strategies within the police (and the responsible political officials), which favour and accelerate the use of technology and raise its place value for the whole system.

- *Reinforcement of international police cooperation.* Growing global and regional mobility of persons and the interchange of capital, goods and information mean for the police a significant extension of its information requirements, which go long beyond national borders. Forms of crime like drug trafficking or financial manipulations in a world-wide economy, but also fortifications of borders against refugees have put bilateral and multinational police co-operation on the top of the agenda. These co-operations have to rely on fast and secure transmission of huge amounts of data, creating the need for building up the necessary communication networks and for sharing the available resources (data-bases, satellites, etc.).

- *Preventive orientation.* Although the police often sink in their workload of everyday business, the idea of proactivity and prevention gets new attention again and again. As society has become more complex and crime has too, a well-targeted intervention needs excellent intelligence. If police are going to penetrate the 'structural black field' of crime (Stümper, 1983), they need means and tools to overcome the 'barriers of privacy' and the fleetingness of modern communication and transactions.[13] The effect is a growing hunger for information on the side of the police, which practically and economically can only be satisfied by advanced technologies, for example, by acquiring external data-sources.

- *Expanding techno-crimes.* Following the computerization of the advanced societies, new possibilities and types of technology-related offences have emerged. Besides computer-crime in its diverse variations the cashless payment opens new ways for fraud (one has only to think of credit-card fraud, etc.). Because a great part of these transactions are virtual

events, only existing in an electronic-symbolic way (such as financial transactions, hacking, etc.), the detection and pursuit of crime involving complex technical processes will be a matter of deployment and mastering corresponding technical means by the police.

- *A continuing process of professionalization and specialization.* Looking back to the development of police forces in the last decade, one can observe in many respects a steady process of professionalization and specialization within the organizational structure (this is at least true for Germany, see Busch et al., 1985). This process is accompanied, even forced, by the introduction of advanced technology and the utilization of its options. In the future it is likely that the police as an organization will be able to build up on the enhanced technical skills of its members, as computer-literacy will grow in society generally.

- *Compulsion to rationalization.* As every modern bureaucracy, police are underlying to a certain extent the requirement of rationalization. The specific pressures on internal structures and procedures come from external demands (better law enforcement and security for the citizens) and police's self-conception, endangered by facing increasing crime-rates and shrinking success-rates. The police have to follow the current rationalization-patterns of industry, which are based to a great extent on the automation of communication structures through the use of technology. A rationalized police will be a techno-police.

- *Technology as a weapon and the promise of technical solutions.* The brightest path for bringing in more technology to the police is the promise of problem solution, with which technology is often connected. Police officials habitually complain about the high level of technology organized criminals operate with and the logical demand is to equip the police forces with even more sophisticated technology, in order to achieve at least a kind of 'weapon equality'. To be successful the police have to have powerful means for law enforcement and here we are back to the thesis of technology as power-amplifier.

Beside the practical advantages advanced technology can contribute, it has — from the perspective of the police — at least one more benefit. The use of sophisticated technology embraces a symbolic function, which cannot not be underestimated and which reaches from deterrent and threat to the suggestion of omnipresence. Above all it is a sign of modernity.

To what extent technology is seen as a key for the solution of major problems one could learn from the current German debate about the legal extension of the use of bugging devices.

All these are factors and developments which contribute from the perspective of the institutional 'inside' to an enhanced introduction and

use of technology in the police. Additionally there are a number of favourable external parameters in society which support this movement.

External driving forces

The external favourable basic conditions for a further technification of police work fall into two groups: firstly, those which are founded on technological progress, and secondly, those which derive from the broader social development.

- *General development of technology.* The general progress of technology in the past decades was tremendous and there are no symptoms that it will stop or slow down in the near future. New scientific procedures will be discovered and the technical innovation cycles become even shorter than they have been hitherto. Devices will become more powerful and simultaneously more affordable. Complex and special procedures will be turned to normal and broadly available tools. The more technology opens up new or better ways to do something, the more police will have a broader choice from aids and devices in using these potentials. An increased availability and affordibility of high-tech devices and methods are crucial in this development.

- *Desire for more security.* In view of current international economical, political and cultural tendencies there are reasons to believe that social conflicts — of which criminality can be seen as one type — will increase in the near future rather than drop in number and quality. If it is true that we are living in a 'risk-society' (Beck, 1986), whose problems become more difficult to tackle, it is just as true that people are looking for more safety and security (at least certain types of security). We can expect that the search for security-means will lead more and more into technology's solutions as a way of reaction (even if they turn out to be insufficient or counter productive). Consequently, and driven by a growing demand of the public on police performance, the use of social control technologies and their intrusion into everyday life will be accepted more broadly by large numbers of citizens and political representatives.

- *Growing security industry.* Another favourable and accelerating factor for the dissemination of social control technologies is the rapid growth of the security industry which supplies the market with a hard to grasp variety of security-related goods and services.[14] It is not only the fact that alarm systems are sold in many do-it-yourself shops. More important is the fact that spreading private police forces and security services are even more subjected to the compulsion of rationalization than state police-agencies. Because security is becoming more capital-

than labour-intensive, social control technologies have a high priority in private policing approaches.

- *General tendency to industrialization of social control.* A perhaps crucial development is a general tendency, which can be observed in advanced societies, of transforming social control into a type of industrial process (Nogala, 1989). Jeremy Bentham's idea of the 'Panopticon', where a central authority (for example, a guard in a prison) has a constant view on what is happening in the periphery (for instance, the behaviour of prisoners in their cells), but where the observed cannot know exactly, whether and when they will be watched, seems to become the paradigm of social control in the twenty-first century. The difference to the nineteenth century idea is that now the 'look of the guard' is mediated by technical means and can even be automated by the deployment of sensor devices and computer systems. Technification of social control processes can be found in nearly all areas of social life and we are witnessing a widespread habituation to it. One important effect for the police is that they will be more and more able to use the information and control systems outside their own organizational boundaries.

All these aspects (which could be deepened and discussed by themselves) will contribute to a more significant role of technology in future policing, as they have done to the current state.

Counter forces

But there are also a great deal of obstacles, problems, conflicts, ambivalence and unintended consequences accompanying the current technification of police work, which should be considered as limiting, hampering and contradicting counter forces, questioning the straightforwardness of the process. The tendencies against a more quantitative and qualitative use of technology by the future police consist of contradictions in functional, economical, legal, political and social conditions — not to forget those inherent in technology itself.[15] To begin with the last aspect:

- *The gap between the promise of the engineers and everyday experience in usage.* Although technology often appears as a solution to problems it will no less often create a new one. This is (or could be) known by everyone, socialized in our techno-civilization. Many of us have the experience that the brand new shining device does not fulfil its promised function or provides only a little progress, and too often we have had to discover that advertisement and reality are two different pairs of shoes. Generally, technology is prone to defects, lives up satisfactorily to its

full function only in ideal conditions, or renders its usefulness only after additional costly adaptations.

Another item is malfunction. Frequent false alarms of alarm systems are a serious problem for the customer and the police. In big cities, for instance, one can observe that little attention is paid when a car-alarm is triggered. Obviously the confidence in technology has been seriously weakened.[16] Another problem is compatibility when connecting different technical systems. The German police can write the book on adaptation difficulties when they tried to connect their different information systems for a better exchange of data and information. One has only to see what is happening in the process of integrating the European police forces technically.

- *Use of technical countermeasures by criminals.* Playing the technology-card is not an option restricted to the police. Criminals and criminal organizations have also access to some social control technologies and are able to use them as countermeasures. This questions the success of the technological progress of the police. As historical experience teaches, we are likely to see an arms race between police on the one side and individuals or well organized and equipped criminal organizations on the other.[17]

- *Limits of police's resources.* As impressive as the imaginativeness and skilfullness of the art of the engineers might be a massive obstacle regarding the spreading of technology within the police are the notorious problems of public budgets, which have to finance public police services. Not all technically achievable options and products sold on the security market are also financeable. Moreover the technology affordable for a central department can be far from being available for every policeman on the beat and it will take a very long time and many yearly budgets to alter the technological level of a whole police force. Even though there is some political and public support for the modernization of the police (especially in times of social crisis), limited financial resources seem to be a severe hindrance for a further and rapid technification of the police.

The ratio between technical effort and practical result is another point which should be examined precisely in terms of rationality of a technologically enhanced police force. Specialized High-Tech is (still) expensive and occupies a lot of financial, organizational and training resources. This can lead to rivalries between departments with a different affinity to technical equipment.

- *Competing alternative strategies.* The visions of police authorities about what the police's performance should be, the best strategy to achieve it, and the future requirements of policing, have changed during the times and developments within societies. Technology is assigned its state of significance in very different ways. Perhaps the techno-euphoria of the seventies and eighties is weakening now. The currently widely favoured concept of 'community policing' implies a very cautious attitude regarding technological features, while strategies dealing with organized crime patterns have a tendency to seek so-phisticated technical weaponry. Perhaps there are more policemen who see themselves as problem-solvers rather than RoboCops (even if TV and cinema often shows this the other way round) and parts of the work force might have little acceptance for changing procedures caused by the introduction of new technologies. The problem is that there could be a rising struggle between different dominant police strategies about priorities and funds as well as public attention to their own 'projects' and their results. To put it simply: there seems to be an alternative between a communication oriented and manpower inten-sive 'citizen-police' and a sophisticatedly equipped police of special agents.

- *Resistance in parts of the public (concerns about privacy, civil rights movement, data-protection).* A substantially moderating factor of the role technology will have in the future of policing is its acceptance by the public and political representatives. It can be seen that the dissemination of modern technology into police and the growth of their power was accompanied by the corresponding rise of a counter-movement against it grounded in informed segments of the public.[18] This opposition has generated three distinct critical discourses which vary in their argumentative focus but share concerns against the empowerment of the police promoted by technology's possibilities: (i) reservations about issues of privacy (which could be seen as a cultural discourse), (ii) defence of civil rights (political discourse) and (iii) the debate on data-protection (legal discourse). The current 'battlefield' between the protagonists of more technology and authorizations for the police in Germany is marked by the debate on whether eavesdropping with technical devices should be allowed (even) in private places. Because some police practices (especially those made possible by technology) are in conflict with the present law regarding 'informational self-determination' and privacy, there have been great (and already suc-cessful) efforts, to adapt law to police's abilities. What we are mainly concerned about here is the problem of the requirements of law en-forcement, on the one hand, and of the democratic necessity of con-trolling and limiting police power, on the other.

- *Doubtful social compatibility.* In the end it could be doubted that what is technologically possible (here in terms of social control technology) is socially compatible and wholesome for society's conflicts too. The technology for a 'maximum-security-society' (Marx, 1988b) is available now, though it is not sure that it is the right tool to solve current and coming social problems. A 'High & Omnipresent-Tech-society' could bring its institutions and members out of the frying pan into the fire. A world determined by surveillance and control-systems could hardly give anyone the desired feeling of security longer than for a short period of time. Big Brother is not a nice vision for free and democratic societies and there are basic and strong sociological arguments that such a society would not function — let alone that it would be able to root out all kinds of crime.[19] What is to be stressed here is that all these factors mediating the role technology will have in future policing, are mainly social forces, which are not easy to predict in their interaction and future development.

IV. Conclusion: The role of technology in future policing — predictable?

What can be said from a social science perspective about the role technology will have in the future of policing is this. Technology will continue to have a remarkable impact on police, as it has had before and it has today: on their structure, their performance and their place value in the state and in society. But it would be more than foolhardy to make more distinct and precise predictions — we are concerned here with an essentially social process wherein there is a complex interaction of economical, sociological, psychological, political, juridical and technological developments. To have a certain social control technology at one's disposal does not mean that it will be implemented (at once or at all) and bringing in more sophisticated technology into policing could sometimes turn out to be impractical.

An instance for the first claim is the fact that the idea and technology for electronic monitoring were developed more than a decade ago before they were introduced into the criminal justice systems of several US states; furthermore, other countries have established programs only on an experimental basis (UK, Singapore, Israel).

An instructive example for the second part of the argument is the experience which had to be made in a small town in Florida with the implementation of a video-surveillance system and which had to be ended prematurely. Reasons for the termination of the project were 'that the system never caught anyone committing a crime, the use of volunteers to man the monitors did not work out, the equipment never worked properly due to interference with the microwave frequency, weather, and misuse, and the department could not afford maintenance costs' (Surette, 1985, p. 84).

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Finally it could be stated that the role technology will have in future policing is primarily a question of what kind of police society is willing to have, that is, how much power this state organization will need to have. Big Brother's and RoboCop's technology is to a great extent available now or will be in the near future. But it is highly questionable if these are socially desirable, compatible and functioning perspectives at all.

Perhaps, the smartest move is not to leave the police to decide alone or to what extent they will rely on technology or, to express the same thought from the perspective of social science: 'The key issue of any kind of power control in modern societies is the control of technological action' (Popitz, 1986, p. 129).

Notes

1. This paper is the revised version of my verbal contribution to the workshop 'The role of social factors in the future of the police' at the 1992 Paris Conference on Comparative Policing. It is based on my studies as a criminologist on the impact of technology on police work and procedures of social control and has to be seen as part of the author's interim findings. A more detailed research project on 'Social Control Technologies' directed by Fritz Sack and in cooperation with other researchers is planned.
2. See for typical statements for instance 'Hearing before the Committee on the Judiciary (US Senate): High-Technology Weapons in the War on Drugs' (Committee/Hearing, 1990).
3. David Gabor (1973), aware of the problem, proposed exactly this solution.
4. At the very least technology enables, when used properly and in the right situation.
5. As agents of the state and bureaucracy, police should also follow the same imperatives of a rational bureaucracy. In contrast to the ideal of rationality Brodeur (1984) describes it more in Kafkanian terms. The contradiction between the rational idea and the experienced irrational functions is a main source for scientific research and should be transferred to the item of technology as well.
6. Alfred Blumstein mentioned the task force on science and technology as part of the 'President's Commission on Law Enforcement and Administration of Justice', created in 1965 by President Lyndon B. Johnson (Blumstein, 1988). However I do not know any well known historical or criminological study which focuses exactly on that item.
7. See LeBlanc, Tremblay and Blumstein (1988).
8. See BKA (1990).

9. See, for instance, Brodeur (1984, 1988), Nogala (1989), Dandecker (1990), or Lyon (1992).
10. Brodeur's statement in an article that '... the meaning of the words police and policing are continually expanding' (Brodeur, 1984, p. 195) — he there differentiates between (i) personal and physical policing and (ii) professional policing and auxiliary surveillance — is worth taking into consideration here. In addition, we actually have to take into account national and cultural differences. Furthermore technology is a very general term for a variety of apparatus, gadgets, machines and complex algorithms, which all have their own specific logic of evolution, use and impact.
11. For more examples see Marx (1988b), Jenkins (1992), Lyon (1992). Interesting visions about technology's application in the not-so-far-future are provided by some articles of Gene Stephens in the journal 'The Futurist' (for example, Stephens, 1990, 1992).
12. This is not a simple enterprise because there are overlappings and some assignments could be discussed controversially. For alternative classifications see Marx (1989) and Regan and Weingarten (1986).
13. See for this issue the article from Clarke (1988).
14. For an interesting theoretical discussion of this phenomena and the connected social processes, see Spitzer (1987).
15. See also the striking list of 'technofallacies' discussed by Marx (1988b) and Corbett and Marx (1991).
16. Is it a surprise that — according to a statement the chief of police of Edmonton, Canada gave during the Paris 1992 conference — the authorities introduced the policy of refusing to respond to an alarm for a period of time if there had been more than three false alarms within six weeks?
17. One simple example is the use of speed radar and anti-radar gadgets.
18. This is at least true for Germany, Canada and the US.
19. The German sociologist Popitz (1968) discussed the problem of knowing too much and he wondered if there was a wise and functionally necessary kind of prevention by 'not-knowing'.

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