User-centered E-Government in practice: A comprehensive model for measuring user satisfaction

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Abstract

New information and communication technologies (ICT) offer the government new possibilities for providing citizens and businesses with better, more efficient services. Criticism about the provision of E-Government services, however, has proposed a more user-oriented approach. The user needs to be placed at the center of the development and the provision of electronic public services. Simultaneously, it is important to investigate the impact of the new services on customers. User satisfaction may indeed have a decisive influence on large-scale adoption and use of E-Government services. This article describes the development of a comprehensive model for measuring user satisfaction in the context of E-Government. It rethinks the e-strategies of government and subsequently presents a conceptual model derived from ICT acceptance theory. Both quantitative as well as qualitative research have been carried out in order to elaborate the model and to formulate adequate indicators for measuring user satisfaction. The measurement model has been tested using data from five Flemish E-Government websites. Structural equation modeling (SEM) was applied in order to investigate the goodness of fit of the model and the underlying indicators. Based on the results, it becomes possible to reduce the list of indicators to nine items, still covering the full conceptual model. With this shortlist of satisfaction determinants, E-Government suppliers would be able to get a clear view on acceptance of their internet services by the users.

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1. Introduction

The rapid development of new telecommunication and computerized technologies in the last decades has had an enormous impact on how we are living and working. New information and communication technologies (ICT) are changing our society completely. The production, management and consumption of information and knowledge are seen to be the core of societal development and economic productivity, illustrated in the rise of concepts such as the information society and the so-called knowledge economy (Castells, 2000; Freeman & Soete, 1997). Policy makers cannot stand aloof from these trends as they are forced to implement innovations as well as to explore new opportunities. New possibilities offered by ICT give government chances to rethink ways of working and providing services for citizens and businesses (Bekkers & Homburg, 2007; Heeks, 2003; Prins, 2001). In this changing world, government authorities simultaneously face two challenges: the importance of fulfilling the new needs and expectations of their citizens and the reality of reduced budgets (Bertot & Jaeger, 2008). The new service delivery must provide greater satisfaction with higher efficiency (West, 2004).

E-Government strategies have been increasingly examined and questioned (Jaeger & Thompson, 2003; Heeks & Bailur, 2007; Titah & Barki, 2006; OECD, 2005). Many critics claim that the development of electronic public services has until now been primarily guided by supply side factors and that technological possibilities rather than user needs have determined all too often the design of online public services (Bertot & Jaeger, 2006; Kunstelj, Jukic, & Vintar, 2007; Reddick, 2005b; Scheller & Summermatter, 2007; Gareis, Cullen, & Korte, 2004; Ebbers, Pietersen, & Noordman, 2008). In reaction to this, the plea for (more) user-centered E-Government strategies becomes more prominent. A demand-oriented approach is proposed to improve the supply and take-up of electronic public services. Therefore, an extensive study of the needs and expectations of users (also regarding to services in the future) is essential (van Dijk, Peters, & Ebbers, 2008; Bertot & Jaeger, 2008; Centeno, Van Bavel, & Burgelman, 2004).

The goal of the presented study is to meet the call for a more thorough understanding of citizens’ needs and expectations towards E-Government. In this article, the user is at the center of the research which has been conducted in order to develop a comprehensive model for measuring user satisfaction of online public services. Enhanced quality of service provision has been a major component of
public administration reform over the last decades and the use of ICT to generate improvements has been a primary driver for E-Government activity (Jaeger, 2003; West, 2004; OECD, 2005; Bekkers & Homburg, 2007). Online public services are increasingly seen as part of a broader service (improvement) strategy, with important customer and efficiency benefits. As users of public services can be obliged to interact with their governments, user dissatisfaction with the quality of the services may quickly become a major political issue (OECD, 2003).

The discussed model for measuring user satisfaction is based on a research track concerning the needs and preferences of citizens towards electronic service provision. It consisted of a literature review and both quantitative research (large-scale survey, n = 1651) as well as qualitative in-depth research (focus group interviews, n = 28) that have been carried out for the development of the measurement model. Afterwards, the model has been validated by advanced statistical testing (structural equation modeling, SEM) based on a sample of 5590 respondents. The results led to the reduction of the measurement instrument (consisting of satisfaction indicators of online E-Government services) to a short list of nine items, still covering the full conceptual model.

The article starts with theoretical considerations concerning the rethinking of E-Government. The successive steps in the development of the measurement tool are presented and illustrated with the most important research results. Finally, the validation of the measurement tool is discussed, together with conclusions and recommendations drawn from the research.

2. Towards user-centered E-Government

2.1. Objectives of electronic public services

There are many definitions of E-Government and the term itself is not universally used. The differences are not merely semantic and may reflect priorities in government strategies (Heeks & Bailur, 2007; Yildiz, 2007; Relyea, 2002; Evans & Yen, 2006). Moreover, definitions and terms adopted by individual countries have shifted, as priorities have changed and as progress has been made towards particular objectives. This is as it should be: the area is a dynamic one and policies, as well as definitions, need to remain relevant. The Organisation for Economic Co-Operation and Development (OECD) defines E-Government as: “The use of information and communication technologies, and particularly the internet, as a tool to achieve better government” (OECD, 2003: 22). This definition emphasizes the outcome opportunities of the delivery of electronic public services. New services can indeed offer (more) advanced possibilities and will be more multifunctional. The new technological innovation impulses, however, do not (yet) take into account the impact on the customers (both citizens and businesses) of implementing such public services (IPTS, 2004; van Deursen, van Dijk, & Ebbers, 2006).

One of the objectives of E-Government is to make the government and its policies more efficient: providing citizens with quicker and better access to public information and the ability to use services in a better government (OECD, 2003; Prins, 2001). The increase in efficiency would strengthen the quality of services and the ambition to achieve more effective outcomes in key policy areas (Relyea, 2002). E-Government would also push the reform agenda (the modernization of the administrations) and simultaneously promote economic policy objectives (OECD, 2003). In addition, public service delivery via ICT would also lead to an improved relationship between government and citizens or businesses (Millard, 2003). Finally, E-Government would fortify democracy and reduce the distance between citizens and government (Macintosh, Robson, Smith, & Whyte, 2003).

2.2. Challenges to electronic public service delivery

Although E-Government is high on the agenda and many resources are set aside for it, E-Government still faces significant challenges as it continues to develop (Jaeger, 2003; Jaeger & Thompson, 2003; Traunmüller & Wimmer, 2004). In addition, the success of the electronic service delivery is not always clear (yet). Adoption and use of the new services is still rather limited in most countries (van Deursen et al., 2006; van Dijk et al., 2008; Kunstelj et al., 2007; Bertot & Jaeger, 2008; Ebbers et al., 2008) and needs to be stimulated (European Commission, 2006). Low uptake becomes problematic as greater efficiency and returns on investments are only possible with a widespread use of the E-Government services (Norris & Moon, 2005; Jaeger, 2003). In the following paragraphs we seek to understand the criticism on current e-strategies.

First, electronic public services have been often primarily guided by supply side factors (Bertot & Jaeger, 2006; Reddick, 2005b; Kunstelj et al., 2007; Gareis et al., 2004). In this approach, governments often start to expand their portfolio of services by creating an electronic version of the existing (offline) services (van Dijk et al., 2008; Lee-Kelley & Kolsaker, 2004). Second, technological possibilities rather than user needs have determined all too often the design of online public services. Too much attention is paid to the technology itself, rather than to the real needs and expectations of users (Bertot & Jaeger, 2008; van Dijk et al., 2008; Ebbers et al., 2008; IPTS, 2004; Pietersen & Ebbers, 2008; Reddick, 2005a).

These two tendencies cross the strategy of government to put the user – the individual – at the center of the new technological developments towards an inclusive knowledge society (Gareis, 2004). In response to this failing, the focus shifted towards (new) paradigms such as ‘user-centered E-Government’ and ‘multichannel government’ (OECD, 2005). Public services have to evaluate the impact of their strategies on the customers (citizens and businesses) and have to consider the new emerging needs and expectations for electronic services in the future. Furthermore, one of the biggest barriers for the development of E-Government is the digital divide (Reddick, 2005a; Reddick, 2005b; van Dijk et al., 2008; Dugdale, Daly, Papandrea, & Maley, 2005; OECD, 2003). Keeping in mind that a large part of the population does not use the internet (or has no access to it) (Eurostat, 2005), government authorities must consider channels other than the internet for their electronic service delivery (Ebbers et al., 2008), otherwise they risk excluding a major portion of their citizens from benefits offered by E-Government. Improved online access for the public at large will thus increase the pool of potential users of electronic services, while simultaneously delivery of (integrated) public services via other (new) channels must be explored (Pietersen & Ebbers, 2008; Reddick, 2005a; Wimmer, 2002). Moreover, this shift to the development of a multichannel government must be combined with the tendency to make E-Government more user-centric (Bertot & Jaeger, 2006; Lau, 2005).

2.3. Towards user-centric E-Government strategies

The tendency to progress to a more user-oriented E-Government approach is influenced by a number of circumstances. In the late 80s, the ‘reinventing government’ movement (Osborne & Gaebler, 1992)
already stressed the rethinking of government services and proposed an ‘outward-looking approach’ (starting from the citizens’ needs) instead of an ‘inward-looking’ approach (starting from the public services themselves) (Tat-Kei Ho, 2002). In addition, the public sector increasingly considered practices and concepts used in the private sector, such as CRM or CCSD. CRM (Customer Relationship Management) was introduced to reorganize the relationship with the customers in a more efficient way (Whiteley, 2001). CCSD (Citizen-Centered Service Delivery) is mainly a Canadian government approach to base its e-strategy fundamentally on citizens’ needs and expectations (Brown, 2005).

It can be stated that a user-centric approach should be an integral part of governmental e-strategies. Continuous inquiry of public service customers is a must, as both services and users (and their expectations) are changing permanently. Especially in the world of ICT where new innovations pass on in a rapid succession (Centeno et al., 2004), more attention to the investigation of needs, perceptions and experiences of users towards technology and its applications is required (van Dijk et al., 2008; Kunstel et al., 2007; Moore & Flynn, 2004). Interesting examples in this field are the Canadian ‘Citizen First Surveys’ (Roy, 2006), the ‘Use of and Satisfaction with E-Government Services’ studies from the Australian Government (2005) or the ‘E-Government Trendbarometer’ carried out in Switzerland (Berner Fachhochschule & Unisys, 2005). Furthermore, it is important to bear in mind that there is no such a thing as ‘the’ citizens. Users of electronic public services are very diverse and heterogeneous (Bertot & Jaeger, 2006; Bicking, Janssen, & Wimmer, 2006). Each user group has its own preferences towards services and channels. This comes with the observation that a ‘one size fits all’ approach is no longer feasible (OECD, 2005).

3. The construction of a model for explaining E-Government acceptance and satisfaction

Given the increasing focus on efficiency and effectiveness in the public sector (Bertot & Jaeger, 2008; Eyob, 2004; McLaughlin, Osborne, & Ferlie, 2002), it is not surprising that the study of performance measurement is increasing. A majority of these studies focuses on policy and administrative procedures and draws on the new public management paradigm (Bouckaert & Thijss, 2003; Flynn, 2007; Brignall & Modell, 2000). The perspective of this article is, however, slightly different as performance measurement is studied from a user-centered viewpoint. The proposed approach aims to respond to the need for more demand side oriented impact studies. As van Dijk et al. (2008) state, there is a lack of data and investigations into the demand side of public or government electronic services (especially in comparison with multiple classifications and benchmarks lists describing the E-Government supply side). Summarizing, the goal of this study is to respond to this call by developing a comprehensive model for studying user satisfaction, hereby taking into account people’s needs and expectations towards online public services.

### 3.1 A basic model from ICT acceptance theory

Research into ICT acceptance has been concerned with how and why people adopt new information technologies. Different theoretical frameworks have been arising during the last decades. On the one hand, ‘Diffusion of Innovations’ by Rogers (2003) provided insights into the adoption and diffusion of innovations within the population. It is a frequently used theory to assess adoption potential (Wejnert, 2002). Rogers’ view is that technology appropriation passes through different successive stages: knowledge, persuasion, decision, implementation and confirmation. The success of an innovation can be estimated using five innovation characteristics: relative advantage, compatibility, complexity, trialability and observability. The second school in technology research, on the other hand, is comprised of the so-called Social Shaping of Technology theories (Lievrouw, 2006), in which Domestication theory (Silverstone & Haddon, 1996) is one of the most important theoretical exponents. The latter starts from a sociological perspective and stresses the implementation of new technologies in the daily routines of everyday life. Domestication theory has originated partly from criticism that was formulated with regard to Diffusion theory, as this theory is too technology-deterministic and assumes that technology adoption is mainly a linear process (Punie, 2004).

Both theoretical schools are general frameworks; they are too broad to apply to most determining variables that influence the acceptance and use of E-Government services (van Dijk et al., 2008). The theoretical frameworks, however, offer the opportunity to derive some general concepts and lines of thought. Diffusion theory, with a focus on innovation related characteristics, has been extended with insights from social psychology studies aiming to broaden the scope to attitudinal (adoption) determinants (Plouffe, Hulland, & Vandebosch, 2001). This has resulted in a greatly elaborated framework for studying ICT and service acceptance, comprising theories and models such as Theory of Reasoned Action-TRA (Ajzen & Fishbein, 1980), Theory of Planned Behavior-TPB (Ajzen, 1985), Technology Acceptance Model-TAM (Davis, Bagozzi, & Warshaw, 1989) and Social Cognitive Theory (Bandura, 2002).

Fig. 1 presents the basic conceptual framework underlying the class of models explaining individual acceptance of information technology and services that forms the starting point for the model presented in this article.

The baseline of the figure is that usage (of technology or services) is the key dependent variable, while intention is seen as a predictor of behavior (i.e. usage) (Taylor & Todd, 1995).

### 3.2 Application to the domain of E-Government services: how to measure E-Government satisfaction?

Predicting user acceptance and measuring user satisfaction can be seen as two separate domains. With regard to the goal of this article, however, we wanted to bridge the two frameworks in order to have an integrated conceptual basis at our disposal. Starting from the perspective of social psychology and intention-based models (Fig. 1), in the following paragraphs several models and studies in the field of quality measurement as well as E-Government are

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3 Canada is still considered to be one of worldwide frontrunners in E-Government development (Roy, 2006).
discussed as they have provided input for the development of the underlying model for measuring E-Government satisfaction. A lot of studies in user satisfaction stress the importance of the relationship between attitudes and perceptions towards (the usage of) electronic services. MORI (2002) elaborates on the role of expectations. They overcome the antithesis between two schools – on the one hand, the “service quality school,” which views satisfaction as an antecedent of service quality; on the other hand, the “satisfaction school” which holds that assessments of service quality lead to an overall attitude towards the service that they call satisfaction – by placing expectations centrally in their conceptual model. MORI states that both concepts are strongly related: if the experience of the service greatly exceeds the expectations clients had of the service, the satisfaction will be high and vice versa. The same line of reasoning is behind SERVQUAL (a multiple-item scale for measuring perceptions of service quality) originated by Parasuraman, Zeithaml, and Berry (1988) and CMT (Common Measurement Tool) which was originally developed by the Canadian Institute for Citizen-Centered Service (ICCS, 2003). Zeithaml, Parasuraman, and Malhotra (2000) extended the SERVQUAL model – which consists of four gaps in explaining customer satisfaction: design gap, information gap, communication gap and fulfillment gap – with an awareness gap between objective user needs and effective user requirements. CMT also highlights the differences between expectations and experiences, as this difference is perceived to be the key for understanding the fulfillment of public services. In addition, CMT also considers the role of surrounding factors (experience, intensity of use, etc.) as they can be used in order to introduce process improvements.

Traditional models in the field of quality and satisfaction measurement, such as SERVQUAL, are originally developed by marketing researchers to assess service quality in general. This model is widely used in different domains, however, its applicability in the field of ICT has come under criticism. Findings indicate that SERVQUAL suffers from a number of conceptual and empirical difficulties (Van Dyke, Kappelman, & Pybuto, 1997; Jiang, Klein, & Carr, 2002). The weak operationalization of the service quality construct in particular raises cautious about applying this model for assessing the satisfaction of information systems. Summarizing, some quality measurement schools’ lines of thought are incorporated in the proposed conceptual model (see 3.3), however, they were combined with conceptions from ICT acceptance theory as well as E-Government research.

In the European IST research project eUser (2004) much attention was given to design and delivery of user-centered online public services (E-Government, e-health, e-learning). At the center of its conceptual framework was the match (or “mismatch”) between demand side and supply side. Therefore, eUser takes into account both drivers and barriers for using/not using public services in relation to the satisfaction. For instance, lack of access to ICT in general (or to the online service more particularly) may be an important barrier and can thus cause a negative perception towards the electronic service provision. Especially for public services, issues like accessibility and usability are extremely important (Jaeger & Bowman, 2005; Bertot & Jaeger, 2006).

In the same context, van Dijk et al. (2008) have tested a model for explaining the acceptance and use of electronic government services. Starting from the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), they have adapted a multi-disciplinary model comprising elements of both demand side as supply side. Based on the results it can be concluded that the supply of E-Government services is a precondition for people to develop the intention to use these services. Supply as such, however, does not lead to a direct proportional increase of the actual use. van Dijk et al. (2008) stress the importance of knowledge or availability of E-Government services. The study also revealed that the interrelated factors of digital media preferences, access, and experience, explain the intentions to use E-Government services better than mental processes and socio-demographic factors. A conclusion from the research is that E-Government acceptance should be seen as a dynamic learning process whereby people will stick to their habits of using traditional (offline) public services unless they learn of a better electronic alternative that is offering real added value.

### 3.3. Conceptual model

Based on the literature review, the basic conceptual model underlying user acceptance models was extended and adapted into a more specific model for studying E-Government acceptance. This is the basis of the framework for measuring user satisfaction of online public services. Fig. 2 depicts this conceptual model.

The conceptual model considers the different phases that the user of E-Government services must undergo. The dotted building blocks and arrows are new in comparison with the basic model. It starts from the individual reactions to (using) E-Government services. It is important to take this into account as expectations will influence people’s attitudes during the whole process and consequently may have an impact on both usage of and satisfaction with the services (ICCS, 2003; MORI, 2002). After the starting point, the following steps can be distinguished:

- **Awareness:** the user must be aware of the existence of electronic public services (in order to fulfill his or her needs) before the intention to use the E-Government services can arise (van Dijk et al., 2008; Kunstelj et al., 2007). This extra step is important as it is necessary in order to continue and go through the next phase. If people do not know that electronic public services are there, they will not use them even if those services have an added value for
them. Raising awareness about E-Government is crucial (Reddick, 2005b) as research has shown that many citizens do not know which services actually do exist (Australian Government, 2005; Berner Fachhochschule & Unisys, 2005) (see also 4.2);
• Intentions to use: the user will develop the intention to use the E-Government services as he or she will consider whether to use the service or not. This consideration (of the perceived utility of the service) can be seen as a first evaluation of the service in terms of the fulfilment that the services can offer or not (Titah & Barki, 2006). Usefulness and ease of use can both have a decisive impact on user intentions (Davis, 1993; Venkatesh et al., 2003);
• Access: the actual behavior (i.e. usage of the E-Government services) is in the extended conceptual model divided across two separate phases. After awareness of the service and positive evaluation of the utility (resulting in intentions to use), the user will attempt to gain access to the service. As awareness and especially accessibility deserve special attention in a governmental context (Jaeger, 2004), this phase is also an addition in comparison with the original model. It points the attention not only to accessibility of E-Government services as such, but also to the problem of the digital divide (Reddick, 2005a; Reddick, 2005b; Pieterse & Ebbers, 2008; Helbig, Gil-Garcia, & Ferro, 2009);
• Usage is the phase in which the user arrives when he or she has developed the intention to use the service and has gained access to that particular service. In sum, the previous stages must be passed before the user can (try to) use the services to fulfill his or her needs.

The last step, and of major importance for this article, is the feeling of (dis)satisfaction that the user may potentially have regarding the particular E-Government services. User satisfaction should be measured during or after usage (the last step in the process), but that does not mean that it stops there (Muyllé, Moenaert, & Despotin, 2003). The model is dynamic as satisfaction can have an impact on the individual’s decision whether or not he or she will reuse the service. (Dis)Satisfaction can also influence individual reactions to (use) E-Government services.

A second observation about Fig. 2 concerns the trajectory from access to satisfaction. We state that access can be seen not only as a condition for usage of the service, but also as having a direct impact on the satisfaction of the E-Government services. Government authorities are forced to offer not only usable services, but also accessible services. Other than private companies, they cannot ignore certain formalities are forced to offer not only usable services, but also accessible services. Other than private companies, they cannot ignore certain dependencies on user intentions (Davis, 1993; Venkatesh et al., 2003); usefulness and ease of use can both have a decisive impact on user intentions (Davis, 1993; Venkatesh et al., 2003).

4.1.1. Methodological base

The first empirical phase of the research project consisted of a large-scale quantitative survey. Data were collected in 2006 in Flanders by a combined online panel (73.6%) and offline data collection (26.4%) resulting in a total sample of 1651 respondents.

The research sample consisted of 49.3% men and 50.7% women, originating from different regions in Flanders. Respondents were well divided across different age categories, although older respondents (people aged 65 and over) are underrepresented. Due to this underrepresentation, we decided to reweight the sample according to official Flemish population information (SVR, 2008) for the gender versus age distribution. The distribution over education levels (3.3% had received only primary education; 39.9% finished secondary school; 33.2% followed higher education and 24.2% obtained a university degree) deviates from the overall Flemish population: this sample is overrepresented by higher educated people (Chi-Square = 558.906; \(df=3; p=0.00\)).

Respondents were asked about their possession and usage of ICT in order to investigate their “techno-profile.” Furthermore, they were questioned about their knowledge of and attitudes towards E-Government. Flemish citizens most often use local E-Government websites and are in general quite satisfied with the service delivery. Electronic public services from regional government (Flanders) and federal government (Belgium) were less often consulted in comparison with municipality websites. Parts of the questionnaire examined satisfaction determinants in more detail (see further) and also inquired into channel preferences. More particularly, the actual and future use of E-Government was assessed by comparing provision of service via non-electronic channels (counter, mail and telephone) with that via electronic channels (internet, digital television and mobile applications). As the main focus of this article is on the development of a model for measuring user satisfaction of online public services, we will not elaborate on the multichannel part of the research.

4.1.2. Knowledge and attitudes towards E-Government

More than once in a lifetime, citizens have to consult different public services. The results of the survey demonstrated that 64.1% of the respondents are familiar with the concept of E-Government. They described it by means of several key words such as “electronic counter,” “reducing the administrative burden,” “outside business hours,” “public service delivery via internet,” “online forms,” “faster,” “tax-on-web,” and “time saving.” In general, E-Government was mainly seen as a public service delivery on the internet.

4.1.3. Most important results on user satisfaction indicators

A central goal of the presented research was to enrich the theoretically based model about E-Government acceptance (3.3) with determinants of user satisfaction. The formulation of adequate indicators, however, is quite complicated. Quality is a notion with a lot of different meanings that can have a subjective interpretation. The quality indicators have been determined through iterative cycles of theoretical and pragmatic consensus.

In order to get an adequate view of user satisfaction concerning electronic public services, it is important to find out what people judge as important. We confronted the respondents with a list of
The indicators were based on the work of Johnston and MORI. Johnston (1995) listed 18 factors which are often used in empirical research related to measuring user satisfaction of service delivery. MORI (2002) employed the same list of indicators in performance management studies in the UK. The presented determinants are related to functionality, accessibility and usability (Bertot & Jaeger, 2006). The respondents were asked to rate the indicators (as a single item) on an 11-point Likert scale (varying from "not important at all" to "very important") in terms of their perceived importance. Each of the indicators was accompanied by an explanatory example so that it was clear to respondents what was meant by the concept.

The results show that the importance (mean) scores are close to one another. However, pairwise t-tests of those means after weighting reveal that 85 out of 105 (15×14/2) pairwise combinations are statistically significant. The indicator "reduce the administrative burden" received the highest average score of importance (Mean = 8.79; SD = 1.41). Flemish citizens seem to be demanding on this matter (Kampen, Snijkers, & Bouckaert, 2005). A second place is reserved for the determinant " xlsignment). Afterwards, the data were selectively recoded in terms of the interview data were handled by one analyst reading all the of the data. Data were analyzed using the constant comparison researcher. The interviews were recorded by tape and video as government and electronic public services. Three focus group interviews are none too positive. Even worse, the government also needs a more efficient mode of communication in order to better address the issue that most citizens consider the information given by the government as incomplete, unclear, and unreliable. Above all, the government must become more user-friendly and take into account the different needs of its citizens. In its service delivery, personal contact still remains important.

According to the respondents, E-Government has potential in the future, but currently they would rather wait to see which way the wind blows. E-Government is considered unsafe and to offer too little in return. After all, according to the respondents, government authorities have a lot of information at their disposal, and could develop a more pro-active service delivery. Special points of interest to the respondents concerning electronic public service delivery are a better legislative framework and clear information and communication about these services. Although there already exist, a lot of electronic services are still too unfamiliar to the audience. Many of the respondents also stress the importance of a centralized website (one-stop government) (Wimmer, 2002), in which information and services can be ranked according to different life-events. And, in addition to the online environment, an offline contact point (such as a helpdesk by telephone) seems to be of vital importance.

4.2.2. Government authorities and electronic public service delivery

By and large, citizens' attitudes towards government in the focus group interviews are none too positive. Even worse, the government is seen as a scapegoat for a variety of shortcomings. Moreover, the respondents condemn the cumbersome and bureaucratic structure of the government. It is sometimes seen as an anonymous, bureaucratic superpower. Reducing the administrative burden would be helpful to bridge the divide between policy and citizens. The government also needs a more efficient mode of communication in order to better address the issue that most citizens consider the information given by the government as incomplete, unclear, and unreliable. Above all, the government must become more user-friendly and take into account the different needs of its citizens. In its service delivery, personal contact still remains important.

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4.2.3. Most important results on user satisfaction indicators

During the interviews different determinants were often mentioned by all respondents as having a decisive impact on satisfaction with electronic public services. Based on the analysis of the data, the following aspects are perceived as extremely important with regard to E-Government service delivery: communication about services, recency of information, security, help or guidance, personal contact and centralization/integration. The indicators can be clustered in three groups: 1) access to the service; 2) use of the service; 3) impact of the service.

- **Access to the service**: the respondents stress that services must be easily findable. More information and communication about which services are being offered is therefore essential. Furthermore, these services have to be easily accessible. Also people possessing fewer computer skills must be able to access the services in an uncomplicated way. Above all, these services must be cost friendly.
- **Usage of the service**: the usage of the service largely depends on the content it has to offer. The available information must be easily comprehensible, reliable and up-to-date. In general, the usability of the service is tremendously important. Particularly, the underlying technical system must be stable and reliable so that no malfunctions can arise. The respondents also pay attention to
safety issues: government has to be careful with all the data it possesses (identity, financial data, etc.). Again, people emphasize the importance of a kind of helpdesk, or the possibility to have personal contact if necessary. 

- **Impact of the service**: very important amongst the goals of any E-Government service is reducing the administrative burden. The latter is, in view of the respondents, strongly connected with the realization of more customer-friendly services. In addition, all respondents point to the necessity of having one central contact point, which is a clear example of integrated E-Government. After all, people are often confused about which government (federal, regional, local) is responsible for what kind of service. The centralization of services and the accessibility by means of one window, or making these services accessible via a functional guide or search robot, are considered to be very important.

The focus group interviews eventually enabled us to complete the list of indicators of satisfaction. It also allowed us to reformulate some of the (descriptions of the) indicators, which is important for practical measurement. Moreover, it became possible to structure and to establish priority in the results of the respondents, i.e. those indicators that have less or more importance to structure and to establish priority in the results of the reformulate some of the (descriptions of the) indicators, which is the list of indicators of satisfaction. It also allowed us to perceived as the most important, followed by the research. Key indicators are split up by underlying determinants.

Based on the indicators collected in the research, the measurement model was constructed by integrating the indicators into a questionnaire. The qualitative research design provided information about how to formulate these indicators precisely, because it had to be ensured that the indicators are understood correctly and exactly the same by all the users. It is indeed important that what is being measured exactly corresponds with what we aim to measure (validity). Therefore, each indicator (single item) was illustrated with an example.

To take into account the differences (or possible discrepancies) between expectations towards the service and the perceptions of the service, it was also necessary to measure the importance of a certain aspect or indicator in view of the user (Kunstelj et al., 2007). After all, some people may evaluate the lay-out of a website as very poor, but on the other hand they do not consider this as an important satisfaction criterion. The average score of this concept should then receive a lower weight of importance. Different techniques exist to link satisfaction scores to impact values. In this study it was opted, for research purposes, to include questions concerning both satisfaction and importance in the questionnaire.

The construction of the final questionnaire was quite a time-consuming task, which happened in different iterations. After developing a first version, a pre-test was conducted within a group of 10 respondents who gave feedback for further elaboration or refinement of the measurement tool. Next, the questionnaire was evaluated by a team of E-Government experts (employees of CORVE – Coordination Unit of the Flemish E-Government – partner in the research project). The final step was to bring the measurement instrument into practice.

### 6. Validation of the research model

In order to assess the fit of the conceptual model, structural equation modeling (SEM) was applied. This statistical technique allows for estimation of the goodness of fit of the hypothetical model given the data at hand (Bollen, 1989). Estimating measurement models to validate conceptual models have a long tradition in marketing and consumer research since the first publications by Bagozzi (1980) and Bagozzi (1982). SEM offers a sub model (measurement model) to test assumptions regarding the strength of the relationships between indicators (items in the questionnaire) and the latent variables (the concepts); with simultaneous estimation of the correlations between the concepts.

Data collection in the validation study was organized using pop-up messages – in cooperation with a company which specialized in internet research – inviting visitors of five Flemish government websites to participate in an online survey. Since the major goal of this research project was the assessment of the fit of the conceptual model with the data in practice, eventual (unit) non-response was not an issue. Answer categories “non applicable” and blanks were treated as missing information in the FIML AMOS estimation solution (Arbuckle, 2005). This approach yields very reliable estimates (Verleye, 1999). In total 5990 respondents were willing to participate in the study. 75.7%

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Results of qualitative research: indicators and importance.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key indicator</strong></td>
<td><strong>Indicator</strong></td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Skills</td>
</tr>
<tr>
<td></td>
<td>Hardware</td>
</tr>
<tr>
<td></td>
<td>Software</td>
</tr>
<tr>
<td>Availability</td>
<td>Anytime</td>
</tr>
<tr>
<td></td>
<td>Anyplace</td>
</tr>
<tr>
<td>Awareness</td>
<td>Communication</td>
</tr>
<tr>
<td></td>
<td>Findability</td>
</tr>
<tr>
<td>Cost</td>
<td>Affordability</td>
</tr>
<tr>
<td>Technical aspects</td>
<td>Speed of the system</td>
</tr>
<tr>
<td></td>
<td>Technical reliability</td>
</tr>
<tr>
<td>Customer</td>
<td>Compatibility</td>
</tr>
<tr>
<td>friendliness</td>
<td>Integration of the different services</td>
</tr>
<tr>
<td></td>
<td>Reduce of the administrative burden</td>
</tr>
<tr>
<td></td>
<td>Possibility of personal contact</td>
</tr>
<tr>
<td></td>
<td>User-oriented</td>
</tr>
<tr>
<td></td>
<td>Flexibility</td>
</tr>
<tr>
<td></td>
<td>Customization/personalization</td>
</tr>
<tr>
<td>Security/privacy</td>
<td>Acknowledge the receipt of transaction</td>
</tr>
<tr>
<td></td>
<td>Protection of personal information</td>
</tr>
<tr>
<td></td>
<td>Security of the transaction</td>
</tr>
<tr>
<td>Content</td>
<td>Identification</td>
</tr>
<tr>
<td></td>
<td>Content recency</td>
</tr>
<tr>
<td></td>
<td>Content readability</td>
</tr>
<tr>
<td></td>
<td>Content credibility</td>
</tr>
<tr>
<td></td>
<td>Content usefulness</td>
</tr>
<tr>
<td></td>
<td>Content sufficiency</td>
</tr>
<tr>
<td>Usability</td>
<td>Help/guidance</td>
</tr>
<tr>
<td></td>
<td>Ease of navigation</td>
</tr>
<tr>
<td></td>
<td>Lay-out and design</td>
</tr>
</tbody>
</table>
of the respondents were female and the age distribution shows an overrepresentation of young adults compared to a random sample from the Flemish population (SVR, 2008): respondents were aged 16–24: 22.0%; 25–34: 41.0%; 35–44: 20.9%; 45–54: 13.4%; 55–64: 2.5%; 65–74: 0.2%; and finally older than 74 years: 0.1%

![Diagram](image.png)

**Fig. 3.** Results of structural equation modeling (SEM).

The pop-up measured two data series following the structure shown in Table 1: the first 29 items have measured the satisfaction rate on a 11-point Likert scale (varying from “not satisfied at all” to “very satisfied”), while the second time the importance was measured on a 5-point Likert scale (varying from “not important at all” to “very important”). Data modeling was carried out on both the satisfaction and importance sub series and revealed twice acceptable goodness of fit (Table 2). For the “cost” measure, only one item was used in the questionnaire.

Table 2 contains RMSEA and two incremental fit indices. Incremental fit indices are informative on the fit of the hypothesized model compared to a reasonable base line model. In this case, the latter is a model that suggests that no factors underlie the observed items and that the correlations between the observed items are zero in the

<table>
<thead>
<tr>
<th></th>
<th>RMSEA</th>
<th>Tucker-Lewis Index (TLI)</th>
<th>Comparative Fit Index (CFI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction model</td>
<td>0.062</td>
<td>0.906</td>
<td>0.926</td>
</tr>
<tr>
<td>Importance model</td>
<td>0.058</td>
<td>0.902</td>
<td>0.923</td>
</tr>
</tbody>
</table>

8 The overrepresentation of female respondents can easily be explained because one of the five E-Government websites deals with family – mother and child – related questions and services.
population. For acceptance of hypothesized models, such incremental fit indices should in general have values higher than 0.9. RMSEA should be smaller than 0.08 for acceptance (Arbuckle, 2005).

For application purposes a shortlist with the best items (largest $R^2$ per latent variable) is needed, still covering the full conceptual model; this study yields the following shortlist with nine items — measuring satisfaction (Table 3).

In general, it can be concluded that the large-scale validation survey confirmed the conceptual model derived from both quantitative and qualitative research. Furthermore, the results also enable us to derive a core satisfaction questionnaire with substantial predictive power towards overall satisfaction rates.

### 7. Discussion and recommendations

E-Government strategies are evolving in maturity and are increasingly investigated. An important criticism, however, is that electronic public services still lack a user-centric approach (Bertot & Jaeger, 2006; van Dijk et al., 2008; Reddick, 2005b; Kunstelj & Vintar, 2006). The absence of large-scale take-up of E-Government services could – to some extent – be explained by the fact that too much attention is given to technology as well as the governments’ tendencies to start all too often from existing ways of working (in terms of the services that are being provided) (van Deursen et al., 2006; Ebbers et al., 2008). In this article, an attempt is made to bring the user-oriented paradigm into practice. More specifically, research is presented concerning the measurement of user satisfaction with (online) E-Government services. The model, based on a literature review and quantitative as well as qualitative research, proved to be a good fit with regard to the measurement of perceptions of actual users towards E-Government. Nevertheless, some considerations and recommendations can be formulated.

First, although the validation research mainly intended to investigate whether the measurement instrument corresponds with the theoretical model and indicators concerning E-Government acceptance and satisfaction, some conclusions can be drawn from the test phase. With an overall satisfaction score of 8.00 on 10 (from five E-Government websites that have participated in the research), respondents seem to be quite satisfied with the services that are being tested. Similar results were detected in the quantitative research (see 4.1) concerning the needs and expectations of Flemish citizens as well in other areas of research (Australian Government, 2005; Berner Fachhochschule & Unisys, 2005; Reddick, 2005a). It raises the question of how contradictions can be explained between satisfaction E-Government users on the one hand, and citizens having very critical and sometimes very negative attitudes towards government and public services, on the other hand (Millard, 2006). The same can be said about the gap between the interest of potential users and actual use of E-Government (van Dijk et al., 2008; Kunstelj et al., 2007).

Second, user-centric research on electronic public services should also pay attention on E-Government acceptance as such. More specifically, a thorough understanding into the motivations of non-usage of E-Government seems to be necessary (van Deursen et al., 2006). The research presented shows that a large part of the respondents explain their E-Government non-usage simply through their unawareness of which services are being offered. Additionally, a lack of awareness of services prevents citizens from getting familiar with the added value that electronic public services could offer in their everyday lives. Summarizing, efforts are needed to improve service delivery, but simultaneously, investigation of which services could really address citizens’ needs (including via which channels) seems to be vital (Centeno et al., 2004). Research has shown that channel and media preferences and experience regarding different types of services have a decisive impact on take-up (van Dijk et al., 2008; Ebbers et al., 2008; Pieterson & Ebbers, 2008). Therefore, governments should take into account these channel-related impacts and rethink their electronic service delivery accordingly. This should also be accompanied with more effective information and communication campaigns regarding the existing services (Reddick, 2005b).

Third, user research concerning citizens’ preferences should be an integral part of e-strategies of government. Inquiring into user needs and expectations only generates added value when it can be organized on a continual basis (Roy, 2006; Bertot & Jaeger, 2008). The latter is important as new developments succeed at an increasing tempo. The plea for repeated investigations with citizens and businesses concerning E-Government should be supported by longitudinal research tracks that provide the opportunity to detect trends and developments for policies in the long-term.

Fourth, satisfaction measurements can offer added value when it comes to evaluating existing services (Gupta & Jana, 2003). These measurements (evaluation of beta services) can also be important before launching new E-Government services. Especially with benchmarking techniques, it becomes possible to determine minimal satisfaction scores that should be achieved before actually offering the new service to the overall population. Benchmarking means that all parts of a specific service can be evaluated, but satisfaction can also be compared with other public services in the same domain.

Finally, in times which require makers of public policies to rethink their services in terms of efficiency and effectiveness, service delivery via new (electronic) channels cannot stay behind in this performance management debate (Gouscos, Kalikakis, Legal, & Papadopoulos, 2007; Bertot & Jaeger, 2008). Only when E-Government services get the same attention in terms of the quality assessment of their service delivery, will users evaluate online services of equal value as their traditional (offline) equivalents. And this is a prerequisite for stimulating not only the potential interest, but also the actual use of E-Government (Bertot & Jaeger, 2006; van Dijk et al., 2008).

These recommendations are not simple to address, but policy makers should consider some of them when evaluating their E-strategies. After all, all efforts towards increasing budgets for E-Government and people management for realizing progressive public policies in the 21st century deserve a larger take-up of E-Government services than occurs today in many countries.

### Table 3

<table>
<thead>
<tr>
<th>Item name</th>
<th>Operationalization of indicators</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infra 2</td>
<td>How satisfied are you with software that is needed to get access to this E-Government website? (e.g. internet browser)</td>
<td>0.904</td>
</tr>
<tr>
<td>Avai 1</td>
<td>How satisfied are you with the opportunity to access the services on this E-Government website anytime you want? (e.g. 24h/7d)</td>
<td>0.688</td>
</tr>
<tr>
<td>Aware 2</td>
<td>How satisfied are you with the findability of this E-Government website? (e.g. via portal website or search robot)</td>
<td>0.520</td>
</tr>
<tr>
<td>Cost</td>
<td>How satisfied are you with the cost of getting access to this E-Government website? (e.g. cost of computer infrastructure, internet connection)</td>
<td>0.580</td>
</tr>
<tr>
<td>Tech 1</td>
<td>How satisfied are you with loading speed of the pages of this E-Government website?</td>
<td>0.700</td>
</tr>
<tr>
<td>Cfr 5</td>
<td>How satisfied are you with the possibility of getting personal help/assistance on this E-Government website? (e.g. special telephone number or helpdesk)</td>
<td>0.733</td>
</tr>
<tr>
<td>SecPri 3</td>
<td>How satisfied are you with the security of transactions that can be performed via this E-Government website? (e.g. payment via secure access)</td>
<td>0.761</td>
</tr>
<tr>
<td>Cont 4</td>
<td>How satisfied are you with the usefulness of the information that is available through this E-Government website?</td>
<td>0.773</td>
</tr>
<tr>
<td>Usa 2</td>
<td>How satisfied are you with the flexibility that is being offered through this E-Government website? (e.g. both information, communication or transaction possibilities are provided according to specific questions from users)</td>
<td>0.773</td>
</tr>
</tbody>
</table>

* No $R^2$ value for this item as it has no latent variable.
8. Conclusion

Recently, the development of electronic public service delivery has been increasingly questioned. Therefore, a more user-oriented approach is often suggested. In this article an overview is given of research that has been carried out to develop a framework for measuring user satisfaction of E-Government services.

This article discusses the different research steps – reviewing ICT acceptance theory complemented with qualitative as well as qualitative research concerning the needs and expectations of citizens towards electronic public services – that were necessary to formulate adequate satisfaction indicators within an integrated framework. The model takes into account determinants concerning accessibility, usability and functionality. Afterwards, the theoretical measurement model was brought into practice in order to investigate the goodness of fit between the perceptions of citizens towards E-Government services and their actual satisfaction.

Advanced statistical testing (structural equation modeling) enabled not only validation of the theoretical model, but also reduction of the list of 29 indicators into a measurement instrument of nine key indicators still covering the full conceptual model. With this concise list of items – comprising determinants of infrastructure, availability, awareness, cost, technical aspects, customer friendliness, security/privacy, content and usability – and, simultaneously, covering the full range of quality assessment of public services, policy makers are provided with a practical tool for bringing the user-centric paradigm into practice.

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