One Inch Wide and One Inch Deep: The Role of Policies in Shaping the Adoption of Open Standards and Software in Government

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Abstract. This paper presents a qualitative and quantitative study on the role of policies in Denmark and Germany in shaping the adoption of open standards and software in government. A comprehensive functionality test, surveys and interviews with suppliers and users in local authorities of both countries have been conducted, together with policy document analyses. While in Denmark open document standards have been bindingly introduced by legislation, Germany adopts a blended top-down and bottom-up approach, only providing recommendations. Although, as a result, it seems that Denmark ranks much higher in the adoption of open document standards, the overall picture is blurrier, as for instance only a small minority of public employees use open source software. The authors also suggest that the need for open standards might actually be overstated, as the rapid adoption of e.g. the PDF document format has made it in practice almost irrelevant.

Keywords: Electronic government, Open standards, Public policy, IT governance.

1 Introduction

International standardization bodies, industry forums, such as the Open Forum Europe, and the open source software community have been seen as aiding government by providing better and cheaper software since the market mechanisms are argued to be more transparent and with less entry and exit barriers, less switching costs, positive network effects, and reduction in path dependency [1]. Massive markets, such as the Chinese public sector, are the best examples of this. To facilitate increased supply-side market competition and smoothen the exchange of data within government and between government and citizens, companies, and NGOs, governments in various countries have pushed for open standards in the exchange of documents. However, governments have been challenged by the diffusion of, for instance, the

PDF format, whereby most of the documents that do not require editing can be exchanged. Moreover, besides open document standards, there are various other open standard challenges that also call for policy attention: the exchange of data between public authorities, document and management systems, e-procurement, digital signature, and IT security [2, 3]. Hence, governments are caught in a prioritization challenge: should policy saliency be given to open document standards, or to open procurement software standards? In the two cases explored in this paper, we argue that, perhaps due to this tricky dilemma, policies on open document standards appear to touch upon only a small part of the challenge, and lack to ground the policies in actionable settings. Therefore we argue that the policies are "one inch wide and one inch deep".

The role of environment and institutional intermediaries to shape and impact the diffusion of information systems are well researched in the information systems community – e.g. [4-7].

Relying on an in-depth qualitative and quantitative study of the Danish and German government initiatives by national parliaments, in which the authors of this paper independently have been involved as national experts [8, 9], we investigate the policies and diffusion of open standards and software in Denmark and Germany. In the Danish case, a comprehensive functionality test, a survey with suppliers and users in the 100 Danish municipalities, as well as an expert group analysis have been conducted [8]. In the German case an extensive survey with 214 municipalities and follow-up interviews, as well as document studies [9] form the empirical foundation for the mapping of governance drivers in this paper.

2   Prior Research and Framework

We have adopted a framework we have earlier used in an analysis of government policies on driving e-commerce adoption forward [4]. Although the objectives of the governance efforts are different, the appeal of the framework is that we take into account global and national environment drivers that are only marginally controlled by national government. We have chosen to categorize the environment drivers into four main categories: industry structure, information infrastructure, financial and human resources, and social/cultural factors.

Various authors have pointed to the role of institutions in innovation and diffusion [5, 10, 11]. We support the notion of institutions and argue that there is a need for conceptually refining our analysis of governmental actions. We have identified four sets of governance actions stimulating open source and document standards diffusion: 1) pedagogical and discourse initiatives (knowledge dissemination e.g. through open source and document standards seminars, materials aiming at improving knowledge, etc.); 2) economic initiatives (e.g. the provision of subsidized pricing for network services, as well as direct subsidies of open source and document standards activities); 3) normative initiatives (e.g. directives and legislation on syntax rules, data dictionaries, etc.); and 4) organizational management [12-14].
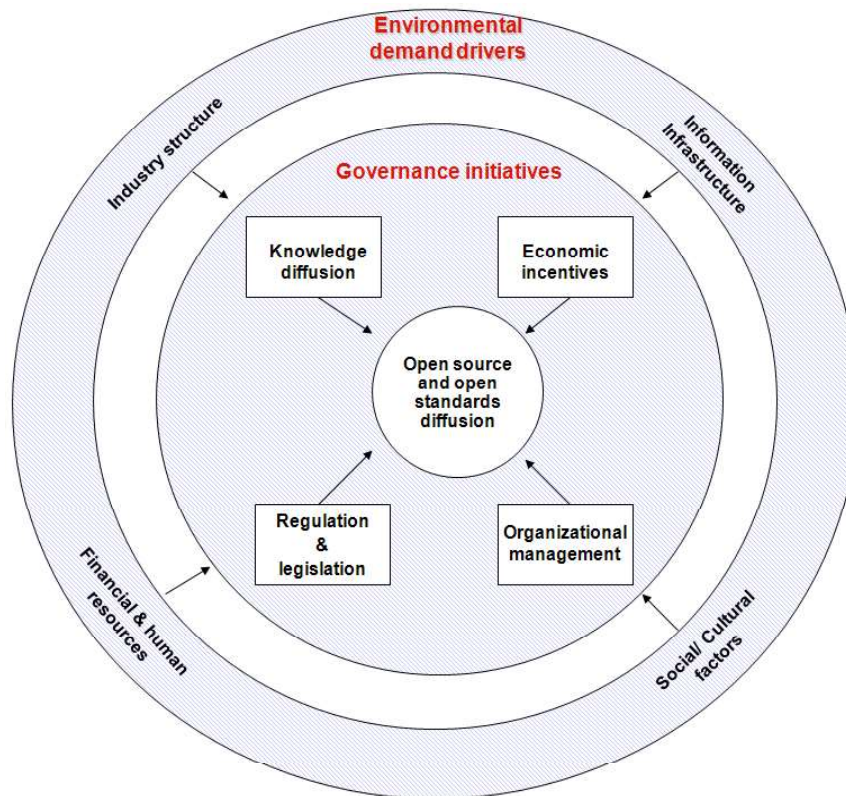
Fig. 1. Framework for identifying demand drivers and policies. Source: Adapted and modified from Andersen et al. [4].

3   The German Case

3.1   Demand Drivers for E-Government Solutions

Germany is a federal republic consisting of 16 federal states. The German e-government initiatives have been fostered in the last years on a federal level. The federal ministry of the interior established an e-government unit, headed by the German federal CIO, which regularly published the Standards and Architectures for E-Government (SAGA) [15] document. This document is made of three main sections: technical standards, data standards and software architectures. The central governance, which is underlying this approach, is the classification of technologies for public usage. The focus of the document is a replacement of proprietary solutions through open source standards. Norms, concepts and architectures are assessed using a pre-defined procedure: 1) suggestion of a norm, standard or architecture through a publicly accessible discussion forum; 2) assessment of the suggestion by the SAGA author team; 3) discussion of the norms, standards and architectures; 4) acceptance of the suggestions by a formal vote of the KBSt; 5) incorporation of the standards into the SAGA document.

   Based on the given structure of SAGA and the federal e-government initiatives in Germany, it becomes obvious that the federal structure with the fine granularity of interaction between municipalities, federal states and federal government is creating severe obstacles. Consequently, the acceptance of the SAGA standard in Germany is

mediocre [16]. Since the first publication and utilization of SAGA in February 2003, the German government has followed a dual strategy. On the one hand, certain parts of interoperability standards are binding for all federal institutions. On the other hand, in many issues the decision whether to apply the standard or not is left over to the individual IT project leader.

Until 2003 there was no centrally defined standard document available. Hence, a strong "bottom-up" growth of infrastructural decisions has been made.

3.2 Policy Instruments Applied

The state Schleswig-Holstein has, as a first federal state, started to establish an e-government law. This outlook shows, that – next to the federal regulation by the introduction of obligatory standards through SAGA – individual states start to regulate the sector in which the federal rules do not bite.

Knowledge transfer is one of the core issues in e-government development. Therefore, the German ministry of the interior has created several initiatives in which current developments of e-government concepts are fostered through regular exchange of ideas and conferences (e.g. DeutschlandOnline, E-Government 2.0 and BundOnline 2005, and so forth).

3.3 Assessment of Policy Effectiveness

Generally, SAGA e-government standards are well accepted in German municipalities. In the study, conducted by Veit and Parasie in 2007, 214 German municipalities, which are organized in the German Association of Municipalities, were asked about their acceptance of the SAGA standard. The results show that 88.4% of the German municipalities know the SAGA standards. 55.8% actively use them in their IT project implementations (for details cf. Veit and Parasie [9]).

Measured on a 5-point Likert scale (1=strong acceptance; 5=no acceptance) the overall-acceptance of SAGA was 2.66. Technical standards and data standards were accepted slightly better (2.40 and 2.57) where the recommendations of software architectures were taken up worst (2.90). Interestingly, also the "one for all" implementations, which is an initiative to share solutions implemented by one institution for many others is taken up worst (3.74).

The latter issue, together with the question of a stronger utilization of open source in e-government, has been content to another study conducted by Reifsteck, Parasie and Veit [17]. The same German municipalities were asked to what extent they are cooperating while creating e-government solutions.

In the German e-government standard, the use of open source software is suggested. The survey shows that already 74% of German municipalities consider open source software solution when making a decision about infrastructural development, primarily within servers (54%), desktop applications (26%), and internal administrative systems (23%). In the external utilization of open source software at the front-end application at the interface to the citizen and businesses is rather low.

The main obstacles for using open source in e-government applications are seen in the missing interoperability among the open source solutions and between commercial and open source modules (73%), in the lack of support (68%) as well as in a lack of know-how about open source solutions (46%) – see Figure 2.
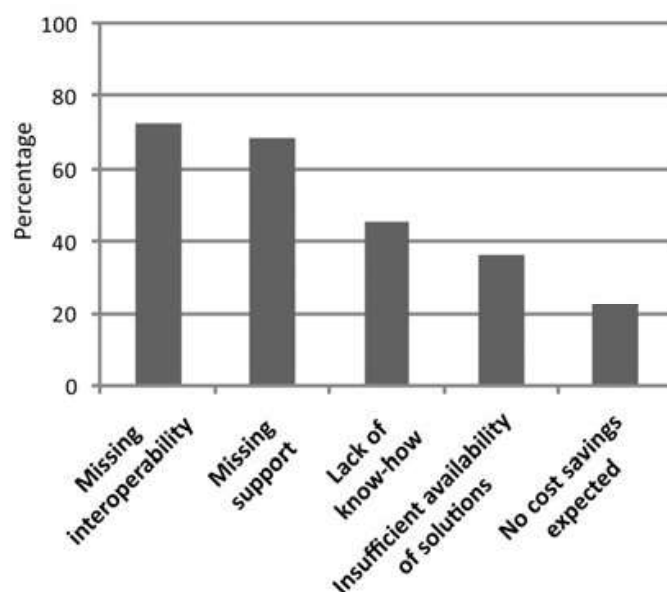
Fig. 2. Obstacles for using open source software in Germany

4   The Danish Case

4.1   Demand Drivers

With 60-70% of the Danish GDP being re-allocated through government and about one third of the workforce employed in the public sector, it is hard to find another case where the public sector plays such an equally critical role in an economy that has, at the same time, managed to stay efficient in the global economy.

In Denmark there has been a long tradition of strong local government, requiring extensive use of IT. Moreover, the 275 municipalities and 14 counties that existed in the 1970s were reduced to 99 municipalities and 5 counties in 2007. These mergers of have been a key driver for an increased awareness of the need to be supported by the use of IT.

In a survey from Statistics Denmark, among the barriers to the use of open source software the failure to adapt to back-office systems has the greatest importance (78%), followed by the barriers of uncertainty about product maturity (75%).

4.2   Policy Instruments Applied

In June 2006 the Danish Parliament adopted on a resolution on mandatory open Standards. Open standards should be part of the basis for government development and procurement of IT software to facilitate competition. The majority of the parties accepted that the resolution should not result in increased costs for the government.

The IT and Telecom Agency has established a software forum (softwarebørsen). As of May 2009, 57 open source software project has been uploaded to this forum. A series of guidelines concerning the use of open standards has been produced.

In the organizational management category, Denmark has established a digital task force directly under the Ministry of Finance and a corresponding board with members

from the local authorities, regions, and national government. This tri-part consensus model has the advantage of creating a forum to meet and agree on strategies. However, parallel to this, the Ministry of Science has launched a strategy on open source and open document standards. There are various incidents of disagreement and intense fights between the two units on how and where to push open standards.

4.3 Assessment of Policy Effectiveness

One possible quantitative indicator for whether the Danish open source policy has been effective is the adoption rate of open source software in government. By computing the data collected by Statistics Denmark [18], we have mapped the adoption and use of open source software in the public sector. Also, we have computed data for whether open source software is used on the public sectors' own servers and at the employees' PC. The data covers the period 2004-2008, collected annually.

The adoption rate is impressive in doubling the number of institutions that has bought open source software from about 25% in 2004 to well over 50% in 2008. However, looking at data for employees' use of open software standards at their own PC, only 8% are using open source software.

The data on spread of open document standards are also leaving the effectiveness of the policy in a blurry picture. 86% of the public sector authorities can receive ODF/OOXML document formats but less than 5% of the authorities have any flow of these. Instead the PDF format has been adopted widely as the format to send document back and forth to citizens.

5 Discussion and Conclusion

Policy drivers in Germany and Denmark have very different composition and timing. In Denmark, open document standards have been bindingly introduced by federal legislation. This has a strong positive impact on interoperability. In Germany, on the other hand, open document formats are just a recommendation by the federal IT coordination unit. Hence, a homogeneous interoperability in Germany is far beyond the reach of today's standardization efforts. Although Denmark has had a lot more proactive and early-on regulation, the output is less impressive. Although almost all government authorities have adopted open document standards, the active use in G2C and in G2G is at a lower level than in Germany. The top-down approach followed in Denmark is contrasted by the combination of a bottom-up with a top-down approach taken in Germany. Because if the complexity of IT architectures and infrastructures, this is dangerous and likely prolongs the phase of a highly fragmented, heterogeneous public IT landscape in Germany. However, strong efforts are undertaken in order to empower the central guidelines published by the office of the CIO in the federal ministry of the interior.

Table 1 summarizes the differences between the two countries' policy drivers regarding normative regulation, economic and financial incentives and regulation, knowledge transfer, and government practice.

Table 1. Comparing policy drivers in Germany and Denmark

	Germany	Denmark
Normative regulation	Federal e-government standard document has been published in March. No binding legislation is passed; Intense disputes between software providers, government and consultancies about a resulting market distortion.	Formal regulation passed by Parliament to make open document standards mandatory for all public authorities; Intense disputes between software providers, converter suppliers, and government; International standardization bodies and national regulation at odds.
Economic & financial incentives and regulation	Heterogeneous requirements in different federal states; Heavy disputes between federal institution and federal states; Open source competence center established at the federal IT office; Sharing of "one for all" applications.	Requirement of providing explicit business case calculation for all IT investments larger than 10 million DKK (ca. 1.5 million Euro); Open source software exchange forum established.
Knowledge transfer	Open source has been identified as major contribution to public IT; Knowledge exchange by federal initiatives like E-Government 2.0 and DeutschlandOnline.	Practical guidelines for how to solve converter challenges published at the National Telecom Agency's website; Open source and open document forum established with participants from local, regional, and national/federal level of government.
Government own practice	Seen as an opportunity to avoid vendor lock-in and create a more diverse software landscape; Strong formalization of data formats and interoperability standards in federal government documents	Seen as vehicle for adoption of open source in other sectors; Relative limited use of open source standards in software developed by government itself; Open document standards are rarely fulfilled in back office or G2G exchanges.

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