1. Effects of ICT on public services - The state of the art

Although billions of Euros have been spent for the development and the deployment of ICT for public services, there is still no comprehensive and valid evidence to which extent and when this investment has paid off.

This has not changed since we call this investment E-Government. However, the E-Government debate has again raised high expectations for the improvement of quality of service as well as cost savings and productivity increases. Government programs have been launched to implement E-Government all over the world. These programs have not yet met their targets and ask for additional funding. But in view of general budget deficits and cuts more and more decision-makers are asking for convincing cost-benefit analyses and proofs for the benefits announced.

But this is not easy at all, as Booz Allan and Hamilton state in their analysis for the British Government:

„There is considerable political pressure in all countries to quantify the benefits of e-government, particularly in terms of efficiency savings. Germany and Italy appear to be the only countries with firm examples of impact thus far. Australia and the UK are alone in attempting to measure impact in a structured way, but are still only defining measures. This continues to be a challenge for governments worldwide."

It is true, that the German Government is trying to quantify costs and benefits. According to a press release of the Minister of the Interior, Otto Schily, at the CeBit on March 12th 2003, the Federal German Government will be investing 1.45 billion Euro for putting 400 services online by 2006. They expect annual savings of 400 million Euro from 2006 on [http://www.heise.de/newsticker/data/anw-12.03.03-012].

Available studies present compilations of individual cases with estimated cost savings or productivity increases. But most of the figures are more or less rough estimates and not proven. And most of these cases cannot be generalized, because the processes and the conditions of each case are not specified and vary a lot within and between countries.
The Booz Allan Hamilton study for the British Government and another one for the German Bertelsmann Foundation present among others the following cases (BAH, 2002; Bertelsmann-Stiftung 2002)

* Germany: BAFöG online (online re-payment of student loans): savings of 4.5 mn Euro p.a. compared to paper based re-payment
* Germany: Arbeitsamt online (online job search für placement service): 520,000 matches each year without personell
* France: SESAM-Vitale (online refunding of health services): patients get refunded within 5 days instead of several weeks (paper based)
* Italy: Consip (e-Procurement): savings between 31 to 35% (in pilots) compared to traditional procurement
* Canada: Efile (online-tax): savings of 60 employees per 1 million users.

Most of these services are provided centralized on the national level, i.e. for millions of potential users. But many citizien-related services, at least in some countries such as Germany, are provided by local governments which have a high degree of autonomy by constitution.

My own experience in the city and state of Bremen, Germany, allows for a more differentiated picture:

Due to a huge federal grant won in a city competition, today about 100 governmental services are available online for complete transactions including digital signatures and electronic payment of corresponding fees. The pattern of use of these services differs strongly:

- 80% of these services are for citizens and reach about 300 transactions per month
- 20% are for business incl. mediators (lawyers etc) and have 3000 transactions p.m.

Of the 3,000 transactions per month with mediators, more than 2,500 deal with the collection of outstanding liabilities, i.e. communication between lawyers and court. This high volume of transaction has led to huge productivity increases: Before introducing the online service, three professionals and 11 assistants were busy with these claims in court, now there are 1.5 professionals and 6 assistants plus a 0.5 system administrator share.

The processing of paper-based applications costs 7.50 Euro more than that of web-form entries. In 2002 there were 20,000 applications entered online. And the lawyers also benefit because they save postal fees and time for printing and posting their claims.

There are other services where the cost-benefit relation is not so good. For example, offering online registration of new citizens within the life event application of moving requires a redesign of the backoffice registration system, which costs almost 1.5 million Euro. Although chip cards with digital
signatures and card readers have been offered to citizens at a 90% discount (20 Euro), only two thousand have been picked up and used so far.

And there are cases such as the ordering of birth or marriage certificates with a certain degree of online orders and delivery by post. But of course ordering by telephone or at the counter have to be maintained. Recently, electronic payment of online orders has been improved very much by integrating it with the overall accounting and payment system of the city. But it is almost impossible to quantify the costs and benefits of this application, because the present accounting system does not differentiate costs for individual products or processes and even less for different modes of orders such as counter, telephone or online.

So we are facing methodological and practical organizational problems in quantifying the benefits of ICT innovations.

2. Methodological problems in quantifying benefits

On order to quantify benefits, we need clear definitions of what we want to measure, and valid and reliable measurement methods. For dimensions of efficiency such as costs or productivity, several indicators have to be defined and detailed measurement procedures have to be specified. And if we want to compare different cases, these methods have to be standardized.

All the benchmarking studies around do not meet this requirement. The Booz Allan Hamilton study mentioned above which is explicitly dedicated to identifying the „most effective“ policies looks at „Government Impact“ split into the two dimensions „Impact on Working Practice“ and „Impact on Costs/Efficiency“. While for the first dimension some indicators are given, such as e-tendering, the report says with regard to „Impact on Cost/Efficiency“:

„No available indicator this year, findings based on interviews. Suggested indicator for future inclusion:
• British Pound Sterling or time impact on a selected group of government processes, e.g. e-procurement,
• British Pound Sterling or time impact on a selected group of businesses from using e-gov services."

These problems are not new. They exist since we are trying to assess the benefits of ICT investment in public administration from the sixties onwards. As we are dealing with an input-output relation, three basic questions arise:

1) How do we define and measure ICT-input?

• By the overall financial investment, and if so, only initial investment, plus running costs, or estimates of total cost of ownership,
• by defining particular technologies, e.g. Internet or Knowledge Management and assigning the respective costs,
by defining particular socio-technical arrangements such as intranet
with technical and editorial staff?

2) How do we measure the benefits (output)?

• By productivity in terms of number of cases processed,
• by the costs of a process or product in terms of staff or time needed,
• by quality of services measured
  • by number of cases returned or mistakes detected,
  • satisfaction of customers according to regular surveys
  • satisfaction of political stakeholders
• by the overall performance of the respective agency?

3) How do we assess the relationship and deal with the following problems:

• The assignment problem: Which input indicators can be assigned to
which output indicators proving a valid causal relation?
• The context problem: How do we control contextual effects which
  influence the output but are not related to ICT?
• The innovation problem: How can we assess unexpected cost or
benefit? What we do not expect we do not measure and therefore will
not be included. It may take years to recognize these unexpected
effects.

For many governmental services it is not easy to define the input and output
exactly. Most governments are just starting to define processes and products.

While looking for recent studies dealing with these problems I came across
The Project on the Impact of E-Government led by the Public Management
Service (PUMA) at the OECD. Unfortunately their most recent publication on
their Web-Site is of December 13, 2001. However, the purpose of the project
is:

„The project on e-government will look at the impact of e-government on
national administrations. It is structured under 4 themes:
• the vision and potential responsiveness of e-government;
• its impact on public administrations;
• its implementation
• and measurement issues.
The result will be a series of analytical products, and a flagship report by end
2002. A major conference is planned for May 2003.“

With regard to the participants in this project we learn:

„In addition to oversight from the Public Management Committee, the project
receives close guidance from an E-Government Working Group, comprised of
high-level e-government officials from Member countries. An E-Government
Associates Group also assists the project, and will include experts from
government, private sector firms, academic institutions and civil society organisations."

The final report announced is not yet available. From a telephone conversation with the responsible officer I learned that the report will not suggest certain methods but describe the problems and deficits only.

3. Why is progress so slow?

If we want to find out why progress is so slow we have to look at the actors constellation. Let us assume National Governments really want to quantify the costs and benefits of their e-government programs and the individual projects and measures. They have two main options: they can give research grants to academic research institutes or give contracts to consulting companies.

Most of the studies on E-Government come from consulting companies, based on contracts or on their own initiative. However, these studies have a double bias: the consulting company pursues an acquisition interest. The study is not a goal in itself but rather a means to get contracts for planning and implementing e-government projects. Therefore they will emphasise the benefits and will not present total cost calculations. And if government is the contractor they do not like critique on their previous and running investments.

Most of the studies present Best or Good Practice examples or quantitative benchmarkings. But they all have difficulties in defining what is „good practice“ or in defining and measuring the indicators for benchmarking. As these studies often are only means to other ends, they are lacking the
resources for a valid methodology. They are put together in a rather short time, the compilation of cases is not based on exhaustive or representative sampling, the depth of the interviews is not very high, rarely there is cross-checking of the information gathered, etc.

Therefore one cannot expect the development of more valid and rigid methods out of this type of studies and from these companies.

The other option for national governments is to give research grants to academic research institutes for developing and testing valid and reliable methods. Here the situation is quite different. There are only a few socio-economic research institutes that have deep knowledge of public administration. And there are even less which are concerned with the application and effects of ICT in public administration. Even fewer have competence in the field of the economy of public services. Therefore the number of researchers who are able to improve the measurement of the economic effects of ICT on public services is almost zero.

And it becomes obvious that the PUMA project cannot solve the problem as there are only government people involved. Which is important but not sufficient.

4. The situation is quite different with regard to ICT in private business

Many of the questions raised with regard to E-Government can be asked in relation to E-Commerce or E-Business as well. Of course there have been and still are many projects with bad cost-benefit ratios in this area. But in most cases this is due to the fact that the responsible managers did not employ the available methods. Business Plans and Business Cases cannot anticipate the future without any uncertainty, but they can identify the factors causing this uncertainty and quantify the risks.

The problems with quantifying the effects of ICT on public services mentioned above do not only occur for ex-ante estimates but also for ex-post analyses. And in this respect there are big differences between the private and the public sector.

Ex-post analysis is the fundamental basis for any kind of learning. If we cannot assess the results of our previous actions we cannot recognize what to do better next time. And for ex-post assessment of ICT-effects on business and business processes, there is a huge range of concepts and methods available.

There are research centers, curricula and text books
• with specific subject fields such as information management, information systems, recently e-commerce,
• which combine technical, organizational and economic aspects,
and which can build on long traditions of theoretical and applied research in economics, accounting, management etc.

There are at least three different subject areas of relevance for making progress in the field of public services as well

(1) Project-oriented concepts and methods

- Ex ante planning of ICT investment /projects
  - Traditional investment planning
  - Cost-benefit analysis
  - Business cases
- Ex post evaluation of ICT investment /projects
  - Cost benefit analysis
  - IT controlling
  - IT auditing.

There is much research, many textbooks and rich practical experience for business which can be and gradually is applied to public administration as well. In particular as many projects are carried out by or with consulting companies who bring these project management concepts with them from their private sector projects.

(2) Concepts and methods for permanent review

Project-oriented reviews do not solve the basic problem because these analyses often stop shortly after a project is finished, and in the ICT context this means after the implementation of a new system. Once a system is running there is not much concern for evaluating its performance. However, this has changed at least in some companies where all kinds of costs are reviewed more critically and rigorously.

The catchwords are

- IT controlling,
- IT accounting,
- IT auditing.

Compared to project-oriented concepts there is less research and much less application of these kinds of analysis because of the cost of establishing a permanent measurement system. However, as the share of costs of ICT on the overall costs is increasing, efforts to measure and reduce these costs are increasing as well.

(3) Theoretical debates
And of course there are theoretical debates concerning ICT effects. Catchwords are

- Productivity paradox,
- Total business productivity,
- Network effects.

These debates show that some problems may never be solved, and that there is no certainty for a valid assessment of costs and benefits of ICT in organizations of any kind.

However, this does not mean that no progress is possible and that we could not significantly improve our knowledge, if we followed the right strategy. In Germany, with regard to ICT in public administration, solid research has been carried out for assessing the effects of different forms of word processing in the 1970s when the Federal Accounting Office claimed for a central organization of typing services within federal offices while trade unions wanted a decentralization and upgrading of typists to office assistants. To prove the benefits of the central model, the Accounting Office presented a comparison of productivity measured by the number of characters written per hour in both settings. As a reaction to trade union criticism, two professors of business administration, Picot and Reichwald, within a public research program for the Humanization of Working Life, developed and applied a four level concept of cost benefit analysis, looking at the level of the concrete technology, the local work organization, the company organization and the economy and society as a whole. However, it took more than two person years to introduce the concept, collect the data and prepare the comparison in three federal offices.

This study proved that the measurement, the assignment and the context problem mentioned above can be handled

- for selected IT-applications,
- for selected public services,
- in explicitly defined organizational and legal contexts.

5. Recommendations

Based on this analyses two recommendations can be derived to improve our knowledge about ICT effects on public services and thereby improve ICT application and finally public services themselves for the sake of the citizens and the governments:

Significant progress can only be reached by establishing a long-term policy overcoming the deficit of too few competent research units with expertise of combined technical, social and economic knowledge necessary to solve these problems. Therefore the Commission should encourage and support establishing research networks concerning the development, application and
improvement of concepts and methods for assessing the economic effects of ICT on public services. The Networks of Excellence in the present calls might offer a starting point. But as they only provide means for exchange of researchers and research and not for original innovative research this potential might not be activated. Therefore additional and accompanying measures will be necessary.

As a short-term measure, a working group should be established to develop a pilot benchmarking of the economic effects of e-government on selected public services in a comparative way, based on the findings of available case studies with particular emphasis on careful selection of services and categorizing the technology as well as the organizational and legal context. This might contribute greatly to the controversy between those who do no longer believe or never have believed that ICT investment in public services will lead to significant benefits and those who swear they will but only in the future. There will be no general answer to this dispute, but there will rather be more suitable and less suitable services. The immediate challenge for national and local governments is to make the appropriate portfolio selections of those services which lead to tangible benefits even in a short-term period, those which will need longer time and those which perhaps never will. And this type of differentiation can only be supported by differentiated in-depth studies.