Measuring the Impact of eGovernment Services

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***Abstract* – Impact of eGovernment services is about measurable effects as experienced by stakeholders. Automatic or semi-automatic data collection can make impact assessments more effective, and periodical assessments become more feasible. The paper reviews earlier research on eGovernment impact, discusses the problem of impact as a function of time, and proposes an indicator set suitable for automatic or semi-automatic data collection.**

Keywords – impact; egovernment assessment; indicators; indicator sets; measurements; eGovMon.

I. INTRODUCTION

The Oxford Dictionary of English [1] defines impact as "*a marked effect or influence*".

For e-government services, the definition of impact needs to be refined further. eGovMoNet, an EU-funded thematic network addressing measurement of eGovernment services proposed the following definition [2]: "*The measurable effect of service initiatives that make a difference to its users, providers, or society*". A key concept here is a measurable effect.

The eGovMon project (2008-2012) [3], a research project funded by the Research Council of Norway, worked with municipalities and government agencies to develop methodologies and tools to measure accessibility, transparency, efficiency and impact of eGovernment services.

According to the eGovMon project proposal, impact was described as "*a measurable positive effect of a service on a web site, e.g. number of visitors, user surveys explaining level of satisfaction with the service*."

Another definition by Millard and Shanin [4] links impacts to general objectives of eGovernment: "*These are the overall goals of a policy and are expressed in terms of its ultimate impacts. These will not normally be expressed as eGovernment objectives, but rather as societal objectives to which successful eGovernment development should contribute, such as economic growth, jobs, democracy, inclusion, quality of life, etc.*"

Measuring impact is not easy for two reasons:

- Impact is multi-dimensional and potentially very complex. An easy way out is to focus on a very limited set of indicators, but simultaneously running the risk of loosing key aspects that makes a difference to the stakeholders (citizens/users, service providers, society).
- Impact is also a function of time. A measurement will never be more than a snapshot of something happening over time.

Note that impact can be positive or negative, based on what kind of difference it makes to its stakeholders. If the impact is positive or negative needs to be addressed from the perspective of the respective stakeholder.

This paper aims at providing a short overview of research on impact of e-government, discuss some of the complexities involved, and finally, propose how impact data can be collected and used for automated or semi-automated measurements.

II. RELATED WORK

There has been limited research on the measurement of eGovernment impact. Except from a few academic papers from around 2004-2005 (described below), most recent search results refer to eGovMoNet thematic network and the eGovMon project (described above).

In one of the first papers discussing impact in the context of e-government [5], Peters, Janssen and van Engers observed: "*Our analyzes shows a messy picture on the measurement of e-government. Many measurement instruments take a too simplistic view and focus on measuring what is easy to measure. Many of the instruments focus on measuring the visible front of eGovernment and ignore the performance of the cross-agency business processes. None of the instruments focus on measuring multi-service organizations. The instruments focus on one (type of) agency and do not provide an overall picture.* " Their conclusion was: "*A good theoretical framework for measuring the impact of eGovernment and the use of resources is still lacking*".

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Aichholzer [6] analyzed the impacts of e-Government in Austria. He based his analysis on case studies and found the following impacts:

- Reduced process time
- Improved service
- Reduced administrative burden
- Increased efficiency
- Adaption problems and reorganization
- Cost reductions and enhanced revenues

He stated that his analysis was "*still largely in its infancy*", and that "*comprehensive and methodologically sound assessment frameworks for measuring e-government effects are not yet at hand*".

Amberg et al. [7] used a stakeholder approach to find different impacts of eGovernment. The stakeholder analysis revealed the following stakeholder groups, and relevant impacts for each group:

Citizens (individual and collective)

- Improved information (quantity and quality)
- Increased quality of service offerings
- Increased citizen- friendliness and comfort of application flows and services
- Availability of online service offerings 24 hours a day
- Time savings (*)
- Financial savings (*)
- Increased (perceived) transparency of application flow
- Improved communication with rural and remote communities
- Increased involvement and participation in decision processes at communal level (e-democracy)

Private sector and non-profit organizations

- Improved information (quantity and quality)
- Time savings (*)
- Financial savings (*)
- Increased information and service delivery transparency
- Increased quality of service offerings
- Improved communication possibilities for organizations in rural and remote communities

Employees

- Increased motivation
- Job enrichment and new forms of functions
- Personnel development (*)
- Reduced work load
- Improved working conditions

Internal organization

- Reduced costs (*)
- Increased revenues (*)
- Increased process efficiency (*)
- Modernization of IT/communication infrastructure (capacity) (*)
- Improved organizational image as a result of better location marketing
- Increased financial aids and donations (*)

Central government politics

- Improved intercommunal communication and collaboration
- Reduced costs (*)
- Improved efficiency (*)
- Improved location marketing and image
- Acceleration of decision processes in public administration (*)

The authors proposed methods to evaluate each effect, for most of them qualitative surveys and personal interviews and for some (*) measurements of operating figures. Such data would typically be accessible from other computer-based systems (e.g. ERP-system) through a protocol or an interface.

The authors ended up with a proposal for a scoring template (Figure 1) for "measuring the total impact of e-government".

The scoring template uses a scale from 0 (insignificant) to 10 (significant) to evaluate the effects on each single stakeholder. Each single effect is assigned a weight. Each stakeholder group is also assigned a weight. The score for each effect is multiplied with the weight and the weighted scores are added together to give the total impact score.

	Evaluation	Weight each effect	Weight stakeholders
Effects on:	(0-10) (E)	(W)	(E x W)
Citizens			**40%**
effect C1	--x--------	20%	8%
effect C2	-------x---	80%	32%
Private sector			**20%**
effect P1	-----x-----	50%	10%
effect P2	---x-------	50%	10%
Employees			**15%**
effect E1	----x------	80%	12%
effect E2	--------x--	20%	3%
Organization			**15%**
effect O1	---x-------	60%	9%
effect O2	x----------	40%	6%
Central government			**10%**
effect G1	----------x	50%	5%
effect G2	-----x-----	50%	5%

Figure 1. Template for measuring total impact of eGovernment [7]

In parallel with these efforts, other researchers have found easier ways to assess e-government [8]:

- Counting the number of eGovernment services or making a checklist of "most important" eGovernment services.

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- Measuring the maturity of e-services based on their complexity or level of integration.
- Measuring the accessibility or usability aspects of eGovernment services.

The common approach is to address the supply-side. What electronic services do the government provide? How many and how good are the services?

Only a small ratio of papers and reports address eGovernment services from the citizen or user perspective (e.g., Norris [9]). What is the uptake of a service? How satisfied are the users?

Impact is about mixing both perspectives (supply side and demand side) with even more dimensions, e.g. uptake and satisfaction, to understand the total effect of eGovernment services.

The problem is to find indicators that are relevant and preferably possible to collect through automated procedures.

Heeks [10] investigated the measurement of impact. He found the following samples of measure: citizen benefit, financial benefit, back-office changes. Samples of indicators were; time saved, financial savings perceived by officials, nature of changes to government processes, and changes in process time. The data gathering methods used were: interview, internal self-assessment, questionnaire, popup survey.

He ended up with the following recommendation:

"**Output/Impact Measurement**
Measures beyond adoption in the eGovernment value chain are needed to judge the value of eGovernment. Most of the impact examples given in Table 3 (of Heek`s paper) were measured by self assessment; a method with distinct drawbacks, as noted below. As also discussed later, there may be emerging opportunities to use web metrics/crawlers to assess some outputs/impacts but only in certain situations. In general, then, output and impact measurements require some form of survey. Surveys have been used for this but survey data to date seems to have concentrated mainly on adoption and use, so there is obvious potential for change."

Millard and Shahin [4] also links impacts and general objectives: "*Outcomes are converted to impacts (defined as the general objectives) by the ICT-enabled policy achievement intervention logic. Impacts are at the societal level, and encompass what eGovernment outcomes should contribute to. This could include*:

- *economic productivity*
- *economic growth*
- *jobs*
- *competitiveness*
- *local and regional development*
- *environmental improvement and sustainable development*
- *inclusion*
- *democracy, participation and citizenship*
- *quality of life / happiness*
- *increased justice and security*
- *universal human rights and peace*

The consulting companies Deloitte Consulting and Indigo [11], working on behalf of the European Commission, published a study on the measurement of eGovernment user satisfaction and impact.

The introduction says:

"*The European Commission Information Society and Media study on measurement of user satisfaction and impact has developed a multilayer user-satisfaction and impact measurement toolkit aimed at providing both policy makers and public agencies with the necessary information and tools for the analysis of public sector service provision. This standardized survey framework provides a hands-on approach to a set of customizable survey tools*".

But, when discussing measurement of user impact, the report focuses on effectiveness, giving the following examples:

- reduced administrative burden – examples: % change in time and costs saved by citizens and businesses, or in number of users reporting e-service saved time over traditional methods for a standard bundle of services;
- increased users' value and satisfaction – examples: % change in waiting times for a standard bundle of services, or in number of users reporting eGovernment services to be useful;
- more inclusive public services – examples: % increase of eGovernment use by socially disadvantaged groups, or of number of SMEs bidding for public tenders electronically.

This short literature review shows the complexity as well as the almost endless possibilities that exist for making indicators.

III. A MODEL TO UNDERSTAND IMPACT

Stragier, Verdegen, and Verleye developed the model shown in Figure 2, to describe the relationship between input, output, outcome and impact [2,12]. The eGovMoNet thematic network used this model.

The model shows the following four types of outcomes from eGovernment: benefits, barriers, uptake and satisfaction, which again makes impact on different stakeholders/stakeholder groups.

By collecting information on benefits (e.g. improved efficiency, transparency and/or quality), barriers (e.g., accessibility barriers), uptake (ratio or number of users) and satisfaction (through e.g., user satisfaction surveys), it would be possible to compute an impact score for each stakeholder/stakeholder group.

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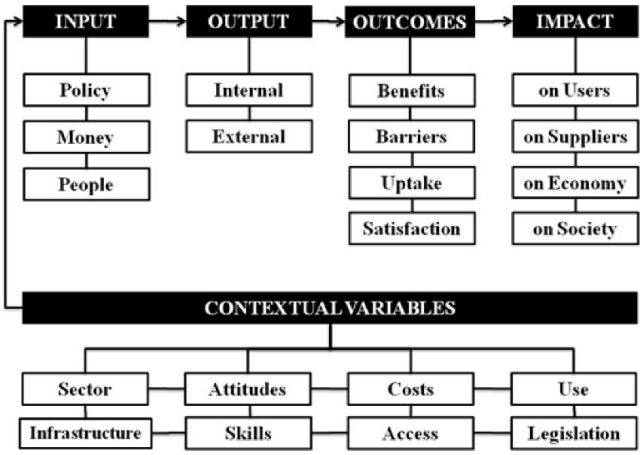

Figure 2. Framework for measuring impact [2,12].

IV. ONE PROBLEM: IMPACT AND TIME

Impact can have several dimensions and be seen as a function of time. Therefore a measurement can show one dominant type of impact at time t1 and another type of impact at time t2. Ideally, impact is measured relative to time t0, before the service is made available.

One illustrative example: A municipality introduces an eGovernment service to handle application for kindergartens. The use of this service is mandatory. Parents experiencing problems are advised to visit the municipal service center for help and instruction. Most parents experience no problems with the service, but a few feel they lack the necessary competence to use the service. The employees working at the service center get some complaining visitors ("everything was better before"), but spend time showing them how to use the system.

The short-term impact is that most users adopted the electronic service, but the introduction also created a high level of noise. The administrative gains for the administration were not very high.

However, the following year, due to efforts put in the first year, things went more smoothly, with almost no complaints and increased efficiency.

This shows that impact is something fluid that changes over time. It is only possible to take snapshots of impact.

V. HOW TO MEASURE IMPACT

For the eGovMon project it was necessary to balance an almost unlimited number of possible dimensions of impact with the need for an effective data collection regime. Therefore, eGovMon did not address long term impact of eGovernment services, but more the short-term effects as seen by citizens/users and administration. It was also necessary to select indicators that could be collected automatically or with limited effort.

The indicators were developed and discussed during workshops with eGovMon partners (municipalities and public agencies).

Two stakeholder groups were identified:

- Citizens/users
- Administration

For the first stakeholder group, the following outcomes were identified:

- Benefits
- Barriers
- Uptake
- Satisfaction

For the second stakeholder group, one outcome was identified:

- Benefits

Even if it would be possible to identify barriers, uptake and satisfaction from the administration side, these outcomes are less relevant since eGovMon targets existing services. Therefore, potential barriers have already been removed; the uptake is in place (the administration processes the results of the service), and at this stage, should the administration not be satisfied with the service, it is their own problem.

This gives the following set of five indicators:

- Benefits for the citizen/user
- Barriers experienced by the citizen/user
- Uptake by citizens/users
- The satisfaction reported by the citizen/user
- Benefits for the administration

A. Benefits for the citizen/user

One of the benefits addressed already is the efficiency gain for the user. Other benefits may be faster response, access from everywhere at any time, and better quality. As a starting point, the efficiency gain for citizens/users is selected as indicator, with the possibility to incorporate other aspects at future times.

B. Barriers experienced by the citizen/user

Barriers include access to technology, accessibility and appropriate training. Since access to technology is not seen as a problem in Norway (the digital divide is almost non-existent), the accessibility score can be used as an indicator. Since services often are provided through forms, it may also be beneficial to address certain specific issues e.g.

- Prefilled content
- Validation of fields where appropriate
- Help information available
- Meaningful error messages (in user's own language)

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- For multi-page forms – possibility to move back and forth
- Possibility to provide user feedback (feedback button)
- The possibility to complete a form after a break (no timeout)

C. *Uptake by citizens/users*

Uptake would typically be the ratio between users of the electronic service and the total number of (potential) users.

D. *The satisfaction reported by the citizen/user*

Satisfaction can be reported through electronic surveys, or even better, a small survey upon exit. "Please rate your overall satisfaction with this electronic service".

E. *Benefits for the administration*

The efficiency gain for the administration has been addressed earlier. Other benefits may include quality improvement of data submitted due to built in validation of forms.

The scores of each of the five indicators can be normalized (e.g., on a scale from 0 to 20) and then be added to produce an impact score (e.g., 0 to 100).

VI. CONCLUSION AND DISCUSSION

In this paper, we have given an overview of some previous attempts to measure eGovernment impact, and also proposed a new set of indicators. Following Heeks [8], self-assessments have been avoided, and focus has been put on data collection by web metrics/crawlers and surveys. Data collection can then be made automatic or semi-automatic. The proposed indicator set tries to balance ease of use with the complexity of impact analysis. The indicator set uses five indicators to measure impact both from the citizen/user side and from the administrative side, and can be used for longitudinal studies of impact.

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