Challenges and Perspectives for Information Systems in Public Administration

Paper by Heinrich Reinermann, Speyer, for the Third Annual Conference of NISPAcee at Bled, Slovenia, March 22-25, 1995

1. Introduction

I cannot exclude that this paper resembles a list of wishes for Santa Claus or the song of the British popgroup Queen in the eighties "We want it all, we want it now", and surely the philosopher Nietzsche was right when he said: "To make plans brings a lot of nice feelings".

In any case, one of the functions of applied informatics like administrative informatics, is to be the "spearhead" of computer science because it knows its field of application and therefore is able to draw conclusions with regard to the future requirements of computer-supported information systems (IS).

What will public administration (PA) look like in the forthcoming decade? This question must be answered before such conclusions can be drawn with respect to administrative IS.

It is the assumption of this paper that PA, in the forthcoming decade, will function more and more according to principles of New Public Management (NPM).

You might argue whether this is going to happen or whether this is desirable in the first place. But: it is the premise of this paper.

2. Features of NPM

PA, being faced with greate challenges like the new international division of labor, the apparent limitations to further growth of public budgets, the changing value systems of citizens and employees, or the dynamics and complexity of public tasks, is answering with a new self-understanding and with new concepts and structures. The features of NPM can be divided into five groups:

a) Each part of PA concentrates on its specific mission. To strenghten this view, public agencies are further divided into easy-to-overlook segments, concentrating on core products. In order to allow flexible responses to changing demands of their environments, these segments are entrusted with as many competences as possible for their products and for their resources alike. Thus, tayloristic division of labor between planning and deciding on one hand and acting on the other, is replaced by object-oriented and holistic structures wherever possible.

b) Conventional vertical hierarchies of command are almost turned upside down in favour of horizontal and direct communication. Wherever suitable, competence for decisions is delegated to those persons who contribute directly to the value stream of administrative processes. Thus, the autonomous segments form a cooperative network. Empowering the basis this way, more intrapreneurship by employees, the liberation of their motivation and the release of their innovative ideas is expected. A high emphasis is put on the horizontal dimension of administrative processes and workflow.

c) In spite of segmentation and delegation, NPM strives for coherence and for goal and result-orientation by decisive leadership based on visions and guidelines, on contract management, and on goal and result-oriented communication.

d) Another special focus of NPM is on the relations between the segments described before and their external or internal clients. The view of external and internal markets and of administrative marketing is maintained.

e) With regard to the civil service, NPM strives for ambitious work environments, and for adequate responses to changed values and work habits.

This must suffice here to describe NPM in a nutshell. Perhaps it is no exaggeration to claim that just like PA, also administrative informatics is facing

a change of paradigm. As applied informatics is supporting the trend to NPM, itself probably will be changed under the influence of NPM. Let us look into this by analyzing these 5 features of NPM from an administrative informatics point of view.

3. Object-oriented Segmentation

a) Uncoupling Information Systems

The new object-oriented structure of PA must be paralleled by an according structure of IS in terms of software, data and hardware. Otherwise, concentration on core products, flexibility and intrapreneurial engagement by employees would be prevented. Former tayloristic barriers in EDP must be overcome. Taylorism is among the important reasons for the computer-productivity paradox. Business Process Redesign, instead of merely automating the status quo, only has a chance if the new autonomy of PA segments extends to their IS as well. The delegation of competences for resources, basically must also cover decision-making for all aspects of IS.

Only then can we expect "lean computer applications", meaning software that fits the specific needs of a segment and avoids ballast and unnecessary ornaments. We should realize that diversity and variety of IS in PA will grow because of segmentation and participation, and informatics as well as administrative politics should accept this now as being the normality. In the past we have often adjusted local ways of work to the needs of EDP. This is, in most cases, no longer necessary.

In other words: IS in PA should be uncoupled from dragging milstones of big central systems; technological and organizational changes should have a chance for immediate realization by the segments concerned, but should only affect others if indispensable. Distributed application systems are wanted, consisting of self-contained parts which communicate via message exchange where necessary. Networked decentralization of IS is the vision corresponding with NPM. What NPM recommends to PA, also applies for its IS, namely: Regulations should be restricted to the essentials; dinosaur systems are ineffective and inefficient.

b) Reinventing Information Systems

A complete redesign of given application systems may be far more necessary than to sustain and repair the old ones. Just as NPM recommends to "reinvent government", we should ask ourselves how we would design the IS of PA today if we had the chance to start from scratch. In doing so, two basic forms of computer-use can be distinguished:

- Computers as machines for processing data (understood in a broad sense, covering written, audible and graphical data)

- and computers as means to provide channels for electronic communication.

Looking only at data processing here (the communication aspect shall be dealt with in the next paragraph), the architecture of IS should follow the product-orientation recommended by NPM. Agencies applying the principles of NPM, carefully define products and services which the various segments are providing to external or internal clients. Examples of such client relations are

- to collect a yearly tax from a car-owner
- to notify a voter before an election
- or to report to management or to controlling.

A corresponding IS architecture would

- provide a datastructure which reflects those relations to exernal and internal clients (e.g. person A owning car B has to pay a yearly tax at the rate of C; person D receives a monthly social subsidy at the rate of E, etc.)

- provide software methods which process those data (e.g. send a tax bill, notify other relevant agencies, calculate certain figures for controlling, etc.)

- and do so on the occasion of certain events (e.g. calendar dates, a citizen appearing in the office, receiving a message from other processes, etc.).

The term "objects" for the combination of data and their pertinent methods hints to the correspondence of such an IS architecture and the object-oriented segmentation of PA called for by NPM.

Such an IS environment would overcome the division of labor between different software and hardware pieces depicting the hierarchy of agencies, (we all know that quite often this *is* the case*)* and would provide integrated administrative processes from their origins to their ends.

It is a different question how this logical IS-architecture should be represented physically. The answer depends on criteria, such as dependency on others, costs, etc. One alternative certainly are client/server systems allowing the electronic exchange of messages, requests and results between objects even from distant places.

In fact, the concepts of NPM and of client/server systems are corresponding very nicely. NPM calls for structuring PA after the mathematical idea of fractals. Fractals are units characterized by selfcontrol, selforganization, and selfsimilarity. They are connected via tasks and results. This calls for concentration on core activities and for division of labor, similar to market economy. In accordance with this concept, a client/server architecture allows a public agency or a subunit to become autonomous in all IT-aspects considered to be indispensable, and to import the rest via networks.

c) Closing Gaps in Existing Application Systems

Empowering the segments of PA with respect to their IS will lead to closing gaps which exist in today's application systems. Of the two basic types of computer-use mentioned afore (data processing machine and communication enabler), the first one still is dominating by far, and here again mass applications based on well-structured data banks and more or less remaining in the background (like financial accounting, personnel administration, or citizen registration) still are characterizing EDP in PA.

Recently, document-oriented office systems including image processing are catching up, however. This means that now the foreground, the core activities of PA, like application processing, can be and must be better supported electronically. Especially important here is to integrate old and new applications under the same and graphical user-surface.

Still another area waiting to be integrated, are less-structured communication processes, now supportable by various forms of groupware.

It is important to take notice of the new fact that for PA being penetrated by IS to a growing degree, quality of administration and quality of IT systems more and more are becoming interdependent.

d) De-Bureaucratization of EDP Structures

To make this vision of object-oriented and self-contained segments come true, in many cases requires to overcome given EDP structures. Often, these are coined by tayloristic specialization and centralization in the form of cooperative computer centers. Meant to share costs and expertise, such structures were adequate when computers were expensive and computer experts rare.

However, what started as a suitable innovation, over time often turned into bureaucratic barriers. For, decision structures relying on many user-agencies to agree, resemble large convoys with the slowest vessel determining progress; and, inasmuch as the cooperatives are financed by fix apportionments of costs, they are not really forced to respond to market needs.

Often enough, this resulted in application systems as inflexible as concrete walls, and in computer centers which are too slow, too expensive, and too irresponsive regarding individual user-expectations.

In order to correspond with NPM those structures should be changed in two respects: We need market-dependent public or private service providing companies which are forced by competition to supply their customers with tailored IS. Those companies must serve many customers, however, in order to share the necessary investments; this way both, individual fit and economy can be reached. To make this happen, reference models must be developed for the various public activities. On the basis of those, modular software applications must be produced which can be customized to local needs.

4. Processes in New Public Administration

a) Free Communication and Knowledge Sharing

The role of IT more and more becomes to enable coordination and cooperation, beyond merely being a tool for the rationalization of work. To this extent, the attention shifts from the contents of databases to communication processes.

This shift of concentration corresponds with NPM. While in the classic paradigm of PA communication was formally restricted to official channels, NPM advocates free communication regardless of hierarchies. One reason is that the quality of a public agency highly depends on the knowledge of its employees. While anyone is free to buy ressources on the market, the special way in which these are combined and utilized is a function of knowledge, and this is highly unique for each individual institution. Therefore, in NPM a lot of attention is directed to communication processes as a way of information sharing and enhancing "organizational intelligence".

Both, formal and informal communication are at heart of NPM:

- informal communication, often neglected hitherto, is an important source of context information. Everyone should be able to know what anyone knows, in order to enhance coordination. And everyone should have the chance to approach those persons directly who can provide answers to a question instead of having to follow the paths of hierarchy.

- formal communication should be mission- and goal-oriented and holistic instead of being divided in accordance with tayloristic division of labor, with errors being detected and repaired only at the very end and again by tayloristic subdivisions.

In terms of IS this means that traditional EDP following hierarchical structures, needs to be supplemented by networks that enable free formal and informal communication. Multimedia systems are important here, allowing desk-top video conferencing and other electronic support for group decisions, intelligent e-mail, problem-oriented communication via list servers, and direct access to all relevant data. Often, data bases will have to be complemented, mainly by mission- and goal-oriented data.

By the way, it has been said that the introduction of the telephone has shaken up even the hierarchy of the Vatican. Having electronic multimedia networks today, it certainly cannot be ruled out that hierarchies partly even will be destroyed because useless layers will be eliminated.

b) Electronic Data Exchange (EDI)

For the benefit of the correctness of data circulating in PA, updating and replication of data must occur prompt, faultless, and as much as possible without human interference. This would also promote the concept of custodians in charge of the correctness of certain data (e.g. citizen data, vehicle data, geographical data, etc.).

Similar to bus systems inside computers, data which have been changed should travel instantaneously and automatically to all target data bases qualified to receiving them. Thus, the data of a car registered, would go without delay to the national vehicle agency, police, insurance company, licence plate shop, revenue office, etc. Or another example: Regulations, released or amended by the department of finance, would instantly be available in any local revenue office, e.g. for the respective consultation of tax payers.

The apparent prerequisite is an electronic network extending beyond public agencies to their clients, and integrating mainframes, workstations, and PCs. To mesh the IS of public agencies and those of their clients seems to have a high potential for raising public efficiency and effectiveness.

c) Software for Workflow and Workgroup Computing

A PA consisting of autonomous segments, needs explicit measures to guaranty coherence. Among them are workflow and workgroup software.

Workflow computing intends to integrate as many administrative processes as possible which are necessary to produce a certain service or product, irrespective of functional boundaries. An example would be a procurement process, integrating purchasing - goods receiving - accounting - and payment.

Workflow computing secures that all parts of a work process are carried out by the persons in charge and on the basis of the same and actual data. Workflow

software should include tools for performance evaluation, simulation of alternatives, process accounting, management information, reporting, and training. Although the intention of workflow computing is to centralize all relevant processes logically, the execution, of course, must be possible in a network of distributed local computers.

Workgroup computing software must provide coherence by supporting communication in ill-structured work environments like project teams.

Both, workflow and workgroup computing, also must be able to integrate internal as well as external participants.

d) Technical and Legal Problems of Warranty and Security

Quality of administration and quality of IS more and more are becoming interdependent, as we said before. This statement also refers to the risks of technology. "Technology risk is now business risk". One should not ignore the fact that the upcoming IS of PA will be as complex as they will be indispensable for core administrative processes. Therefore, resolving the problems of availability, warranty, and security must receive high priority. After all, we are dealing with public institutions here which must expect to be held responsible by politicians, courts, auditors, and others.

5. Coherence and Leadership

NPM fosters the uncoupling of conglomerates in order to improve local fit, flexibility, and employee morale. On the other hand, the overview and the influence of political and administrative management must be maintained. For this purpose, quite often data bases for product information, program budgeting, cost accounting, or controlling still have to be established.

Technically, IS are required which are able to provide management reports and analyses in spite of the fact that in decentralized PA very likely the boundaries of heteregeneous IT systems must be overcome and in spite of the fact that quite a few data files even may be invisible or unknown.

Moreover, IS for management not only must provide aggregated data; detailed information is important also in PA, and here IS must not undermine meaningful communication habits. Details can be important for politicians and managers because often they are held responsible for them regardless of delegation.

Details can be important also because by aggregation, negative developments may be set-off against positive developments. And quite often details can be important because means and ends are interrelated.

In this respect, in addition to well-known MIS concepts like EIS, DSS, or controlling, in the future other concepts are important like the information warehouse, providing data access in heterogeneous environments, or computer-supported auditing, exception reporting, intelligent agents and brokers able to find hidden files, etc. In a way, IS for management are needed which resemble the stethoscope of a medical doctor.

6. Clients

The tayloristic division of labor, hitherto typical for PA, turnes out to have severe disadvantages from the citizen's point of view. One of them is that PA seldom deals with human beeings as a whole but rather with certain segments, corresponding to certain jurisdictions performed by respective departments or agencies.

Not every citizen is able to manage this complex system, as intended; some fall through the administrative net (compare the so-called two-thirds society). Others again may take advantage of the complexity of PA for fraud (e.g. collect financial subsidies from several cities).

Given this situation, it becomes very important to utilize the potential of electronic networking to the benefit of the citizens in that they are treated by government and administration holistically as entire persons. Networks should be used to realize the "virtual administration", an administration that is - like a virtual computer - logically, although not physically, available to citizens in all relevant aspects of their case. There are several aspects to this vision:

- an administration actively and ex-officio calling a citizen's attention to services available, especially when borderlines of jurisdictions have to be crossed (e.g. a citizen with a low pension paid by social insurance, might qualify for social welfare which is administrated by the city, however)

- agencies drawing upon data which exist already somewhere in the administrative system, instead of requesting them anew

- citizen offices, clearing a broad range of general administrative business of a client on the spot, and providing for access to special administrative branches. The citizen office should at least be able to consult its clients with regard to those other agencies which must be contacted; preferably it should be able to initiate online and multimedia communication between a citizen and the civil servants concerned.

7. Civil Service

With respect to the civil service, IS must, among others, support the new flexibility of labor, manifesting itself in several forms of telework like

- telecommuting ("to bring the work to the people instead of the people to the work")
- telecooperation (e.g. in the future "distributed capital Berlin-Bonn")
- telepresence of experts
- or mobile offices.

The problem to solve here, again is uncoupling and coherence of work at the same time, through electronic networks.

8. Concluding Remarks

In this lecture, I was able to look only into some of the relations between NPM and administrative informatics. It seems to be important to realize that the basic ideas of NPM and the client/server-architecture of IS go hand in hand. This requires to combine the efforts to reorganize PA and the efforts to establish IS! Big opportunities for strengthening the effectiveness and efficiency of PA would be missed if one tried to develop PA and its IS *independent* of each other.