

Impacts of New Technologies on Public Administration

- Some Deficits of ICT-Applications in Public Administration Today: Challenges for Curricula in Administrative Informatics -

by

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(in: Information and Communication Technology as a Driving Force of Change in Public Administration, Proceedings from the Third Summer Workshop held in Prague, September 8-13, 1996, Mirko Vintar and Heinrich Reinermann (eds.), NISPAcee, Bratislava (Slovakia) 1997, pp.26-36.)

Whereas Professor Mirko Vintar started his deliberations from the future (the "information society": what kind of ICT-providers and ICT-users do we need?), I would like to start from the presence: what kinds of information systems have we got in public administration (PA) today? To which extent are we satisfied with them? Is there something that needs to be changed? And what implications for curricula in administrative informatics (AI) can be derived from that?

1. Administrative Informatics - a Necessary Interface

My point of view will be administrative informatics. By AI I mean the interface between informatics and public administration; by informatics I mean a set of knowledge necessary for developing and providing hardware (computers, peripheral devices), networks, software (systems and application software), and data; by PA I mean parliaments, governments, departments, agencies, public utilities, both on state and local levels, as well as courts, in other words: PA is used in the broad sense of public sector, in the following.

Of course, interfaces are very important in informatics, and so is AI as an interface dealing with two questions:

- How does informatics influence PA?
- How do the requirements of PA influence informatics?

To deal with AI as an interface of this kind seems to be quite necessary. This becomes obvious when you take a closer look at ICT systems in PA. Often they are not in a good shape! In many countries quite a gap between ICT potential and ICT reality in PA can be found. Some call this gap an "EDP legacy". In the following I would like to list some examples for this phenomenon.

2. Some Deficits of ICT Systems in PA

- a) Application systems often resemble "islands". They lack horizontal integration and links to the clients of PA (e.g. other agencies, business companies, citizens). Instead, ICT systems follow the hierarchical structure of PA: a system for budgeting here, a system for citizen administration there, another one for social administration and so on.
- b) Traditionally, ICT systems were built on proprietary hardware and software from different vendors and suppliers and as a consequence, incompatibility quite often is the case.
- c) Implementation periods for software packages can be astonishingly long. In one case, in one of the 16 states of my country, it took not less than 20 years before an application system was installed in the last of 43 identical agencies - needless to mention that, by then, the system was outdated in terms of its hardware and software features.
- d) Even in 1996, the proportion of workplaces which are actually equipped with ICT, can be quite low - in some of our states e.g. 20 percent only. Of course, this causes some problems for electronic communication alone.
- e) There are many complaints about the "productivity paradox of EDP", meaning that actual productivity gains do not live up to expectations or promises. And one should be aware of the fact that a 20 percent productivity increase alone is necessary just to break even with the additional ICT costs (assumptions: on the average 60.000 US Dollars salary and 12.000 US Dollars ICT costs per year at a workplace).
- f) One of the reasons for a lacking net productivity gain by investments into ICT, is a 1:1 transfer of traditional administrative procedures to the computer. Often, ICT experts tend "to look over the shoulders" of administrators and to replicate their work on machines, more or less. Thus, the potential of ICT as an "enabling technology" is not utilized, of course.
- g) In the past, computer centers have provided identical application systems for dozens or even hundreds of public agencies within their jurisdiction. Therefore, individuality and locality of applications is often neglected. Here, reference models could provide a better approach; they are able to take care of, let us say 80 percent of a respective administrative procedure, e.g. vehicle registration, whereas 20 percent or so can be tailored to local and individual needs and circumstances.
- h) On the other hand, public agencies quite often "reinvent the wheel" although the administrative procedure to be supported might not be much different from others. E.g. although individuality is necessary to a certain extent, vehicle registration procedures will be more or less the same all over the country which again points to the benefit of reference models.
- i) Because of the complexity and incompatibility of many ICT-systems, maintenance costs are extremely high. Therefore, the largest part of ICT staff is needed just to maintain existing systems, with little capacity left to develop new applications, leading to the so called "tailback of applications".
- j) Due to the fact that in the beginning of the computer era there was no trained personnel available, of course, a high percentage of today's IT personnel consists of former administrators who have been retrained so that they were able to develop and maintain

software for their sphere of experience. Social administrators became "experts" for ICT systems in social administration, teachers for school software, medical doctors for hospital applications, judges for ICT systems in courts and so on. Today of course, the qualifications necessary are quite different. Small application systems (some call them "dog hut software") are being replaced by big complex networked systems ("highrise complexes" so to speak), and a quite different set of knowledge is needed, especially knowledge of software development tools for software modeling, prototyping, data modeling, process modeling, software testing, controlling of ICT systems and the like.

k) Project management of real EDP projects often is not existent or not as effective as it ought to be. Almost all ICT projects last longer and cost more than expected.

l) There is also an astonishing amount of impatience on the side of the sponsors of ICT projects. As a consequence, quite often there is no time for solid planning of ICT systems. Some call this the "Whyscy-syndrom" - why isn't Sam coding yet?

m) ICT systems to be found in reality not seldom are old fashioned. In other words: networking, workflow technology, data warehouses, to name but a few, are not yet utilized as much as they could be. However, when you take the trends towards an "information society" into account, you would expect PA to be among the pioneer users of new ICT products and services in order to help pave the way towards a national information infrastructure which can then be utilized by the whole population, by enterprises and by citizens.

n) To conclude this list, it shall be mentioned that ICT systems in PA quite often are not well protected against computer crime, hackers, viruses, or destruction. Astonishingly enough, PA sometimes runs large ICT networks without even being aware of the risks involved, and in the wake of this without having a strategy or policy for data security.

o) It does not come as a surprise after all that there seems to be quite a lot of weariness concerning EDP among politicians, agency heads, and users. Until now, EDP often does not live up to their expectations or to the promises made by ICT experts. Overall, the "climate" in the area of AI is not as good as it should be - and as it could be.

3. Consequences for AI Curricula

I think, the existence of such gaps has a lot to do with curriculum development for AI. For, the gaps lead to two main questions, namely:

- Who should be involved in closing those gaps now and in the future, or in other words: who should be the addressees of AI curricula?
- Which knowledge is necessary to avoid such gaps in the future, or in other words: what are the topics to be included in AI curricula?

4. Clients of AI Curricula

At least three large groups of clients of AI curricula should be taken into account:

- The users of future IT systems must become more involved in systems development. In the past ICT experts tended to "look over the shoulders" of future users which is to mean that they

asked the administrators, carefully to explain their work; then, after some time, the ICT experts returned with a solution which they presented on nicely coloured slides which the users didn't understand but to which they were supposed to agree - and normally they did.

- Also, leaders in the public sector (politicians, agency heads, managers) must become more involved in systems development. In the past they tended to leave ICT, as a supposed technical matter, to the experts. Sometimes, leaders even seemed to be kind of proud not to know anything about ICT. However, they are supposed to answer policy questions related to ICT, like "is it worthwhile to invest in ICT?", "where do we want to go, what goals do we want to achieve with ICT systems?", "which harms to society (citizens, civil service, etc.) do we want to avoid?", or "how much ICT training do we need for our staff?"
- Last not least, ICT experts should be addressees of AI curricula. In the past they tended to be satisfied with ICT knowledge in a narrow sense; very often they didn't know much about PA as their clients. In the future, however, they should be better able to communicate with administrators, and this means that both is necessary: to explain, let us say tax administration, to ICT experts as well as to explain IT matters to tax administrators.

ICT experts also need constant qualification with regard to the rapid technical progress in their field.

5. ICT as an "Enabling Technology"

To get these three groups of actors involved in the development of IT systems for PA is especially necessary because ICT, in the last decade, has become an "enabling technology". Two basic phenomena are behind this:

- Whereas ICT, some 40 years ago, started out with "computers" (i.e. machines which were able to do just that - to compute), it has become possible in the meantime to digitize, to store and to manipulate automatically all the three communication media which are important in PA, namely writing, speech, and pictures (both, fixed and moving). This is, of course, what "multimedia" is all about.
- Having electronic networks today, information has lost one characteristic feature dominant in the past: locality, meaning that the content of information used to be tied to a carrier, like paper. Because of locality as a secondary characteristic, it was difficult and time consuming to communicate. With electronic networks, however, information has become ubiquitous; since electrons travel at the speed of light (7.5 times per second around the globe), information put in a computer which is connected to a network, is available anywhere on earth and practically without any loss of time.

As a consequence we are faced with completely new situations, due to this dramatic growth of technological potential: global multimedia access to information, from our own desks; telepresence, telework, and telecooperation; intermeshing of information systems of public agencies and those of their clients; new ways for citizens to access public administration; new ways to inform the population about public affairs; or new ways for citizen participation - to name but a few.

The main message to be derived from this is that it is no longer sufficient to transfer administrative procedures, more or less 1:1 on ICT systems - we can do much better! However: this implies to see ICT as the "enabling technology" mentioned before and to utilize the new ICT potential to do administrative work in ways different from the past.

In the last analysis this means to integrate the strategies of PA and the strategies of its ICT systems! In other words:

- persons in charge of developing strategies for public agencies must take the ICT potential into account
- and people in charge of developing ICT systems must consider these as extensions of the development plans of the respective agencies.

This proves again: professional systems development must involve three groups:

- users
- decision makers
- and IT experts.

6. "Information Society"

To get users, leaders and ICT experts involved in the development of ICT systems for the public sector, is necessary yet for another reason: many societies find themselves in the middle of a paradigmatic transformation from "industrial societies" to "information societies". Since Professor Vintar has elaborated on this notion already, let me just briefly remind you of the dramatic changes in the international division of labour which are going on and which are caused partly by a globalization of economic affairs. This new situation implies opportunities and risks for businesses and employees at traditional locations, unknown so far, and it also implies different ways how we educate and entertain ourselves, how we organize our health care, transportation, or environmental protection systems, and so on.

Here, among others, the state is taken to task as a "development agency": The state must

- organize a social dialogue concerning the directions to be taken
- guarantee the technical infrastructure (which is more than building the so called "information highways")
- further develop the legal framework
- remove obstacles
- create incentives
- and contain risks.

As can easily be seen: PA is deeply involved in all of this, and the knowledge necessary for these new tasks must be reflected by the AI curricula we are discussing here. One consequence seems to be obvious to me: Among other topics, AI curricula must address the

management of ICT systems in three fields - public agencies, ICT units, and politics. Here, all people involved in decision making about information systems in public administration must know the important problems at stake and how to solve them. This Know-how often is neglected in curricula dealing with informatics and therefore lacking in public administrations. I suggest strongly this Know-how to be included in AI curricula and shall conclude my paper by listing some fields of management knowledge necessary to develop information systems in PA.

7. Management in Public Agencies

Public administrators should

- have a vision and a strategy with respect to the development of the respective administrative unit
- integrate those strategies with the plans to further develop the ICT systems in and for those administrative units
- be ready to "reinvent government" which is but a modern phrase for what Joseph A. Schumpeter used to name the "process of creative destruction" of traditional structures on the part of innovative entrepreneurs. Schumpeter described the history of economy as a "history of revolutions" of a technical and organizational kind, as the "process of industrial mutation..., which constantly revolutionizes the economic structure from within, which constantly destroys the old structure and constantly creates a new one".⁽¹⁾ In my view, when we talk about "redesign" or even "reinventing" our organizations today, we are talking about the same context with different words. Indeed, we are always called upon to redefine our role and our possibilities in the context of social and technical change
- decentralize responsibility for resources, and that means here: Not only for finance, for organization, and for personell but also for ICT because this is a prerequisite if one wants to avoid the danger of "software concrete" imposed upon an administrative unit by centralized ICT units and reducing the leeway for innovation
- provide for central frameworks and service at the same time, however, because decentralization is not supposed to create chaos, of course, and because decentralization does not preclude help desks and other kinds of centrally organized support
- consider management of the ICT units within their jurisdiction as part of their overall management efforts. E.g. this could mean budgeting and contract management ("resources for performance!") and competitive tendering, may be outsourcing, with respect to management relations between an administrative unit and the respective ICT units
- qualify themselves in ICT matters in order to be able to communicate efficiently with ICT experts. For, it seems no longer to be tolerable that ICT experts have to use "Kindergarten terms" in order to make themselves understood when communicating with agency heads.

In short: Public managers must give up their lack of interest or even apathy for ICT, and they must take on responsibility for ICT instead. Otherwise the "productivity paradox of ICT" is not going to disappear; we will continue to spend much money on ICT although we should know that "just to throw money at a problem" normally doesn't solve it; rather, in the field of ICT this attitude not seldom has created "ruins of investment".

8. Management in ICT Units

Similarly within ICT units, effective management must be executed. Managers here should

- develop visions and strategies, too, and integrate those into the development strategies of the respective administrative units
- define their clients and products, install cost accounting systems, apply controlling
- be ready also to "reinvent" the existing ICT systems. A striking example is New Public Management, the principles of which are applied by more and more public agencies which implies that proper information systems are available, e.g. data warehouse systems, data mining, executive information systems, cost accounting, product information systems, budgeting, controlling, benchmarking - to name but a few
- be aware of the change of roles which has been imposed on ICT units recently: from computer centers to service providers
- release standards in order to secure an open ICT infrastructure; the Internet technologies have created a new potential in this respect and should be taken into account
- consolidate and modernize the ICT equipment ("rightsizing", client/server systems, workflow systems, graphical user interfaces and many other concepts can be utilized here)
- look for strategic alliances and joint ventures with third parties in order to utilize "economies of scale" (e.g. for software projects, for computer centers)
- develop new services for the administrative units which, in the wake of New Public Management, are given more responsibility for their ICT systems; among those services are
 - procurement, installation, maintenance, and back-up of decentralized systems
 - procurement, verification, and integration of software offered by the market
 - user support, help desks, etc.
 - qualification of users with respect to new application packages and new releases, respectively
- take on the new concepts of data modeling, workflow and process modeling

- develop concepts and strategies for a security management necessary for their clients; there are very sensitive areas and less sensitive areas of public administration in this respect, and for each level of security, appropriate means are available like encryption, firewalls, electronic signature, etc.
- really manage software projects which, again, involves many concepts which must be known and above all, applied e.g. software development methods, user participation, change management, quality management, software testing (not only at the end of a development process, rather as early as possible), organized learning from software mistakes (e.g. what were the procedures that caused a software mistake?), documentation of software quality (because otherwise improvements could not be measured), and many more aspects
- apply modeling software in order to guarantee proper communication between users and ICT experts; analogously to the term WYSIWYG ("what you see is what you get") WYGIWYW is necessary ("what you get is what you wanted")
- apply methods for software adaptation like reengineering, migration, or redevelopment of software
- qualify the ICT experts; several aspects are important, here: adaptation to the extremely fast technological progress and to the changed needs of public agencies (more systems analysts, less programmers); in addition, ICT experts should be trained in public affairs because there is no effective communication with public administrators as long as matters of public administration must explained to ICT experts in "Kindergarten terms", as well.

9. Management in the Sphere of Politics

Last not least, there must be effective management in the sphere of politics, too. Politicians in charge should

- develop visions and strategies for their countries: considering the approaching "information society", where do we want to be in the year 2020?
- liberalize the telecommunications market
- promote societal acceptance
- emphasize education and training, necessary in an "information society"
- guarantee equal opportunity by avoiding a gap between information-rich and information-poor
- prevent the criminal misuse of global communication facilities
- protect intellectual property in a world of ubiquitous information through the further development and enforcement of copyright laws
- protect consumers in economic transactions with virtual businesses

- and last but not least, guarantee a sufficient number of employment opportunities by charting the proper course at the proper time in areas of research, development, economic, employment, and education policies.

10. Conclusion

These are some of the aspects and topics, I would like to see included in the curricula for AI - the theme we are going to discuss in depth during our workshop.

The need for education and training civil servants in the areas mentioned before, seems to be obvious. Someone has to take care of this. Why not us when we teach Administrative Informatics?

Literature

[\(1\)](#) Schumpeter, Joseph A., Capitalism, Socialism, and Democracy, Bern 1986, Chapter 7, pp. 134-142.