Social science research on informatization in public administration: the German experience

Stefan Kuhlmann

Informatization in public administration

Despite a lack of exact data and increasing problems in gathering them we know that public administrations make great use of modern information technology and that the number of applications is increasing steadily. The use of technology is no longer restricted to the automation of administrative data files, i.e. the storage and processing of mass data.

Nowadays the daily office work (i.e. communicating, information processing, filing etc.) is technically supported; local data systems are integrated into larger information systems; and interagency networks are growing.

The most recent development is the use of expert systems technology to support complex administrative decision-making.

As a consequence, the modernization of public administration is no longer primarily a question of the efficient allocation of classical bureaucratic means. Today nearly all administrative activities are also somehow concerned with the logic of computer science. That is why we call this ongoing change the *informatization* of public administration.

Experts agree that increasing informatization in the public sector influences both the societal functions and services of the administration, and that working conditions within administrative organizations will be altered. A vast field for social science studies has been created here.

However, on examination of the experts' discussions on informatization in various countries it will be noticed that not

Dr Stefan Kuhlmann has been a member of the Fraunhofer Institute for Systems and Innovation Research, Karlsruhe, Federal Republic of Germany, since 1988. Previously he was a member of the Forschungsgruppe Verwaltungsautomation, GhK-University, Kassel. This contribution was realized due to a research project granted by the Stiftung Volkswagenwerk. CDU: 681.3(43).

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everywhere is attention paid to the same issues. There are different perceptions of the opportunities and threats posed by the technically based modernization of administration. The contributions to this issue are proof of this.

Therefore, before reporting the German experience in more detail I will stress its four striking peculiarities. They can be described as follows.

In comparison with other countries the regulation of *privacy protection* can be regarded as satisfactory. There has been an early and broad debate on the possible risks arising from 'big brother'.

Nowhere, with the exception of some Scandinavian countries, has so much attention been paid to the technology-induced changes of the *working conditions* of the public employees as in Germany.

The chances of modernizing public administration by means of the reorganization or even restructuring, which may evolve from informatization processes based on a conscious use of *information management* are considered, in Germany, far less promising than in other countries.

The use of *expert systems technology* in public administration is, in Germany, less developed than in other countries.

The perception of informatization by the German social sciences

Social and administrative scientists did not show much interest in the processes of informatization for a long time — referring to the representatives of the classical disciplines of social science at West German universities such as: sociologists, political and legal scientists, economists and psychologists. It was only recently that a greater number of these social scientists started to discover such research topics as 'information technology/society/polity' (in political sciences: Hartwich, 1986). Presumably the broad public discussion about the advantages and risks of modern technology, which is very popular in the FRG, contributed to their new attempt. This discussion is also a reaction to the high rate of technology use in the public sector as hardware and software became increasingly more efficient and cheaper. Promoters of 'modernization policies', by putting the public sector under pressure in order to attain additional information technology use, also stimulated — in an exemplary way of course — the relevant market even more. In order to appease critical public discussions

(e.g. by the unions or public) and to 'humanize modernization policies' (i.e. as a result of political pressure) several public authorities (federal government, state governments) have initiated special social science research programmes. These programmes and the grants connected thereto have finally attracted a number of social scientists from universities who usually research and teach in a more secluded field. Meanwhile it is *en vogue* at university to be preoccupied with information technology and its 'revolutionary' impacts — which are subject to a remarkable variety of different considerations. So far, however, scientific research originating from this context reflects but little knowledge of the very crucial details of practical use and the various possibilities to design information technology. This applies especially to the use of information technology in the public sector.

Nevertheless, for more than fifteen years there have also been social science research projects on informatization carried out by the more practically orientated institutes (outside the university or groups of researchers just associated with universities). Currently these institutes obtain the bulk of their research budget from the public programmes already mentioned. They developed their approaches and methods during the 1970s when adopting the Technology Assessment Debate from the USA (von Thienen, 1983), and the research projects on social impacts of information technologies (Kling, 1980; Langenheder et al., 1982).

Among these researchers there are only a few experts who have dealt explicitly with public administration, developing approaches and methods suitable for understanding the consequences that informatization has for the special functions and working methods in the public administration of democratically constituted states. The small group of scientists and institutes following such approaches and methods has not grown essentially during the past few years (a survey is given in Reinermann et al., 1988).

Since the mid-1970s the 'Forschungsgruppe Verwaltungsautomation' (research group on automation in public administration) has belonged to the circle of these institutes. Taking its research works as examples I would like to sketch — from my point of view — some of the most important issues of social science research on informatization in German public administration.

Information technology use in public administration

The use of modern information technology in the public sector of

the FRG began at the end of the 1950s. We can broadly divide the development since then into two stages:

1. The first occurred in the first two decades and is characterized by the mastering of repetitive mass work by automation and the introduction of large central electronic data-processing (EDP) centres;
2. The second stage began at the end of the 1970s. Its characteristics are the technical support of more demanding administrative work and the decentralized use of smaller but more efficient units (which can be integrated into networks).

In the late 1950s the first designers of EDP systems in the public sector of the FRG (the 'pioneers') found computer systems on the market that had originally been provided for the handling of scientific-technical calculations. Consequently, EDP was *first applied* to such administrative procedures, where masses of equal calculation processes had to be continually repeated (Brinckmann, 1983). The EDP systems were large and needed specially secured rooms. Provision, maintenance and operation of these systems was expensive. Therefore the use of technology was only acceptable if it followed the 'economies of scale': the largest possible quantity of data had to be processed as quickly as possible in the largest possible computers. To achieve this, all EDP-relevant steps had to be displaced locally and temporally from the administrative work process in order to be transferred and concentrated in large EDP centres. No doubt there soon were smaller computer systems at hand — the 'Mittlere Datentechnik' (middle-scale data technology) — that would have allowed the data-processing to be less centralized and locally and temporally closer to the department in charge. However — and municipal administrations may serve as an example here — the large EDP centres had already established themselves, on an organizational level, as mainly independent institutions with specialized knowledge. Their survival was also secured by special legislation and subventions because the government recognized an instrument of control in central data-processing. Therefore any further development was strongly determined by experts and the technical equipment of the EDP centres. They offered their clients, the municipal administrations, an increasing number of EDP procedures. As they were designed to meet the varying demands of different users simultaneously,

they often tended to be highly complex, neglecting the interests of the smaller users.

The effects of this centralistic concept have dominated the scene so far, but it has inherently contained considerable technical and organizational problems from the beginning. As the number of administrative procedures and external users involved increased, so did the problem of fast and smooth input and transfer of data from their place of generation to the EDP centre and back.

The 1970s are therefore characterized by enlargement and improvement of data input and transfer: users were provided with on-line connections to the EDP centres by terminals; computers were installed on the spot which could either be used independently or in connection with big central computers. The combination of qualified specialists and information technology systems in comprehensive central EDP centres lost significance compared with technical and organizational solutions operating in and for small administrative units. Today the centres are more in charge of development and consulting duties (an international comparison of the centralization/decentralization tendencies is provided by Mayntz, 1986). Herewith the *second stage* of informatization in public administration has begun, the informatization of administrative work places — at present the 'state of the art' in information technology use in the public sector of the FRG.

It is still open as to where the latest offers of information technology will lead: microcomputers, local area networks, integrated services digital networks (ISDN), office automation, or new storage techniques. Personal computers are very popular as they are easy to handle and can be employed without large investments. EDP experts, however, follow their use suspiciously and warn against 'uncontrolled spread'. Meanwhile there is also a series of pilot projects about the use of new networks and office automation systems. These systems, however, have so far hardly played a role in the everyday business routine. The political leadership of some federal states and towns are trying to develop and realize comprehensive concepts for the future use of these latest information techniques. Whether they will be successful is not known.

If asked for the reasons and intentions of planners and organizers of technology use, the answers for the first stage of technology application are easier to give than for the second: in the 1960s the urge to rationalize administrative procedures

dominated; not only to cut costs but also to overcome a significant lack of qualified manpower. In the 1970s explicitly pronounced social and political reform targets were added. This was the time of general social-democratic reform policies in the FRG.

For the second, still continuing period of informatization in the public sector, the predominant reasons and intentions of the actors in charge are not clear; presumably the interests involved in the process of informatization have become too manifold and contradictory. The process is mainly geared by the interaction of subdominant interests competing with each other, and is hardly calculable: among those interests are 'modernization policies', emancipation interests of single administrative units towards the EDP centres, competition mainly within the middle management level, but also against lower and higher levels of the administrative system, the organized (by unions) interests of the employees conflicting with efficiency-orientated plans of the management and many more.

The main issues of social science research projects in this field

If it is true that today the situation of the different interests is difficult to survey, the future development of informatization in public administration cannot definitely be determined. The opportunities to take the interests of citizens and employees into consideration are better than in the past. Social science research projects can contribute by finding out under which conditions the implementation of socio-technical systems can be described as 'socially and politically assessed'. In my view such assessment in terms of system-design can be summarized under four guidelines, which can also be described as the main issues of social science research:

1. The informatization of administrative actions is destined *to improve the fulfilment of their legally determined tasks and duties and to improve the quality of their services for the citizens*. Important criteria for the improvement of the services do not simply refer to measurable quantities like speed and volume, but also to qualitative aspects like transparency of the decision procedure and maintenance of the citizen's legal protection. Under which circumstances does information technology support or impair these improvements?

2. The informatization of the work place in the public sector *should not reduce the number of work places if possible and should improve the working conditions of the employees.* Today in the FRG the public sector does not suffer from a lack of manpower, but the entire labour market suffers from a lack of work places. Under these circumstances the public administration also bears the social responsibility to secure work places. Today's technology allows us to enrich and differentiate the working contents and to strengthen the self-responsibility of employees. Under which conditions does informatization support or impair these targets of work policy?

3. The informatization of public administrations should *improve the capacity to cope with problems in democratic political-administrative systems.* The informatization can be understood as a political process influenced by competing interests (Grimmer, 1986). Concentrations of power based on advantages of information can either be stabilized, transferred or removed. Bureaucratic patterns of information perception and decision-making can be either hardened or mollified. Political-administrative structures can become petrified or more flexible. Are there different strategies for informatization and what do their respective consequences look like?

4. *The informatization of public administrations should proceed openly. The administrative management should jointly design in agreement with the employees and, if possible, also include clients.* What kind of macro- and micro-political conditions, and what kind of qualifications do the participative planning, development and implementation of information technology systems demand and how can they be realized?

These issues mark the fundamental questions to which the Forschungsgruppe Verwaltungsautomation has dedicated more than a dozen interdisciplinary empirical projects since 1975. These projects were and continue to be conducted in different branches of the public sector (municipal administration, tax administration, pension insurance, health insurance, labour administration, administrations of the federal states). This means that there was an opportunity to investigate a great number of applications of information technology from simple office technology to batch-processing in large EDP systems up to the use of microcomputers and integrated office automation systems.

The main outcomes of the research projects

I will briefly sketch some of the most important results of this research work regarding these four issues:

An improvement in both the fulfilment of legally stipulated administrative duties, and the quality of public services for the citizens took place during the first period of informatization in public administration in particular with respect to the quantity of services (Kuhlmann, 1986): administrative procedures (or parts of them) could be accelerated, thus, for example, unemployment, pay or pensions were paid sooner or fines collected more quickly. A considerably increased number of administrative procedures could be handled without a large increase in the number of employees; for example the right to belong to a legal pension fund was widened in the early 1970s by law thus raising the number of members. Another example is the EDP-supported procedure for the allocation of (nearly) all study-permissions for West German universities which were also realized at that time. Such successes were achieved where administrative duties had already been formalized and standardized to a great extent or where they could be formalized quickly (without considerable resistance). The adequate treatment of the individual case, however, was often neglected. The citizen, whose concern deviated from standard profiles, had to struggle harder to obtain his rights than before informatization. Occasionally he faced bigger problems because the concentration of important parts of the administrative procedure in distant EDP centres rendered the process cumbersome (Grimmer et al., 1986).

The conclusion for the current process of informatization is as follows. The more flexible the information technology that can be applied, the more intelligent and precise the software that is adapted to the respective administrative duty, the more officials can handle 'their' cases in a self-responsible way, the better the chances are that the informatization of administrative duties will achieve good results not only regarding quantity but also quality. The latest information technology is in this context — at least — no hindrance and can even become a productive resource, if applied adequately (but it does not stand *eo ipso* as a guarantee for improvements).

Within the course of its first stage informatization did not cause a reduction in the number of *work places* in the public sector; however, it brought shifts within the structure of work places, and

it partly caused problematic *working conditions*. Despite the abolition of old functions the number of work places remained constant or even grew because on the one hand a number of new functions were assigned to public administration, and on the other hand the manual input of data was still necessary (by data typists). As the centralization of data resulted in the splitting of what had originally been continuous work processes, the continuity of content and context of work was interrupted. This made work more abstract for the employee and consequently more strenuous. Employees working at terminals in addition suffered from a lot of ergonomic insufficiencies.

The current process of informatization tends to reintegrate work processes (this is true especially of office automation systems). This provides more attractive working conditions for self-responsible employees and much repetitive work will be abolished (e.g. that of data typists). The ergonomic problems of the hardware have, in the main part, been solved. There are, however — especially in public administration — still many unsolved design and ergonomic problems with the software; the plan to model less standardized administrative duties in software systems so that the regulations can be realized simultaneously with self-responsible decisions with regard to the individual case is very difficult and demands much skill (Grimmer, 1988).

There is no doubt that informatization has, up to now, altered the *capacity for handling problems in the political-administrative system of the FRG*. The most important effect is, in my opinion, the political-administrative regulation of a great number of social problem situations; the administrative organization of financial allocations to old people, unemployed people and in cases of illness would be impossible without EDP in the given differentiated way — the social reality and social conflicts would be much harsher. On the other hand the comprehensive information technology infrastructures that have developed since the 1960s especially in national social security administration systems have reached such a complexity that radical reforms of the social security system as a whole, given a willing majority, would presumably fail because of the persistence of these infrastructures. Large information technology systems are able to shift the internal power structures of an institution but stabilize them afterwards against its environment (Brinckmann and Kuhlmann, 1989).

This is possibly true for the massive informatization of the West

German police apparatus. Regarding the political resistance that it provokes (recently due to a census although there was no direct connection with the police apparatus), it might prove to be counter-productive in the medium-term.

Employees and clients were not asked to *participate in the design and implementation of information technology* during the first stage of informatization in public administration. Nowadays participative system-designing is often demanded, occasionally even by the EDP and administrative management. It is, however, not yet common. Beyond that, experience and suitable instruments are lacking. However, there have recently been various projects where participation models were tested (Brinckmann, 1987).

Further research requirements

Does information technology matter? Not only for the social science research already mentioned but also for the 'modernization policies' this seems to be self-evident! However, disregarding positive and negative mystifications of informatization, to assign a priori consequences of historical significance to information technology (Kuhlmann, 1985), we have to ask to what extent and what kind of quality technology actually 'generates effects'. For a couple of 'effects' the use of information technology is no doubt a necessary condition. This is true for the acceleration of administrative production and for the handling of repetitive duties. But is technology use a sufficient condition for attaining these purposes? What role do other organizational factors play? What role can public administrations play as institutions? Theoretical work has to be done here. It can continue the recently started discussions in organization theory (March and Olsen, 1984), which have to be followed regarding informatization in public administration.

Organization research has to show why certain information technology configurations in the public sector will succeed and others will not. There are always alternatives to all technical solutions up to non-technical solutions. What kind of interests of all the possible deciding actors are being satisfied with the choice of certain technical configurations and which remain unsatisfied (Schumacher-Wolf, 1988)? Finally, the question arises as to whether the process of informatization or, in general, the societal and political-administrative process of innovation (where the increasing use of information technology belongs) can be open and

rationally controllable or whether it can only be corrected in some marginal details.

How to achieve socially assessed information technology use in public administration? If we want to support the development of 'socially assessed' technology use in the public sector we need answers to questions for the genuine effects of technical systems on the one hand, and, on the other hand, their relationship to other, social, organizational innovations. Only then can we clarify whether the discussions about the necessity of 'socially assessed' and participative technology design are more than a marketing strategy and guarantee acceptance. In practical terms important tasks result therefrom for *qualification research*; it has to clarify who needs which knowledge to actively intervene in the process of informatization. Mere technical knowledge is certainly insufficient — but probably it is not the most important.

Finally *application research* will have to find out *the limits for informatization in the public sector*; indeed the latest information technology is very flexible and adaptable, but it is nevertheless not always and not fundamentally compatible with all the delicacies of the interaction between regulations and administrative actions! How deeply can and should information technology systems be integrated into public administration (see the recent discussion on the use of expert systems in public administration; Snellen et al., 1989)? Is a really automated public administration in terms of democracy theory and democratic politics desirable? Even if it were, it would remain elusive.

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