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Abstract

Technological advances such as the creation of bandwidth, modular applications and cloud computing have enabled the creation of a distributed collaborative sourcing model named Software as a Service (SaaS). SaaS presents the embodiment of a new service delivery model in which a service provider is delivering its electronic services over the web to many users on a pay per use or period basis. SaaS is still unexplored in the public sector context and its use has been limited. Based on interviews and a group session the main challenges for adopting SaaS are explored from the government perspective. It was found that SaaS could provide many benefits which are related to the outsourcing of the local control, installation and development of software which could result in potential cost-savings and better cost control. Disadvantages and risks are related to the more difficult control of the IT function. Several items were mentioned as both a benefit and disadvantage, as this will be dependent on the organizational arrangements. There are also many challenges that need to be addressed including ensuring the quality, privacy, security and business continuity which require the implementation of organizational changes and governance mechanisms for public sector organizations that are considering SaaS.

Keywords: Software as a Service, Cloud, Sourcing, Adoption, Diffusion, Public sector, E-government.

1   Introduction

Government agencies are in various stages of development and are looking for ways to improve their service provisioning, while at the same time looking for ways to reduce their costs due to severe budget cuts. It is often argued that there is a need for restructuring structures and processes to improve efficiency and effectiveness (Beynon-Davies, & Williams, 2003). One way of restructuring the IT function is by embracing the software delivery model named Software as a Service (SaaS). This can be viewed as a new type of sourcing model in which IT-based services are provided over communication networks to users.

The Software as a Service concept has been heralded as a new way of software service provisioning, as it enables for the faster implementation of software changes (Bennet, et al., 2001) and allows to get rid of the own installation, control and maintenance of the IT function (Gonçalves & Ballon, 2011). SaaS is based on the concept of delivering software in the future as a service rather than as a product (Bennet, et al., 2001). The user pays a certain fee for the use of the software or for a certain period that the software is used. SaaS providers host and provide access to a software application over a network. This type of sourcing model enables the development of a service only once and provides it to many users. Companies in the IT industry are already moving to a web service delivery model by exposing network capabilities and combining these with online content and applications (Gonçalves & Ballon, 2011). Within e-government there is an opportunity for a similar shift. SaaS can be provided by organizations within the public sector, but also by private companies residing outside the public sector, thus providing at least two ways of sourcing. The use of SaaS might provide the opportunity to lower cost, but also to deliver software applications to end-users over the web, providing a much more flexible experience in terms of time and location of access (Gonçalves & Ballon, 2011). Although the current literature focuses primarily on business-oriented SaaS services (Gonçalves & Ballon, 2011), within the public sector there are some notable and visible examples of SaaS as well. This includes the use of office applications provided by the SaaS model and the use of services to the citizens. In the latter situation the services provided by a SaaS provider are integrated in the website of the agencies responsible for providing the services and the data is communicated to the agency to enable the processing. In both examples the governmental agencies do not have to develop or maintain the services in-house and rely on the SaaS provider.

The business rationale for SaaS is driven by the movement of the software maintenance and control to the SaaS providers. It is often argued that SaaS has implications for both businesses and management (Olsen, 2006) and SaaS will change the relationship between buyer and seller (Sääksjärvi, Lassila, & Nordström, 2005). Yet, the specific benefits, risks and adoption challenges for government are unexplored. The goal of this paper is to understand the possible benefits, risks and challenges of the SaaS model in the public sector. This paper is structured as follows. In the next section, the background of SaaS and related developments such as cloud computing are discussed. Next, the research approach is presented, followed by a discussion of the findings. Finally, conclusions are drawn.

2   Background

2.1   Shift in thinking about software

Whereas in the past software was bought and locally installed and maintained, the SaaS models resemble a fundamental new way of thinking in which software is rented and remotely provided. SaaS has existed almost for a decade and has been advocated for a faster implementation of software changes and focus on the demand-side (Bennet, et al., 2001). SaaS can be viewed as a logical success of the Application Service Provider (ASP) model. ASP use can be considered as a type of IS outsourcing of telecommunication-based application services (Smith & Kumar, 2004), using networks

to provide online application services on a rental basis (Tao, 2001). Recently several technological advances have made it feasible to sell computing as a service rather than a product:

1. *Cloud computing*. Cloud computing enables the scalability of software at low cost, making it feasible to provide software services to a large user base at low costs.

2. *Bandwidth*. Availability of bandwidth enabling connecting almost anywhere at any time.

3. *Modular software*. Modular design of service enabling the decoupling of functionality and configuration and composition of services as preferred by users.

SaaS is a software delivery model in which services are installed, assembled and maintained on the systems of the SaaS provider and used by others over the Internet. The user pays a certain fee for the use of the software or for a certain period that the software is used. The latter case is like a subscription that can easily be terminated as no large investments need to be made. The software ownership often remains at the SaaS provider of the software, although this is not necessary. In traditional models, licence buying or software development costs are high, but the variable cost of sale is substantially lower than for hardware. In the SaaS model, no large upfront investments are needed, but the variable costs can be substantially higher. Payment might be dependent on elements such as the number of users and the expected lifetime of users. The basic long-term vision of SaaS is centred around separating software possession, maintenance and ownership from its actual use. SaaS providers will often not only provide one service of a certain software suite, but might typically provide a bundle of software services, although models are possible in which SaaS services are provided by the company who has developed the software. By delivering a set of software as services, the idea is that many of the present limitations constraining its use, deployment and evolution can be overcome. The shift in offering services also has implications for the SaaS providers' revenue models. Traditionally, the customer buys a license to use an application and installs it on their owned or controlled hardware. Over time new updates can be installed, including security patches and other control and update activities. By buying a license, the customer gets unlimited usage of the software. Per user or per installed system additional licenses might be necessary. In contrast, in the SaaS models the user does not buy a lifetime license. The user pays a certain amount for the software running on a third-party server and loses access when he ceases payment. This can be done on a pay per use or pay per period basis. The payment can either be charged as a pre-paid subscription or on a pay-as-you-go basis. Table 1 summarizes the main shift from traditional software to the SaaS delivery model.

Characteristics	Traditional software	SaaS
Ownership	Buying of software	Renting of software without taking ownership
Pricing model	Upfront investments and costs for local installation/maintenance incl. licenses	Pay-per-use or pay-per-period
IT function	Buys, installs, develops, implements and maintains their own software	Subscribe, plug in and use: no need for an IT function and no concern of updates
Expertise needed	In-house software expertise needed for control and maintenance	Usage expertise required

Table 1. Shift in emphasis of the main characteristics

2.2 SaaS and its relationship to SOA and cloud computing

SaaS is often running on top of a virtualization layer, which can be considered as part of the cloud. The software is often constructed based on Service-oriented architecture (SOA), but SaaS is a type of business model which originates from a fundamental change in thinking and should not be confused with SOA. The SOA paradigm focuses on building information systems by discovering, matching and integrating pre-developed services (Linthicum, 2004) and should be viewed as an architectural model for developing software. In contrast SaaS should be viewed as a new business model for the delivery of services. Nevertheless we view modular architecture and SOA as one of the enablers of SaaS. The

basic idea of SOAs is to decompose a system into parts that are made accessible by services, to design these services individually and to construct new systems using these single services.

SaaS and clouds are interrelated as clouds are often viewed as the technical platforms to install the software for the SaaS services and ensure aspects like scalability, reliability, speed of response and so on. There is no consensus about a definition of clouds. Generally, clouds offer resources on demand (Rosenthal, et al., 2010) from which application services can be accessed over a network (Buyya, Yeo, Venugopal, Broberg, & Brandi, 2009). In essence it concerns the pay and use of distributed, low-cost hardware. Rosenthal et al. (2010) provide a set of features of cloud computing. Janssen and Joha (2010) add a seventh and eighth essential characteristics based on the idea that a cloud is a distributed system that is presented as one infrastructure that provides services based on service level agreements. These characteristics are resource outsourcing, utility computing, large number of (inexpensive) machines, automated resource management, virtualization, parallel computing, data access control and service level agreements. Like in SaaS, in most clouds charges are paid per use or period. A cloud consists of large farms of inexpensive servers which are distributed over several locations. The basic idea of the use of clouds is to shift the responsibility to install and maintain hardware and basic computational services away from the user to the cloud vendor (Rosenthal, et al., 2010). The cloud vendor should ensure security and data access control mechanisms. In a cloud there is a dedicated pool of hardware and virtualization software that can be used to support a variety of tasks and provide services to the cloud participants.

2.3   SaaS and its relationship to sourcing arrangements

Outsourcing is about the contracting out or selling of the organizations IT function to a third party vendor who in return provides the service for a certain period of time and for a certain amount of money (Willcocks & Kern, 1998). Outsourcing arrangements address the relationship between one client having one or more external vendors, whereas shared service arrangements address the relationship between many clients and one vendor, which belong both to one and the same organizational entity (Janssen & Joha, 2006). Outsourcing has become one of the strategies adopted by businesses to manage their IT function (Gonzalez, Gasco, & Llopis, 2006). Gurbaxani (1996) concludes that the nature of outsourcing is changing in significant ways and that the strategies and options managers can pursue are becoming more diverse and varied. He also concludes that outsourcing solutions appropriate in one instance might be counterproductive in others.

SaaS can be viewed as a type of sourcing arrangement, in which the SaaS providers can be viewed as a specific type of outsourcing provider. Whereas there is limited literature about SaaS, there is a wealth of literature on outsourcing (Gonzalez, et al., 2006; Lee, Huynh, Kwok, & Pi, 2003). There are many theories underpinning sourcing theory and its decision-making process. Lee et al. (2003) and Jayatilaka, Schwarz, and Hirschheim (2003) provide an overview of sourcing theories including transaction cost theory, core competency theory, resource-based, power-political and organizational theories. In the domain of sourcing the relationship between service providers and service requesters has been suggested as a critical role. Outsourcing research can be viewed from the strategic, economic and social perspective (Lee, Huynh, Kwok, & Pi, 2000) and from strategic and organizational, political, technical and economical dimensions (Baldwin, Irani, & Love, 2001). Lee et al. (2000) provides five major research areas: organization, performance, decision, contract, and relationship. We will use these research areas to explore SaaS in the public sector.

3   Research approach

SaaS has not been researched yet in the public sector and there is limited experience in this field. As the goal of this paper is to understand the possible benefits, disadvantages and challenges of SaaS in the public sector, we opted for conducting interviews. Interviews will allow us to explore and in-depth discuss the concept of SaaS and in this way create a better understanding of the possible challenges for adopting SaaS in the public sector. In addition, reports about SaaS in the Dutch public sector were

studied, although the number of reports was limited. All interviews were conducted using open-ended questions, informed in many ways by our understanding of SaaS and outsourcing as presented in the background of this paper. The interviews lasted between 1 and 2½ hours and covered the main characteristics of SaaS, advantages, disadvantages and risks (strategic and organization, political and legislative, technical and economical), suitability of the concept for the public sector (type of organizations, services, arrangements), adoption challenges (organization, performance, decision, contract, and relationship), practical challenges and research challenges.

The interviewees were selected to cover a wide range of aspects and to ensure that different views were included. Thirteen interviews were held with IT-managers, outsourcing specialists, outsourcing and SaaS decision-makers and IT-experts from a variety of public organizations, including the tax authority, social security agency, Ministry of the Interior and Kingdom Relations, municipality association and two municipalities. Interviewees covered persons that were already using SaaS as well as those who are considering the use of SaaS or did not decide to use it. Questions with respect to the benefits and risks, organization, performance, decision, contract, and relationship were asked. This analysis should increase our knowledge of the potential use, benefits, risks and challenges of SaaS.

4 Findings

4.1 Benefits and disadvantages

The four categories classified as strategic and organizational, political, technical and economic were taken as this categorization is commonly used in outsourcing (Baldwin, et al., 2001) and shared services (Janssen & Joha, 2006).

SaaS benefits	SaaS disadvantages and risks
Strategic and organizational	
• No installation and maintenance of software • No software expertise necessary • Focus on core business • Sharing of software installation and enrolment risks with SaaS providers • No need for human resource management of IT staff • Solving scarcity of IT staff • Improved time-to-market • Opening up new software applications otherwise out-of-reach and enabling innovation	• Need for contractual expertise • Reliability and long term sustainability of SaaS providers • Lack of technical expertise and experience • Difficulty to switch from provider • Risk of lock-in • Less customization opportunities • Integration of software from various SaaS providers. • Lack of innovation and no grip on further development and standardization
Political and legislative	
• Eliminate the need for an ICT-department • Eliminate the need for the governance of IT • Increased accountability • Increased control • Higher service levels that are required • Transparent payment (per use)	• Quality assurance • Ensuring accountability of service providers • Data ownership • Less influence on developments • Privacy control • Ensuring that SaaS providers follow standards and guidelines • Jurisdiction and applicability of law • Interruption or termination of services due to lack of payment
Technical	
• No complicated license management • No complicated versioning control and update concerns • No patching and other maintenance activities in house	• Problem shift to composing and integration • Assurance that data is back-up and can be recovered • Access control and security • Loss of data in case of bankruptcy of provider

• Get rid of legacy systems • Speed of installation always up-to-date • Reduction of overcapacity of hardware (memory and processes) • Back-up and recovery ensured by SaaS provider • No need for having in-house user support	• Identification and authentication • Information sharing among software from different SaaS providers • Performance management and scalability issues • Users utilizing applications running on the same server
Economic	
• Access to software without needing upfront investments • Economies of scale by spreading the costs of innovative solutions over many customers • Less direct costs • Control and predictability of IT costs	• In the long term higher indirect costs by additional management, control and security efforts • Dependency on SaaS provider resulting in higher (transition) costs

Table 2.   Benefits, disadvantages and risks of SaaS

Table 22 shows the overview of the benefits, disadvantages and risks of SaaS that were identified. The political aspects were extended with aspects related to legislation. The main benefits are attributed to not having to install, control and maintain software. Instead software can be used immediately without having to have a large server park and in-house ICT specialists. Other advantages are the potential economies of scale in development, maintenance and distribution costs (including license management, patching, up-to-date software, back-up and recovery and user support), more predictable payment and no need to make large investments. This is related to having a less complicated IT function. The possibility of spreading the costs over many customers was mentioned by many interviewees, as this was viewed as a possible way to deal with the budget cuts. SaaS can significantly alleviate software costs, as companies would be able to subscribe to services for short periods of time. The one-time use of statistical and drawing software was given as an example. Sääksjärvi et al. (2005) give an overview of 12 benefits and 4 risks as found in literature. The resulting list from the interviewees is longer and shows more challenges and concerns than discussed in previous literature. This can be attributed to the risk-averse attitude of many government employees and to the concern of meeting public values like privacy and security. The SaaS concept was viewed as more appealing for its low investment costs, no need for having expertise required for managing a complicated IT function, the access to software that would otherwise be out-of-reach and enabling innovation as depreciation of existing software hindered the buying of new software.

Some benefits were also mentioned as a disadvantage and the other way around. Innovation was given as a benefit, but at the same time there were concerns about the possibility to steer development in the right direction to ensure software innovation and customization. Also security was mentioned as both a pro and a con. SaaS providers could be specialized in providing secure applications and access to data and in this way ensuring higher levels of security. However, another possible scenario is that the SaaS provider has limited expertise, data is shared with other users that might be fraudulent and no insight is given about the number of attacks and security breaches.

When looking at the disadvantages, it can be concluded that they are often risks that might result into some undesirable effects. They were especially related to exposing or losing critical data, violation of privacy and potentially losing control of data exchanges. Another complication might be if the data is stored outside the country and other legislation is applicable to the data. Transferring the control to a third party creates often the feeling that control is given away. Many of the interviewees were asking questions like how they could be sure that the data was not given away, that they could detect intruders and ensure a high level of security. Additionally, failure to pay in time might result in the termination or interruption of the service and data loss, which should be contractually ensured. Private SaaS providers might get bankrupt and not cooperate when asking for a transfer of data to switch to another provider. Not all interviewers were convinced of the benefits of SaaS. The use of the SaaS model makes many issues easier like license management, ensuring security patches and software updates, upgrading to new versions, back-up and recovery mechanisms and user support. As such, the

control and execution of the IT function becomes simpler and easier. The IT manager can concentrate on acquiring the desired functionality at the right quality and the sourcing of this functionality. This is a shift towards functions that are more strategic in nature. One interviewee formulated that "SaaS provided us the opportunity to get rid of those cumbersome control and maintenance functions, which caused me a headache several time (...) now the management of the SaaS provider and ensuring that they are up-to-date causes me headaches. I'm not sure if this has solved any of our problems". Several persons had the same vision as this interviewee and they viewed the SaaS model as a shift in the type of problems that need to be managed. On the other hand one interviewee indicated: "I really prefer to handle these types of problems instead of having to ask my staff to code a way around". Similar findings are found in outsourcing literature, as Lacity and Willcocks (2002) argue that there is unlikely an agreement of cost-savings among stakeholders, due to differences in opinion about what should be measured and how it should be measured, and to which situation it should be compared with.

The question about the suitability of the SaaS model for public sector organizations revealed that many of the interviewees viewed the SaaS model as especially suitable for small public agencies, that have limited resources for operating their own IT function. In this way they can escape from having an expensive IT function. In light of the risks, shared service centres were often mentioned as the organizational concept and preferred type of service providers for providing and hosting the SaaS. Such a center could ensure the reliability, high levels of security, accountability and privacy. For larger agencies, advantages were especially viewed for the provisioning of standardized software that needed to be accessed anywhere at any time. More specific software was considered as less appropriate. Yet some remarked that this might be a matter of time. The interviews show that the SaaS model can provide many advantages, but that these might be seriously hampered by many risks that need to be dealt with. The choice for SaaS is not only a trade-off between the benefits and risks, but also the management ability to deal with the challenges that will be discussed in the next section.

4.2   Adoption challenges

The study of outsourcing has progressively increased ever since its start in the 1960s (Gonzalez, et al., 2006). Gonzalez found that the articles were mainly empirical, in which field studies were the preferred method and were aimed at trying to explain outsourcing. Over the years new topics have appeared like the impact on staff and offshoring. The adoption challenges that were found, show the clear need for addressing a broad range of issues. Furthermore, many of the interviewees were interested in prescriptive models of SaaS and to understand which arrangement is preferred in which situation. This should support them in making their decisions and implementing the right SaaS model. We will discuss SaaS adoption challenges following Lee et al.'s (2000) classification of five major research areas: organization, performance, decision, contract and relationship.

4.2.1   Organization: Creating and managing SaaS services

The choice for SaaS is an important decision having a long-term and strategic impact as it requires a lot of organizational changes in order to adopt and manage this new service delivery model. This will have consequences for the way SaaS needs to be budgeted, planned and staffed. Changes at the strategic level involve ceding control over how certain processes and IT systems are designed, run and managed, while changes at the operational levels involve dealing with more frequent software upgrades, the requirement to provide more and different end-user support and removing control over certain components of the enterprise operating environment from the IT group. In literature it was already acknowledge that software providers need a complete shift in paradigm (e.g. Olsen, 2006). The interviewers revealed that there is also a large change in the governance, structure of IT and capabilities necessary from governments.

Most of the interviewees indicated the need for developing new types of capabilities to deal with SaaS. One interviewee formulated this as "there is a shift from technical issues to expertise and knowledge in sourcing and developing management capabilities to control the relationships". This types of shift

when moving to outsourcing can also found in literature, as for example Feeny and Willcocks (1998) discuss the need for certain core capabilities for exploiting information technology and outsourcing. Several of the interviewees indicated that developing the capabilities from organizational experiences, thus by accumulation from the past, was not a good option and this might result in a failure. They indicated the need to find out which capabilities are required and ensuring that investments can be made and organizational structures and routines are in place before the SaaS model can be used on a large scale. By developing them first and experiment on a small scale the intricacies and required expertise can be identified. Furthermore, it was argued that capabilities are needed covering the whole life-cycle of SaaS. Among the interviewers there was no consensus if there would be a best model for organizing SaaS. It might be that there is a need for trade-offs to accomplish certain advantages and motives. This idea is also found in outsourcing literature as Hirschheim and Lacity (2000) found that a best practice associated with one motive is by definition in conflict with the best practices prescribed for the other motive.

The interviewees were very reluctant to move to SaaS on a large scale without any assurances. The primarily reason for this is that SaaS customers do not own the system, but instead have access to a unique working copy of the data sitting on the host company's servers. The customer can access the system to manipulate and change data, but only within tightly constrained operating parameters of the SaaS provider. The interviewees suggested a careful migration and back-up strategy. The interviewees argued that applications and information that are of particular importance must initially be retained in house and run on the own IT system, but can be maintained by the SaaS providers. So if a client is using core applications and is not satisfied with what comes as part of the package with the SaaS provider, those applications can immediately be taken over by the own staff. This could imply that there are higher retained software costs for the client than may have been initially assumed, and those costs should be understood and be part of the initial business case justifying the purchase of the SaaS system. Furthermore, they were suggesting the making of clear agreements about the data ownership and what will happen in case a SaaS provider goes bankrupt, is taken over by another company, changes it terms or is changing its orientation and vision. Suggestions include having copies and storing them in the own organizations and the use of a third party enabling business continuity.

4.2.2   Performance: Monitoring execution

There are different characteristics underlying performance, not only the speed and quality of the service, but also the security and meeting the regulatory requirements. The performance will to a large extent be dependent on the quality of the used technology and architecture, the organizational governance and the predefined requirements. The interviewees indicated that it is necessary to involve the IT group in selecting and implementing SaaS solutions, as they have knowledge about issues like choosing architectural options such as single or multi-tenancy design, security and detection of intruders. Nevertheless, it is also a risk as part of the IT function might be outsourced. Therefore it is important to ensure that business unit personnel involved in the SaaS solution efforts possess adequate IT knowledge. Business unit buyers must clearly understand and account for the implications the IT architecture and functionality of a SaaS solution will have on the business processes it will support.

The selection of a SaaS provider is critical for continuity. The SaaS user might need some mechanism to monitor the performance and security, and have expertise to talk to the SaaS provider about performance needs for security and scalability. Furthermore, there must be contingency plans in place to address and account for change in control and potential provider failure. The market will endure inevitable consolidation, and do so to its benefit, but buyers must ensure they are prepared to tolerate the consolidation process.

4.2.3   Decision: Public or private SaaS?

SaaS can be conceptualized as an outsourcing decision to a party that can either be public or private. If operated by a public party, the SaaS arrangement can be viewed as a particular type of sourcing arrangement, where resources and services are retained in-house, or at least within the government,

and is comparable to a shared service centre (Janssen & Joha, 2006). The major difference is that SaaS concerns software services, without any persons executing processes, whereas in SSC persons are often involved in executing processes. In other words, SaaS concerns the sourcing of IT-services and SSC can provide not only IT-services, but also execute complete business processes. Another aspect of public and private distinction is whether the SaaS services are accessible to a public audience (for example drivers license renewal service) or whether user access is limited to government employees (for example for human resource management services). Also hybrid models are possible, where organizations may choose to outsource non-critical and low-sensitive information, while keeping business-critical services and data in their control. The latter was often preferred by the interviewees.

Most interviewed governmental representatives favored the option of sourcing SaaS to an entity within the government. This enables governments to keep close control of their privacy sensitive data, avoid potential security problems, ensure authorization, identification and encryption, and avoid legislation and regulation risks by outsourcing this to a third party and nevertheless gain advantages of this development. They were suggesting that the client organizations should be involved in the governance of the SaaS provider and have direct influence on the strategy development and priority and resource allocation. This idea is confirmed by literature as the costs and productivity increase using outsourcing brings also considerable management costs and risks which might even outweigh the benefits of outsourcing (Fowler & Jeffs, 1998).

4.2.4 Contract: Short or long term?

Good contracts were considered as essential by the interviewees, as this is an instrument to accomplish the benefits and avoid the risks. Contracts are more complicated as on the one hand it should be flexible and demands instant scaling up based on pay per use, whereas on the other hand long-term sustainability, secure software access and information storage need to be met. These short term and long term interests might be conflicting, as the SaaS provider might require that some kind of payment or longer term commitments are part of the contract.

There were huge discussions about the privacy of data during the group session. SaaS providers will often store the data in the cloud and data might be stored on systems that are shared with other public and private parties. Furthermore, the location of storage is an issue, as Dutch governments often require that data will be stored within the Netherlands to ensure that the Dutch law will be in effect. It is likely that new agencies or authorities are required to verify and control that data does not cross national boundaries and that licenses are legal. In general the contract needs to take into account on data protection and regulatory compliance issues, intellectual property concerns and contingency in the event of business discontinuity caused by the service provider. Also the risks of non-performance, and potential exit scenarios need to be contractually defined.

The use of SaaS might be related with the other of other applications and sourcing providers. The data stored by SaaS providers need often be exchanged with other data, as such the interviewees indicated that contractual agreements enabling the information exchange with others are necessary. Organizations that have already undertaken outsourcing efforts must account for those efforts when making additional investments into SaaS solutions. This is the case with any multi-sourcing effort, but while SaaS and traditional outsourcing are not mutually exclusive, the viability of their effectively co-existing in common process areas is in part dependent on the willingness and ability of the outsourcing and SaaS provider(s) to cooperate. Hence, often a multitude of relationships need to be governed.

4.2.5 Relationship: Governance of the relationships

Relationships are evolving and dynamic, which is often viewed as a success factor for outsourcing (Willcocks, Lacity, & Kern, 1999). Like in shared service arrangements (Janssen, Joha, & Weerakkody, 2007), relationships are also considered as critical by the interviewees. There is a shift in responsibilities and tasks moving from the user organization to the SaaS supplier, which also requires new governance mechanisms which are focussed on the relation with the SaaS supplier. This

relationship was directly connected to the accomplishment of advantages by the interviewees and determines whether SaaS will really result in lower costs. Uncoordinated adoption and not having the appropriate organizational and governance mechanisms in place could undercut the benefits of SaaS.

The shift from on-site software from one-to-one to one-to-many service provision will impact the relationships between the SaaS providers, its customers and developers. To use the model, a change in culture and habit is necessary; instead of having the own department and direct control the emphasis would be on the management and control of the SaaS software provider which is operating on a distance. Managers cannot drop in and ask for improvements or actions like if they were having their own department. This implies a change in the way services are delivered and whereas in an outsourcing arrangement things can be decided once the services have become operational, in SaaS arrangements it is important that already in advance future scenarios are defined and the way to anticipate on such scenarios. SaaS software might not easily be changed and changes might be difficult to realize. The interviewees indicated that it's important to distinguish between the service provider and developer role, as they might not be the same. A SaaS provider might typically provide software from multiple software providers. Most interviewees indicated that there is a need for a separate entity within the own organization that manages the SaaS provider.

Research typically distinguishes between outsourcing from the perspective of the client and from the vendor (Gonzalez, et al., 2006). This is especially important for SaaS delivery given the compliance with the Data Protection Act and potential future data regulations that will govern organizational processes. Using SaaS implies creating a dependency on the provider and dismantle the own IT function. Once the IT function is eliminated it will be hard to create a new one and insource the services. This could create a potential lock-in situation that need to be anticipated for.

As SaaS is a hosted delivery model, users may find they do not have access to the same level of service and support they get from their internal IT group or would get in an outsourcing arrangement. Supporting and training users on new functionality delivered via the more frequent upgrades enabled by the SaaS model requires skilled resources, but not all SaaS providers will offer the level of support required to meet end-user needs, especially during initial deployment efforts. As a result, SaaS buyers need to account, plan and budget for all required support requirements. In addition, the relationship at a higher level to steer the direction of software development to ensure that the software is up-to-date and matches the changing requirements in time was considered as important. The deployment of SaaS solutions can prove liberating or threatening to an IT group. One of the core appeals of SaaS applications to business units is the potential to implement them with little involvement with the IT group. SaaS is potentially liberating to the IT group in that it can enable offloading of work to support and manage business unit operations applications and systems, and free up the IT group's time to focus on other more critical issues and needs beyond deploying new software applications. The use of SaaS is potentially threatening in that it pulls architectural and operational control over components of the overall enterprise systems for which the IT group is still responsible out of the IT group's control. This can complicate operations, at least in the short run, by introducing new interfaces to implement and support, new operating practices to define and learn, and new third-party providers to manage. Table 3 provides a summary of the main adoption challenges of SaaS for each of the five areas.

	SaaS adoption challenges					
Organization	1.	SaaS vendor management	3.	Accountability structure	5.	Migration strategy
	2.	Changed IT governance	4.	New IT capabilities	6.	Service integration
Performance	1.	Speed and quality of service	3.	Business continuity	5.	Regulatory requirements
	2.	SaaS capacity management	4.	Access control & security	6.	Quality assurance
Decision	1.	Public or private	3.	Single or multi-	5.	Data ownership

		vendor		tenancy	6. Vendor responsibilities
	2.	Public or private SaaS	4.	Architectural options	
Contract	1.	Strict services description	3.	Cost & payment structure	5. Location of storage
	2.	Good contract management	4.	Data privacy & protection	6. Data exchange contracts
Relationship	1.	New governance structures	3.	Potential lock-in situation	5. Strategic alignment
	2.	Changed culture and habits	4.	User training and helpdesk	6. Managing many vendors

Table 3. Summary of adoption challenges of SaaS

5 Conclusions and further research

SaaS is a type of business model to deliver software as a service instead of owning and maintaining software locally. Whereas service-oriented architecture (SOA) can be viewed as an architectural model for developing software, SaaS is focused on the delivery of services, without the ownership of software being transferred to the users. In this research benefits, disadvantages, risks and adoption challenges of SaaS from the government perspective are identified and a comprehensive list is created. Advantages are related to easier IT control, no installation and development costs and access to software otherwise out of reach. The number of risks and possible disadvantages given by the interviewees is richer than can be found in literature. Disadvantages and risks are related to continuity, performance, privacy, ensuring the control of the IT-function, and the influence on further innovation and development directions. Some risks are caused because both software and information resides on systems of the SaaS vendor, whereas the information ownership belongs to the user. The benefits and risks are identified based on a limited number of interviews and should be extended in further research. The list can be used to support decision-making about the use of the SaaS model.

The SaaS model of service provision has the potential to become an important sourcing strategy for government organizations. SaaS requires, however, a fundamental overhaul in the organization of the IT function, as there will be a shift from local installation and maintenance to managing a remote provider who is operating on a distance. The interviewees viewed the SaaS model as especially suitable for small public agencies, that have limited resources and for well-standardized software that is provided to many users. For larger agencies advantages were especially viewed for the provisioning of standardized software that needed to be accessed any time anywhere. Despite the many advantages of using SaaS, there are still a number of challenges and risks that are not addressed yet.

Although it is acknowledged that software providers need a complete shift in paradigm, this research revealed that there is also a large change in the organizational governance, structure of IT and capabilities necessary from governments when using SaaS. There is a shift from capabilities for managing IT in-house to capabilities required for the management and governance of the relationship with the SaaS provider. Major challenges are related to performance monitoring and ensuring the continuity, security and quality. Following outsourcing literature we recommend further research in the research areas concerning the creation and management of SaaS services, performance monitoring, public or private SaaS decision, trade-offs between long and short term contractual agreements, and governance of the SaaS provider-user sourcing relationship.

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