TALLINN UNIVERSITY OF TECHNOLOGY
School of Information Technologies

Edi Arnold Kiviniemi | 194195IVGM

Service Integration and Management in Public Sector. A Case Study on Success Factors, Challenges and Risks.

Master's thesis

Supervisor: Alexander Norta
PhD
Co-supervisor: Mihkel Lauk
MSc

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Edi Arnold Kiviniemi | 194195IVGM

Teenuste Integratsioon ja Juhtimine Avalikus Sektoris. Juhtumiuuring Edutegurite, Väljakutsete ja Riskide Kohta.

Magistritöö

Juhendaja: Alexander Norta
PhD
Kaasjuhendaja: Mihkel Lauk
MSc

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Author’s declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

Author: Edi Arnold Kiviniemi

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Abstract

Service integration and multi-sourcing have become more common practices in the production and provision of digital services by the public sector in the 21st century. Nevertheless, in complex multi-vendor ecosystems, where different services from several suppliers may overlap, challenges could rise in the overall service delivery. Those challenges can turn out to be, e.g. finger pointing, a lack of collaboration, and a lack of transparency or measuring success in the end-to-end services. The main objective of this research was to investigate service integration and management (SIAM) at the chosen public sector organisations from the perspective of success factors, challenges and risks in the application of SIAM. End-to-end measuring of services, collaboration between parties in a SIAM ecosystem and governance were under special focus.

This research applied case study methodology. The main data collection methods chosen were semi-structured interviews and document analysis. The author conducted in total eight interviews with leading experts, CIOs and directors from service integrators and their customer organisations in the public sector from Finland and Denmark. The main findings revealed that the success factors are both technical and organisational, which include having a clear vision, strong strategy, understanding customer needs and their differences, and understanding the role and scope of the service integrator. On the other hand, the aforementioned attributes can turn out to be challenges or risks as well depending on the service integrator's expertise and maturity. At the end of the research, a collection of lessons learned were compiled on how service integration and management can lead organisations to the desired benefits and success.

This thesis is written in English language and is 43 pages long, including five (5) chapters, one (1) figure and six (6) tables.

Keywords: Service Integration and Management (SIAM), ICT-Services, IT Service Management, The Nordics, Service integrator, End-to-end Services

List of abbreviations and terms

CIO	Chief Information Officer
ICT	Information and Communications Technology
IT	Information Technology
ITIL	Information Technology Infrastructure Library
ITSM	IT Service Management
KPI	Key Performance Indicator
NGO	Non-Government Organisation
NPS	Net Promoter Score
OECD	Organisation for Economic Co-operation and Development
SIAM	Service Integration and Management
SLA	Service Level Agreement
VPN	Virtual Private Network

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1 Introduction

Governments and public sector organizations are on the lookout for new ways to improve the productivity of services and work in the public sector. The need to change and reform is not a new challenge in public administration and public management [1, pp. 26-27]. In today's world, ICT is in an ever important role enabling higher productivity than before and keeping most of public services up and running 24 hours a day.

A term that has slowly gained more awareness in the past decade or so is called service integration and management, or SIAM for short. SIAM originated in around 2005 from within the UK public sector, where the purpose to its creation was to obtain better value for money from services delivered by multiple service providers for the government departments [2, p. 29]. The new approach introduced the concept of a "service integrator", which purpose is to provide governance, management, integration and assurance to ensure that the customer organization gets maximum value from its service providers [2]. In public sector context, customer organizations can be, for example, ministries or public agencies. SIAM can be also applied to non-IT services, but in this thesis the scope is on ICT infrastructure and end user services. Additionally, SIAM is applicable also for managed services, cloud services and more traditional IT services, such as hosting and end user computing [2, p. 38].

The motives for establishing a SIAM model are to have a greater and faster access to best-of-breed services, assigning accountability and control for the integrated delivery of services to one entity that specializes in service integration capability, cut down acquisition costs by utilization of economies of scale and ultimately lead into improved service quality. The service integrator provides the customer with a single point of accountability for the integrated delivery of services and encourages service providers to work together to drive down costs and improve service quality [2]. Along with the anticipated benefits comes a set of challenges that one needs to be prepared for. Typically, SIAM implementation projects are long and resource intensive endeavors, but challenges can arise and be present even in the everyday service production and delivery. In the next subchapter the typical challenges are elaborated in more detail.

This thesis is divided into five main sections. In the Introduction chapter, the topic, problem statement and research objectives are presented, and it sets the frame of reference for the rest of the paper. In the second chapter, the relevant theories and earlier studies on this theme are introduced to the reader. The third chapter is about research methodology that gives a detailed explanation about research methods used and the research questions. In addition, the data collection, validity and data analysis procedures are explained. The fourth chapter is dedicated for the results and findings from the interviews. The fifth and final chapter summarises the thesis by drawing conclusions and giving recommendations for future research in this domain.

1.1 Problem Statement

Sourcing services from multiple suppliers, internal and/or external, to an organization's IT service environment allows flexibility and having access to best-of-breed services from the market. Nevertheless, adoption of SIAM methodology to organization's strategy and starting to work with multiple suppliers is not a guaranteed path to success. There are still many potential grey areas where things could go wrong, not only during the designing and implementation of service integration, but even in the day-to-day service production, once the new ways of working have been set up.

In complex multi-vendor ecosystems, where different services from several suppliers may overlap, challenges could rise in the overall service delivery. Goldberg et al. in an earlier study found out that when things are not going well and service levels are not met, it often leads to finger-pointing between people and no one's taking ownership. A lack of collaboration between providers, a lack of transparency, as well as insufficient understanding of end-to-end services might also lead to issues in the overall service delivery and keeping customers happy [3]. A big challenge in having many suppliers providing services to an organisation is getting them to work together towards common goals [4]. Moreover, measuring services and service levels end-to-end has been identified in literature as one of key challenges in service integration.

With regards to problems highlighted above, this research sets out to study the key success factors, bottlenecks and risks around service integration, measuring of services and collaboration between the key actors. This study focuses specifically and solely to service

integration taking place in the public sector from ICT infrastructure and end user services point of view.

1.2 Research Objectives

This research is by nature an exploratory case study. The purpose of an exploratory case study is to find out what is happening, seeking new insights, and generating ideas and hypotheses for new research [5], [6]. This research aims to provide an understanding to the application of service integration practices and processes in the public sector concerning ICT infrastructure and end user services, and to discover new information. More specifically, the research has the following objectives:

1. Explore factors enabling or hindering service integration that have been identified in earlier studies and literature.
2. Describe the motivations for moving to a service integration model.
3. Examine the application of service integration practices in real-life context.
4. Study and analyse the key success factors and challenges in service integration practices in public sector organisations.
5. Gather lessons learned from the research that are based on the research findings.

Due to the exploratory nature, this thesis does not actively try to find improvements in service integration practices at the case organisations or try to develop a framework of best practices.

1.3 Context

The public sector is the part of the economy that is composed of all levels of government, public services and government-controlled enterprises [7]. It does not include private companies, non-government organisations or NGOs and households. Public sectors include public goods and services such as healthcare, public education, public transportation, military, electricity and law enforcement [8]. Moreover, the public sector is also a big employer that employs people working in various aspects of the government. For example, in the US the public sector employs 20.2 million people, which is

approximately 14.5 percent of the workforce [9]. Although public goods and services are, in general, not free with some exceptions around the world, the organisations in the public sector do not seek to generate a profit, like the ones in the private sector. Instead, as public resources are scarce and financed by taxes paid by the taxpayers and governmental long-term bonds, finding solutions for coordinating the use of public resources better is beneficial for both the government and the taxpayers.

In the recent years, governments around the world have started to view public procurement as a potential lever for improving public sector performance. In the last decade, the relative size of public procurement in OECD countries has remained rather constant, both as a percentage of GDP (11.8% in 2017) and in terms of general government expenditures (29.1% in 2017) [10]. Purchased goods and services account for almost one-third of total public spending and consequently, as the spending base is large, improvements can have a substantial impact on budgets, freeing up resources for other priorities [11].

A traditional way of procuring goods and services, both in public and private sectors, has been through single-sourcing. It means having a single vendor, typically a large local or global IT company, who tries to meet the customer's needs. Another related term and sourcing strategy is outsourcing, where a buyer establishes a contractual agreement for a third party to administer and deliver either goods or services, or both [12]. Typically, outsourcing contracts are long-term arrangements and require continual monitoring of the third party's performance, in order to meet the set cost, efficiency and quality targets for remaining competitive and retaining the benefits expected from outsourcing [13]. Committing to a single vendor has been noticed to involve many risks, such as supplier lock-in, bad vendor selection, and limited domains of competence [14]. Therefore, firms have increasingly shifted to sourcing their IT activities from multiple service providers, which brings along advantages of a choice among "best of breed" vendors, lower costs resulting from vendor competition, and improved agility and adaptability to dynamic environments [15]. Goldberg et al. state that "multi-sourcing is gradually becoming the standard operating model for outsourcing customers" [16, p. 101]. This trend is taking place both in the public and private sector organisations, and it is the dominant service delivery model especially for IT services today. However, multi-sourcing has also its own pitfalls, as the service landscapes become more complex when there are more providers delivering interdependent services and the customers struggle with integrating the providers individual parts into end-to-end services [4]. As a result of the shift from single

supplier to an environment with multiple service providers and the challenges associated with multi-sourcing, the concept of service integration and management evolved.

As mentioned earlier, service integration and management originated within the UK public sector and it is adopted in public sectors around the Europe today. According to European Association of Public IT Service Providers – Euritas, public service integrator organisations are known to exist in Finland, Denmark, Germany, Croatia and the Netherlands, to name a few [17]. SIAM is a rather new and contemporary phenomenon that is relatively little researched, especially in the public sector context. SIAM and its application in the public sector is a timely topic, as more countries, like for example Estonia, are planning to form some sort of SIAM adaptations, where e.g. public ICT infrastructure services are consolidated to a central organisation that also operates as an integrator [18]. This sparked an interest and motivation to take up this theme and to be as a sort of a pioneer to do research on it.

2 Related Work

This chapter presents the essential literature, earlier studies and theories relevant to the thesis. This chapter and its contents serve as a fundamental and necessary basis for understanding the topic and the achievements of earlier studies up to this point. This chapter is sectioned into three parts. In the first part, IT services, IT service management and the ITIL framework are introduced. In the second part the SIAM methodology and its most relevant elements to this study are explained. Lastly, in the third part the relevant theories are summarised.

2.1 Literature Review

In the literature review the core topics and earlier studies in relation to this thesis are presented.

2.1.1 IT Services

Information technology or abbreviated as IT and IT service are fundamental terms in this study and neither of them has a single commonly accepted definition. ITIL 2011 edition's definition of IT gives a broader and explicit view of IT. The definition is presented in the table below.

Table 1. IT defined by ITIL 2011, [19]

The use of technology for the storage, communication or processing of information. The technology typically includes computers, telecommunications, applications and other software. The information may include business data, voice, images, video, etc. Information technology is often used to support business processes through IT services.

As the definition suggest, IT is about processing information in a comprehensive manner with the support of digital technologies. Without IT, there would not be a near-instant exchange of information or the digital solutions that is taken for granted today. Neither would there be the great technology products that support us to be connected every hour, every day, if you wanted so.

The same applies to digital services or, alternatively, electronic services, which could be defined as: ”The electronic delivery of information including data and content across multiple platforms and devices like web or mobile. Information is presented in a way that is easy to use and understand and typically involves transactional services such as submitting forms for processing and receiving benefits.” [20]. Many of the public and private services offered with electronic means work that way, as suggested in the definition. An example of a digital service could be, for example, paying an invoice online or registering your place of residence online, without actually having the need to go to a public office. It is although very important to notice that digital or electronic service has a very different meaning than IT service and these terms should not be mixed up. IT service is one of the core terms in this thesis. In ITIL 2011 edition, it is defined as follows in the table below.

Table 2. IT Service defined by ITIL 2011, [19]

A service provided by an IT service provider. An IT service is made up of a combination of information technology, people and processes. A customer-facing IT service directly supports the business processes of one or more customers and its service level targets should be defined in a service level agreement. Other IT services, called supporting services, are not directly used by the business but are required by the service provider to deliver customer-facing services.

As it is suggested, IT services are a mixture of three base ingredients that constitute an IT service. These ingredients are information technology, people and processes. It is evident that you need to have processes in place for providing any service and you need people for keeping those processes running. Information technology as the third ingredient is also obvious, as it is the culmination of these three, “what would an IT service be without IT?”. There is plethora of different IT services and they can be very distinct from each other. Therefore, it might not be easy to categorise them. However, Gartner in their definition of IT services has made a division into three categories, which are business process services, application services and infrastructure services [21]. These service categories could still be further subcategorised, but it is not so relevant at this point to go into such detail. Additionally, IT infrastructure and end user services are types of specific IT services that are also in the focus of this thesis. IT infrastructure services do not have one commonly accepted definition, but they can be said to be comprised of communication services, networking, data processing and storage, platforms through

which businesses can share for example, content and media, knowledge management, systems, and applications [22]. End user services neither have one commonly accepted definition, but they can be said to be comprised of services, such as service desk, end-point security management, device management, applications and other components that workers or otherwise known as end users require to perform their jobs [23].

IT services could also be divided by the level of expertise you need to provide them. Some services, like industry or occupation-specific application services could be very difficult to replicate or be handed over to another service provider. On the other hand, for services related to basic IT hardware systems, network infrastructure or IT service desk operations for example, you can find many local and global service providers because of their prevalence in organisations [22].

2.1.2 IT Service Management (ITSM)

IT service management (ITSM) generally refers to a set of practices that are performed by an organisation to maximise business value from the use of information technology. The practices take place across the whole lifecycle of a service and include strategic planning, designing, delivery and operation [23]. The definition of ITSM by ITIL is presented below.

Table 3. IT service management defined by ITIL 2011, [19]

The implementation and management of quality IT services that meet the needs of the business. IT service management is performed by IT service providers through an appropriate mix of people, process and information technology.

As IT systems, both hardware and software have become more commonplace in organisations, and any interruptions in them could turn out to be serious for business continuity and consequently costly, the role of ITSM has become irreplaceable. ITSM is not just a set of process, but a cultural mind-set to ensure that the desired outcomes for the business are achieved [23]. In reality, it means that an end user customer is delivered IT services at a satisfactory level. Another key aspect is the continual improvement of the service and related processes. Those are at the centre of ITSM. It involves a shift from managing IT as stacks of individual components to focusing on the delivery of end-to-end services using best practice process models [24].

Today's organisations tend to be complex by nature and rapidly evolving due to rapid development of technology. Some common challenges that IT departments face include roles and responsibilities of staff are not clearly defined or are non-existent, lack of clearly defined processes and SLAs, businesses not understanding the essential requirements for using IT in their organisations and utilisation of outdated tools and equipment [25]. These are also some common challenges that organisations try to tackle by implementing ITSM practices and processes. Some common processes to be mentioned include incident management, problem management, release management change management, configuration management, capacity management and availability management. Each of them serving a specific purpose in the provision of better quality IT services [26].

For ITSM there exists several bodies of knowledge and some widely accepted standards. The corresponding standard for ITSM is ISO 20000, which is specifically dedicated for IT service management and IT governance [27], [28], whereas the most adopted and recognized body of knowledge for ITSM is ITIL [23].

2.1.3 ITIL

Information Technology Infrastructure Library or ITIL is a globally recognized collection of best practices for IT service management. The purpose of ITIL is to support organisations and individuals to gain optimal value from IT and digital services. The ITIL approach provides guidance on how to use IT as a tool to facilitate business change, transformation and growth for reaching the needs of the business and support its core objectives and goals [29]. Apart from being just an approach to running and managing IT services, ITIL is also providing a common language for businesses and professionals through a glossary of related concepts and terms [29], [30]. ITIL is the most recognized framework for ITSM with tens of thousands of certified experts worldwide [31, p. 3], [32].

ITIL was created by the UK government's CCTA (Central Computer and Telecommunications Agency) with the objective of ensuring better use of IT services and resources. Since its emergence in the 1980s, the ITIL framework has been used in both government and non-government organisations [33]. The latest version of ITIL – the 4th edition was released in 2019 [34]. Key updates to ITIL 4 that the former edition – ITIL 3 was lacking are focus on end-to-end IT service management, multi-sourcing and service integration [3, p. 2], [35], which are also some of the core themes in this thesis.

Although ITIL is the most known and widely used framework for ITSM, there are still some other commonly used public frameworks, such as Control Objectives for Information and related Technology (COBIT), Capability Maturity Model Integration (CMMI), enhanced Telecom Operations Map (eTOM), Microsoft Operations Framework (MOF) and The Open Group Architecture Framework (TOGAF) [36], [37]. Each of them approaches ITSM from a slightly different direction depending on the industry and the nature of business and operations.

A reason why particularly ITIL has gained global success is that ITIL is a non-proprietary framework. ITIL is not based on any particular technology platform or industry type. Moreover, it is not tied to any commercial proprietary practice or solution, but is owned by the UK government, that created it. Therefore, its service management practices are applicable in any IT or service organisation, regardless of size of the organisation or being public or private. These factors make ITIL applicable and relevant for many organisations, but still it is up to each organisation to decide the level of application of practices themselves. [31, pp. 3-4]

2.1.4 Multi-sourcing

In ITIL 4 edition, the term "sourcing" has been defined as "The activity of planning and obtaining resources from a particular source type, which could be internal or external, centralized or distributed, and open or proprietary." [34]. Multi-sourcing, stated by Goldberg et al., is the blending of services from multiple external and internal providers [4]. Goldberg et al. continue that multi-sourcing "allows companies to assemble a best-of breed provider portfolio and to reduce costs. A key difference between single- and multi-sourcing is the potential interdependence between services delivered by multiple providers." [4]. Another related term to multi-sourcing is outsourcing. Although they sound similar, they have a clear difference and should not be mixed up. The essence of outsourcing is to take important business functions that do not differentiate an organization and extracting value from them without investing time, money and talent [38]. In outsourcing, a buyer establishes a contractual agreement for a third party to administer and deliver either supplies, services or whatever the object of the contract is [12].

In the last decade or so, IT outsourcing customers have increasingly been adopting multi-sourcing approaches, continuously enlarging their supplier base and it has become the

standard mode of operation in IT outsourcing [3], [4]. The popularity and increasing number of subscription-based services, i.e. cloud services can be seen as a determinant for the shift towards multi-sourcing. The attempt to improve the quality and cost of services also motivate organisations to apply multi-sourcing [39], [40]. Eventually, it still comes down to aspiration for reaching a competitive advantage, which is the ability to create more economic value than competitors [41]. The aforementioned applies specifically to private economic actors, namely corporations, while public organisations are mainly motivated by the cost reductions and the quality of service.

Bapna et al. state that many organisations struggle with challenges in managing and integrating their multi-sourcing portfolios [42]. One reason for this is that multi-sourcing leads to more complex services and service provider portfolios with highly interdependent services [42]. Working together with just one supplier for managing infrastructure is much easier than working with several or even dozens of suppliers, but then most likely you would lack the freedom and flexibility to choose either a new supplier to work with or to acquire new services. On the other hand, having many suppliers providing services to an organisation and getting them to work together towards common goals can be a challenge. Often under these circumstances, various services need to be integrated and managed as an end-to-end service for the service delivery to the client's business units to be seamless [4]. This activity is called as service integration and management.

2.2 Service Integration and Management (SIAM)

This subchapter gives an introduction into service integration and management concept, the SIAM ecosystem, related processes and explains its purpose and the business case why SIAM is applied in organisations. It is an extension to the literature review.

Service integration and management (SIAM) is a management methodology that can be applied in an environment that includes services sourced from a number of service providers [2, p. 12]. SIAM is the generally accepted acronym for service integration and management. Some other equivalent acronyms that are in use include MSI (Multi Sourcing Integration), SMI (Service Management Integration) and SMAI (Service Management and Integration) [2, p. 13]. The development of SIAM has been influenced by a few reasons. Firstly, in the recent decade or so, a major change in the role of IT in

business has happened. IT has shifted, at least partially, from a support function to serve as a potential competitive advantage for organisations and enable more accurate and faster decisions based on data. Secondly, the technology has continued its rapid advancement, which has entailed in the emergence of a large amount of new products, services and naturally service providers as well. As the number of service providers in the global markets has increased, organisations have started to move away from outsourced contracts with a single supplier to an environment with multiple service providers [2, p. 12]. However, operating with multiple service providers and managing them increases complexity and possibly requires more staff. SIAM aims to guide organisations to overcome challenges associated with these complex multi-vendor operating models.

SIAM can be applied to different sizes and types of organisations, and to different industry sectors, including both private and public [2]. In general, the more a customer requires different service providers the higher is the expected value from applying SIAM. Thus, customers that only require a single service provider are unlikely to get the full value [2, p. 13]. SIAM can be applied to environments that include external service providers only, internal service providers only, or a combination of internal and external service providers [2, p. 13].

Implementing SIAM methodology in an organisation does not happen overnight. It requires from all the involved parties openness, transparency, clearly defined roles and responsibilities, and collaboration across all parties to be effective [2, p. 13].

2.2.1 SIAM Ecosystem

In a traditional buyer-seller relationship, one party is in the role of a buyer and the other party acts as a seller. To adapt this set-up in the context of ICT services – one party is the customer organisation and the other is the service provider. However, in a SIAM ecosystem there are three parties. In addition to customer organisation and service provider, the third party is called a service integrator. In figure 1 below, each one of the parties are presented in its own layer in the SIAM ecosystem.

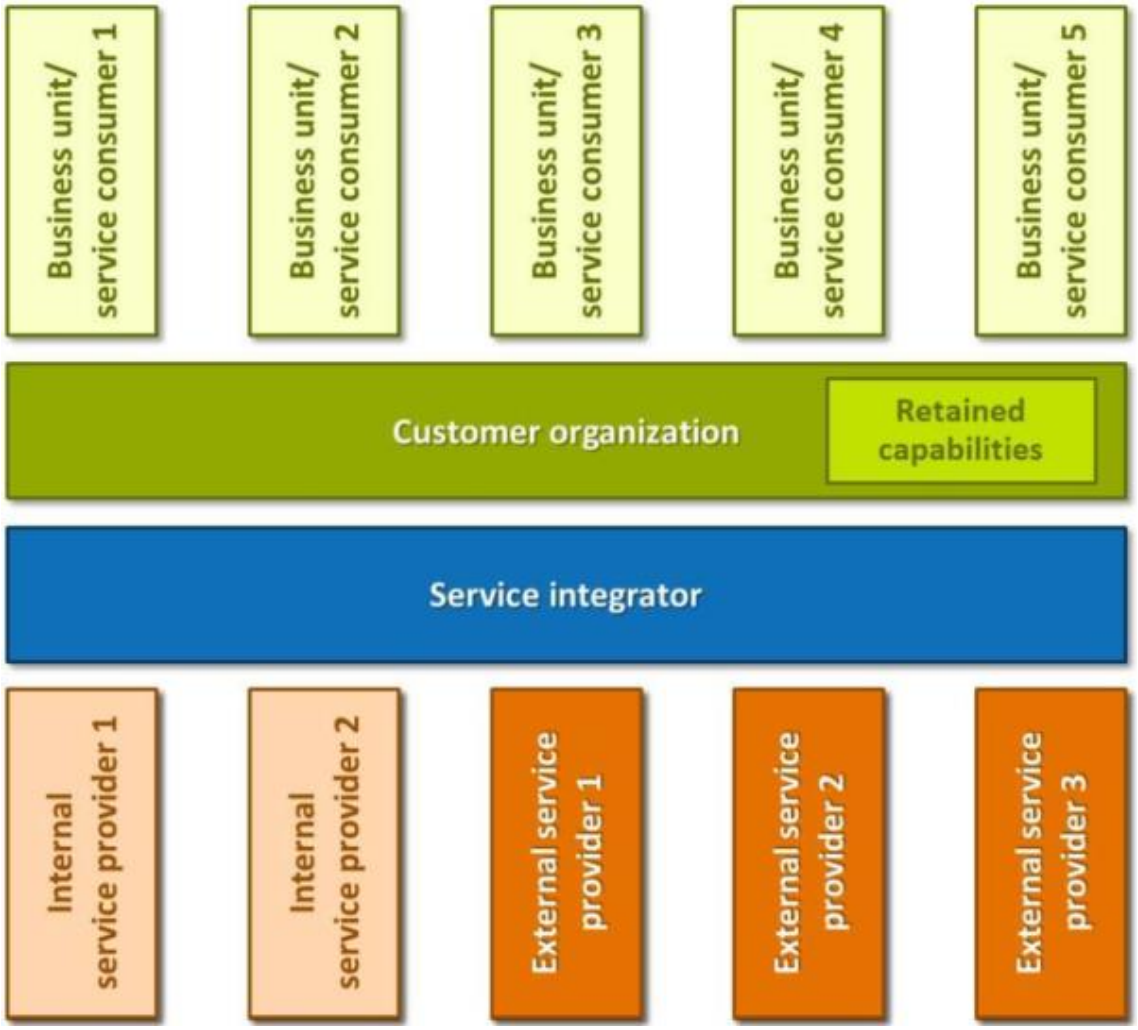

Figure 1. The SIAM layers, including consumers of services from the customer organisation, [2, p. 15]

In SIAM methodology tasks like vendor management, tendering, contract management and procurement are managed by the integrator, which would traditionally be the responsibility of the customer organisation. The role of the service integrator involves being the agent of the customer, acting on its behalf [2, p. 136]. The service integrator is responsible of performing end-to-end service governance, management, integration, assurance and coordination [2, p. 16]. In this context, end-to-end refers to the delivery of services from one end to the other, i.e. from the service provider to the customer. The service integrator has a direct relationship with the service provider(s) and the customer organisation.

2.2.2 SIAM Practices and Processes

Practices are defined as the actual application or use of an idea, belief, or method, as opposed to theories relating to it [43]. There are four practices in SIAM that need to be implemented, monitored and continuously improved over time for a SIAM ecosystem to perform successfully. The four practices are:

- People practices: managing cross-functional teams,
- Process practices: integrating processes across service providers,
- Measurement practices: reporting on end-to-end services, and
- Technology practices: creating a tooling strategy [2, p. 20].

These practices support governance, management, integration, assurance, and coordination across the SIAM layers (the layers being Customer Organisation, Service Integrator and Service Provider) [2, p. 19].

A process defined by ISO is a set of interrelated or interacting activities that use inputs to deliver an intended result [44]. In general, many management methodologies present processes having a definite start and end within one organisation [2]. In SIAM, processes may also be executed across organisations in the same or different SIAM layers [2, p. 20]. Many of the processes used within a SIAM ecosystem are similar to the ones in ITIL, like change management and vendor management [2, p. 20]. In ITIL 4 though, the previously known 26 processes presented in ITIL v3, have been replaced [45]. ITIL 4 does not talk about processes anymore; instead, there are 34 practices in total, some of which have a corresponding ITIL v3 process, while some do not [46].

For introduction, some processes used within a SIAM ecosystem can include change management, event management, incident management, vendor management, capacity and availability management, software asset and configuration management, service level management, service catalogue management, release management, knowledge management, continual improvement, monitoring, measuring, reporting and service continuity management [2, pp. 20-21]. Processes need to be allocated and adapted between the different parties to support integration and coordination. Sometimes some of the processes can span multiple layers. An example could be related to service catalogue

management, where the representatives from the service integrator and customer organisation design together plans or a strategy for needs concerning services in the future.

2.2.3 The Purpose of SIAM and Business Case

SIAM was created to serve a specific purpose guiding organisations to tackle challenges inherent to multi-sourcing and to lead towards success. Kevin Holland in his SIAM-related whitepaper published in 2015 has comprehensively defined the purpose of SIAM, which is also mentioned in the SIAM Foundation Body of Knowledge. The definition is presented in the table below.

Table 4. The purpose of SIAM defined by Kevin Holland, [47], [2, p. 35]

Effective SIAM seeks to combine the benefits of best of breed based multi-sourcing of services with the simplicity of single sourcing, minimising the risks inherent in multi-sourced approaches and masking the supply chain complexity from the consumers of the services. SIAM is therefore appropriate for businesses that are moving to or already have a multi-sourced environment. The benefits of a well-designed, planned and executed SIAM model can be realised by businesses that use multiple external suppliers, a mix of internal and external suppliers, or several internal suppliers. SIAM is therefore appropriate for most of today's businesses.

Briefly summarised, it could be said that the purpose of SIAM is to simplify the management of complex multi-vendor ecosystems and to deploy the benefits of multi-sourcing.

The business case of SIAM concerns not only private organisations. Many of the same expected benefits are also realisable in public sector organisations. In Europe, the SIAM approach and model in one of its forms is in use in the public sectors of at least the United Kingdom, Denmark, Croatia, The Netherlands and Finland. The UK government in fact is considered the birthplace of SIAM methodology [2, p. 31]. The organisation managing the development and delivery of digital services in the UK is called the Government Digital Service (GDS) [48], [49]. In Denmark, a similar organisation is called the Agency for Governmental IT Services or in Danish simply known as Statens IT [50]. Moreover, in Finland the corresponding organisation is the Government ICT Centre – Valtori, Logius in the Netherlands and APIS IT in Croatia [51], [52], [53].

The expected benefits of SIAM for an organisation can be tangible and intangible. In general, they can be placed into four groups. First, improved service quality can be expected in many ways, like having more time and resources to concentrate on business outcomes or having faster access to industry-leading services and service providers. Second, optimised costs and improved value. Competitive tension between service providers can have a positive effect on price for the customer and can simultaneously lead to increase in value. Third, improved governance and control. The service integrator acts as a single point of ownership for sourced services and has the responsibility for management of service provider performance. Fourth, improved flexibility, for example, in replacing service providers or as increased ability to scale service provision. [2, pp. 40-56]

The benefits are different for each organisation, depending on, for example, the scope of SIAM implementation. Similarly, the expected risks vary by organisation. Risks can arise in several areas. These areas include building the business case, security, roles, responsibilities and ownership, measuring practices, and resistance to change [2]. Every project has its own risks and challenges, but they can be overcome by managing those risks and having proper processes in place.

2.3 Theoretical Framework

The theoretical framework introduces and describes the theory related to the thesis topic and the research problem. It attempts to explain why the research problem under the study exists.

2.3.1 Dynamic Capabilities Theory

Organisations are affected by internal and external forces to initiate change. The driving forces behind organisational change can be technological, legal, customer-related or attempt towards improved cost-efficiency, to name a few [54]. An organisation's ability to respond to those forces and initiate change is vital for its success and even staying in the competition.

Teece et al. in their study tried to find an answer to "How firms achieve and sustain competitive advantage?" and introduced the dynamic capabilities approach [55]. According to Teece et al. "Dynamic capabilities, which are underpinned by organizational

routines and managerial skills, are the firm's ability to integrate, build, and reconfigure internal competences to address, or in some cases to bring about, changes in the business environment" [55], [56]. The organisation's ability to cope with change and to meet the resulting development and renewal needs depends on the dynamic capabilities of the organization [55, p. 516], [57, pp. 1106-1107] & [58, pp. 43-44]. Dynamic capabilities are a combination of managerial decision-making, ability to anticipate future trends and possible changes in the operating environment, and ability to reorganise internal competences accordingly.

Although dynamic capabilities are perceived more as the foundation for reaching competitive advantage in business development, they can also be viewed from a public sector perspective. The content of the dynamic capabilities is largely the same, but the motives for it are not, as the purpose of public organisations is not to strive for reaching competitive advantage. In the public sector, an organization's dynamic capability is the strategic ability to adapt an organization's service operations and service production to changing conditions [59, pp. 691-692]. Strategic planning is the key dynamic capability of public organisations. Public administration has traditionally used strategic planning and the development of long-term strategies to manage changes and uncertainties in the operating environment [60].

Service integration and management and multi-vendor ecosystems are unarguably complex concepts. In regard to SIAM methodology, one study found that the most challenging part in adapting the concept of SIAM operating model into an IT-organisation is the implementation [61]. Additional factors, such as development of internal service integration capabilities, planning the implementation and operating model well and leading people towards change are key in successfully practicing service integration [61]. Consequently, a link between an organisation's dynamic capabilities and ability to integrate services and manage them exists, but the reality is more complex than that. As a service integration and management ecosystem consists of three layers – customer organisation, service integrator and service provider(s), it is up to each actor on each layer to have sufficient capabilities and maturity to fulfil its role.

3 Research Methodology

This chapter explains the research methodology of this study. It consists of presenting the case study design and the research questions, and explanation of the data collection, data analysis and validity procedures used.

After being introduced with the topic more deeply, examining relevant literature and having discussed with a few experts and researchers of the field, some gaps in the existing research were identified as a result. This led into the methodology formulation and selecting case study as the applied research method.

3.1 Research Questions

The main objective of this study was to investigate service integration and management as a contemporary phenomenon at the chosen public sector organisations from the perspective of success factors, challenges and risks in the application of SIAM. End-to-end measuring of services, collaboration between parties in a SIAM ecosystem and governance were under special focus. The study so far has shown that both public and private organisations of today consume and need many ICT services for their operations and for that reason, single sourcing is not the favourable option any longer. To increase flexibility and efficiency in sourcing and to have the access to the best of breed IT services by multi-sourcing, service integration and management is a requisite for that. In relation with the main objective, this study tries to give an answer to the main research question that is:

How can service integration and management benefit the sourcing of ICT services in public sector organisations?

To support the main research question and to give more structure for finding information, the author has determined sub-research questions, denoted by SRQ subsequently.

SRQ 1: How does the application of SIAM methodology affect the involved stakeholders?

SRQ 2: How service quality is controlled and measured in SIAM?

SRQ 3: How are the relationships and operations governed within the SIAM ecosystem and between the stakeholders?

Each of these sub-questions have been further elaborated into more specific questions for obtaining more direct information that addresses the subject.

The questions for the first sub-research question (SRQ 1) are listed and explained below:

- What are the key success factors for operating SIAM practices?
- What factors hinder operating SIAM?

These follow-up questions relating to SRQ 1 aim to find the essential elements that should be in place for successful operation of SIAM and factors that could hinder it and cause bottlenecks.

The questions for the second sub-research question (SRQ 2) are broken down as follows:

- What are the indicators used for service quality?
- What factors motivate the responsible stakeholders for trying to meet the agreed targets?

The questions in this section under SRQ 2 are dedicated to end-to-end measuring of services, service quality and motivations for maintaining desired quality levels in SIAM ecosystems. In a sense, SRQ 2 is also a continuum for SRQ 1, as aspects relating to measuring of service quality in SIAM have been identified as a potential challenge in SIAM literature.

Lastly, the questions for the third sub-research question (SRQ 3) expands further:

- What factors are necessary for maintaining functioning relationships within SIAM ecosystem?
- What factors affect a decision to use an internal service provider?
- What factors affect a decision to use an external service provider?

These questions seek to dig deeper into the associated roles and overall governance of operations and relationships in a SIAM ecosystem.

3.2 Case Study Design and Selection

When the research itself was being planned, it was quickly determined that this study has traits of a case study. A case study "is an empirical inquiry that investigates a contemporary phenomenon within its real-life context" [62]. Rather than having a comprehensive data set and studying its properties with statistical methods, a case study covers either one or a few cases with a deep focus to them. Yin states that the case study strategy is feasible "especially when the boundaries between the phenomenon and context are not clearly evident" [62]. The aim is not to find generalisations, but instead to describe the phenomenon in detail and to make new observations. As the objective was to study the success factors and bottlenecks in implementing SIAM, the case study design is well suited for this study. In addition, Runeson et al. mention that the contemporaneousness is a necessity to allow data collection from the case [5], which the phenomenon in this case fulfils.

A case study can be designed into a single-case or multiple-case study, depending on the number of unit or units of analysis within the case. A unit of analysis can be, for example, a project. Gustafsson explained that a multi-case study should be considered when the purpose of the research is to understand the differences between cases and that multi-case study analyses data within each case and across the cases. A single case study, on the other hand, is suitable when the intention is to study a single thing or single group [63].

Runeson et al. distinguish between the four general types of purposes for research tailored from Robson's classification that are exploratory, explanatory, descriptive and improving [5], [6]. An exploratory research aims to find out what is happening, seek new insights, and generating ideas and hypotheses for new research, while an explanatory research seeks an explanation for a situation or a problem, mostly but not necessarily, in the form of causal relationship [5, pp. 13-14]. The purpose of a descriptive research is to describe the current status of a situation or phenomenon, or a research could try to improve a certain aspect of the studied phenomenon, which is the fourth general purpose for a research [5, p. 14].

Flyvbjerg discusses that case study strategy was originally used primarily for exploratory purposes [64]. However, a case study can be used for any of the four general research purposes, and as one of the examples Runeson et al. mention that case studies in the software engineering discipline often take an improvement approach [5, p. 14]. For this study, the case study strategy was chosen, that adopts the single case design and serves by purpose to be exploratory.

3.3 Data Collection Procedures

In regard to choosing data collection methods, the most important thing is to think about how well they provide answers to research questions [65]. It is also important to consider the available resources and practical arrangements, such as equipment, where and when the data is collected, and so on [65]. Two main data collection methods were used in this research, namely semi-structured interviews and document review. According to Kabir, data collection is one of the most important and challenging phases of research [66]. The data collection for this research could be roughly divided into three distinctive phases; the active documents and records collection phase, the interview phase and the passive documents and records collection phase. Majority of the data was collected during the first two phases.

Triangulation in data and methodology were employed in this research, which purpose is to increase the precision and strengthen the validity, not only in the results, but the whole study itself. To define triangulation, Neil Salkind explains it as "The term triangulation refers to the practice of using multiple sources of data or multiple approaches to analysing data to enhance the credibility of a research study" [67].

3.3.1 Document Analysis

As explained by Bowen, a document analysis is "a systematic procedure for reviewing or evaluating documents – both printed and electronic (computer-based and internet-transmitted) material." [68]. In this study, document analysis was used as a secondary data collection method to supplement the overall data collection process and to enable the triangulation in data and methodology. Denzin, 1970 as cited in Bowen, 2009, mentions that in qualitative research, it is common to use document analysis in combination with other qualitative research methods as a means of triangulation [68, p. 28]. Yin points out that one major importance of reviewing documents when carrying out a case study

research is that they help in gathering background information and collaborating data collected from other sources [62].

Documents were gathered from books and scholarly articles, conference proceedings, trade journal articles, reports, government sources, national and international newspapers and magazines. At times, it was challenging to find proper pieces of literature, especially in the form of earlier academic studies on Service Integration and Management, as the concept is still emerging and a little academic literature is available. Grey literature was consulted in cases where an academic journal that addresses a specific theme could not be found. The target dates of document inclusion documents were from the years 2010-2021. However, earlier documents were also used where later documents were not available or a document is otherwise unique and therefore it is often cited by academics. To support the document gathering and analysis process, the author kept a written record, i.e. a reading diary, where the titles of the documents, pages covered and time spent on reading were listed. This procedure allowed the author to keep track of the document gathering and analysis process in real-time.

3.3.2 Interviews

Semi-structured interviews were the main method for collecting primary data in this research. According to Dr Catherine Dawson, semi-structured interview is the most common type of interview where researchers aim to get specific information so they can compare it to other interview data. This requires asking the same questions for each interview, but keeping their responses flexible. This means including follow-up questions if a subject answers a certain way. Interview schedules are commonly used to aid the interviewers, which list topics or questions that will be discussed at each interview [69]. Data collection through interviews is very frequently used in case studies, as pointed out by Runeson et al., simply for the reason that much of the knowledge that is of interest is not available anywhere else than in the minds of the people working in the case being investigated [5].

The interview process started from designing the interview schedule, which comprises the structure and the questions. In general, this phase is called as the interview design phase. The interview design and question formulation was done individually by the author, supported by one brainstorming session and two pilot interviews. The pilot interviews were rich in feedback, which contributed in the interview structure and

questions to reach their final format before the start of contacting potential actual interviewees. The three aforementioned individuals were from the author's own network of contacts that the author knew to have adequate amount of relevant experience in SIAM in order to be able to give remarks for editing and other suggestions.

Table 5. Research design phase: Interview consultations and pilot interviews. Source: The author

#	Participant / Role	Topic, description	Date, length	Documented as
Research design phase: Interview consultations and pilot interviews				
1	Interview brainstorming 1: e-Governance Consulting Manager	Discussion on what kind of data and results would be desirable and what kind of questions could be asked.	March 1, 2021 1 hour	Word notes
2	Pilot interview 1: Senior ITSM & SIAM Consultant	Pilot interview 1. Feedback on the questions	March 26, 2021 50 minutes	Recording, Word notes, primary data
3	Pilot interview 2: Country leader at a global ICT service provider	Pilot interview 2. Feedback on the questions	April 6, 2021 1 hour	Word notes

In total 19 people carefully selected to be fit for the interviews were sent an interview invitation. The invitations were sent by email. The invitees were discovered either from open sources by the author or recommended by the individuals, who participated in the interview design phase, or by the actual interviewees. All of the invitees were in that point of time employed at public sector organisations. Eight of the invitees were from service integrator organisations and the other eleven were from their customer organisations. The semi-structured interview type was selected to be used. Two sets of interview questions were crafted of which one was used for the interviews with the people from service integrators and the other for people from the customer organisations. Some of the questions in the respective interview sets were the same, while the rest were slightly modified according to the role of the organisation, i.e. service integrator and customer.

This enabled to have insights and data from two different perspectives and that way validate the views of each side.

Eventually eight of the invitees agreed to be interviewed. All eight participants were introduced to the topic and its purpose, and were provided with the interview schedule, i.e. the questions, already a minimum six days beforehand. Only with one of the interviewees, the same information was provided by less than six days remaining to the interview. By doing this, it was ensured that the interviewees had enough time to familiarise themselves with the topics and the questions, expectedly leading to higher quality in results. Alternatively, it gave the interviewees a time window for withdrawing from interviews, if after reviewing the topics and questions someone felt not being the right person to answer those questions. In fact, this procedure led to a couple of participants withdrawing from the interview.

The interviews took place in April 2021. All of the interviews were conducted remotely via Microsoft Teams or other similar platform. The length of the interviews varied between 45 minutes to one hour. All of the eight interviewees were asked for permission the interview to be recorded and each of them accepted. As Catherine Dawson suggests, having a recording of an interview brings along several advantages, such as having plenty of useful quotations for report and having a complete record of interview for analysis [69, p. 67]. The recording types used were either voice recording or audio-visual recording. Solely using box ticking or note-taking on paper or laptop as a recording method would not have been suitable or adequate for these interviews, as they were semi-structured by type. The interviews were conducted in Finnish and English, depending on the language preference of the interviewee. The transcriptions were done in the language used during the interview. Each interviewee was later provided with the interview transcript for review and to give an opportunity for making corrections, clarifications or fine-tuning. In order to remain the full anonymity of the interviewees, the interview recordings or transcriptions cannot be made public and provided in the Appendices.

Table 6: Research and data collection phase: The interviews. Source: The author

#	Participant / Role	Relevant experience	Date, length	Documented as
Research and data collection phase: The interviews				
Interview set, Service integrator organisations				
1	Interview 1: Interim CEO / Director	20+ years	April 7, 2021 1 hour	Recording, transcription, primary data
2	Interview 2: Head of Unit in Service Strategy	10+ years	April 21, 2021 45 minutes	Recording, transcription, primary data
3	Interview 3: Deputy CEO	10-15 years	April 22, 2021 1 hour	Recording, transcription, primary data
4	Interview 4: Head of Product Management	10+ years	April 23, 2021 1 hour	Recording, transcription, primary data
Interview set, Customer organisations				
1	Interview 1: CIO	10+ years	April 16, 2021 50 minutes	Recording, transcription, primary data
2	Interview 2: Head of Service Production	~ 10 years	April 19, 2021 1 hour	Recording, transcription, primary data
3	Interview 3: Director, ICT-Services Unit	10+ years	April 21, 2021 45 minutes	Recording, transcription, primary data
4	Interview 4: CIO	~ 8 years	April 22, 2021 50 minutes	Recording, transcription, primary data

The purpose of the interviews was to gather new and relevant data and information for enabling to answer the proposed research questions. The interview structure was divided into five main sections, which were 1. Background Questions, 2. Leading Questions, 3. Success Factors, Challenges and Risks, 4. Service Quality and Indicators, and 5. Customers and Service Providers or Service Providers and Collaboration. See Appendix 2 and 3.

3.4 Data Analysis Procedures

According to Runeson et al., data analysis enables the researcher to understand exactly what happened in the case [5]. In consequence, the understanding of the case helps the researcher to draw patterns and conclusions from the gathered data, which is the basic objective of the data analysis. Thematic analysis was used as the chosen method of qualitative data analysis for analysing the content of the interviews. As stated by Braun and Clarke, thematic analysis is "a method for identifying, analysing, and reporting patterns (themes) within data" [70].

This research employed Robson's guidelines on qualitative analysis, which consists of five iterative steps [6, p. 459]. The steps are:

1. Data collection – This step included the data collection, i.e. the document gathering and analysis, the interviews and preparing the transcripts.

2. Coding – The author generated the codes for the interview transcripts, which means that the important parts of the transcripts were labelled based on the codes. This part was mainly done with the help of proprietary software NVIVO. Primarily, the codes represent certain themes or constructs in a text. Some codes had also assigned hierarchical sub codes.

3. Hypothesis definition – This step included the main the analysis part. The coded pieces of text and transcripts in general were walked through several times for detecting patterns in the data, creating hypotheses and finding similarities and differences within the gathered data.

4. Generalization / findings – After the data analysis was done, the author arranged the findings and determined the relevant contents for the research to be passed on to the reporting phase.

5. Reporting – Producing the report to give a structured and logical representation of the results.

3.5 Validity Procedures

Allen and Yen point out that a traditional way to examine whether research results are trustworthy is to ask if results are reliable and valid [71]. Generally, the trustworthiness of a study can be measured through validity and reliability. According to Runeson et al., the validity of a study refers to "the trustworthiness of the results and to what extent the results are not biased by the researchers' subjective point of view" [5, p. 71]. Reliability, in turn, refers to how well a study can be replicated by another researcher [72]. Another way to explain reliability is that, hypothetically, if another researcher conducted the same study, the results should be the same [5, p. 72].

Kesler, and later down the list, Robson point out things that can improve validity and reliability, and that should be considered already when designing a research [72]. These things include:

1. adequate sample size,

2. the connection between theory and data is demonstrated,

3. the objectivity of the researcher is demonstrated,

4. the researcher aims to find as comprehensive a theoretical overview as possible,

5. only comparable things are compared [72].

Robson adds a few more ways to improve validity that are:

6. triangulation,

7. member checking – letting participants of a study to have material reviewed, e.g. interview transcripts,

8. peer debriefing – working with a group of researchers tends to have advantages over working alone and it will lower the risk of being biased by one researcher,

9. audit trail – that means keeping track of all data and material in a systematic way, e.g. version control and reading diary [6].

All of the above listed points were borne in mind throughout the various phases of the research and therefore the required level of validity in this study is ensured. What comes to the sample size concerning interviews can always be argued, but the sample size in this research should fulfil at least the minimum requirement for it. One should also remember that only very few individuals qualified as potential interviewees for this study due to the required industry-specific knowledge and experience. Objectively, it can also be stated that peer debriefing was only partially achieved. In this study it means, that the available resources were limited and the study was conducted by one researcher. What was done to compensate is that research colleagues were involved in reviewing documents related to the study, like the research design.

4 Results

This chapter of the study explains and presents in detail the case and subject selected as well as the data that were collected. It provides an in-depth understanding of the analysis of the interviews conducted using NVIVO software. Further, in presenting the outcomes of the interviews, this chapter submits a full explanation of the results, which are further divided into theme-based subchapters.

4.1 Case and Subject Description

As during the time of his studies, the author was based in Estonia, researching service integration in the Nordic context seemed relevant. It was known that in the Nordic countries, service integration was done in various public ICT services, at least, in Finland and Denmark. In Denmark, The Danish Government's Agency for IT-services and Operations called Statens IT and The Government ICT Centre Valtori, in Finland, were the two case organisations in this study representing public service integrators. Statens IT has been established in 2010, having today around 450 employees and over 31,000 end users at state institutions in 19 ministerial areas [73]. In turn, Valtori commenced their operations in 2014, having today over 1400 employees and providing a wide range of ICT services to approximately 80 government entities [74].

In order not to have too one-sided view to service integration, the author decided to involve the aforementioned case organisations' customer organisations to the study as well. Their participation in the study was really meaningful to understand both sides – the customer and the service integrator. The customer organisations were public agencies from different spheres of the government, by size ranging from about a 1,000 up to 7,000 employees and widely using services either ordered through or produced by the integrator. Suppliers or service providers from the private sector and their representatives were not involved in the study nor interviewed. In order to understand how the interviewees from the case organisations were chosen please see section 3.3.2 Interviews. In section 4.2.1 General Description of the Respondents, the background and knowledge in the field of the interviewees is described in more detail.

4.2 Presentation of Findings

The audio and audiovisual records of the interviews were transcribed into texts with an Android-based Live Transcribe application. After that, the "raw" transcripts were still reviewed by the author and improved into error-free texts. Next, the interview transcripts were shared with the interviewees for review and to give an opportunity for making corrections, clarifications or fine-tuning. Lastly, the transcription text files were uploaded and analysed in a software called NVivo, which is a CAQDAS or computer-assisted qualitative data analysis software [75]. The analysis procedure started with thematic code generation in NVivo. The codes generated predicated on the research questions as well as the issues that emerged from the data collection. Afterwards, upon finishing the thematic coding of the collected data from the interviews, the codes were categorised into several thematic areas, as shown below:

1. Success Factors and Positive Sides in Service Integration
2. Challenges and Risks in Service Integration
3. Important Processes
4. Service Quality and Indicators
5. Collaboration between SIAM Layers and Actors
6. Factors Affecting Sourcing of Services.

4.2.1 General Description of the Respondents

This section gives a brief general description about the eight interview participants; the relevant experience they had, e.g. in IT and IT governance, including experience in SIAM and their knowledge of ITIL and SIAM concepts both in theory and in practice, respectively. These themes were usually discussed in the beginning of the interviews and supported by the leading questions of the interview schedules.

Out of the interviewees, four were from service integrator organisations and another four were from customer organisations. The interviewees were from Denmark and Finland. All of the interviewees had long and diverse careers in the IT field in various positions. A few of them had also long experience in the private sector before moving to work for

the public sector. A couple of them had also experience working at both a service integrator and customer organisation that was applying SIAM approach. All of the interviewees had several years of experience in service integration either on strategical level or on both strategical and operational levels.

Every interviewee was either familiar or very familiar with ITIL framework and seven out of eight were also certified professionals in ITIL having passed at least to the Foundation level of the ITIL certification scheme. SIAM, on the other hand, on a theoretical level as a management methodology was less known to the participants. All of the participants knew the term and had at least a general understanding of its application, but three out of eight were not familiar with the theory. Nevertheless, the trio had more knowledge of SIAM in practice.

Additionally, other frameworks or methodologies that the participants named they had knowledge in or were applied in their organisations' were TOGAF, SAFe and CMMI. In addition, ISO standards like ISO 20000 – Service Management System Requirements, ISO 27001 – Information Security Management and ISO 27701 – Extension to ISO/IEC 27001 and ISO/IEC 27002 for privacy information management – Requirements and guidelines were mentioned in the course of interviews, relating to service integration.

4.2.2 Success Factors and Positive Sides in Service Integration

The participants from service integrator organisations highlighted many things from roles and processes being clear to the ability to build common goals where the actors from all SIAM levels are striving together. A fundamental success factor is that roles, responsibilities and processes should be clear at the service integrator and at external service providers. Otherwise, the possibility to succeed in service integration is low. The processes partly relate also to customer organisations. Additionally, there has to be a common glossary and understanding about the roles and related technical terms between all stakeholders. On the other hand, one participant stated that if something is not working the way it should, then roles and responsibilities can always be changed, but it requires identifying what exactly is not working and taking initiative.

In consequence, a success factor stated by one participant is to be able to create the overall service and service delivery in such way, that it is advantageous for all involved stakeholders to pursue a common goal. As there are many suppliers involved and a single

service can involve ten different suppliers, it is difficult to manage them to operate in a synchronized way. The more suppliers are involved, the more complex the service, the more difficult it gets. It is not advantageous and serving the common good nor the customer, if the suppliers are not focusing on the service chain, but only on their part and sub-optimizing that. In fact, referring to theory this is said to be one of the most important duties of a service integrator.

From a more technical side, if a chosen system, for example an ERP or enterprise resource planning system is bad, it is not well implemented or it is not serving the purpose it was acquired to, then there is going to be trouble. By having standards and factors enabling flexibility, service integration becomes easier and the same applies to systems integration, which is also done sometimes in synchronization with service integration. “It is a technological question. We can get more capabilities, workers, guidance, support and consultation as much as we want, but if the system we have configured is bad, nothing is going to replace that.” as one participant stated.

From the customers’ point of view, the most mentioned success factor was the understanding of the customer’s needs. Moreover, it is important also to know the differences of the customers for identifying what type of services are suitable for a customer and what not. To achieve that, there has to be an adequate amount of interaction between the customer and integrator. Secondly, the competence of the service integrator has to be high. It means that the integrator is not optimizing their processes, but the outcomes what the customer receives. As there are many customers, a part of that competence is the ability to configure a service so that it fits the needs of the customer, and ideally many customers, which would lead to bigger volumes and utilization of economies of scale.

Mutual trust between customers and the service integrator is a central element for successful customer relations management and service integration as well. An interesting aspect that several participants mentioned was that according to them having a service integrator that is a public actor for public sector customers increases the mutual trust, instead of having a private service integrator. To refer one participant: “you feel, you are on the same side of the table”. “A public organization has a better knowledge of the public sector and the organizations in general. Also, there is a higher interest I believe” as one participant stated.

Having a proper internal system in place to develop service integration expertise is crucial. It is important to train the staff to understand the principles, the role and responsibility of service integrator in the big picture, as it is not like working in a traditional sales organization or consumer of services, but being in the middle of both spheres. Additionally, vendor lock-in avoidance is key competence that a service integrator should have. Creating a procurement strategy and having vendor management processes in place are prerequisites to avoid lock-ins. Moreover, the degree of dependency on a specific service from a single supplier should be reviewed regularly and if giving up a service seems difficult, then the integrator together with customer should map other options as a precaution. From technical point of view, standard interfaces are known to reduce dependencies and following standards is a good thing both in technology and functions, as one participant pointed out.

4.2.3 Challenges and Risks in Service Integration

The respondents together identified numerous potential challenges and risks in service integration, which could be summarised into four main types.

The role and scope of the integrator: During the interviews, it was identified that based on the experiences of the case organisations, the role and scope of the integrator are not always clearly defined, which could lead to potential risks. It was not always clear what service or part of a service is for the integrator to take care of, as customer organisations still had various services where the integrator was or has not been involved. This mainly relates to business applications and industry-specific systems. There should be a common understanding between the integrator and customer what is the scope of integrated services portfolio and where it is not feasible to extend it. As customer organisations in the public sector are agencies, fulfilling their own responsibilities and specific tasks, where they need industry-specific systems, it should be very carefully considered whether integrator should be somehow involved in them. Focus only on the services that the integrator can fulfil in its intended role.

The expertise of the integrator: Expertise can relate to knowledge of the customers, their differences and needs, and integrator's internal capabilities and the skill-level of the staff. If roles and responsibilities between all three SIAM layers are not clear, it instantly poses a risk that something is misunderstood, left unattended or neglected. The responsibility over creating SLAs, indicators and measuring services ultimately falls to

service integrator. If the integrator is lacking expertise in this area, there is risk that the service levels might be lower and performance falls behind, than if there were proper SLAs and indicators in place. Although, in long service chains it is not always easy to measure the overall service levels or successes, which is a challenge in the field of service integration in general.

Governance: Challenges can arise in the governance of service integration. Key aspects include continuous communication, honest reporting and addressing problems when they arise. Collaboration needs to be open and transparent between all parties of the ecosystem. The vision how service integration is implemented and led needs to be clear from the very beginning. If the aforementioned things are neglected, problems will arise. Ability to anticipate certain things, customer needs, and technological paradigms and advancement should support the integrator in governance and showing the direction. Partially, this also relates to the expertise of the integrator.

Resistance to change: Changes in service integration are inevitable and frequent. They take place in the implementation of service integration and in operation. Therefore, the management and the staff at both the service integrator and the customer organisations need to be prepared for encountering resistance to these changes. A lot of the resistance can be prevented or mitigated with strong communication and leadership, which creates trust, keeping good relations between all stakeholders and SIAM layers, and having good negotiators in order to reaching common ground.

4.2.4 The Most Important Processes

The most important processes were discussed, as it was one of the questions in the interview schedules. Correct processes have to be in place, for service integration to be holistically functional in and between all SIAM layers. The processes that several of the interviewees named were incident management, event management, change management, configuration management, release management, service level management, problem management and supplier management. Other processes that were named are request fulfillment, financial management, security management and capacity management.

The most mentioned process was change management, which in general all the interviewees considered very important that affects and concerns all the three layers. One

of the participants outlined that it is critical that every stakeholder involved in change management has a common understanding about the roles, tasks and schedules as changes of different scale take place constantly. If not, projects or other endeavors might continue to grow in time and scale and the planned changes cannot be taken to go live. Another participant said that the change management process in ITIL is by nature a quite technical one, which is a useful tool for process specialists and architects. However, there should be a more high-level change management process in place, which concerns, e.g. a whole service chain. For example, if Microsoft decides to make updates to Teams application, which will have an effect to the customer environments with a risk involved that the service will be interrupted, there should a process in place for that. This process would estimate how the change affects the service delivery, inform relevant stakeholders and analyse the interdependencies between the service and for example, data centers or the service desk.

Problem management was considered important. Referring to one of the participants on the importance of problem management, the participant said, "If you have a good problem management in place, you can prevent many incidents, which is something everyone wants - to prevent incidents from happening." On the same theme, another participant mentioned, "As we are talking about mission-critical services and applications, for example to citizens, it is extremely important that all the stakeholders know and are familiar with the problem management process, especially in multi-vendor environments, like the one where we are operating". One participant found that having a CMDB or configuration management database that presents the interdependencies, is constantly updated and transparent to all necessary stakeholders could support many other processes, like problem management and speed up the problem resolution times.

Cost management was considered important, but it is a more dominating factor in the private than public sector. The customers in the public sector expect the services to be working, which is even more important. Additionally, the clientele hardly ever changes in the public sector and the existing clientele is well known.

4.2.5 Service Quality and Indicators

The part concerning service quality, its indicators and motivating factors could be divided into four key areas. 1. The indicators used for measuring service quality, performance, availability and other relevant event. 2. Suitable indicators for measuring services end-to-

end. 3. Challenges experienced in measuring services end-to-end. 4. Factors that motivate suppliers to high service quality.

The indicators used by the organisations:

The interviewees together listed many various indicators that their organisations were using. The five most mentioned or important indicators were SLAs, availability, net promoter score or NPS, lost work time and customer satisfaction. The other listed indicators were service request ticket amounts, number of problems, resolution times, usability, customer feedback, end-user satisfaction, cost-efficiency, success rate in development, customer and change projects, security incidents, level of information security, uptime and downtime.

In general, the interviewees considered the fact that services and systems are maintained up and running as the most important factor concerning service quality. The reason is that every time services are disrupted, it could lead to lost working time, congestion in services, and indirect or even direct costs. Disruptions in services may also lead to lower customer and end-user satisfaction. One interviewee brought up the importance of information security and more specifically the concern of having almost no indicators there. “It is very difficult to understand what the level of information security concerning the services is and whether it is sufficient”, as was continued by the interviewee.

Suitable indicators for measuring services end-to-end:

Thinking of indicators for measuring services end-to-end was considered difficult. Still, two indicators were brought up that had been experienced as suitable for measuring services end-to-end. They were customer satisfaction and lost work time. One interviewee stated that “In my opinion, the only really good indicator for measuring services end-to-end is customer satisfaction, because in the end if some service is down, the customer is not interested in where it is broken, but that it is not working and it has to be fixed.” Consequently, if a system or a service is disrupted, it could lead to lost work time. As an example, if a public agency has 5000 employees working in remote conditions and the VPN service goes down for one hour, it leads to 5000 hours of lost work time.

Challenges experienced in measuring services end-to-end:

The challenges that the different organisations had faced were difficulty in creating a proper and suitable indicator for a service and not enough emphasis on creating more meaningful indicators together with customers. Many interviewees said that the measuring of services, indicators and reporting could be improved in general and it doesn't mean that this applies to all the services. Otherwise, statements about the challenges, especially in measuring end-to-end services, were rather limited.

One interviewee stated that: "The whole sanction model or reward model is a really challenging thing to think about. Personally, I think it would probably have been already done if it were a simple task. It is not possible to think about it at a general level, but on a case-by-case basis per service provider. If there were a common model, it might not be suitable for very many or many services."

Motivating factors towards high service quality:

The "carrot and stick" idiom arose when speaking of motivating factors. It means that "stick" is given when things do not go well as a way of penalizing someone, while "carrot" encourages and incentivizes an organisation or individual to keep doing good work and meeting targets. The interviewees were unanimous that incentive-based indicators and targets would be very welcome, but unfortunately at the moment the only mean to influence is through penalties or reclamations. This leverage was said to work well with commercial actors, but not so much if both the service provider and customer are public organisations. On the other hand, whenever a situation goes to the point that sanctions are applied, it instantly tells that service cooperation has failed, regardless of whether it is a public partner or commercial actor, and the sanctions do not help the situation, as one interviewee pointed out. Another interviewee mentioned that "Indicators wouldn't need to be always negative that when targets are not met, it is either penalised or have to be compensated. Giving "carrot" would be a win-win operating model. As a service integrator what matters is to be able to create value for customers. If that happens, it would be natural to share some of that value with the service providers, which in turn motivated them to keep producing services better."

The big scale and volumes were mentioned to be in favour for integrator and that was said to motivate commercial actors to keep good relations and meet the targets. It gives a

leverage for the integrator and for example, in case of a disruption they are prioritised for maintaining the good relations and avoiding reputational damages, even though there was not even a direct penalty involved.

4.2.6 Collaboration between Service Integrators, Service Providers and Customers

In complex multi-vendor ecosystems where service integration is implemented, collaboration between actors of all SIAM layers is an absolute necessity and a fundamental requirement to success. Knowledge of your customers, their needs, suppliers and common objectives rise as key themes. The service integrator has the main responsibility over governance, management, integration, assurance and coordination. The service integrator should also be the one for laying the foundation for collaboration and operate as mediator and begin troubleshooting, in case something is not working as it should in the service delivery from the supplier to the customer.

During the interviews, some good practices for collaboration were identified. The more the customer organisation is involved in the service management of their services and service strategy creation, the more it deepens the relationship and creates trust between the customer organisation and the integrator. Some examples include creating task forces with the customer to think about ways to develop their services, having a channel for continuous feedback that works both ways, creating development plans to identify and anticipate the future needs better and so on. Another good idea was finding organisations among customers to volunteer in piloting projects of new services for the purpose of testing and supporting their development. The formation of a customer advisory board has been seen to enhance the cooperation between the customer organisations and the integrator. It is a place to discuss and monitor timely topics around services, customer satisfaction and quality of services.

Naturally, the importance of communication was emphasized over and over, which was expected. Especially, in the case of service outages, maintenance outages and other problems the communication needs to be flawless and prompt to minimize the impact. One interviewee pointed out that communication needs to be honest and even the difficult things and challenges need to be brought up to the discussion and that applies to all stakeholders. If the service levels are low or have gone down, it needs to be addressed in order to find solutions to improve the situation. This can be done, for example, by creating a task force that is set with specific objectives, the supplier allocates the necessary

resources for it and then an improvement plan is created and the further progress is monitored. Moreover, the top management has to be committed and supporting the improvement efforts, who ultimately have the authority and responsibility to correct the flaws.

Transparency was highlighted in the interviews in regard to communication and service delivery in the whole service chain. Transparency needs to be demanded from the service providers and maintained to their organisations. It is important, as the public sector is regulated by laws and some services may be subject to regulatory requirements, that the transparency is maintained. Although, an interesting aspect that was mentioned in one of the interviews was that, in case of failing to meet, for instance, regulatory requirements or they are neglected or something goes terribly wrong, the big and often international service providers face also a reputational risk. This reputational risk drives the big service providers to perform well and adhere to common agreements. Still, in the end it is the responsibility of the service integrator to organise the tenders, choose the most suitable suppliers and be in charge of their actions, even shortcomings. That is also what the customers highlighted and trust that the integrator does its role well. It was mentioned, that to the customers it is a less important factor, who is the service provider, as long as the service delivery and collaboration are running as agreed. One of the interviewees stated, that there lies a risk for the customers, if they in the end choose the service provider that then the integrator could withdraw from its responsibility and say that "but you were the one who decided". Therefore, there needs to be trust to one-another end-to-end, from customers towards the service integrator and towards service providers.

4.2.7 Factors Affecting the Sourcing of Services

In service integration, a service integrator's decisions on where, what and how services are sourced will be influenced by several factors. First, the SIAM model that has been adopted. More specifically, this comes down to what is the role of the service integrator – does the service integrator operate as a pure integrator between the suppliers and customers or does it have its own service production and if so, what kind of capabilities it has. In the public sector context, it may not be possible to find the supply for a specific service from the private sector or the sourcing of a specific service from the private sector is forbidden, for example, by law. If the integrator has its own service production, then it leads to a question what services should be sourced internally, what externally and why.

The decision whether to source, e.g. a service internally or externally is a sum of many factors. One important factor is a well-functioning market. It depends on what is being sourced, the number of market actors capable of providing the service and their capabilities to produce it with quality and cost-efficiently. Respectively, if the supply in the private market is narrow, then the level and the amount of internal competence is being inspected. Additionally, the cost level plays a role in the decision. One example that was brought up in the interviews was a data centre service. If the market has several big and experienced suppliers of data centre services, it is very likely that they have a large amount of data centre capacity, high competence level and a capability to produce 24/7 the given service. In this case, it is likely to choose, at least a proportion of the data centre service, to source externally. Still, it is not always the case and it doesn't necessarily mean that the whole data centre service is sourced externally and from a single supplier.

One factor, as previously mentioned, is the service itself and the level of its criticality. In the public sector, depending on the country, some services are defined by law to be produced only within the public sector in order to ensure the security and service continuity at all times. In other words, legislation also plays a role in sourcing decisions in the public sector. As a one final factor can be mentioned strategy. Strategy is a plan or a mission to achieve something, which has an effect on the sourcing decision. This might be, for example, to analyse and identify what are the core competences of the integrator, what are the customers' needs in the future and how the integrator can respond to those needs.

To summarise, the sourcing decisions depend on a sum of factors – legal requirements, cost level and cost-efficiency, market conditions, experience and competence of both external and internal service providers, criticality of the service and its security class, and the chosen strategy.

5 Conclusions and Future Work

This chapter provides a review about the main findings of this study based on the results of the primary and secondary data collected from the interviews and collected documents. In addition, the chapter addresses the implication of the results, limitations of the study, and possible areas for future research.

5.1 Summary of Findings and Recommendations

This study focused on service integration and management in the public sector from mainly ICT infrastructure and end user services point of view. The main objective of this study was to investigate service integration and management as a contemporary phenomenon at the chosen public sector organisations from the perspective of success factors, challenges and risks in the application of SIAM. End-to-end measuring of services, collaboration between parties in a SIAM ecosystem and governance were under special focus. In the end, the interviews with field experts resulted into approximately 10 hours of interesting views, discussion and new information that were very meaningful for this research overall. Respectively, hundreds of websites, reports, earlier studies, conference proceedings, books and other documents were in total gone through during the research process to understand the studied phenomenon better.

By answering to the main research question, the author tried to pinpoint the benefits of SIAM associated with the sourcing of ICT services in public sector organisations. It was determined that service integration and management has many identified benefits for the public sector and public organisations involved in it. Probably the biggest advantages are the cost savings coming from the utilization of economies of scale, i.e. making bigger orders in quantity for several agencies instead of only one. Secondly, by having a service integrator to take up and care of tendering, procurement, market review and all the other procurement related tasks and functions, it frees up internal resources at those public agencies. It also reduces the number of overlapping functions and resources in that part of the government where service integration is executed. Thirdly, by centralizing the aforementioned procurement functions to the service integrator and having many public agencies as customers, it increases the order quantities and total contract values. As a result, it gives leverage for the service integrator over contract negotiations and finding

the most suitable supplier. On the other hand, the volumes and potential long-term opportunities for winning the contract attracts also the big and skilful service providers able to offer those best-of-breed services.

To reflect on the identified success factors, challenges and risks, they form a sum of factors that either enable or hinder successfully implementing and doing service integration. As a summary, the biggest weight in achieving success lies on the service integrator, but customers and external service providers, of course, have their own assigned responsibilities to contribute to the overall performance. Service integrator needs to understand the customers' needs, their differences and its role and scope well. The maturity and service integration expertise, as well as internal capabilities of the integrator affect to the chances of achieving success.

Measuring service quality end-to-end and having proper indicators in place are necessary for understanding the performance and value that service integration could bring. It was perceived to be easier said than done both in literature and by the interview participants. Reasons for it may be lack of strategic requirements, inability to map service architecture or end-to-end workflow, difficulty in creating purposeful and suitable indicator, or not having proper data gathered or available to create purposeful indicators. To propose solutions for making the measuring of end-to-end services easier, a few things have been listed here and include: to create a performance management and reporting framework, standardise reporting and thrive for automating reporting to free resources for something more meaningful, focus on indicators that matter and are meaningful for customers, and apply agile thinking in reporting to assess and confirm whether a report is still fit for purpose.

As a conclusion, service integration and management brings along several benefits, as listed earlier and thereby bears great potentiality for enhancing public sector performance. Nevertheless, one should be prepared for facing several challenges associated with implementing SIAM that can have long-term effects and map the risks for creating a plan to eliminate or mitigate them. See also Appendix 4 to view the key themes and condensed findings of the research.

5.2 Impact/Implication of Study

The aim of this research was to provide an understanding to the application of service integration practices and processes in the public sector concerning ICT infrastructure and end-user services, and to discover new information. Service integration as a theme is broad, diverse, complex and relatively new, yet timely and bears great potentiality for enhancing public sector performance. As feedback from the interviewees, the author received encouragement, inspiration and genuine interest towards the study. The output of this study was a relatively large amount of valuable and new information that was further enriched into a compilation of lessons learned in the field of service integration.

In a time as this when more and more organisations are looking at the option of adopting service integration to their environment, this study gives insight with the help of real-life examples, to the success factors, challenges and risks around service integration. The general wish from the author is that this study would spark the interest for future research in the field and provide support for real-life cases around service integration.

5.3 Limitations

No similar studies from this specific angle to service integration and management exists. The topic of service integration and management is broad by nature, including many interconnected components between the actors of same and different SIAM layers. Working individually as a researcher on such a diverse and broad topic can be denoted as a limitation. With more resources available, e.g. working in pair or in small group would have abled more organisations and cases to be studied simultaneously.

It was a conscious decision not to have interviewees from the service provider layer of the SIAM ecosystem, i.e. private IT service providers and mark out their contribution to this study. Having their insight and side of the story could have had an impact to this study and its results, but in the end, the focus was in the relation and interaction between the integrator and the customer organisations.

As mentioned already earlier in the third chapter, the sample size concerning interviews can always be argued, but the sample size in this research should fulfil at least the minimum requirement for it. One should also remember that only very few individuals qualified as potential interviewees for this study due to the required industry-specific

knowledge and experience. In the end, it can be said that all of the interview participants were very suitable by profile for the purpose of this research to mitigate the potential limitation of the sample size.

5.4 Future Research

This study focused only on the applicability of service integration and management in the public sector and identifying its key success factors, as well as bottlenecks and hindering factors in relationship management, performance management and strategic governance of the model. The study focused on the public sector context; as such, the findings here may not be fully transferable. The chosen organisations in this research were public agencies from Finland and Denmark. There is the possibility that similar research on other countries that are using multi-sourcing and have implemented SIAM methodology, would yield different outcomes. For transferability, further study in more cases, such as in the forms of recommended below will be appropriate and is encouraged.

For future research, the author can recommend following one of three proposed directions, depending on the state of affairs in the country or state to be researched. One of the three alternatives is to study service integration and management implementation projects, specifically how an organisation managed the implementation of SIAM as part of an organisation's operating model. Second alternative is to study the technical side of service integration and the tools associated with it. In particular success factors, challenges and risks associated with the integration of services from the technical perspective. Third alternative direction is to conduct a similar research as in this thesis in a country that has implemented a SIAM model, and related practices and processes in the public sector. In other words, a comparative study from the perspective of success factors, challenges and risks in the application of SIAM.

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References

[1] P. Sydänmaanlakka, Älykäs julkinen johtaminen, Helsinki: Talentum Media Oy, 2015.

[2] C. Agutter, Service Integration and Management (SIAM) Foundation: Body of Knowledge, 2nd ed., Scopism Limited, 2020.

[3] M. Goldberg, G. Satzger and H. Fromm, "Adapting IT Service Management for Successful Multi-Sourcing Service Integration," in *The 24th European Conference of Information Systems*, Istanbul, 2016.

[4] M. Goldberg, G. Satzger and A. Kieninger, "A Capability Framework for IT Service Integration and Management in Multi-Sourcing," in *23rd European Conference on Information Systems (ECIS)*, Münster, 2015.

[5] P. Runeson, M. Höst, R. Austen and B. Regnell, Case Study Research in Software Engineering: Guidelines and Examples, 1st ed., Hoboken: Wiley Publishing, 2012.

[6] C. Robson, Real World Research, 2nd ed., Blackwell Publishing, 2002.

[7] K. Wegrich , "Public Sector," Britannica, [Online]. Available: https://www.britannica.com/topic/public-sector. [Accessed 20 11 2021].

[8] PrivacySense.net, "Public Sector," [Online]. Available: https://www.privacysense.net/terms/public-sector/. [Accessed 20 11 2021].

[9] J. Brock, "United States Public Sector Employment," in *Strategic Choices in Reforming Public Service Employment.*, London, Palgrave Macmillan, 2001, pp. 97-126.

[10] OECD, "OECD iLibrary - Size of public procurement," [Online]. Available: https://www.oecd-ilibrary.org/sites/fc0c31c5-en/index.html?itemId=/content/component/fc0c31c5-en. [Accessed 20 11 2021].

[11] C. Husted and N. Reinecke, "Improving public-sector purchasing," 1 8 2009. [Online]. Available: https://www.mckinsey.com/industries/public-and-social-sector/our-insights/improving-public-sector-purchasing. [Accessed 20 11 2021].

[12] M. Craumer, "How to Think Strategically About Outsourcing," *Harvard Management Update*, vol. 7, no. 5, 2002.

[13] S. Parniangtong, Supply Management: Strategic Sourcing, Singapore: Springer, 2016.

[14] S. Bhattacharya, A. Gupta and S. Hasija, "Single Sourcing Versus Multisourcing: The Role of Effort Interdependence, Metric-Outcome Misalignment, and Incentive Design," *INSEAD Working Paper*, vol. No. 2012/26/TOM, 2012.

[15] L. Cohen and A. Young, Multisourcing: Moving Beyond Outsourcing to Achieve Growth and Agility, Boston, MA: Harvard Business Press, 2006.

[16] M. Goldberg, A. Kieninger and H. Fromm, “Organizational Models for the Multi-Sourcing Service Integration and Management Function,” in *IEEE 16th Conference on Business Informatics*, Geneva, 2014.

[17] Euritas, “Members,” [Online]. Available: https://www.euritas.eu/category/members/. [Accessed 21 11 2021].

[18] Eesti Rahvusringhääling, “Digiriigi alustaristu ja -teenused lähevad üle kesksele korraldusele,” [Online]. Available: https://www.err.ee/1608155728/digiriigi-alustaristu-ja-teenused-lahevad-ule-kesksele-korraldusele. [Accessed 8 07 2021].

[19] ITIL, “ITIL glossary and abbreviations in English,” [Online]. Available: https://www.axelos.com/Corporate/media/Files/Glossaries/ITIL_2011_Glossary_GB-v1-0.pdf. [Accessed 24 3 2021].

[20] F. Stephan, “What is Digital Service Delivery?,” 15 1 2016. [Online]. Available: https://www.excella.com/insights/what-is-digital-service-delivery. [Accessed 22 6 2021].

[21] Gartner, “Gartner Glossary, IT Services,” [Online]. Available: https://www.gartner.com/en/information-technology/glossary/it-services. [Accessed 22 6 2021].

[22] Stefanini Group, “What Are Infrastructure Services?,” 29 1 2020. [Online]. Available: https://stefanini.com/en/trends/news/what-are-infrastructure-services. [Accessed 12 10 2021].

[23] A. Hayes, “End User,” 05 08 2021. [Online]. Available: https://www.investopedia.com/terms/e/end-user.asp. [Accessed 15 10 2021].

[24] Executech, “What Are IT Services? 20 Examples of How IT Support Can Benefit Your Business,” [Online]. Available: https://www.executech.com/insight/what-are-it-services-benefits-of-it-support/. [Accessed 22 6 2021].

[25] AXELOS, “What is IT service management?,” [Online]. Available: https://www.axelos.com/best-practice-solutions/itil/what-is-it-service-management. [Accessed 25 3 2021].

[26] TrustRadius, “IT Service Management (ITSM) Software,” [Online]. Available: https://www.trustradius.com/it-service-management-itsm. [Accessed 23 6 2021].

[27] T. B.S, Practical IT Service Management - A Concise Guide for Busy Executives, 2nd ed., Cambridgeshire: IT Governance Publishing, 2014.

[28] A. Yazici, A. Mishra and P. Kontogiorgis, “IT Service Management (ITSM) Education and Research:Global View,” *International Journal of Engineering Education,* vol. 31, no. 4, pp. 1071-1080, 2015.

[29] International Organization for Standardization, “ISO/IEC 20000-1:2018,” [Online]. Available: https://www.iso.org/standard/70636.html. [Accessed 23 6 2021].

[30] T. Proehl, K. Erek, F. Limbach and R. Zarnekow, “Topics and Applied Theories in IT Service Management,” in *46th Hawaii International Conference on System Sciences,* Honolulu, 2013.

[31] AXELOS, “What is ITIL®?,” [Online]. Available: https://www.axelos.com/best-practice-solutions/itil/what-is-itil. [Accessed 25 3 2021].

[32] AXELOS, “ITIL - IT service management,” [Online]. Available: https://www.axelos.com/best-practice-solutions/itil. [Accessed 25 3 2021].

[33] Office of Government Commerce, The Official Introduction to the ITIL Service Lifecycle, Norwich: The Stationery Office, 2007.

[34] D. Malihin, "6 Things You Should Know About ITIL Expert," 16 1 2018. [Online]. Available: https://www.linkedin.com/pulse/6-things-you-should-know-itil-expert-dragos-malihin. [Accessed 23 6 2021].

[35] ITIL Central, "In A Nutshell: A Short History of ITIL," [Online]. Available: https://itsm.fwtk.org/History.htm. [Accessed 25 3 2021].

[36] AXELOS Limited, ITIL Foundation: ITIL 4 Edition, TSO, 2019.

[37] Orange Business Services, "ITIL 4: an enabler for multi-sourcing IT service innovation," 27 6 2019. [Online]. Available: https://www.orange-business.com/en/blogs/itil-4-enabler-multi-sourcing-it-service-innovation. [Accessed 25 3 2021].

[38] L. Shiff, "Popular IT Service Management (ITSM) Frameworks," 14 6 2021. [Online]. Available: https://www.bmc.com/blogs/itsm-frameworks-popular/. [Accessed 15 7 2021].

[39] Andri, Paulus, Hanes and Ng Poi Wong, "Measuring the Maturity Level of ITSM Using ITIL Framework," in *Fourth International Conference on Informatics and Computing (ICIC)*, Semarang, 2019.

[40] P. Bendor-Samuel , Turning Lead to Gold – The Demystification of Outsourcing., West Provo: Executive Excellence Publishing, 2003.

[41] L. Cohen and A. Young, Multisourcing: moving beyond outsourcing to achieve growth and agility, Harvard: Harvard Business Press, 2006.

[42] M. Wiener and C. Saunders, "Forced coopetition in IT multi-sourcing," *Journal of Strategic Information Systems*, vol. 23, no. 3, pp. 210-225, 2014.

[43] L. Rafati and G. Poels, "Capability Sourcing Modeling: A high-level conceptualization based on Service-Dominant Logic," in *International Conference on Advanced Information Systems Engineering*, Thessaloniki, 2014.

[44] R. Bapna, A. Barua, D. Mani and A. Mehra, "Research Commentary-Cooperation, Coordination, and Governance in Multisourcing: An Agenda for Analytical and Empirical Research," *Information Systems Research*, vol. 21, no. 4, pp. 785-795, 2010.

[45] Oxford English Dictionary, "Meaning of practice in English," [Online]. Available: https://www.lexico.com/definition/practice. [Accessed 24 6 2021].

[46] International Organization for Standardization, "The Process Approach in ISO 9001:2015," [Online]. Available: https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/iso9001-2015-process-appr.pdf. [Accessed 23 06 2021].

[47] ITIL-Docs, "Lists 26 ITIL Processes & 4 ITIL Functions," 20 7 2018. [Online]. Available: https://www.itil-docs.com/itil-processes-functions/. [Accessed 24 6 2021].

[48] AXELOS, "ITIL 4: Connecting key concepts – Part 3," 16 5 2019. [Online]. Available: https://www.axelos.com/news/blogs/may-2019/itil-4-connecting-key-concepts-part-3. [Accessed 24 6 2021].

[49] K. Holland, *An example ITIL®-based model for effective Service Integration and Management Whitepaper*, AXELOS, 2015.

[50] GOV.UK, “Government Digital Service,” [Online]. Available: https://www.gov.uk/government/organisations/government-digital-service. [Accessed 1 4 2021].

[51] GOV.UK, “Government Digital Service - About us,” [Online]. Available: https://www.gov.uk/government/organisations/government-digital-service/about. [Accessed 1 4 2021].

[52] Statens IT, “About the Agency for Governmental IT Services,” [Online]. Available: https://statens-it.dk/english/. [Accessed 1 4 2021].

[53] Valtori, “Information on Valtori,” [Online]. Available: https://valtori.fi/en/information-on-valtori. [Accessed 1 4 2021].

[54] Logius, “English,” [Online]. Available: https://www.logius.nl/english. [Accessed 24 6 2021].

[55] APIS IT, “About APIS IT,” [Online]. Available: https://www.apis-it.hr/apisit/index.html#/page?docId=D9619A3BDFD4D0DBC1257F50004F4C2C. [Accessed 24 6 2021].

[56] Entrepreneurship in a Box, “32 Drivers of Organizational Change,” [Online]. Available: https://www.entrepreneurshipinabox.com/6001/32-drivers-of-organizational-change/. [Accessed 24 10 2021].

[57] D. J. Teece, G. Pisano and A. Shuen, “Dynamic Capabilities and Strategic Management,” *Strategic Management Journal,* vol. 18, no. 7, pp. 509-533, 1997.

[58] D. J. Teece, “Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance,” *Strategic Managagement Journal,* vol. 28, no. 13, pp. 1319-1350, 2007.

[59] K. M. Eisenhardt and M. A. Jeffrey, “Dynamic capabilities: what are they?,” *Strategic Management Journal,* vol. 21, no. 10/11, pp. 1107-1121, 2000.

[60] D. J. Teece, “Business models and dynamic capabilities.,” *Long Range Planning* , vol. 51, no. 1, pp. 40-49, 2018.

[61] A. L. Pablo, T. Reya, J. R. Dewald and A. L. Casebeer, “Identifying, Enabling and Managing Dynamic Capabilities in the Public Sector.,” *Journal of Management Studies,* vol. 44, no. 5, pp. 687-708, 2007.

[62] M. Sotarauta, Kohti epäselvyyden hallintaa: pehmeä strategia 2000-luvun alun suunnittelun lähtökohtana., vol. 6, Tampere: Acta Futura Fennica, 1996.

[63] O. Virri, “Service Integration and Management (SIAM) Practices and Four Case Studies of Finnish Companies,” Helsinki Metropolia University of Applied Sciences, Helsinki, 2016.

[64] R. K. Yin, Case Study Research: Design and Methods, 3rd ed., SAGE Publications, 2003.

[65] J. Gustafsson, “Single case studies vs. multiple case studies: A comparative study,” Halmstad University, Halmstad, 2017.

[66] B. Flyvbjerg, “Five misunderstandings about case-study research,” *Qualitative Inquiry,* vol. 2, no. 12, pp. 219-245, 2006.

[67] S. Hirsjärvi, P. Remes and P. Sajavaara, Tutki ja kirjoita, Helsinki: Tammi, 2013.

[68] S. M. S. Kabir, “Methods of data collection.,” in *Basic Guidelines for Research: An Introductory Approach for All Disciplines,* Chittagong, Book Zone Publication, 2016, pp. 201-275.

[69] N. J. Salkind, Encyclopedia of Research Design, Thousand Oaks, CA: SAGE Publications, Inc., 2010.

[70] G. A. Bowen, "Document analysis as a qualitative research method.," *Qualitative research journal,*, vol. 9, no. 2, pp. 27-40, 2009.

[71] C. Dawson, Introduction to Research Methods 5th Edition: A Practical Guide for Anyone Undertaking a Research Project, 5th ed., London: Robinson, 2019.

[72] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77-101, 2006.

[73] M. J. Allen and W. M. Yen, Introduction to Measurement Theory, 1st ed., Prospect Heights, IL: Waveland Press, 2001.

[74] M. Kesler, Ideasta ratkaisuun 2 – virikkeitä luovaan ongelmanratkaisuun opetuksessa, Helsinki: Kehittämiskeskus Opinkirjo ry, 2015.

[75] Statens IT, "Om Statens It," [Online]. Available: https://statens-it.dk/om-os/om-statens-it/. [Accessed 14 4 2021].

[76] Valtori, "FIGURES AND HISTORY," [Online]. Available: https://valtori.fi/en/figures-and-history. [Accessed 14 4 2021].

[77] QSR International, "About NVivo," [Online]. Available: https://help-nv.qsrinternational.com/20/win/Content/about-nvivo/about-nvivo.htm. [Accessed 16 07 2021].

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Appendix 2: Final Interview Question Set – Customers

Question set used in the final interviews with the interviewees from customer organisations.

Background questions

- Job title:
- Responsibilities:

- Number of employees in your organisation:
- Number of services ordered from the integrator:
- Services ordered from the integrator (Service categories):
- Number of end-users of the services ordered from the integrator in the organisation:

Leading questions

- What experience do you have in service integration and management?
- How familiar are you with the ITIL 4 and SIAM (Service integration and management) concepts?
- How familiar are you with your service integrator and other private ICT service providers?

Success factors, challenges and risks

1. In your opinion, what are the positive aspects of delivering ICT services through an integrator?
2. In your opinion, what are the key success factors in service integration?
3. In your opinion, what are the negative aspects of delivering ICT services through an integrator?

4. What are the most important processes for the smooth operation of service integration?
5. How well do you see the following things going with your integrator in terms of collaboration and integrated services?
    a. Communication and taking responsibility
    b. Flexibility in services and change management
    c. The quality of services

Service quality and indicators

1. In your opinion, what are the most important metrics for measuring service quality in your organization?
    a. How well (or poorly) do you think the services ordered through the integrator are measured?
    b. What challenges have you encountered in measuring services ordered through the integrator?
    c. Who is responsible for the quality of service? Who is responsible for reporting?
    d. What kind of metrics do you think should be used?
2. How are service providers motivated to achieve or adhere to agreed service level (SLA) or performance (KPI) targets?

Service providers and Collaboration

1. How is the customer / end-user organization considered in the services ordered from the integrator?
2. How much can your organization influence decisions about services ordered from the integrator?
    a. What about the chosen service provider?

3. What kind of relationships does your organisation have with your integrator and other private service providers?
    a. How often are operative meetings? How often are strategic meetings?
    b. What tools are in place to maintain relationships with customers and service providers?
    c. What kind of transparency do you think is in communication (end-to-end)?

Appendix 3: Final Interview Question Set – Service Integrators

Question set used in the final interviews with the interviewees from service integrator organisations.

Background questions

- Job title:
- Responsibilities:

- Number of employees:
- Number of service providers:
- Internal units with internal service production:
- Number of customers:
- Number of services provided to end users:

Leading questions

- What experience do you have in service integration and management?
- How familiar are you with the ITIL 4 and SIAM (Service integration and management) concepts?
- How or to what service areas are services divided in your organization?
- What do you think are your organizations strong areas? Where could be room for improvement?

Success factors, challenges and risks

1. In your opinion, what are the key success factors in service integration?
2. In your opinion, what factors do you think hinder the implementation of service integration?
3. What are the most important processes for the smooth operation of service integration?

4. How is your organization trying to avoid vendor lock-ins from developing?
5. How does your organization try to develop internal service integration expertise?

Service quality and indicators

1. Opening question: How important do you consider service quality?
2. In your opinion, what are the most important metrics for measuring service quality in your organization?
    a. Are there indicators and methods in place for end-to-end management of service delivery?
    b. What challenges have you faced in measuring services end-to-end?
    c. Who is responsible for the quality of service? Who is responsible for reporting?
    d. What kind of metrics do you think should be used?
3. How are in-house service providers motivated to achieve or adhere to agreed service level (SLA) or performance (KPI) targets?
4. How are external service providers motivated to achieve or adhere to agreed service level (SLA) or performance (KPI) targets?

Customers and service providers

1. Opening question: Could you introduce and briefly talk about your customers and service providers?
2. On what basis is it decided to outsource a service to an external service provider or to produce it with own resources? What factors influence it?
3. How are service providers' service integration capabilities managed?
4. To what extent can the end-user organization influence decisions about the services ordered from your organization?
5. How is your organization maintaining relationships with customers and service providers?
    a. How often are operative meetings? How often are strategic meetings?

b. What tools are in place to maintain relationships with customers and service providers?

c. What kind of transparency do you think is in communication (end-to-end)?

Appendix 4: Thematic Plotting of Code Categories