

eGovernment: Does IT save time?

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"I am rather in awe of these new information systems: tasks that could take hours before are now done in few seconds. However there is always as much work to do, as we offer more and better services, even though I am not sure citizens realize that quality of service is higher".

This quote is taken from an interview of a civil servant realized by a PhD student of my team working on the organizational impacts of IT on the public sector in Switzerland. Even though the interview was focused on reorganization we found this quote very significant. It does indeed raise some interesting issues:

- Is the time gain really so great, from hours to seconds?
- What are these new and better services (if any)? What purpose do they serve? What is their added value?
- What is the perception of citizens: do they realize or not that services are better and quicker? Do they respond to actual needs?

The goal of this paper is to define a methodological approach to investigate these issues. We will not try to answer all these questions and will focus on (i) *modelling services*; (ii) *measuring the time gained*; (iii) *and measuring the perceptions of citizens*. This framework is still in preliminary stages and has not yet been validated in practice.

1. Modelling Administrative Services

In previous work (Glassey 2004) we defined 65 services types and a dozen of methods, such as *Initiated - Terminated - Notified - Validated - Published - Modified - Consulted - Searched* in order to describe these services, as well as a model of service provision (see Fig. 1).

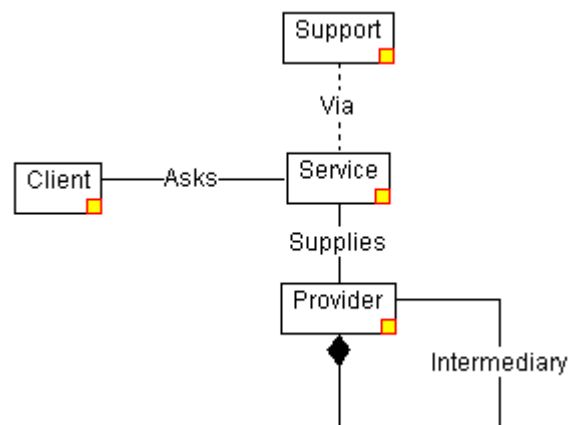


Figure 1: Service Provision Model

For each concept (client, service, actors, etc.) we developed modelling stereotypes and a semi-formal description template (Table 1).

<i>Service name</i>	Public health inspection
<i>Short service description</i>	The department of Public Health has to inspect restaurants, shops, enterprises, etc. to verify if they comply with public health standards. It makes routine controls where the clients are aware that they will be checked and it also sets up unexpected controls. The results are made public.
<i>Supplier</i>	Department of health
<i>Clients</i>	Shops, restaurants, enterprises, medias, citizens
<i>Uses types</i>	Initiation, termination, notification, validation, publication, modification, consultation, search
<i>Intermediaries/ partners</i>	Consumers association, laboratories

Table 1: Example of a Service Description

We used these semi-formal descriptions in combination with scenarios to create UML activity diagrams (see an example in Fig. 2) and we added XML descriptions of required knowledge or information to fulfil a process (Glasse, 2005)

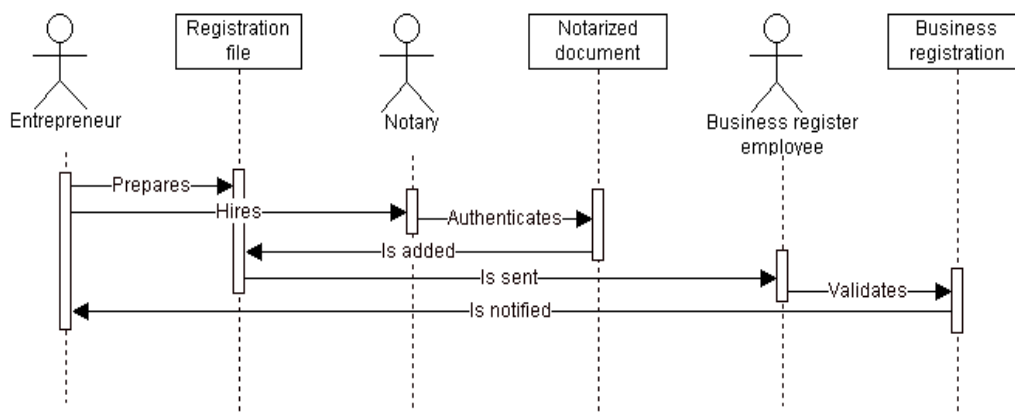


Figure 2: Example of an Activity Diagram

At the time we developed this approach, there was no systematic inventory of administrative services in Switzerland, but the Swiss Strategy for eGovernment 2007-2010¹ stated the need for a standardized eGov architecture that would rely on a business process management approach. A nation-wide survey was thus launched in order to gather a list of all administrative services provided in Switzerland (more than 2'000). The so-called inventory of public services (eCH 2009) defines 17 activity domains (work, construction, education and research, international relations, jurisdiction, social affairs, politics, health, culture, agriculture, taxation, environment, etc.) and nearly 150 services groups. A list of these services is provided as appendix and for each service it defines standardized actions that can be applied to it: ask, request, show, report, order, buy, register, delay, deliver, withdraw, notify, modify, require, etc.

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http://www.bk.admin.ch/themen/egov/index.html?lang=fr&download=M3wBPgDB_8ull6Du36WenojQ1NTTj aXZnqWfVp7Yhmfnapmmc7Zi6rZnqCkkIR7g36DbKbXrZ6lhuDZz8mMps2gpKfo

As this standardized typology is readily available we will use it in combination with the modelling tools briefly presented above. This will allow us to formalize and describe the selection of services we want to survey. Up to this point we are still relying on a rather classical process modelling approach and we yet have to add the temporal dimension we specifically want to investigate with our approach.

2. Measuring Electronic Services Time Savings

As opposed to other dimensions that are commonly surveyed in the domain of service provision and where the units of measure might diverge (such as user satisfaction which we will discuss further on), time has a completely standardized and universally accepted measurement system. In this case, our problem is not the unit of measure (seconds, hours, days, weeks, years, and so on), it is rather when to press the buttons on our stopwatch.

Indeed public administrations provide many different types of services to their clients, whether they are citizens, businesses, self-employed professionals, other units from the public sector, etc. The interactions between a public administration and its clients are mostly process-based and can be categorised as follow: structured procedures or routines, semi-structured decision processes and negotiation-based case-solving (Lenk & Traunmüller 1999).

Structured processes are still rather easy to measure, as they can be formalized as a chronological sequence of elementary operations and of resources, with models directly inspired from flowcharts or many other techniques based on Petri nets. The activity diagram showed in the previous section is such an example. In negotiation processes it is not always so simple to define a starting point and an ending point. Furthermore, if one wants to answer a question such as « Does IT save time? », he has to not only measure strictly the time saved during the process of providing an administrative service, he has to take into account other dimensions, such as lost time (e.g. when a system is down) or the extra hours necessary to offer extended service time.

Our time measurement framework is still in early stages and it is likely that we are missing a few dimensions. However, we will describe it here briefly:

- Time saved: *duration* of a given service to be delivered by a public administration; *time to fill* in an application by users (e.g. filling in a paper-based tax form vs. online); *travel time* necessary to reach the public administration's premises, *waiting time*, when queuing to get a service; *lost time* (e.g. when a form is missing and you have to go back to bring it);
- Time added: *IT downtime*; *IT support*; *IT training*;
- *Increased service availability*: going from a model where calls are answered from 9 to 11am and 2 to 4pm to a 24/7 online desk.

Again the *Time saved* indicators are mostly applicable as such to transactions, with a beginning initiated by a « customer » and an end where the public administration delivers a service. However, public administrations have widely been using IT to publish information (from opening hours and news to regulations or full databases). Here we will recycle the well-known *time to publication* indicator. Last, there is also a large body of communication between public administrations and citizens or businesses. In order to measure this we will use the *response time* as an indicator.

These time indicators are quite rational, but we all know that one hour of listening to a boring keynote speech at a conference is not the same as one hour at the pub with friends. This leads us to the second part of our question: how do citizens perceive this service time? Do they really appreciate the fact that a service is provided in one second instead of ten minutes? In another interview by a student of mine, responses show that the perceived quality of service at an

administrative desk had more to do with the fact that there were flowers in the waiting hall and that the civil servants were neat and polite than with the actual quality of the service. Could it be that such subjective factors are also applicable to the concepts of time and eServices? We do not have any philosophical or psychological competences to answer that question, but let us mention a survey by DeDonno & Demaree (2008), where 163 participants were asked to complete a task (the Iowa Gambling Task). One group was told that the time allotted was not enough to complete the task, and the other was informed that they had enough time to do so. The group that was under time pressure performed the task significantly worse than the other.

3. Measuring Perceived Time Savings and Service Quality

As we want to answer the question “Do citizens realize that services are better and quicker?” we will rely on the body of research on user satisfaction. We will not do a literature review here but we will use Wixon and Todd's paper (2005) as a starting point. They propose “an integrated research model that distinguishes beliefs and attitudes about the system from beliefs and attitudes about using the system”. To survey the behaviour of using technology Wixon and Todd rely on the well-known technology acceptance model (TAM) developed by Davis (1989). This theory suggests that users confronted to a new technology are influenced in their use by the:

- *Perceived usefulness*: Davis defines it as “the degree to which a person believes that using a particular system would enhance his or her job performance”;
- *Perceived ease-of-use*: Davis describes this as “the degree to which a person believes that using a particular system would be free from effort”.

These two factors can be used as such when surveying eGovernment services, and we will simply add the *perceived time saving*.

Getting back to Wixon and Todd (2005), they compared the work on information systems' user satisfaction by Bailey & Pearson (1983), Baroudi & Orlikowski (1988), Doll & Torkzadeh (1988), and Ives & al. (1983) in order to define their own framework. They propose a list of more than 40 variables to survey user satisfaction, amongst others:

- *System quality*: accessibility, timeliness, language, flexibility, integration, efficiency;
- *Information quality*: accuracy, precision, reliability, currency, completeness, format, volume;
- *Service quality*: relationship with staff, communication with staff, technical competence of staff, attitude of staff, schedule of products or services, time required for new developments, processing of change requests, vendor support, response time, and means of input.

The works mentioned above are foundational in the domain of user satisfaction, but they lack a practical approach to implement such a survey. Furthermore they address information systems in general and might not be suitable for eGovernment services. We thus decided to extend the user satisfaction concept to integrate elements of perceived quality of service. To that effect we used as a starting point the literature review by Papadomichelaki & al. (2006) who surveyed 18 well-known quality of service approaches. They categorize quality of service components in four key areas:

- *Service*: performing service accurately, consistently and in time but degree of personalization of the service and facilities such as message boards, chat rooms, and social media.
- *Content*: accuracy, correctness, reliability, timeliness, completeness, relevancy and ease of understanding of data and the number and quality of hyperlinks the site offers; web site's structure, design and appearance, search facilities, easiness of navigation and an easy to remember URL.
- *System*: availability, accessibility, system integrity, performance, reliability, interoperability, regulatory and last but not least security.

- *Organization*: leadership, strategy and planning, human resources, measurement analysis and knowledge management, partnerships and resources, process management and customer focus.

The approach of Papadomichelaki & al. (2006) is very comprehensive and it would probably be too ambitious to want to implement it completely in our survey. We thus decided to focus on two key dimensions: *Service* and *Content*. The *Organisation* domain is clearly out of the scope of our paper and we consider that the *System* is more a technical issue.

In order to measure content quality we use the information criteria of CoBIT 4.1² that we applied to data governance for Swiss public registers and found quite adapted (Glasse, 2009). This framework for IT governance consists of a set of good practices ensuring that IT is aligned with the business and enables business processes. It also provides resources for risk and performance management. The data requirements (or information criteria) defined by CoBIT are:

- *Effectiveness*: relevant, correct, consistent, usable and timely information.
- *Efficiency*: provision of information through the optimal use of resources.
- *Confidentiality*: protection of sensitive information from unauthorised disclosure.
- *Integrity*: accuracy, validity and completeness of information.
- *Availability*: information is available when required.
- *Compliance*: information use is complying with the laws, regulations and internal policies.
- *Reliability*: information can be trusted.

To measure attributes of electronic services such as accessibility, timeliness, personalization, navigation or online facilities, we adapted an assessment framework we developed in order to measure the “proximity” of eGovernment (Glasse & Glasse 2004). The unit of measure used in this assessment is the Smallest Number of Clicks (SNC) to reach a given element of measure (Table 2).

Proximity Dimensions	Brief Definition	Elements of measure
Communication	SNC to find means of communicating directly with public administrations.	<i>Phone/Fax/Postal Address E-mail/Skype/IM</i>
Up-to-dateness	SNC to reach elements showing the temporal relevance of information or services or to access up-to-date information.	<i>Last update Newsletter “Push” services, RSS</i>
Navigability	SNC to find help and support or to reach navigation tools.	<i>Index Search engine Help, FAQ Return to homepage Personalization</i>
Accessibility	SNC to find elements guarantying that the portal is open to varied users.	<i>Navigation for handicapped Translations Use of life events or other topical navigation</i>
Transparency	SNC to find elements that help understanding administrative services and to give feedback regarding these services.	<i>Survey Data protection Official publications</i>

Table 2: Measuring Proximity of eGovernment Services

[1] 2 <http://itgi.org/cobit/>

4. Conclusions and Future Work

This framework is still rather abstract and has to be validated. However we believe it integrates some important concepts if one wants to assess eGovernment. Indeed it builds on our previous work on process and knowledge modelling and adds a time dimension. Of course process modelling and business process management do take into account processing time. Available modelling software provide functionalities to run simulations, which are usually applied to find bottlenecks along the execution of a process or of a sequence of activities. With such a projective approach one is able to optimize or reengineer services and to make decisions regarding where to add more resources (or where to cut them). In this case our intention is to use them the other way around, that is to find out a posteriori if there are indeed more, better and quicker services, or if there is always as much work because of information systems themselves (conception, maintenance, learning curve, bugs, downtime, etc.), or if there should be an IT version of Parkinson's law (who wrote in 1955 that "Work expands so as to fill the time available for its completion"). In any case the Bannister's law (1984) which states that complexity increases to utilise the technology available is certainly applicable to eGovernment services.

Table 3 wraps up the dimensions of measure we proposed, with "objective" measures and perceived elements. The usual limitations of developing metrics and indicators apply to the objectivity of the measure.

	Time	Quality of Service
Measured	Duration of service Time to fill in application Time to publication Response time Travel time Waiting time Lost time IT downtime IT support and training	Increased service availability Information: Effectiveness, Efficiency, Confidentiality, Integrity Availability, Compliance, Reliability eServices : Communication, Up-to-dateness, Navigability, Accessibility, Transparency
Perceived	Perceived time savings	Perceived usefulness Perceived ease of use

Table 3: Measured and Perceived Time and Quality of Service

In future work we will implement this framework into a research design: the measured elements will be rather straight-forward quantitative indicators and the perceived elements will have to be measured through qualitative indicators. A pilot application of this framework will be necessary in order to validate our framework and to test the relationships between the measured and perceived indicators.

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