Decision Making and Value Realization in Multi-Actor e-Government Contexts

Leif Sundberg[a,1]
Mid Sweden University

Abstract. In the last two decades, governments around the world have been implementing electronic services in order to create a range of public values and meet new demands from a variety of stakeholders. Such activities fall within the scope of the e-Government research field. Developing large-scale information systems has proven to be a challenging task and many initiatives have ended in failure. This paper explores uncertainty in the e-Government context. How is it related to the various actors in the public sector, and how can decision making be adapted here to improve value realization? Using actor-network theory as an analytical lens, the collaboration of five Swedish municipalities in creating common e-services is examined as a case study. The results indicate that factors beyond decision makers' control, such as relations outside of a project, create a high degree of uncertainty. This uncertainty can be reduced by creating durable relations between local and global socio-technical actors. Inscribing values into generic software that has a high grade of interoperability should help to strengthen these networks beyond projects and regional borders.

Keywords. E-Government, complexity, decision making, public values, actor-network theory.

1. Introduction

Electronic government, or e-Government refers to the public sector's use of information and communications technology (ICT) to deliver electronic services [1]. With its heritage from the information systems (IS) discipline, e-Government research is characterized by multiple scientific approaches that employ a variety of methods. E-Government, as well as the IS research field are sometimes described as theoretically weak [2, 3]. While methodological and theoretical pluralism might result in conceptual vagueness and a lack of common definitions, one advantage might be that different disciplines can learn from each other [4, 5]. Markus and Robey have suggested that careful examination of the causal structures of the IS field could improve its theory [6].

A common argument in favor of using ICTs in the public sector is increased efficiency at lower costs. E-Government can also be seen as a paradigm for how governments are supposed to work. This new paradigm is a networked, multi-sectored, power-sharing and collaborative government. Government acts as a guarantor of public values, which it co-creates with its citizens [7]. Values in e-Government can be seen as a synthesis of previous public management paradigms, such as Weberian bureaucracy and New Public Management. Examples of such values include accountability, transparency and citizen-oriented approaches [8]. However, the definition of public values can be ambiguous. Bozeman (2009) argues that a single definition is not needed,

---

[1] Corresponding Author: Leif Sundberg, Mid Sweden University, Holmgatan 10, 851 70 Sundsvall, Sweden. E-mail: leif.sundberg@miun.se

and that it is instead a question of normative ideals and consensus about the benefits, obligations and principles that exist between a government and its citizens [9]. In developing a theory concerning how public managers should behave, Moore argues that two basic issues must be resolved: what managers need to do in order to produce values and how to measure whether value has been created [10]. Deploying ICTs requires decision makers to prioritize between (sometimes conflicting) expected values [11]. Many e-Government solutions have vast target groups, which may include the majority of a country's population. The variety of stakeholders that stand to be affected puts great pressure on those involved in making related decisions. Implementing large-scale ICT solutions has proven to be a challenging task that has often resulted in many failures and wasted public funds. The literature mentions a number of factors that add to the complexity of information systems implementation. This complexity is increased as a result of e-Government's unique characteristics, which include organizational diversity and large groups of heterogeneous stakeholders [12, 13]; for similar issues in the IS field, see [14, 15]. New technology adds a further dimension of complexity when a decision maker is expected to have full knowledge of a system that may consist of multiple layers of hardware and software [16, 17].

Normative decision making methods are based on axioms that presuppose a rational decision maker who can bases his or her choices on preferences that are aligned with specific goals and objectives. Many decision problems involve making decisions under uncertainty due to incomplete data and/or unknown consequences. Studies have shown that managers are seldom rational in their decision making [18]; instead they often make decisions based on their intuition and "gut feeling" [19]. Furthermore, unlike laboratory decision making contexts, real life situations are often complex and involve a number of motivating "social" factors, such as habits, emotions and subconscious reactions [20]. When decision making is seen as an event that precedes action, we are in danger of having a reality that is configured by linguistic intervention. A better way of approaching such social phenomena may be to instead ask ourselves why some actions appear to "succeed" in creating large-scale effects [21]. According to Larsson and Grönlund, decision making is a key factor in decentralized e-Government contexts, but current practices and structures are ill suited to meet the new challenges being faced by the public sector [22].

This paper explores uncertainty in the complex, multi-actor e-Government context. How is it related to the various actors in the public sector, and how can decision making be adapted here to improve value realization? Neither technological nor social factors are given a prioritized position as causal agents; they are instead seen as parts of a network in which many factors co-exist as equals.

This paper proceeds as follows. Section (2) presents a description of the analytical framework, namely the actor-network theory (ANT). The method and material used are then described in section (3), followed by the results of a case study in section (4). Finally, conclusions and implications for further research are presented in section (5).

2. Analytical framework: Actor-network theory (ANT)

Ontologically, it is difficult to justify a world in which properties such as "technology" and "the social" are separated and one is given a privileged causal status. A world without such differentiation could prove appalling, however, as it may mean that we lose explanatory power; with technological and social "causes" are seen as equals, entangled

in a web of **actors** and **relations** that shape each other over time. These hybrid entities are fundamental components of the Actor-network theory (ANT) [23, 24]. By using ANT as an analytical lens, this paper avoids the dualism between technology and society. According to ANT, all actors who interact with a phenomenon being studied shape the relations in a reflexive way. Be they technologies, individuals or organizations, actors are defined by their interplay with other actors and not necessarily by their roles. This interplay can be described as "relational materiality" in which heterogeneous materials build up large and complex **networks** [25]. Actor-network theory presupposes materialism, but its main concern is how material is organized and ordered. Simply put, "the social" refers to patterned networks of heterogeneous materials (which could include people, animals, texts, money, architectures and technological artifacts). Some relations and materials are more **durable** than others [26], however, networks are never static and always unstable Law and Callon (1992) distinguish between **local** and **global** networks. A local network is a set of relations necessary to the successful production of any working device; these relations can be seen as "the project." In contrast, a global network is a set of relations that is built up; generates space, time and resources that facilitate innovation. Such a network, which is essential for any project, includes actors outside of the project. A project's capacity to impose itself as an obligatory passage point (**OPP**) between a local and a global network is beneficial for reaching a successful outcome. When the OPP is reached, actors are forced to converge around a certain topic or objective. [27]. A central question addressed by ANT is which relations are stronger than others, which suggests that a period of stability during which actors co-evolve can occur. Such a period usually takes place after a process of **translation** in which one actor convinces the others to align their interests towards an established network [26]. In relation to technological artifacts, it is important to note that they can be understood through the different factors (e.g. beliefs, relationships, uses and assumptions) their innovator embodied in them through the process of **inscription**. The literature suggests that the dynamics of complex, sociotechnical processes such as e-Government implementation can be better understood through ANT [23, 28, 29].

3. Method and material

The case study presented in this paper focuses on a collaborative e-Government project between five Swedish municipalities.

The empirical data stem from:

- Interviews with ten informants who were involved in the project (Table 1); and
- Over 700 project documentation files (Table 2).

Table 1. Overview of the interviews conducted.

Role	Duration
Project leader 1 (A)	75 m
GIS* engineer (B)	45 m
Head of the steering group (C)	70 m
GIS coordinator (D)	45 m
Project leader 2 (E)	50 m
IT resource person (F)	55 m
Software developers (G)	45 m
IT architect (H)	55 m
Executive director (I)	60 m

* GIS = Geographical Information System

Table 2. Overview of the documentation reviewed.

Document scope	Quantity
Guiding and steering documents	68
Meeting documentation	296
End-reports	17
Accounting	263
Follow-up	25
External monitoring	27
System management	7

In order to maximize variation within the interviews, informants with differing expertise were selected (Table 1). All interviews were conducted in person, with the exception of interviews B and D (which were conducted via telephone). Interview G involved two informants. A snowball sampling method was used in order to gain access to informants and increase trust. This entailed asking the informant(s) to recommend other informants at the end of each interview. Interviews were recorded, transcribed and printed. Follow-up e-mails were sent to solicit post-project implementation data on e-service usage in each municipality. The level of analysis is a mix of individual actors, groups and organizations. Actor-network theory was operationalized by a) identifying relevant local and global actors and b) interpreting "causes" (in the form of translations, inscriptions and durable networks that have led to value realization).

4. Results and analysis

4.1. Local and global actors

The case study concerns a collaboration project (hereinafter referred to as Regional Digitization Initiative, RDI) between five Swedish municipalities that was partly financed through the European Union's (EU) structure fund for regional development. Sweden comprises 20 county councils and 290 municipalities, each with a relatively high degree of autonomy vis-à-vis the central government. The county where this case takes place is characterized by low population in relation to its geographical area. The purpose of the studied case was to make it easier for businesses and citizens to access geographical data and apply for building permits; the proposed solution was a series of e-services that would be connected to digitized maps. The idea for RDI arose from a separate project that aimed to promote innovation and digitization in the EU. Inspired by a project in Ireland, one of the project coordinators suggested that the participating municipalities submit a joint funding application to the EU for a similar project. In order to demonstrate that the municipalities would contribute funding as well, each city council needed to provide a decision in writing. The request for this decision was treated differently in each municipality, depending on whose desk it landed on. No strong network was initially established and it was up to each of the responsible employees to convince the head of that particular city council that the project was a good idea. In the end, five of the county's seven municipalities agreed to finance half of the project costs if the EU funding was granted. The application was subsequently made, and the EU agreed to supply half of the project's SEK 23 million budget from its structure fund. RDI started as a project in 2011. Many of the informants noted that they had not fully realized the large scale of the project until it had been underway for some time. RDI was guided

by a steering group that included a representative of each municipality and a project group with additional members that was later divided into subproject groups (each with operational responsibilities). The project group was described as being creative and having a broad range of ideas. However, two issues soon became clear: too few resources had been invested in project management and the municipalities had little related experience with these types of collaborative projects. As a result it was difficult to find the proper competences. An external steering group head (informant C) and additional project leader (informant E) were later hired. RDI was initially unstructured, with no match between resources and activities. However, the situation improved over time as clearer routines for steering the initiative and managing change emerged.

In time, the steering group did what they were supposed to do: govern. All too often a steering group becomes a group of people who are looking in the rear mirror, asking themselves what happened with the project. (Informant C).

No formal decision making process was used. Decisions were made largely depending on the specific competences found within the steering group. Many informants described the formation and formalization of the steering group as a success factor, and uniting members through a commonly used project model enabled the network to grow stronger. Beyond RDI, project members' networks and relations were also extended to their respective municipalities. The nature of these relations, which varied to some extent, affected the members' performance in the project. The two smaller municipalities that were involved provide good examples. One had weak internal networks with heavy stove-piping, especially within the department that worked with building permits. That department's manager showed little interest in the RDI, which made it hard for those from that department involved in the initiative to prioritize it. In contrast, the other small municipality had a flat organization and stronger internal networks. Furthermore, the executive director of the department responsible for building permits (informant I) was a steering group member and hence could continue to strengthen the network at home.

Since RDI incorporated EU funding, it was necessary to describe how the project would meet the overall objectives set for structure funds, such as equality and sustainability. While the project's relation to EU was kept alive through a demand for continuous documentation, the informants describe the result reporting being time-consuming and somewhat contrived. Up to that point, while the RDI project had created a local network, the process of extending it to actors outside of the project remained slow and ongoing. Furthermore, two years into the project, no technological actor had been created.

4.2. Translations and inscriptions

Before creating the required e-services, a number of existing software platforms were evaluated before procurement. However, when a generic platform that would support the creation of 10 dynamic e-services could not be found, a new platform had to be developed. A small local firm (informants G) that was known to one of the municipalities was contracted. When the developers met with the project group, they suggested that an alternative to hard-coding e-services would be to develop a generic open-source platform (which would allow project members to code dynamic e-services themselves):

The project group had created a long list of processes…a long line of papers we used to refer to as the "Dead Sea Scrolls"…we said "stop", we will create a platform where you can build the e-services yourselves. (Informants G).

The steering group reportedly approved the initiative quite easily (which indicates an easy translation), and the developers began creating the platform. Many of the actors inscribed the same values into open-source technology, such as increased efficiency and maintained flexibility. The use of generic software was mentioned early in the project documentation. A software platform that the project group could use to create and fine tune the suggested processes was built. The building permit process was divided into several separate e-services, and the project group created numerous versions of each service in the platform prior to finalization.

Initially we thought that we were going to make use of something that already existed. However, we ended up developing something entirely new. (Informant A).

RDI was extended for six months beyond its original timeframe of three years. User feedback about the e-services was gathered through dialogue and seminars with local entrepreneurs during the last year of the project. Towards the end, much effort was put into determining how to manage the e-service platform. During the extension period, it became clear that one of the municipalities would join another network for future collaboration and that some issues related to hosting and management costs needed to be resolved. The informants describe the reason for and activities during the extension differently, which could be interpreted as a weakening of the project network's durability. One idea that was discussed but ultimately could not be implemented was to integrate the e-services with the municipalities' internal systems for case handling. The suppliers of the internal systems did not want to open them for integration. As a translation between the open source promoters and the licensed software suppliers could not be found, no relation between these two technologies proved possible at the time. The e-services were launched in spring 2014.

4.3 Obligatory Passage Point

As of the time of writing, RDI's results have not been formally measured. The percentage of building permits issued through e-services varies between the five municipalities, ranging from 3-4% to 12-15%. E-service users are described as satisfied with the ease-of-use, unlike the building permit administrators (who were generally not satisfied with the RDI's results). Since the e-services were not integrated with internal systems, these administrators had to manually print and process incoming cases. Hence, even though some values were inscribed into the created artifact, value realization suffered since no relation with other technological actors could be established.

However, RDI did yield some unexpected values outside of the project. Since the created software was a generic open-source solution that was licensed under AGPL v.3, other actors (including additional government agencies) could use it as well. An e-service created by one agency could hence easily be exported and used by other actors. National agencies as well as other municipalities soon started showing interest in the new software platform's functionality. After RDI's launch, additional initiatives of collaboration with other involved actors are planning future development and more e-services.

The county borders are no longer relevant...if it were not for them [the borders], *additional municipalities would probably have joined RDI when the project started.* (Informant F).

While the previous RDI network has changed and fragmented into several follow-up projects for both managing and developing the software and integrating internal case management systems, additional actors (such as the Swedish Association of Local Authorities and Regions) are also starting to use the new software for integrating national and municipality e-services and systems. Hence, the network that developed RDI collapsed and re-formed in different configurations. The current empirical material does not reveal these networks' strength. However, when municipalities export and share e-services, the stage is set for increased collaboration and streamlined processes. Instead of reinventing the wheel, municipalities can share a ride on a global, socio-technical network. When the local network of RDI ceased to exist, additional actors converged around common topics. Rather than necessarily being derived from RDI objectives, these topics stemmed from the unexpected benefits that were established through the open-source platform. In light of the results, a question for ANT is whether it is meaningful to talk about OPPs in projects or if it would be more suitable to look for a point of no return. When a local network creates such large-scale effects that it would be contradictory not to take them into account, the effects become a natural part of the global network and the local-global difference disappears.

5. Conclusions

This paper has explored uncertainty in the complex, multi-actor e-Government context, including how it is related to the various actors in the public sector and how decision making can be adapted here to improve value realization. Using ANT to examine a collaborative e-Government case study enables some preliminary answers to be identified. Factors outside of decision makers' control, such as inscriptions and translations between social and technological actors in the global network, create a high degree of uncertainty. This study confirms that a strong local network accompanied by durable relations to the global network appear to contribute to the success of an e-Government project. However, it is important to acknowledge that these relations include technological actors. When these actors are granted the same causal status as human actors, a logical prerequisite for value creation would be to focus first on the inscription process, then on a translation step in which technological actors interoperate. Using generic software with a high grade of interoperability should be beneficial for creating such relations. Further, decision makers need to focus beyond traditional limits such as projects and regional borders when planning for value realization. Given that value realization occurs when socio-technical actors are connected through durable networks, some interesting paths for both further research and improved practice arise. One such path would be examining value inscription in artifacts: How can the values from relevant stakeholders be included in decision-making processes and then further realized through integrated socio-technical networks? These may be key questions for any decision maker aiming to fulfill the promises of co-created values in e-Government to answer.

References

[1] OECD, *The e-government imperative: Main findings*, Policy Brief, OECD Observer, 2003.

[2] R. Heeks, S. Bailur, Analyzing e-government research: Perspectives, philosophies, theories, methods, and practice, *Government Information Quarterly* **24** (2007), 243-265.

[3] M. Yildiz, E-government research: Reviewing the literature, limitations, and ways forward, *Government Information Quarterly* **24** (2007), 646-665.

[4] F. Bannister, R. Connolly, The great theory hunt: Does e-government really have a problem? *Government Information Quarterly* **32** (2015), 1-11.

[5] G. Walsham, Are we making a better world with ICTs? Reflections on a future agenda for the IS field, *Journal of Information Technology* **27** (2012), 87-93.

[6] M.L, Markus, D. Robey, Information Technology and Organizational Change: Causal Structure in Theory and Research, *Management Science* **34** (1988), 583-598.

[7] J.M. Bryson, B.C. Crosby, L. Bloomberg, Public Value Governance: Moving Beyond Traditional Public Administration and the New Public Management, *Public Administration Review* **74** (2014), 445-456.

[8] A. Persson, G. Goldkuhl, Government Value Paradigms – Bureaucracy, New Public Management and E-government, *Communications of the Association for Information Systems* **27** (2010), 45-62.

[9] B. Bozeman, Public Values Theory: three big questions, *International Journal of Public Policy*, **5** (2009), 369-375.

[10] M.H. Moore, *Creating Public Value – Strategic Management in Government*. Harvard University Press. 1995.

[11] F. Bannister, R. Connolly, ICT, public values and transformative government: A framework and programme for research, *Government Information Quarterly*, **31** (2014), 119-128.

[12] J.R. Gil-García, T.A. Pardo, E-government success factors: Mapping practical tools to theoretical foundations, *Government Information Quarterly* **22** (2005), 187-216.

[13] W. Lam, Barriers to e-government integration, *The Journal of Enterprise Information Management* **18** (2005), 511-530.

[14] K. Lyytinen, R. Hirschheim, Information systems failures – a survey and classification of the empirical literature, *Oxford Surveys in Information Technology* **4** (1987) 257-309.

[15] L. Willcocks, C. Griffiths, Predicting Risk of Failure in Large-Scale Information Technology Projects, *Technological Forecast and social change*, **47** (1994), 205-228.

[16] National Research Council, *Making IT better: Expanding Information Technology Research to Meet Society's Needs*, The National Academies Press, Washington D.C, 2000.

[17] M. Prandini, M. Ramilli, Raising Risk Awareness on the Adoption of Web 2.0 Technologies in Decision Making Processes, *Future Internet* **4** (2012), 700-718.

[18] M.D. Cohen, J.G. March, J.P. Olsen, A Garbage Can Model of Organizational Choice, *Administrative Science Quarterly* **17** (1972), 1-25.

[19] A. Riabacke, Managerial Decision Making Under Risk and Uncertainty. *IAENG International Journal of Computer Science* **32** (2006).

[20] O. Renn, C.C. Jaeger, E.A. Rosa, T. Webler, The Rational Actor Paradigm in Risk Theories: Analysis and Critique in M. J. Cohen (ed.): *Risk in the Modern Age. Social Theory, Science and Environmental Decision-Making*, MacMillan, London, 1999.

[21] R. Chia, The concept of decision: A deconstructive analysis, *Journal of management studies* **31** (1994), 781-806.

[22] H. Larsson, A. Grönlund, Sustainable eGovernance? Practices, problems and beliefs about the future in Swedish eGov practice, *Government Information Quarterly* **33** (2016), 105-114.

[23] F. Söderström, U. Melin, The emergence of a national eID solution – an actor network perspective, *The 35th Information Systems Research Seminar in Scandinavia (IRIS),* (2012).

[24] A. Tatnall, A. Gilding, Actor-Network Theory and Information Systems Research, *Proceedings of the 10th Australasian Conference of Information Systems*, 1999.

[25] J. Law, Notes on the Theory of the Actor-Network: Ordering, Strategy and Heterogeneity, *Systems Practice* **5** (1992) 379-93.

[26] J. Law, After ANT: complexity, naming and topology, *The Sociological Review* **47** (1999), 1-14.

[27] J. Law, M. Callon, The Life and Death of an Aircraft: A Network Analysis of Technical Change. In W.E Bijker, J. Law, *Shaping Technology / Building Society: Studies in Sociotechnical Change*, MIT Press. 1992.

[28] A. Cordella, J. Hesse. E-government in the making: an actor network perspective, *Transforming People, Processes and Policy* **9** (2015), 104-125.

[29] R. Heeks, C. Stanforth, Understanding e-government project trajectories from an actor-network perspective, *European Journal of Information Systems* **16** (2007), 165-177.