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Master's Thesis 2017

**The maturity of United Kingdom (UK) Accounting Actors in Software as a Service (SaaS) and their Readiness for Automated Integrations**

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## **ABSTRACT**

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The purpose of this research is to gain an understanding of the level of maturity amongst the vendors and users of Software as a Service (SaaS) in the UK Accountancy sector, as well as to measure their readiness for automated integrations. In order to address these issues, this thesis provides an up to date academic analysis of SaaS and Cloud Computing in general and more specifically an in-depth report on how it is currently used in the accountancy sector in the UK. In addition, it examines the business and relational strategies behind the selection and development of SaaS solutions, and provides an insight into the type of business relationships, and division and influence of power amongst the key relationship stakeholders.

These issues are of particular relevance to a business sector that has many predefined misconceptions and is in a current state of flux in terms of the rapid movement away from legacy systems, such as desktop software solutions and manual records, to Cloud-based solutions. In addition, a new generation of accountants and clients who have grown up using technology as a norm, are demanding alternative and modern business solutions. In turn, this is having an effect on how the UK accountancy sector will function and look like in the future, and how related relationships and business strategies will be managed. The study focuses on SaaS Vendors and Accountancy Firms located in the UK and who are currently using SaaS solutions. This is a qualitative-based study and it utilises methods such as interviews and open-ended questionnaires with specifically selected interviewees.

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In Luumäki, 10<sup>th</sup> April 2017

Luke Treves

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## 1. Introduction

*“Software as a Service (SaaS) is going to become more and more popular. We’re going to see more and more solutions deployed through the web” – Norman Wendl, Coercon Tech.*

*“Fundamentally, we don’t see their [business] model going over a cliff. But it shifts toward this new model that is software as a service, and ads.” – Tom Bittman, Gartner Research*

Over the past 20 years technology has progressively dictated business performance, and for companies to remain relevant through evolution and adaption to the markets they serve, so must the technology that supports their core functions. Historically, companies have been required to buy, build, and maintain their own IT infrastructures despite exponential costs, and are often restrictive to business operations as they are generally only accessible onsite. In the modern business environment Cloud Computing and in particular its deliver models, such as Software as a Service (SaaS); are steadily increasing in popularity due to a number of critical operational factors including its ability to simplify deployment, allowing users to access business critical information and systems whenever and wherever they want using any internet connected device, and reducing customer acquisition costs. With SaaS, vendors can also support multiple customers with a single version of a product. This approach, called multitenancy, allows companies to scale as fast and as much as needed without replacing costly hardware, software and the people needed to manage it all. In addition to this as SaaS applications are subscription based, there are no license fees meaning lower initial costs for a user. Of particular relevance to this Master’s Thesis, SaaS solutions also provide seamless “integrations” and SaaS vendors with true multitenant architectures can scale indefinitely to meet customer demand. Many SaaS vendors also offer customisation capabilities to meet specific needs. Plus, many provide Application Programming Interfaces (APIs) that let a user integrate with existing Enterprise Resource Planning (ERP) systems or other business productivity systems. (Salesforce 2017).

To put this into a business context, a survey of a thousand IT professionals by Forrester Research found that companies are turning to hosted SaaS products as a way to offload management of non-mission-critical applications such as HR and CRM. Plus, the subscription-based SaaS pricing model can keep IT budget costs consistent or lower than packaged or homegrown software. (Salesforce 2017). In a business environment where companies across all industrial sectors are looking at ways to reduce overhead costs and

deliver greater value through focusing on their key business activities, SaaS offers a more efficient and effective way of conducting business.

The United Kingdom (UK) SaaS and the broader Cloud Computing vendor landscape are both diverse and highly dynamic. To date it has been the established IT services providers such as Microsoft, Sage and SAP; that have secured the biggest slice of the Cloud opportunity, as large enterprises look to work with big international suppliers under broad-scope deals as they build first-generation private and hybrid cloud environments. However, a vibrant community of specialised vendors and integrators has developed around fast-growing SaaS and IaaS (Infrastructure as a Service) solutions; who typically target the Small and Medium Sized Enterprises (SME) market. Some of these vendors are positioning themselves as orchestrators or aggregators of third-party offerings, and others resell services delivered by other providers. Despite an unclear business outlook due to factors such as Brexit and a general downturn in the business operating environment, it is forecasted that UK SMEs will continue to invest in Cloud-based business applications such as SaaS, with key areas of investment being in the fields of Customer Relationship Management (CRM), analytics, mobility, and industry-specific software.

In more conservative business sectors, such as finance and accounting SMEs provide strong opportunities for SaaS vendors seeking to expand in the UK market either in partnership with existing vendors or as a standalone vendor. Over recent years there has been increasing evidence that these companies are successfully attacking the client base of well-established vendors in the SME segment, such as Sage; who have witnessed a steady flow of their clients switching to specialised accountancy SaaS vendors. The basic presumption behind this thesis is, therefore to assume that there is a demand from SME accountancy firms and their clients located in the UK, for commercial Cloud software and SaaS will not only increase the number of demanders but also in the number of demanded solutions and associated applications per firm. In addition, to this increase in solutions and applications, there will be an associated demand for facilitating integration between them in order to drive maximum efficiency, return on investment, and value creation and retention.

Previous academic research on SaaS and Cloud Computing has primarily focussed on the technical aspects of these services. They do not investigate the business opportunities and potentials such service delivery methods can offer SME users or the importance of factoring them into the overall business strategy and interlinked relationships between the



members of a business network. From this perspective Cloud Computing and its delivery platforms, including SaaS; has the potential to revolutionise the mode of computing resource and application deployment, breaking up traditional value chains and making room for new business models (Leimeister et al. 2010). The importance of this thesis is that it provides an up to date academic analysis of SaaS and Cloud Computing in general, but more specifically an in-depth report on how it is currently used in the accountancy sector in the UK. In addition, it examines the business and relational strategies behind their selection and development, and provides an insight into the type of business relationships, and division and influence of power amongst the key relationship stakeholders; which has not been studied from the perspective of the main issue this thesis is aiming to address. This is of particular relevance to a business sector that has many predefined misconceptions and is in a current state of flux in terms of the rapid movement away from legacy systems, such as desktop software solutions and manual records, to Cloud-based solutions. Additionally, a new generation of accountants and clients who have grown up using technology as a norm, are demanding alternative and modern business solutions. In turn, this is having an effect on how the accountancy sector will function and look like in the future, and how related relationships and business strategies will be managed.

## **1.1 Objective and Research Question(s)**

The objective of this Master's thesis is to gain an understanding of the level of maturity amongst the vendors and users of SaaS in the UK Accountancy sector, and their readiness for automated integrations. Therefore, the primary research question of this Master's thesis is:

- **“What is Software as a Service (SaaS) and what are the potential benefits and pitfalls of using such a Cloud-Based service in a business environment?”**

In order to answer this question, there are a number of supplementary questions that will need to be answered these include:

- “What kinds of software services are currently being used/available?”
- “How do these software vendors handle the connections/integrations now if a customer requires one?”

- “What types of Business Relationships govern the interactions between the key accounting actors that enable SaaS to develop in the sector?”
- “How mature are UK Accounting Actors in SaaS and what is this readiness for Automated Integrations?”

Typically services, software and applications offered by Cloud Computing and SaaS vendors can be defined as a type of ERM technique. Therefore, this research will also seek to define from the researchers’ perspective the types of sourcing strategies employed by UK Accountancy firms and their clients, when they are seeking a SaaS vendor and the types of relationships that are established between all interested stakeholders, and the reasoning for choosing a certain strategy.

## **1.2 Research Methodology**

This section includes the research methodology of this Master’s Thesis. In more detail, this section contains the research strategy, the research method, the research approach, the methods of data collection, the selection of the sample interviewees, the research process, the type of data analysis, and the limitations of this research are established.

### **1.2.1 Research Strategy**

The core research held with respect to this Master’s Thesis is an applied one. In this context, an “applied research” methodology is used by the researcher to answer a specific primary question and supplementary questions; that have a direct application in the real world, in this case, the readiness of accountancy actors in the UK for SaaS business solutions and its associated automated integration processes. The answers to these questions can be used to identify potential areas for future business development and strategies for both of these groups, as well as new streams of value generation in an increasingly complex and challenging business environment.

Supporting the core research of this Master’s Thesis the researcher applied a “basic research” approach in the theoretical section of the report to gain a better understanding of the general principles and applications of SaaS and integrated systems, and so to contextualise the findings of the empirical research.

### **1.2.2 Research Method**

In order to satisfy the objectives of this Master's Thesis, a qualitative research was undertaken. The main characteristic of qualitative research is that it is typically suitable for evaluating small samples, and to gain an in-depth understanding of particularly questions and problems that cannot be gained through numerical or quantitative data investigation. A qualitative approach benefits a researcher by presenting a comprehensive description and analysis of a research subject, without limiting the scope of the research and the nature of participant's responses. (Collis & Hussey, 2009).

The effectiveness of qualitative research is heavily based on the skills and abilities of the researcher(s), and there are risks that the outcomes of such research may not be perceived as reliable, because they mostly come from researcher's personal judgments and interpretations, and only reflect the opinions of a narrow sample group and may be considered not to present an accurate picture of what is actually occurring in the research area. In this research some of these risks are overcome by the fact that there are only a limited number of vendors offering SaaS and automated integration solutions to accountancy actors in the UK, therefore the wider audience is rather narrow. However, this also raises the issue that responses from accountancy actors may be affected by the relationship status with their current vendor.

### **1.2.3 Data Collection and Tool**

This Master's Thesis research is based on both a theoretical and empirical data collection and analysis. The theoretical part is based on the analysis and comparison of previous academic journals and articles gathered using the key terms and concepts that are defined in Section 1.5 of this research. In addition, the research makes use of previous research undertaken by respected professional service and consultancy bodies, as well as professional press articles on the subject of this report. These reports and researches provide an essential insight into sector specific data that is often not available in academic journals and articles that often focus on high level or functional/operational aspects of SaaS and Cloud Computing; and do not provide a deep analysis of their use or impacts on a certain geographical or business area.

The empirical part of this research is based upon evidence that has been gathered through a series of in-depth telephone interviews with representatives from SaaS vendors

who are currently providing Cloud-based accounting software for SME businesses in the UK, as well as UK Accountancy firms who make use of such services. In depth interviews are personal and unstructured dialogues, whose aim is to identify participant's emotions, feelings, and opinions regarding a particular research subject. The main advantage of such an approach is that they involve personal and direct contact between interviewers and interviewees, as well as eliminate non-response rates. However, such an approach requires an interviewer to be competent in conducting an interview. Unstructured interviews also offer flexibility in terms of the flow of the interview, thereby leaving room for the adding of additional questions that were not originally considered by a researcher and to generate deductions that were not initially meant to be derived regarding a research subject. However, there is the risk that the interview may deviate from the pre-specified research aims and objectives (Gill & Johnson, 2010).

A semi-structured questionnaire was the primary data collection tool used in this research, and it was used as an interview guide for the researcher. Some certain questions were prepared, so as for the researcher to guide the interview towards the satisfaction of research objectives, but additional questions were raised during the interviews depending on the interviewee's responses, and the researchers interpretation of them. In addition, a detailed questionnaire was also developed and used in instances where selected interviewees expressed a preference to respond in this format. This questionnaire (Appendix 1 and 2) was broadly based on the questions used in the interviews. The results gathered from interviews and questionnaires will be assessed using the Forrester Maturity Model described in Section 3.5 of this Master's Thesis and the researchers own deductive skills.

#### **1.2.4 Sample Selection**

In this research there were two specific sample groups (1) SaaS vendors providing specific solutions to the accountancy sector; and (2) accountancy actors using said SaaS solutions. SaaS vendors were selected based upon an internet research of all the major SaaS vendors who offer services to the accountancy sector in the UK. Selected SaaS vendors included Sage (with systems Sage One and Sage Live); Exact; Xero; Linnworks; Quickbooks (Intuit); Kashflow; Receipt-Bank; Iris; FreeAgent and AccountIQ.

Input from a selection of 10 accounting companies was also sought as their feedback and comments are also critical in answering the main and supplementary questions of this

research. This is because they are often regarded as the trusted advisor of the firms and/or individuals who requires accounting services. It is often the case that if your company accountant advises you to use a certain software package and/or integration as it will increase efficiency and effectiveness for your company, and ultimately deliver added value i.e. money; that you are more likely to do adopt the software and associated services. It is also important to recognise that there are lots of different types of accounting companies ranging from micro or small accountancy firms who continue to use legacy record systems such as paper files or Excel databases and spreadsheets. These firms are typically slower to adapt their business models and implement modern accountancy practices and technologies. Then there is the bigger group of accounting companies who know they should do something to keep on the ball but continue to use on site and specially designed accountancy systems. Finally, there are the modern accountancy firms who realise that if they offer their customers more services and better support for technologies such as SaaS, and its associated applications; that they will achieve additional business opportunities and value streams. These in the future will be the accountancy firms that will likely be the most successful, as accounting becomes more automated and conducted through computer algorithms rather than by a person.

With this in mind, interviews and feedback was sought from progressive accounting firms who are very close to their clients, and who are likely to have the best feeling about how ready their clients are for SaaS and automated integrations. These firms were identified using search facilities that are available on the websites of the SaaS vendors providing services to the UK Accountancy Sector. These facilities have specific search functions that enable a researcher to identify accountancy firms that are currently using SaaS solutions. Finally, the firm's suitability for follow-up contact was assessed by cross-referencing their position in the Institute of Chartered Accountants in England and Wales (ICAEW) 2014 Survey of the 75 most successful UK accountancy firms.

### **1.2.5 Research Process**

An introductory email was sent to suitable representatives for the two sample groups in October 2016, and interviews were conducted between mid-October and early November 2016 with respondents who were willing to participate in this research. The response rate was 20% which is a suitable response rate for the sample size that was approached. Interviews were conducted via telephone due to the geographical distance between the researcher and the interviewees, and generally lasted 20 minutes. A record of the

interviews was taken in writing so to enable the researcher to analyse and compare the data gathered; and interviewees were fully informed regarding the objectives of the study, while they were reassured that their answers would be treated confidentiality. In addition, to this primary empirical evidence, secondary sourced empirical evidence was gathered from company websites where answers to the research questions were publicly available. This analyse took place between December 2016 and January 2017, in order to enable the researcher to produce a detailed analysis interpretation of the results by the end of February 2017.

### **1.2.6 Analysis of the Research Data**

The analysis of qualitative research objective is to uncover and/or understand the big picture, by using the data to describe the phenomenon and what it means. Both qualitative and quantitative analysis involves labelling and coding all of the data gathered in order to identify similarities and differences in responses. Responses from even an unstructured qualitative interview can be entered into a computer in order for it to be coded, counted and analysed. A qualitative researcher, however, has no system for pre-coding, therefore a method of identifying and labelling or coding data needs to be developed that is bespoke for each research that is called “content analysis.” (University of Surrey 2016).

Content analysis is a procedure for the categorisation of verbal or behavioural data, for purposes of classification, summarisation and tabulation; and can be used when qualitative data has been collected through:

1. Interviews
2. Focus groups
3. Observation
4. Documentary analysis

The content of these data collection techniques can be analysed on two levels:

1. Basic level or the manifest level: a descriptive account of the data i.e. this is what was said, but no comments or theories as to why or how.
2. Higher level or latent level of analysis: a more interpretive analysis that is concerned with the response as well as what may have been inferred or implied.

Content analysis involves coding and classifying data, also referred to as categorising and indexing and the aim of context analysis is to make sense and meaning of the data collected and to highlight the important messages, features or findings. (University of Surrey 2016). There are numerous tactics for generating meaning from the content of qualitative evidence, ranging from descriptive to the explanatory; and from the concrete to the more conceptual and abstract. The most common tactics begin with a researcher reviewing the data they have gathered and noting common patterns and themes, seeing plausibility in the conclusions and whether they make sense in the context of the overall research objective; and clustering the common patterns and themes into classes, categories, and bins that help the researcher see “what goes with what.” Counting is also a familiar way to see “what’s there.” Making contrasts/comparisons is also a prevalent tactic that sharpens understanding. Differentiation sometimes is needed too, as in partitioning variables. (Miles et al. 2014).

Tactics for seeing things and their relationships more abstractly are also needed. These include subsuming particulars into the general, factoring, noting the relations between variables, and finding intervening variables. These tactics build a logical chain of evidence and making conceptual/theoretical coherence; allowing a researcher to systematically assemble a coherent understanding of data. (Miles et al. 2014). Using these tactics the data gathered through qualitative based interviews and questionnaires, was analysed in cross reference with Forrester's SaaS maturity model discussed in Section 3.5 of this Master’s thesis. QDA Miner4 Lite was used to assist in the categorisation and analysis of the data, and turn them into concrete findings and conclusions.

### **1.2.7 Delimitations**

The main restrictions for this Master’s Thesis are mainly related to the scope of the type of SaaS Vendors and Accountancy firms that were surveyed. It only takes into account the most popular SaaS vendors that offer services to the accountancy sector, and who have offices located within the UK. It does not take into account smaller software companies who often only have a small client base and niche offerings, and are typically limited in their scope and as a source of in-depth quality information needed to answer the main question of this Master’s thesis.

This Master’s Thesis also only examines accountancy firms that demonstrate an innovative and forward thinking approach to its business strategy in the opinion of the

researcher, and use one of the software systems described in Section 1.2.4 of this Master's Thesis. It is also limited to surveying SME accountancy firms located within the UK. The reasoning for focusing on SME's is due to the reasoning that most large companies usually have a form of SAP or other kind of highly modified systems that cannot support integrations. This is because, integrations are usually only viable when they are through SaaS solutions operating with standard software, as they are more flexible and easier to adapt to specific user requirements. The bigger the company the more they have modified systems that are less compatible with generic or commercially available software systems.

In addition, this Master's Thesis does not investigate the Software Development Life Cycle (SDLC) - being the structured sequence of stages in software engineering to develop the intended software product through to "Disposition," whereby the software may decline on the performance front, become completely obsolete or may need intense upgradation. Typically, leading to the need to eliminate a major portion of the system including: archiving data and required software components, closing down the system, planning disposition activity and terminating system at appropriate end-of-system time. This thesis research only examines the current market conditions and maturity within the main actors in the UK SaaS and integrations sector.

Finally, it will only give brief descriptions of other service models and deployment models that are available through the Cloud Computing. This is because SaaS is the most relevant deployment model to this Master's Thesis topic. This Master's Thesis does not make any recommendations or comparisons of the different software's that have been identified.

### **1.3 Structure of Thesis**

This thesis consists of six main chapters. The introduction aims to explain the research topic, basic need and background for the study and explain the structure and methodology used. There are three theoretical sections, which aim to provide important background knowledge from prior studies and present findings from scientific literature and academia, as well as relevant reputable industry resources. The first theoretical chapter provides an overview of Cloud Computing and its delivery models. The second chapter provides an in-depth examination of SaaS, including the SaaS business model, systems and data integrations through SaaS and introduces two models used to assess the maturity level of



SaaS vendors. The third chapter examines SaaS from a business perspective and highlights opportunities for creating value through the use of Cloud Computing and SaaS. Figure 1 provides an overview of the structure of this research.

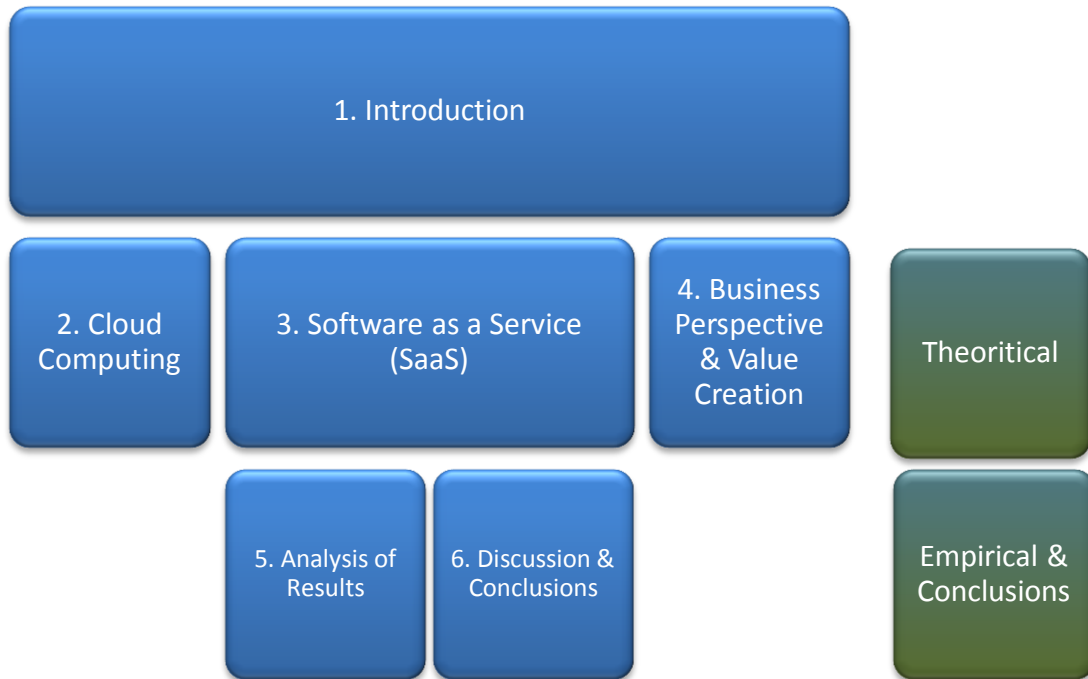


Figure 1. Structure of Master's Thesis.

In the empirical part of this Master's Thesis, the findings from the interviews of the benchmark companies are analysed and presented. Results from previous studies and literature are combined with the results from the interviews in order to get a comprehensive picture of the current state of play amongst the main SaaS Accountancy Actors operating in the UK, and to provide a general overview of the uptake of SaaS solutions within the UK accountancy sector. In addition to this, the maturity level of SaaS Accountancy Vendors is assessed using Forrester's SaaS Maturity Model, and a general assessment of the other Actors i.e. Accountancy Firms and their Clients; is made based on the results of the benchmark interviews. After the empirical findings have been presented, the final sections of this Master's thesis discussion and conclusion points are provided. The aim of these sections is to give an overall summary of this thesis research and also to evaluate the reliability and validity of this study and give further research topics.

## 1.4 Conceptual Framework

The conceptual framework outlines the system of concepts, assumptions, expectations, beliefs, and theories that support and inform a research, and are, therefore a key part of research design. Miles and Huberman (1994) defined a conceptual framework as a visual or written product, one that “explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them.” The most important aspect of the conceptual framework is that it is primarily a conception or model of what is out there that a researcher plans to study, and of what is going on with these things and why—a tentative theory of the phenomena that is being examined. The function of this theory is to inform the rest of the research’s design and help a researcher to assess and refine their goals, develop realistic and relevant research questions, select appropriate methods, and identify potential validity threats to their conclusions. In a nutshell it helps a researcher to justify their research. (Maxwell 2013, 39).

The “research problem” is a part of a researcher’s conceptual framework, and formulating the research problem is often seen as a key task in designing a study. It is part of the conceptual framework, although often it is treated as a separate component of a research design or proposal; because it identifies something that is going on in the world, something that is itself problematic or that has consequences that are problematic. A research problem purpose is to justify your study, to show people why your research is important. In addition, this problem is presumably something that is not fully understood or studied from a chosen perspective, or we do not adequately know how to deal with; therefore, we want more information about it. Not every study will have an explicit statement of a research problem, but every good research design contains an implicit or explicit identification of some issue or problem, intellectual or practical, about which more information is needed. (The justification of “needed” is where your goals come into play.) (Maxwell 2013, 40).

A tool frequently used by researchers to develop and clarify the theory supporting their research is what is commonly known as “concept mapping.” This was originally developed by Joseph Novak initially as a way to understand how students learned science, and then as a tool for teaching science, and can be defined as a visual display of the conceptual theory—a picture of what the theory says is going on with the phenomenon a researcher studying. These maps do not depict the study itself, nor are they a specific part of either a

research design or a proposal. However, concept maps can be used to visually present the design or operation of a study. Rather, concept mapping is a tool for developing and presenting the conceptual framework for your design. And like a theory, a concept map consists of two things: concepts and the relationships among these. These are usually represented, respectively, as labelled circles or boxes and as arrows or lines connecting these. There are several reasons for creating concept maps:

1. To pull together, and make visible, what your implicit theory is, or to clarify an existing theory. This can allow a researcher to see the implications of the theory, its limitations, and its relevance for your study.
2. To develop theory. Like memos, concept maps are a way of “thinking on paper”; they can help you see unexpected connections, or to identify holes or contradictions in your theory and figure out ways to resolve these.

It is critical for a researcher to be aware that no map can capture everything important about the phenomena they are studying; every map is a simplified and incomplete model of a more complex reality. Such a simplified visual display can be useful for representing your ideas, but it necessarily leaves out a key ingredient: the nature of the connections that you see between these concepts, which are explored in more detail within a research paper. (Maxwell 2013, 54).

The main research problem examined in this thesis is “what is the maturity of UK accounting actors in Software as a Service (SaaS) and their Readiness for Automated Integrations.” To address this problem critically, both a theoretical analysis of previous researches and empirical a “qualitative research;” are deemed appropriate to obtain the most in-depth results. Using the “concept map” model and caveats described by Maxwell (2013), Figure 2 provides a depiction of the research design of this study and the supporting theoretical and empirical research.

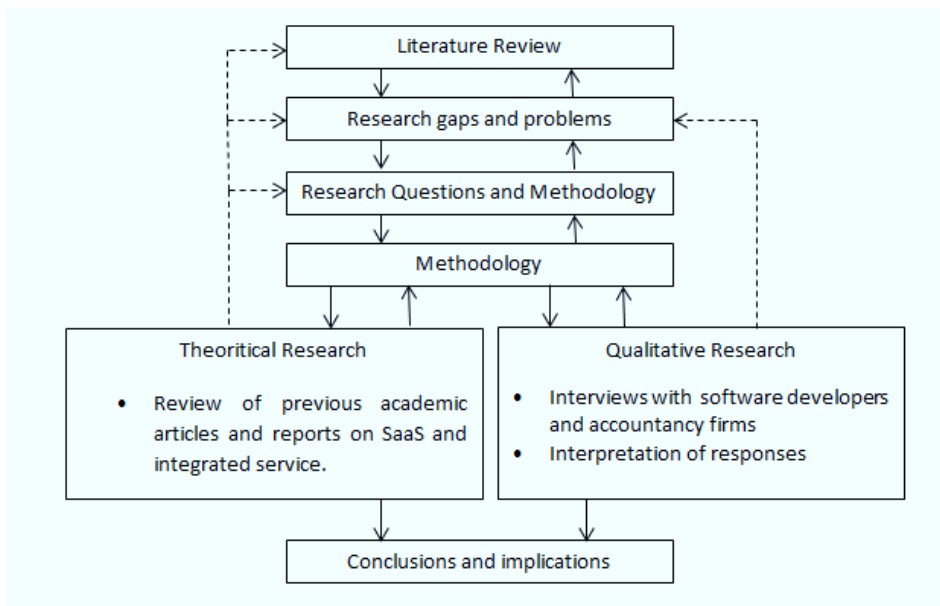


Figure 2 Research Design of Master's Thesis

In addition, Figure 3 provides a high level depiction of this research's concept mapping, which helps focus the study.

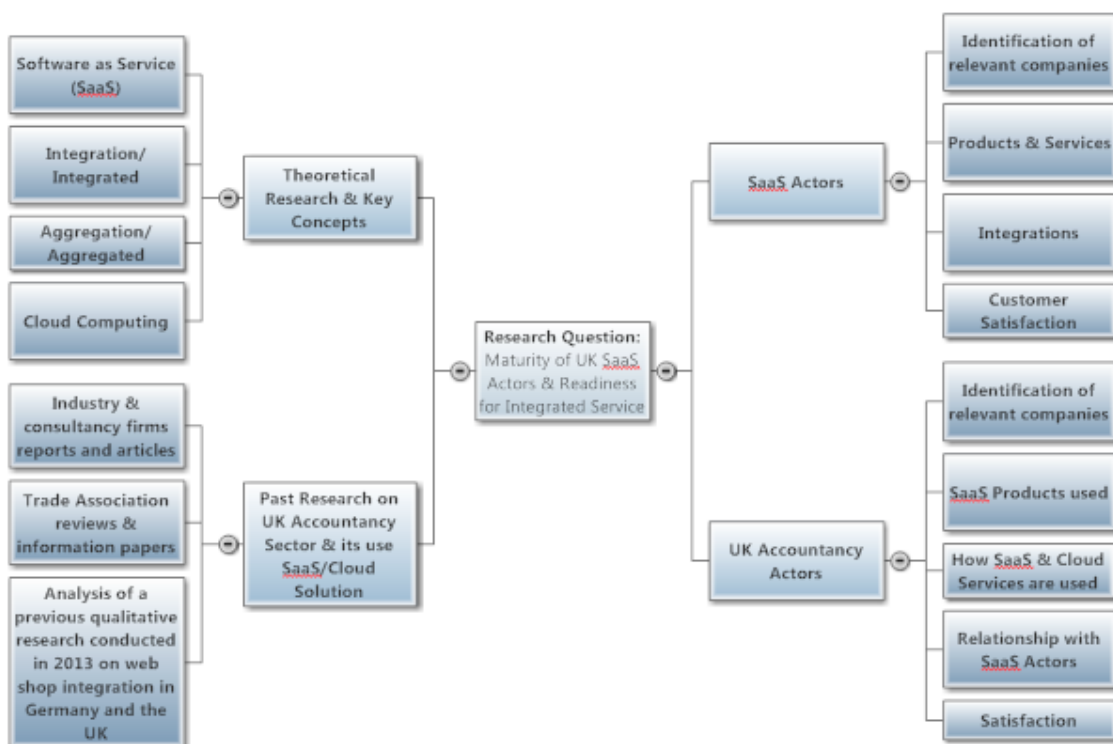


Figure 3. Concept Map of this Master's Thesis.

Whilst this study focuses primarily on the maturity and use of SaaS and readiness for integrated services within actor in the UK accountancy sector; many of its findings and

principles can be applied in other business sectors and across national borders. However, it is important to note that if doing so that a reader should factor in issues such as domestic regulations and business sector characteristics, as well as the type of SaaS vendor and its offerings in a given operating market.

## 1.5 Definition of Key Terms

This section clarifies the main key terms and abbreviations used throughout this Master's Thesis.

### **Accountancy Firm/Accountancy Firm Partner**

**Aggregation/Aggregator** - a tool that pulls together information from multiple sources, and consolidates that information into a smaller and more easily digested number of streams.

**API** - is the acronym for "Application Programming Interface," which is a software intermediary that allows two applications to talk to each other. For example, each time you use the Facebook app, send an instant message, or check the weather on your phone, you are using an API. API's also offer a layer of security in that it communicates with small packets of data, sharing only that which is necessary. Therefore a users' device is never fully exposed to the server, and likewise the server is never fully exposed a users' device. (Mulesoft 2017) (1).

**Automated Integrations** – also known as "Continuous Integrations" enables seamless real-time data exchange and interactions, between different business applications.

**Client** – typically the client of the accountancy firm and main user of SaaS solutions.

**Cloud Computing** - often referred to as simply "the Cloud," is the delivery of on-demand computing resources - everything from applications to data centres - over the internet on a pay-for-use basis. (IBM 2017).

**Enterprise Resource Planning (ERP) system** – helps companies integrate and manage all of their financial, supply chain, manufacturing, operations, reporting and human

resources activities. ERP systems can be deployed on-site, but automated, cloud based solutions are becoming increasingly popular. A central feature of all ERP systems is a shared database that supports multiple functions used by different business units. In practice, this means that employees in different divisions—for example, accounting and sales—can rely on the same information for their specific needs. ERP software also offers some degree of synchronized reporting and automation. (Netsuite 2017).

**SaaS Vendor** – is a developer and provider of SaaS solutions.

**Software as a Service (SaaS)** – are Cloud-based applications run on distant computers “in the cloud” that are owned and operated by others and that connect to users’ computers via the internet and, usually, a web browser. (IBM 2017).

**SME (Small and Medium Sized Enterprises)** – are non-subsidiary, independent firms which employ less than a given number of employees. This number varies across countries. The most frequent upper limit designating an SME is 250 employees, as in the European Union and is the definition applied within this Master’s Thesis. (OECD 2005).

## 2. Cloud Computing

SaaS is a “Cloud Computing” services that enables applications to be delivered to a user over the Internet and allows access to them from any Internet-enabled device and in any location. Such services offer high scalability, which gives a user the option to access more, or fewer, services or features on-demand. SaaS removes the need for organisations to install and run applications on their own computers or in their own data centres, eliminating the expense of hardware acquisition, provisioning and maintenance, as well as software licensing, installation and support. This section of the Master’s Thesis provides an introduction to the main definitions and principles associated to Cloud Computing and its main delivery models; setting the context for a deeper analysis of SaaS in Section 3.

### 2.1 What is Cloud-Computing?

There are multiple definitions of the principles behind Cloud Computing and the Cloud in general. Youseff et al. (2008) were amongst the first academics to attempt to provide a comprehensive definition of Cloud Computing and its supporting elements, stating that *“Cloud Computing can be considered a new computing paradigm that allows users to temporary utilize computing infrastructure over the network, supplied as a service by the Cloud-provider at possibly one or more levels of abstraction”* (Youseff et al. 2008). According to Armbrust et al. (2009) *“Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the datacentres that provide those services. The services themselves have long been referred to as Software as a Service (SaaS). The datacentre hardware and software is what we will call a Cloud. When a Cloud is made available in a pay-as-you-go manner to the general public, we call it a Public Cloud; the service being sold is Utility Computing. We use the term Private Cloud to refer to internal datacentres of a business or other organisation, not made available to the general public. Thus, Cloud Computing is the sum of SaaS and Utility Computing, but does not include Private Clouds.”* In this context the authors also understand Cloud Computing as a collective term, covering pre-existing computing concepts such as SaaS and utility computing. (Leimeister et al. 2010). Armbrust et al. (2009) further perceive the following aspects as new: (1) the illusion of infinite computing capacity available on demand, (2) the elimination of upfront commitment to resources on

the side of the Cloud user, and (3) the usage-bound pricing for computing resources on a short-term basis.

More recently and often accepted as the most comprehensive definition of Cloud Computing, is that of Mell and Grance (2011) of the National Institute of Standards and Technology (NIST) who state that:

*“Cloud Computing is a model for enabling ubiquitous, convenient, on demand network access to a share pool of configurable computing resources (e.g. networks, servers, storage, applications, and service) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This Cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployments.”*

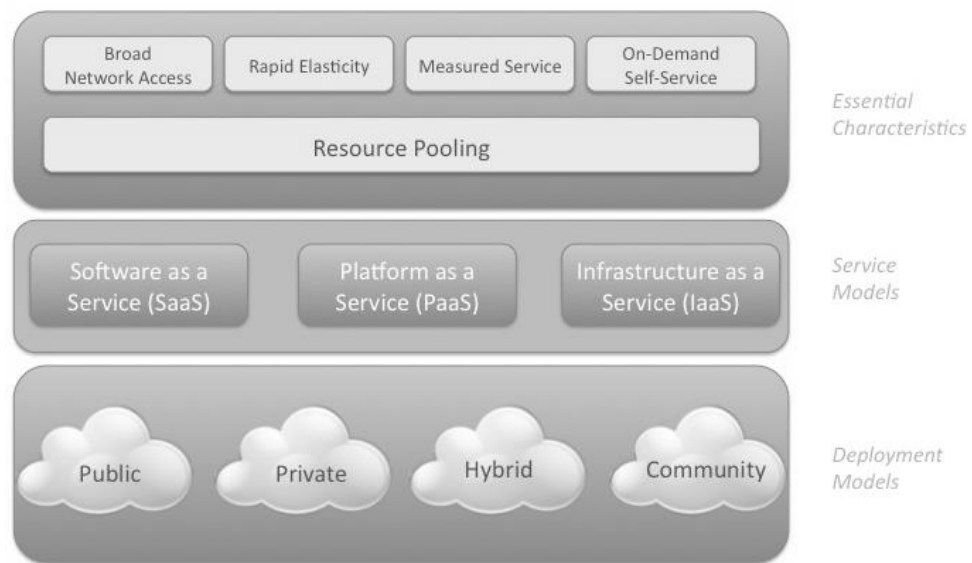


Figure 4 Visual Model of NIST Definition of Cloud Computing (Mell and Grance 2011).

Figure 4 provides an overview of the model proposed by NIST. This Cloud model is composed of five essential characteristics, three service models, and four deployment models. These are described in more detail in the follow three sub-sections.

## 2.2 Essential characteristics of Cloud Computing

The essential characteristics of Cloud Computing are:



- It is an **on-demand self-service** through which a user can individually access computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.
- **Broad network access** is a prerequisite because capabilities are available over the network and accessed through standard mechanisms that promote use by wide-ranging user platforms such as mobile phones, tablets, laptops, and desktop workstations.
- The vendor's computing **resources are pooled** to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand and specification. There is a sense of location independence in that the user generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction such as country, state, or datacentre. Examples of resources include storage, processing, memory, and network bandwidth.
- It is characterised by **rapid elasticity**, and capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.
- Cloud systems are a **measured service** that automatically control and optimise resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service e.g. storage, processing, bandwidth, and active user accounts. Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilised service. (NIST 2011).

## 2.3 Cloud Computing Delivery Models

The concept of Cloud Computing typically has three types of service delivery models (i) Software as a Service (SaaS), (ii) Platform as a Service (PaaS), and (iii) Infrastructure as a Service (IaaS):

- **Software as a Service (SaaS)** provides a client with the capability to use a vendor's applications that are routed through a Cloud-based infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser, or a program interface. The client does not manage or control the

underlying Cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings. (NIST 2010).

- **Platform as a Service (PaaS)** provides a computing platform and solution stack upon which applications and services can be developed and hosted by using programming concepts and tools supported by the vendor. Examples include Force.com and Google App Engine. (Walraven et al. 2014). Motahari Nehad et al. (2009) define PaaS more comprehensively as *“providing facilities to support the entire interface development lifecycle including design, implementation, debugging, testing, deployment, operation and support on rich Web applications and services on the Internet.”* In addition, to this they note that Internet browsers are the most common environment for this type of application development and is typically performed on a pay-per-use or charge-per-use basis.
- **Infrastructure as a Service (IaaS)** is the provision of fundamental computing resources (e.g. processing, storage and networks) through which the client is able to deploy and run arbitrary software as a virtual or physical service, for example Amazon Elastic Compute Cloud (EC2) for developers. (Walraven et al. 2014). The user does not manage or control the underlying Cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components such as host firewalls. (NIST 2010).

Finally, taking into account the NIST (2010) model there are four Cloud Computing Deployment Models these being:

- By **Private Cloud** on which the infrastructure is provisioned for exclusive use by a single organisation that has multiple consumers for example business units. It may be owned, managed, and operated by the organisation, a third party, or some combination of them, and it may exist on or off site.
- By **Community Cloud** on which the infrastructure is provisioned for exclusive use by a specific community of consumers from organisations that have shared concerns for example mission, security requirements, policy, and compliance considerations. It may be owned, managed, and operated by one or more of the organisations in the community, a third party, or some combination of them, and it may exist on or off premises.

- By **Public Cloud** on which the infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organisation, or some combination of them. It exists on the site of the Cloud provider.
- By **Hybrid Cloud** on which the Cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardised or proprietary technology that enables data and application portability, for example Cloud bursting for load balancing between Clouds.

By considering these various definitions, Cloud Computing can be described as “a trend that refers to the delivery of information and communications technology (ICT) solutions as online services, covering software applications, system software, hardware infrastructure, etc.” (Walraven et al. 2014). In this sense Cloud Computing has a very different concept to existing business processes. In traditional environments, users are required to procure the systems and software that they use, which is typically fixed to a specific location. In a Cloud Computing environment, however, users only require an Internet enabled terminal or device to handle and store all tasks on the network, without constructing a system or purchasing software programs. Users only pay a fee to use the system, wherein the hardware and software are integrated somewhere offsite. Cloud Computing supports large-scale computing resources and enables virtualisation; on-demand computing; dynamic deployment and flexible scalability. Benefits of cloud computing include there being no initial cost of purchasing software or hardware, freedom from maintenance and updates, accessibility through the Internet, high availability, and pay-per-use pricing. (Kim et al 2012). This enables individuals and companies to operate more effectively, enables them, their staff and clients to access live and real-time information wherever and whenever they want, on multiple devices such as smart phones, tablets and laptops; which is not feasible using traditional systems and software solutions.

Whilst there are numerous benefits in using services delivered through Cloud Computing, a user must also take into account a number of critical technical problems in Cloud Computing. These include the provision of pre-specified scalability even at peak times, providing availability of services and data sets, engineering services with high commonality, and adapting partially matched services. These problems must be addressed from the consumers’ viewpoint. (Kim et al 2012).

Security concerns are also an often cited issue when discussing conducting business over the internet and through Cloud based systems, and this needs to be constantly monitored. However, as the Cloud Computing model has matured and deployed across many companies, security concerns have been set aside so as to embrace the advantages that the platform can deliver. Advocates of Cloud-based business and SaaS point to the fact that web hosted software's are held in highly secure data centres, which allow an improved level of security, that reduce the risk of data loss and system breaches by improving the capability to secure, monitor, and manage devices and software. In addition, such systems are based on service level agreements that usually contain specific financial penalties for security compromises under the SaaS model. Companies hosting their own software may not be able to similarly transfer these financial risks to a 3rd party. That said by its nature Cloud-based software does rely on information moving through the open internet, where it may be susceptible to security attacks and breaches. Therefore, security remains a key issue when evaluating and choosing a cloud-based service.

### 3. Software-as-a-Service (SaaS)

SaaS as a Cloud-Computing delivery model was introduced in the previous Section, building on this brief introduction the main features of SaaS are that it provides applications that are performed on top of PaaS and IaaS. According to Lenk et al. (2009), this layer includes all the applications that run on the Cloud and provide a direct service to the client. It provides an integrated buy service approach comprising of hardware, development platforms, and applications to the end users over the internet with a specific user interface (Buyya et al. 2009). All updates to software are performed by the software vendor and consequently, the end user does not need to be concerned as to whether the software is up-to-date. Kim et al (2012) provide a more comprehensive definition of SaaS as *“a software distribution model in which customers can acquire services on demand by ordering and receiving various kinds of software application services via the Internet. Compared with traditional service models, SaaS has very many advantages such as investment reduction, performance improvement, time-saving, easier collaboration, global accessibility, etc. A well-designed SaaS application must have three features, namely multi-tenant efficiency, scalability, and configurability. Although not all existing SaaS applications support all of these features.”* SaaS, can, therefore be described as a software deployment model that delivers software applications and updates online and as on-demand services, for example, the Salesforce CRM application, Facebook and Google Apps. (Walraven et al. 2014). In summary, the SaaS model does not require software to be hosted on the premise of a user. Instead, the SaaS vendor hosts the software on a contract basis, and access to clients' business relevant tools and information is delivered via the public internet.

There is a final layer of SaaS, which is the IT foundation including servers, network devices, storage devices, databases, and other physical resources. Under the SaaS model Cloud Computing is classified into four kinds of offerings, which are Cloud Computing serving as the data centre, Cloud Computing in the form of distributed computing, Cloud Computing in the developed form of a utility grid, and Cloud Computing serving as Software as a Service.(Kim et al. 2012).

#### 3.1 SaaS as a Business Model

The provision of IT resources in enterprises is closely linked with the general consideration whether information and communication technology should be kept in house

or sourced from external providers. This has become one of the most important organisational concepts and operational decision making factors in recent decades, especially in the light of the rapid development of Cloud Computing solutions, such as SaaS which can deliver cost, quality, flexibility and competency advantages to an outsourcing company. Allowing them to focus on their core business activities and in turn delivering better value to their key stakeholders. (Leimeister et al. 2010).

As with many other business and technology solutions there are many industry practices and models, for SaaS management and its operational platforms. (Tang et al. 2010). By way of examples, Hewlett Packard provides operation solutions focusing on the SaaS service operation itself, such as reliability, scalability, and security. Salesforce.com provides platform sharing customer relationship management services via a Web-based programming tool for SaaS. Google AppEngine provides platform developers with a flexible programming template and a powerful data access mechanism. OpSource.com also provides SaaS hosting services for users with enterprise-class clouding services. (Chang et al. 2010). This is also the case for in the demographic profile SaaS vendors to the accountancy sector, where vendors pitch different solutions and approaches to business so as to gain a competitive advantage over their competitors, and to meet the different requirements and characteristics of their partners and their clients.

Kim et al. (2012) highlight the fact that the SaaS model allows a user to access the software provided by a vendor via the Internet typically for a set monthly charge. This method eliminates the need for users to establish a system by themselves or purchase the specific software. SaaS systems do not require a higher cost for an initial installation as is often the case for custom designed desktop software, and it can be directly customised by the user. Therefore, the user can handpick their desired software and use it. In addition, because SaaS is developed in compliance with Web standards, it can also be used by different users on multiple internet connected devices and locations making SaaS a very powerful software distribution method.

The outsourcing of business functions is a significant business decision and numerous factors need to be evaluated and taken account before a decision is made. Companies should ask them questions like is this a core function? How will outsourcing bring value to our company? What skills will be lost and may not be replaceable if the function is outsourced? What is the risk of our supplier becoming a competitor using the information we provide them? Such issues are also applicable and need to be addressed when

outsourcing the hosting of core financial software applications. Many of the cost advantages associated with SaaS have to do with economies of scale. A large company with significant human and physical assets may not see the same impact from SaaS as a start-up who does not need to hire staff or purchase servers because of SaaS adoption. On the other hand, if a company is able to eliminate the operational costs of a data centre from your operating budget, that may represent a significant cost advantage, no matter the size of your company.

When discussing the cost benefits associated with SaaS adoption an important element to consider when comparing on-site versus SaaS options is bearing in mind not only the question of how much the software will cost, but when payment is required. One of the most attractive aspects of the SaaS model to many users is the ability to pay for software over time, typically on a month by month basis; instead of making an upfront capital investment that is typical of an on-site system. Whilst upfront payments may not be a problem and may be preferable to large companies, often this is not feasible for SME's and the ability to spread costs overtime enables them to access systems that may not have been accessible to them using a traditional approach to systems investment; and thereby improve their business functionality and tap previously inaccessible value streams.

For most companies scalability is a key issue when making decisions as to what technologies and systems that underpin their daily business, the software requirements of today may not be exactly the same as their future requirements. SaaS is well-adapted to this reality and by enabling a user to select and remove applications, functionalities and features on demand. Users are able to tailor choose and design their operating systems to meet their own and their clients specific requirement, and only pay for what is being used. SaaS is a compelling option for the evolving organisation; it is also innately scalable, allowing licensing decisions to be based on the needs of today, rather than making assumptions about the future. However, whilst SaaS offers some unique benefits in terms of scalability it is worth bearing in mind that network based systems do to. By maintaining its own software and having it located in house, it may be easier for a company to customise the software without relying on an intermediary; though it is important to note that this option is not always feasible for SME's due to financial and resource constraints, and is usually only applicable to larger companies who have the necessary resources to develop and maintain their own systems. Additionally, many companies often look to

augment accounting software with add-on modules. If the SaaS vendor is not accustomed with the other software, it may not be possible to create the necessary integration.

### **3.2 Integration of data under SaaS**

Over the past 20 years technology has progressively dictated business performance, and for companies to remain relevant through evolution and adaptation to the markets they serve, so must the technology that supports their core functions. Consequently, progressive approaches for developing information systems and software's must strive to align technology closer to business needs and a necessity to adapt quickly to market opportunities. Rapid globalisation of companies and their supporting supply and value chain integrations; necessitates a company's enterprise technology to integrate with external parties. Internal drivers' of cost rationalisation and the need to deliver consistently better services to clients and the ultimate end-users requires continuous efforts to integrate both internal and external (client) operating environments. In the past integration between such systems was inhibited by issues including inflexible operating systems connected by inflexible glue code, and evolution of functionality was expensive. Change was restricted significantly by cost as a result of legacy systems being built with a point driven mentality. These systems were often designed with a narrow business outlook and the evolving operating environment it operates within. These systems are ill equipped for interconnection and integration within a heterogeneous and scattered enterprise or business operating network, including dispersed operating locations and greater outsourcing of noncore functions and tasks. In this context, when we evaluate such systems in the modern business environment key value contributors such as system flexibility, maintenance, and ease of evolution; are proving these legacy systems to be inefficient. (Perrey et.al, 2004).

Perrey et al. (2004) argue that enterprise scale information systems integration should be driven by business value proposition rather than system level requirements. This argument is underpinned by the need for all stakeholders affected by a system, in the case of this Master's Thesis the SaaS Vendor-Partner (Accountancy Firm)-Partners Client (End User); to recognise where the value lies in any new approach in order to balance and evaluate the risk and costs of taking a particular action. This is particularly relevant for SME's where successful tapping of a value stream is even more critical when trying to survive in increasingly volatile operating environments. Perry et al. (2004) also state that



where stakeholders expect models of their key value creating processes they ought to expect models of their key value creating system behaviours. Presently technological models are mainly constructed on a needs basis translated through requirement analysis into requirement lists, and do not express the value they bring to business. Rather they are constructed lacking traceability of value adding activities, which rather than being seen as a means to develop more efficient and effective enterprise systems are considered to be an unacceptable overhead. In order to remove this barrier enterprise systems must easily demonstrate their value, and developers and change management teams must effectively communicate to use why the solution is being implemented not just what is being implemented, and by identifying measurable value adding activities that are aligned with the company's overall business strategy.

“Integration” of systems and data through SaaS, also known as “Automated Integrations” and “Automated Data Flow”; allow real-time and continuous data exchange between business applications (apps) allowing a company and their client users to streamline their business processes and reduce their workload, and thereby enabling them to focus on other business priorities. Modern integrated solutions offer a number of value streams and associated benefits to both the vendor as well as the user. In a 2013 Qualitative Research conducted by Insight Europe into web shops integration in Germany and the UK, it was reported that the main values delivered to vendors of integrated systems included:

- **New customer development** – clients are attracted by the fact that any ERP can be connected with the respective web shop solutions; purchase becomes more likely.
- **Customer retentions and customer satisfaction** – less sources of error for the customers, times-saving, cost-saving.
- **Image enhancement** – suggests high expertise and communicates customer focus.

From a commercial partner and end-user perspective the main benefits included:

- **Reduction of workloads**
  - Time-saving
  - Cost-saving
  - Less frustration

- **More flexibility** regarding ERP system and web shop systems used
  - Existing software can be kept using
  - No dependency on one provider
  - No training effort for learning new system
- **Streamlined business**
- **Less errors**
- **Higher satisfaction of the customers** who use the customer's web shop

Whilst some of these results are unique to the web shop industry, many of them are replicated in other sectors that are taking advantage of SaaS and its associated integration capabilities. A final precursor is that whilst there are numerous benefits derived from using integrated systems, there are also numerous barriers, particularly from a vendor perspective who face obstacles, such as high workloads generated through the fact that it is time-consuming to create interfaces due to numerous possible combinations of solutions; a need to have deep knowledge of different solutions which creates additional complexities, and close cooperation of different vendors is necessary. It is difficult to outsource activities and it is challenging and time-consuming as a high level of knowledge about respective solutions is essential; and there is a constant threat of competitor SaaS vendors stealing your customers. From a partner and user perspective the main barriers are a lack of knowledge about possibilities for integration; high costs, a lack of insight into long-term benefits and cost-savings and concerns about Return on Investment (RoI).

### **3.3 Challenges facing integration**

Whilst the integration of numerous disparate operating systems through SaaS provides numerous benefits, it also creates a number of significant challenges for both the software vendor and the actual users of such software and systems, some of these were introduced in the previous section. Integration without the proper tools is complicated. Many businesses implement custom integration to take on the challenge of creating seamless connectivity. This method calls for a developer (vendor) to create point-to-point integrations between applications and services. As a business grows and the number of integrations increases, the point-to-point architecture or "spaghetti code" becomes complex, fragile, and expensive to maintain. Companies without an integration solution often resort to manual data entry. This method requires individuals to transfer data from one application to another by hand, often resulting in "swivel chair" data entry - an expression used to describe the manually entering data into one computer or network

system and then entering, or re-keying, the same data into another system, and is often used when attempts to configure or set up either system to effect the transfer fail. Such a technique is time consuming and expensive. Some companies employ data loaders or other tools to help integration, yet with limited connectivity to certain services, they are not always scalable. (MuleSoft 2017) (2). Table1 summarises some of the main challenges encountered when attempting to integrate systems.

<b>Challenge</b>	<b>Brief Description</b>
Semantics	Different Web Services will have different meanings attached to data values that may have the same standard, name in each service. The challenge is to mediate between these different contexts.
Modularisation of Business Processes	Existing EIS solutions (e.g. SAP) are monolithic and not easy to break into modular pieces of functionality to facilitate “best of breed” computing.
Security and Trusted Intermediaries	What methods will be most effective for ensuring that only authorised users can access a Web Service? Conversely, how does a user ensure that a Web Service does not misuse information that is exchanged during interaction?
Quality and Source Selection	The challenge is to ensure that a Web Service is providing accurate, complete, consistent and correct information. Given the potential for multiple Web Services providing similar capabilities, how select most appropriate source?
Licensing and Payment Mechanisms	How will users pay for access to Web Services?
Development Tools	What kind of tools (e.g. modelling, programming, search) will be needed to make Web Services development efficient?

Table 1. Integration Challenges facing Web Service providers (Hansen et.al 2003).

Out of these challenges “Security and Trusted Intermediaries” has probably been the most commonly cited concern for SaaS and Cloud-Computing users and their associated networks. Over time confidence amongst users of individual SaaS products has risen and they are generally confident that their vendor is proficient in maintaining security, ensuring

the backup of data and performing related support activities. However, when it comes to venturing more widely into “the Cloud,” where multiple applications may be used as services, this confidence drops due to the complexity of establishing trust with numerous third-party providers. (Lamont 2010).

### **3.4 Role of Aggregation and Aggregator in Integration of data through SaaS**

When discussing the integration of software and systems used by companies and their clients it is important to factor in the aggregation of disparate and diverse series of data that is generated and stored by such systems, and is often one of the biggest inhibitors of integration by onsite legacy systems used by many companies. Modern Cloud Computing software services, such as SaaS; enable companies to address this issue by acting as an aggregator of information that is exchanged by a company and its clients. In this sense an aggregator can be seen as a tool that pulls in information from multiple sources, and consolidate that information into a smaller and more easily digested number of streams. Hansen et.al (2003) of MIT describes an aggregator as an entity that:

- Transparently collects and analyses information from different data sources;
- Resolves the semantic and contextual differences in the information;
- Addresses one or more of the following aggregation purposes / capabilities:
- Content Aggregation
- Comparison Aggregation
- Relationship Aggregation
- Process Aggregation

There has been extensive research on information aggregation, but with the arrival of the Internet there has been a new focus on the entities that aggregate information from heterogeneous web sites these are often referred to as “Aggregators”. Web Services such as SaaS; solve a number of the technical challenges faced by early Internet Aggregators, which had to overcome technical challenges related to the integration of data source sites that were not originally developed with the intent of supporting aggregation. The Web Services archetype solves some of the technical integration challenges by standardising the infrastructure for data exchange. However, the Web Services model also assumes that application components are designed with the intention of being aggregated. This

assumption, that disparate data sources are going to be designed and implemented with the intention of being aggregated, raises a whole new set of challenges. (Hansen et.al 2003).

It is the case that not every system designed to integrate data can be called an Aggregator. To be an aggregator, a system must provide certain capabilities, as summarised in Table 2.

Aggregation Capability	Definition	Example
Content Aggregation	Pulls together information related to a specific topic (e.g., IBM Corporation) and provides value-added analytics based on relationships across multiple data sources.	Employee Benefits Portals where an employee can get access to all his benefits information (e.g., health plan, 401K, etc.)
Comparison Aggregation	Within a particular business domain identifies the optimal transaction based on criteria supplied by the user (e.g., price, time).	Shopbots that compare product prices (e.g., <a href="http://www.mysimon.com">www.mysimon.com</a> , <a href="http://www.dealtime.com">www.dealtime.com</a> ).
Relationship Aggregation	Provides a single point of contact between a user and several business services / information sources with which the user has a business relationship.	Aggregation of all your frequent flyer programs (e.g., <a href="http://www.maxmiles.com">www.maxmiles.com</a> ) or financial accounts (e.g., <a href="http://www.vodlee.com">www.vodlee.com</a> ).
Process Aggregation	Provides a single point of contact for managing a business process that requires coordination across a variety of services / information sources.	B2B and EAI tools that provide rule-based workflow and data aggregation to link multiple business processes together (e.g., WebMethods, BizTalk)

Table 2. Aggregator capabilities (Hansen et.al 2003).

Early successful aggregators like Yodlee, a British software company which develops account aggregation of financial data through its SaaS platform; focuses primarily on aggregating data. MIT foresees that such standards as well as advancements in technologies will enable the next generation of aggregators to aggregate business processes that will enable the faster creation of new business models, and make it easier and much faster to aggregate information than ever before. In turn will be more cost effective and generate better RoI for all those integrated into the aggregation system. (Hansen et.al 2003).

It can, therefore, be concluded that whilst aggregation is not a new concept and has occurred long before the advent of Web Services standards. What is new is the dawn of universally accepted standards for accessing information from heterogeneous sources. These standards will have a profound impact on aggregation and on systems

development in general in the future. The aggregation pattern derives its value from allowing a vendor and a user to extract and process data from multiple systems in one united application. This means that the data is up to date at the time that you need it, does not get replicated, and can be processed or merged to produce the dataset you want. The aggregation pattern is valuable if a vendor or user is creating an orchestration of APIs to “modernize” legacy systems, especially when an API is being created to collate data from multiple systems, and then processes it into one response. Another use scenario is for creating reports or dashboards which similarly have to pull data from multiple systems and create an experience with that data. Finally, you may have systems that you use for compliance or auditing purposes which need to have related data from multiple systems. The aggregation pattern is helpful in ensuring that a company’s or user’s compliance data lives in one system but can be the amalgamation of relevant data from multiple systems. The amount of learning that needs to take place across the various systems to ensure you have visibility into what is going on is therefore reduced. (MuleSoft 2017) (3)

### **3.5 Assessing the Maturity of SaaS Vendors and Solutions**

There are various models for assessing the maturity of SaaS, probably the most recognised is that of the research and advisory firm “Forrester.” Forrester's SaaS maturity model provides an assessment of the solutions and underpins guidance on realistic strategy transformation for those software vendors and services providers considering a SaaS business model. Targeting the highest maturity level is not necessarily the best fit for every vendor. (Reid 2008). Forrester's model has 5 levels of assessing maturity with differing dynamics as shown in Figure 4.

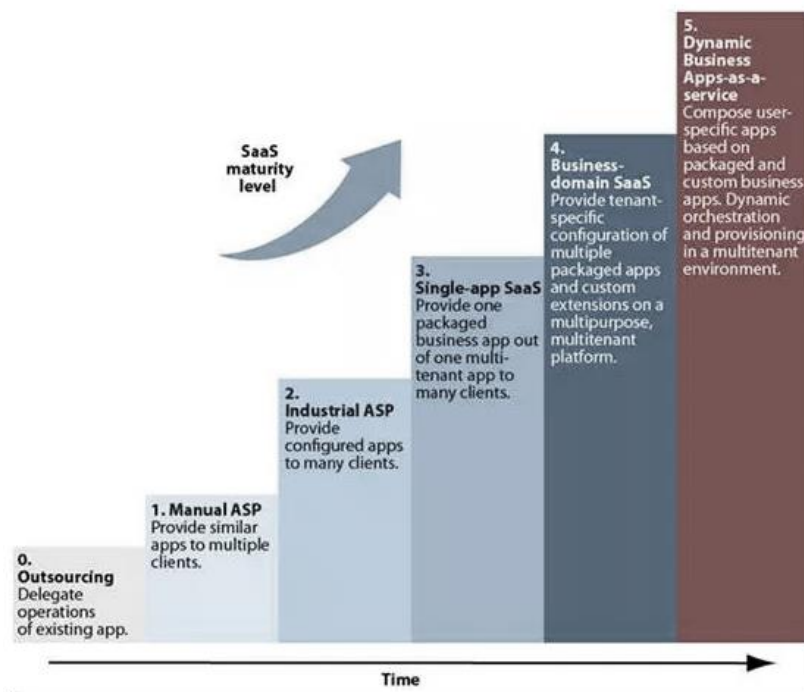


Figure 5. SaaS maturity model (Reid 2008).

Looking at these levels of maturity in more detail:

**Level 0: Outsourcing:**

Target: Large enterprises

Dynamics: This simply is outsourcing applications to an outsourcing firm who runs these applications on a unique basis for the client. This level is generally applicable for large firms and is more expensive than the SaaS model as the outsourcing firm cannot leverage the same application for any other customer.

**Level 1: Manual ASP business:**

Target: Single packaged applications (requiring significant IT expertise) to several midsize firms

Dynamics: At this level a vendor caters for various clients at a time providing them with the same core application but customisable to a certain extent for each one. Each client is provided a dedicated server running its version of the application.

**Level 2: Industrial ASPs:**

Target: Small and Medium Enterprises (SME)

Dynamics: At this level, providers with the help of IT management software are able to serve identical customer specific offerings to large number of SME clients. The incremental change from level 1 is the cost reduction.

### **Level 3: Single-app SaaS:**

Target: Small and Medium businesses (SME)

Dynamics: Applications at this level have SaaS capabilities (web based user interfaces, delivered over internet, serving large number of clients with scalable IT infrastructure). Another characteristic of level 3 is low level of customisation for end users.

### **Level 4: Business-domain SaaS:**

Target: Small to large enterprises

Dynamics: SaaS applications at this level are advanced and sophisticated so as to serve the needs of business of various sizes and their specific business domain (e.g. complete customer care) requirements. At this level the vendor may also provide a platform for other business logics which can be integrated with previous SaaS applications (of level 3). The applications are also customised to suit requirements of businesses.

### **Level 5: Dynamic Business Apps-as-a-service:**

Target: Small to large enterprises

Dynamics: According to Forrester “At level 5, advanced SaaS vendors coming from level 4 will provide a comprehensive application and integration platform on demand, which they will pre-populate with business applications or business services. They can compose tenant-specific and even user-specific business applications on various levels.”

Presently, SaaS maturity level has advanced to level 4 where many applications targeting large enterprises have been launched but many of the SaaS offerings still remain at level 3.

An alternative to this SaaS maturity model was proposed by Microsoft in 2006. Microsoft developed a four level maturity model shown in Figure 5, which uses three basic fundamentals to define its various stages. These are:

1. **Scalability** – the applications should be scalable



2. **Multi-tenancy** – the applications should be able to cater to many customers to ensure its cost effective
3. **Configuration** – the applications should be customizable

Based on the above three fundamentals, following four level maturity models were proposed:

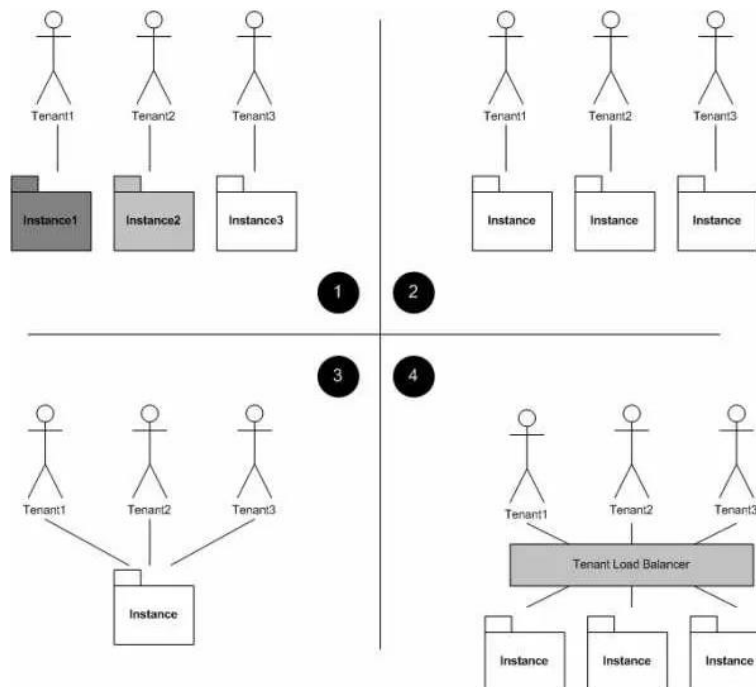


Figure 6. SaaS Maturity model by Microsoft (2006)

The descriptions of various levels are as follows:

### Level 0: (Ad-hoc / Custom)

At this level, nothing is done to facilitate multiple tenants (clients) running on the same system. The only way to support multiple clients is to serve them with different copies of the software. Furthermore, because little is done to allow customisation through configuration, each copy includes specific client customisations, in the forms of custom extension code, custom processes, and custom data extensions. As a result whilst “technically” the software is delivered as a service (i.e. the software does not run on premise) economy of scale cannot be achieved as each client runs a different instance of the software. Although this could be a starting point to validate the business model, one has to move quickly up, as it does enable the easy management of numerous clients.

### **Level 1: (Configurable)**

At level 1, software can be tailored for each tenant via configurations, but all the tenants have to use the same code. However at level 1, the architecture is still not multi-tenant, each client runs their own copy (albeit the same). The separation can be either virtual (virtual machines on a same server) or physical (running on separate machines). Although much better than the previous level, the architecture allows customisation through configuration, the computing power is not shared among the instances therefore, the vendor cannot achieve economy of scale, putting it at a competitive disadvantage versus a multi-tenant solution.

### **Level 2: (Configurable, Multi-tenant)**

At this level the application architecture includes multi tenancy concepts. Similar to level 1, the user interface can be customised according to a tenant specification, as can the business rules and the data model. Customisation per tenant is performed through configuration and a self-service tool, avoiding the need for vendor intervention. It is almost the SaaS “perfect case”; the only big piece missing at Level 2 is the capacity to scale out to add more nodes to (or remove nodes from) a system, such as adding a new computer to a distributed software application; the data partitioning is such at this level that growth can only be achieved by scaling up – replacing what you have with something more powerful or up-to-date.

### **Level 3: (Scalable, Configurable, Multi-tenant)**

Level 3 is the highest level in the Microsoft model. At this level, the architecture allows all the capabilities of level 2 (multi-tenancy, configuration) plus the scale out of the application. New instances of the software can transparently be added onto the instance pool to dynamically support the increasing load. Appropriate data partitioning, stateless component design, shared metadata access are part of the design. In this model a Tenant “Load Balancer” - a device that acts as a reverse proxy and distributes network or application traffic across a number of servers and are used to increase capacity (concurrent users) and reliability of applications - is introduced, maximizing the utilization of hosting resources (CPU, storage etc.); the total load is adequately distributed over the entire infrastructure. The data is also periodically moved to average the data load per

instance. At level 3, the architecture is scalable, multi-tenant and customizable via configuration.

While very simple to understand, the authors of the model pointed out that it also has a number of limitations and drawbacks including the fact that it does not reflect real-life business scenario's, such as the inclusion include client requests such as data isolations. They also point out that the model does not touch upon the topic of versioning and upgrades of single instances and it does not explain how a vendor can move from level N to N+1. (Microsoft 2006).

In this Master's thesis Forrester's SaaS Maturity Model will be used to evaluate the maturity of UK accounting actors in SaaS and their readiness for automated integrations, alongside the researcher own observations and analysis.

## 4 The Business Perspective and Value Creation through Cloud Computing and SaaS

Business relationships and networks are a common feature of the modern business operating environment no matter which sector you are operating within. More specifically business relationships and networks are most evident in businesses that are seeking to focus more on their key competencies and are operating or are planning to expand their business at an international level, where global competition means that most companies cannot do all of the activities that are required of them as a standalone, particularly if they want to be successful, meet customer expectations and generate repeat business. The Business Dictionary (2016) defines a “Business Relationship” as

*An association between individuals or companies entered into for commercial purposes and sometimes formalised with legal contracts or agreements. Many senior corporate executives maintain a friendly business relationship with an extensive network of other executives, business people and contractors that they can call upon for advice or for other business purposes.*

### 4.1 Business Networks

A “Business Network” builds upon this definition and can be viewed as a collaboration of “Business Relationships”, where businesses have mutual goals and build alliances with other each other to meet those goals. “Business Networks” are characterised by (i) on-going open dialogue between customers and partners; (ii) a focus on sharing vital information between businesses; and (iii) provide access on a “want-to-know” basis instead of a “need-to-know” basis. Research has shown those companies who adopt this approach, are seeing massive gains in the productivity of their employees, gains in revenue and product creation (Nelson 2013).

A Business Network in its most abstract form is a structure where a number of nodes are related to each other by specific linear threads, in reality it is much more than this. A complex business market can be seen as a network where the nodes are business units — manufacturing and service companies and the relationships between them are the threads. Both the threads and the nodes in the business context have their own particular content. Both are “heavy” with resources, knowledge and understanding in many different forms. This heaviness is the result of complex interactions, adaptations and investments

within and between the companies over time. It is not a world of individual and isolated transactions between companies. Instead, each node or business unit, with its unique technical and human resources is bound together with many others in a variety of different ways through its relationships (Håkansson & Ford 2002).

Håkansson and Johanson (1992) go further to describe business networks in terms of actors, activities, and resources, which influence each other as follows:

- Actors perform activities and control resources
- Activities transform resources and are used by actors to achieve goals
- Resources give actors power and enable activities

A network must also have at least three actors and is characterised by relationships which are influenced by other relationships, both direct and indirect connections, and a lack of boundaries. A network is also different from traditional hierarchical or organisational structures because the links between those involved are neither fixed or subject to ownership nor overall control.

The differences in the types of player in a business network, their role within it, their own possible objectives for being in a network and the overall business objective of establishing a business network and the interlinked relationships; result in a wide variety of forms of business relationships. In addition to the conventional ones between a producer and immediate user there are typically (i) indirect relationships where the manufacturer or service provider has virtually no direct contact with the end user; and (ii) blurring of roles in which the distributor companies develop new product or service types for their own customers, and they rather than the manufacturer or service provider specify the design, materials, production and delivery methods. Only a few manufacturers are likely to be able to this and the distributor has a close and long-term relationship with them. These scenarios show the rising importance of distributive intermediaries in Business Networks for both suppliers and end-users, which are able to provide resources, skills and positions and an extended network of companies beyond the original supplies circle (Ford et al.1998, 181-182).

It is clear for any of these scenarios to work in practice there should be a framework as to how the network partners interact with each. Håkansson and Ford (2002), are recognised academics on this issue and have produced a number of respected articles investigating

both how companies should interact within a network and the challenges that may arise. In their paper “How should companies interact in business networks?” They introduce a number of theoretical and conceptual Business Network paradoxes. The first network paradox describes a scenario in which companies within a network are not free to act according to their own aims or to circumstances as they arise. The second paradox concerns the ability to influence and be influenced in a network. To put this into context, a company’s relationships are the outcomes of its strategy and its actions. But the paradox is that the company is itself the outcome of those relationships and of what has happened in them. Thus a network is both a way to influence and to be influenced.

The final paradox concerns controlling and being out of control in networks. Companies try to control the network that surrounds them and to manage their relationships to achieve their own aims. This ambition is one of the key forces in developing networks. But, the paradox is that the more that a company achieves this ambition of control, the less effective and innovative the network will become. In this sense a company faces a catch twenty-two position where too much control of their network partners can result in a lack of innovation and possible stagnation. Whereas a lack of control can lead to a lack of knowing what each node is doing and a potential risk of loss of reputation. It is crucial therefore to establish frameworks that can strike a correct balance between these two extremes.

This brief introduction to the paradoxes that can arise in Business Networks demonstrates the enormity and complexity of managing such systems, and the importance of effective relationship management. Håkansson and Ford (2002) set out a framework for how companies should interact in network relationships based on the principle of an awareness of the limitations both of business researchers and of businesses themselves. These limitations include the inability to be able to design a one size fits all model as each network is different, are generally in a constant state of flux and managers have to accept that their current network position may not be optimal from the perspective of each single issue that they face, and change in position is not a quick process. The basis for interaction should be the formulation of new questions rather than looking for optimal solutions.

If we re-examine the three paradoxes, under the first paradox the opportunities and threats a business encounters relate to the “heaviness” and “variety” in a network. In this context variety means that a company should interact to continuously learn and develop

the way it is embedded in its relationships and the network. It requires ever-new conceptualisations of situations, relationships and business units. Heaviness emphasises the costs of changes and the importance of using the resources that are already available to the company in its existing relationships. The second paradox suggests that a company should use its interactions as a way to learn about the link between its own resources and those activated in its relationships, which can often be a difficult task. Instead a company should interact to try to understand how the network functions from the perspective of these specific others and how they see their own position and its own. Finally, the how to manage a company's interactions relate to the third network paradox, that control is important but also dangerous. This means that companies should aim for control but as soon as they acquire some "final" control over the surrounding network (or their supply chain or value chain) they should be worried. It is the role management to encourage and help others to continuously clarify their understanding of the network. It is their actions, based on their perspectives that provide the dynamics of a network.

This highlights the importance of companies undertaking a pre-analysis of a proposed business networks before entering into them, particularly in an increasingly international business environment. In their article "Using case methods in the study of contemporary business networks" Halinen and Törnroos (2005), identify a framework in which network participants, particularly the hub company; should function. This framework is based on four characteristics:

- i. The identity of the other firms with which the firm has direct relationships and indirect relationships in the network;
- ii. The role of the firm in the network;
- iii. The importance of the firm in the network;
- iv. The strength of relationships with the other firms.

They suggest that these points can, at the outset, be used as guidelines in the search for the boundaries of a network. Similar with other concepts offered, the perspective on defining the network is clearly that of one "Hub Company." The hub company should be able to establish "network horizons" and "network contexts" which emphasise the perceptions of an actor in the definition of network boundaries. They suggest a means to do this is Håkansson and Johanson's (1992) ARA (Actor's, Resources and Activities) model of business networks in which the perceived context includes the actors and their relationships that the actor regards as relevant, the activities performed in the network and

the resources used and created within it. This network context is expected to be, at least, partially shared by close network actors. Networks can thus be limited in relation to those actors, who, at a certain point in time, actively relate to each other through business, social and/or technological exchange.

Up to this point the main focus of this thesis has been on Business to Business (B2B) Relationships in a Business Network. However, an equally important and of increasing business focus are the relationships between a Business and its Customers (B2C) – be this a private or commercial buyer or end-user. In modern business there is also an increasing focus on value-based selling rather than product selling, which is of particular relevance to this thesis which examines a service(s) rather than a physical product. This issue is tackled by Terho et al. (2011) who state that value-based selling is “... almost like taking the sales out of selling – Towards a conceptualization of value-based selling in business market.” In this context, the creation of superior customer value is a key to a firm’s long-term survival and growth, and capturing of customer value is the cornerstone of modern business success, which increasingly be only achieved through strong business networks and relationships. Terho et al. (2011) identify three key focus areas which lead to a value-based selling framework. These being (i) Understanding the customer’s business model; (ii) crafting the value proposition; and (iii) Communicating customer value.

A reoccurring key theme in this framework is that these factors take place within broader networks and involve a network of different stakeholders, both internally and externally to the company. The importance of interaction within business networks and their interlinked relationships value delivery and the importance of engaged and proactive interaction as a means of learning and systematising action; is a critical factor here. This takes advantage of the variety in the network and also capitalises on the economy of network stability. It also highlights the need to continuously clarify each members understanding of the network. The actions of each individual member and their unique perspectives that provide the dynamics of a network and these dynamics can lead to a change its position and bring advantage to it. They also have similarities in that they highlight the need for agility and the ability to adapt appropriately to different situations.

Inherent to all these frameworks is also the rising position of the customer and supplier companies, which has seen a shift from a world where the seller dictates the market to one that is increasingly influenced by supplier and customer networks, which inherently



requires a two way communication, an understanding and interactive relationship with the customer/supplier. As well as monitoring, maintaining and renewal systems that ensure relationships and networks do not stagnate and become ineffective. It is also evident that a company's communication efforts should not only be externally focussed, but should also have an internally focussed dimension as well so as to ensure relevant customer information is available throughout the company so that employees fully understand its offerings the customers' dynamics and needs, and to enable them to communicate more easily with customers and partners in a timely manner, and in turn increase customer satisfaction and retention. Internal communication focus also enables employees to quickly access the required information, such as supplier contacts, specific emails or product specifications. This allows them to communicate more easily with customers and partners in a timely manner. It also increases internal traceability if a problem or issue occurs.

The frameworks presented in this Master's Thesis demonstrate the need to have a clear and adaptive strategy, with definite objectives which are regularly reviewed, updated and/or discarded as they have been completed and/or are no longer relevant. It is also critical for a vendor/supplier and their associated partners to understand its target market and the importance of having easy access to and regularly maintaining relevant customer and market information, which can enable a user to adapt their methodology according to the audience, their drivers and characteristics.

Clear and two-way communication and the ability to manage different types of relationships, and in different situations; is also essential for both (i) the target end-user to understand the benefits for them in using a certain product or service; (ii) for a company's partners and the end-user to fully understand the product or service objectives and targeted outcomes, and quickly access/trace relevant information; and for (iii) the all interested to get the best results from using a certain product or service. In summary, it is important to build lasting relationships with those individuals and companies involved in the project; and to have a two way dialogue and mutually beneficial value deliverables. It is also important to keep in mind that whilst a relationship with a supplier or partner company may at a certain time be deemed noncritical to your current business activities you may need them in your future activities, so it is important maintain relationships during periods of downturn. It is also important to contextualise their relationship/networks, and refresh or bring them to an end if deemed appropriate.

## 4.2 The SaaS Business Network

The SaaS Business Network has not been extensively studied from an academic perspective, but it can be broadly seen to consist of three levels shown in Figure 6.



Figure 7. Typical SaaS Business Network Members.

In the following paragraphs these different levels are explored in more detail:

**SaaS product vendors** consist of numerous Independent Software Vendors (ISVs) and large enterprise product vendors. The initial stage of SaaS market development was dominated by niche and small players, some of who were interviewed as part of this Thesis research; developing applications to solve various business problems but as the SaaS market matures and develops, many prominent names of the IT and the desktop software industry such as Sage and Oracle have started developing SaaS products. Primary functions (client facing and internal) of product vendors include: product development; product maintenance, updating and new releases; ensure security of data stored; and provide technical support and assistance.

**A SaaS service user/provider's** role is to understand end-user requirements and provide custom solutions. In this case the service user/provider is typically the Accountancy Firm. Service providers also act as aggregators of various SaaS products. Service providers are of great importance as customers have specific requirements; further end users may have existing incompatible applications with SaaS products, etc. which need to be integrated with SaaS offering. It can be said that service providers are the link between the product vendors and end users. They are involved in following key activities including: driving sales through direct sales or acting as sales agents; acting as SaaS product aggregators; provide infrastructure and provide consulting: which application is suitable, cost-benefit analysis, how to implement?

**Customers/end users.** Traditionally the focus of SaaS vendors has been SME's because large enterprises were slow to accept the utility and adopt it, had invested heavily in the development of their own enterprise specific requirements and were reluctant to discard

these, and early SaaS offerings were not good enough to serve varied and complex requirements of large enterprise. However, recently the focus has shifted and large enterprises have also become a focus area for the product vendors. (Researchpedia 2016).

### **4.3 Power in Business Relationships**

The previous section introduced the concept of networks and the actors within it as nodes. Each of these nodes has a different role to play within a network and consequently these result in different levels of influence and power amongst the different members. Ford et al. (1999) describe business networks as a complex network of companies, working together to accomplish certain goals." Håkansson and Johanson (1992) go further to describe business networks in terms of actors, activities, and resources, which influence each other as follows:

- Actors perform activities and control resources
- Activities transform resources and are used by actors to achieve goals
- Resources give actors power and enable activities

A network must also have at least three actors and is characterised by relationships which are influenced by other relationships, both direct and indirect connections, and a lack of boundaries. A network is also different from traditional hierarchical or organisational structures because the links between those involved are neither fixed or subject to ownership nor overall control. A network member's position within a network depends on a number of factors, but most often by what the company does in relation to other companies in the network the role of a buyer, supplier, manufacturer, etc. Johanson and Mattsson (1992) succinctly describe the nature of these different roles as "The concept of network position facilitates understanding of how an individual actor is related to, or rather embedded in the environment." Positions within a network therefore can be defined by resources and value activities controlled by the company, and the relationships in network.

These issues lead to the question as to the level "power" and "influence" each network node has on the other nodes within the network; and vice versa. In order to understand the influence of "power" within a business relationship it is important to establish a basic

understanding of the concept from a purchasing and supply management perspective. Supply chain management power can be defined as “the capacity to optimise the behaviour of suppliers and subcontractors in accordance with desired performance objectives” and purchasing power as “the capacity to achieve a successful negotiated contractual outcome on behalf of an organisation.” In summary, “power” in a business relationship and network context is the ability to influence the decision-making and actions of the other party. This power is viewed to stem from organisational structures and can thereby be called structural power due to its sources (Kähkönen and Virolainen, 2011).

Kähkönen and Virolainen (2011) state that “power” depicts the different roles or positions each company has in a network with focal companies have more power over their partners than lower-tier component suppliers, and that the network position is a structural determinant of power as set out in Figure 8.

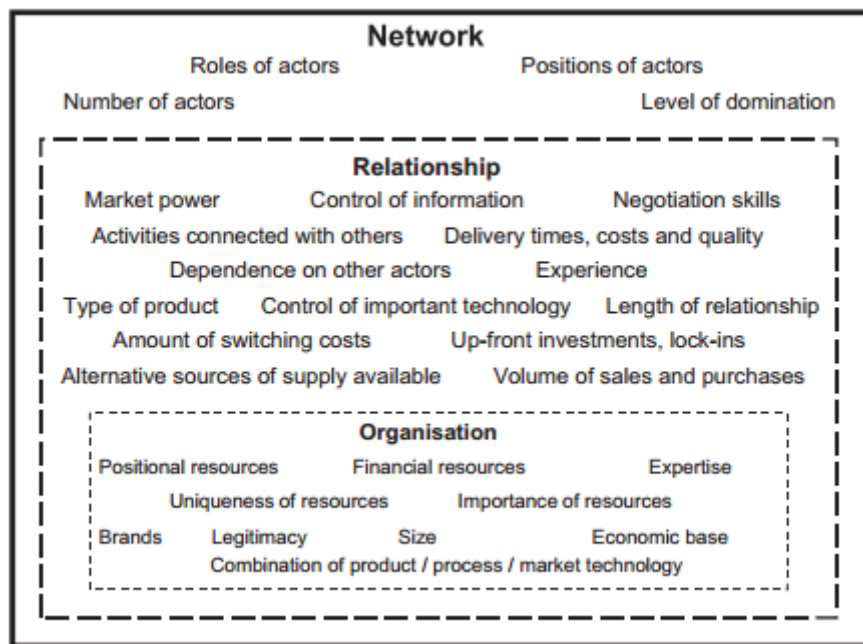


Figure 8. Sources of Structural Power on different levels of analysis (Kähkönen and Virolainen, 2011).

Additionally, actors’ capabilities and resources determine their power relations and positions as well as their roles. The character and role of actors depend on the activities they perform or control, the resources they manage and the knowledge they have about these and the other actors in the network, and all of these define their network position. In buyer-supplier relationships power, power positions and power balance should be

recognised when developing supply strategies, especially in forming the relationships, supplier/vendor selection and sourcing, development of relationships and relationship management. (Kähkönen and Virolainen, 2011).

Power relationships are an important issue in the context of this thesis as “collaborative relationships” are an important feature of interactions between SaaS vendors, accountancy firm partners and the end-user; and power influences the nature of collaboration in buyer-supplier relationships. This is explored in more detailed in the Section 5 of this Master’s Thesis, but at a high level an SaaS vendor typically relies on its accountancy firm to influence its clients to use their software solution, and an accountancy firm relies on its clients using the software to formalise its reporting and management systems so as to be more time and resource efficient, and the client relies on and trusts both the software vendor and accountancy partner to recommend and offer, as well as support them in the use of a software solution.

#### **4.4 Value in Business Relationships**

“Value” is an abstract concept and there are many different definitions, but generally when it is discussed in the context of business relationships value is generally considered from three perspectives (i) the value of a relationship; (ii) the value of an offering; and (iii) the value created in a relationship (Forström 2005). It is a trade-off between the benefits and sacrifices of a product or service to an end-user, and their incentive to buy.

Modern business relationships, and associated purchasing and supply decisions are increasingly undertaken using a more holistic, strategic and long-term methodology; and are based on factors such as what opportunities for improvement of efficiency and effectiveness can my relationship with a certain supplier/vendor or supply network, bring to the company over the long-term, and what value can they deliver when balanced against the challenges that their management may create for the buyer. This is in sharp contrast to the traditional view of purchasing that treats each interaction with a supplier as a one off transaction, and decisions being based on who can provide me a standardised product and the lowest cost. According to the Industrial Network Approach (INA) created by IMP Group (Industrial Marketing and Purchasing) business relations are the outcomes of interaction among firms and these relationships in turn are interconnected in network structures. Harland (1996) describes the formation of a network approach to business relationships as “*Actors develop and organize their activities partly in response to how*

*their customers and suppliers perform and organize theirs.” Anderson and Narus (1999) go further to contextualise it as “Actors perform activities and create value through transforming resources,” taking into account the importance of networks in delivering value to its companies.*

These statements highlight three network layers associated with these types of relationships, these being *activities, resources and actors*. Adopting this layered approach firstly the activities conducted by a buyer maybe interlinked; secondly the resources of two firms maybe tied together, such as the machine of a supplier that produces components to be used directly in the buyer’s production equipment. Thirdly, actors represented by people in the two organisations are involved in substantial interactions overtime, which tend to bond both firms and people together. According to this ARA model (activities, resources and actors) the three network layers are interrelated, intertwined and independent, as shown in Figure 9; inferring that each layer affects, and is affected by, the activities, resources and actors in the wider network. Consequently, business networks can be analysed in terms of either the patterning of activities (what activities are undertaken), constellation of resources (what resources are used in these undertakings) or webs of actors (those that undertake activities and control resources). (Gadde et al. 2010). The role of an individual actor in a network depends on a number of factors including the activities they performs and controls, the resources it owns and its knowledge regarding the other actors in a network.

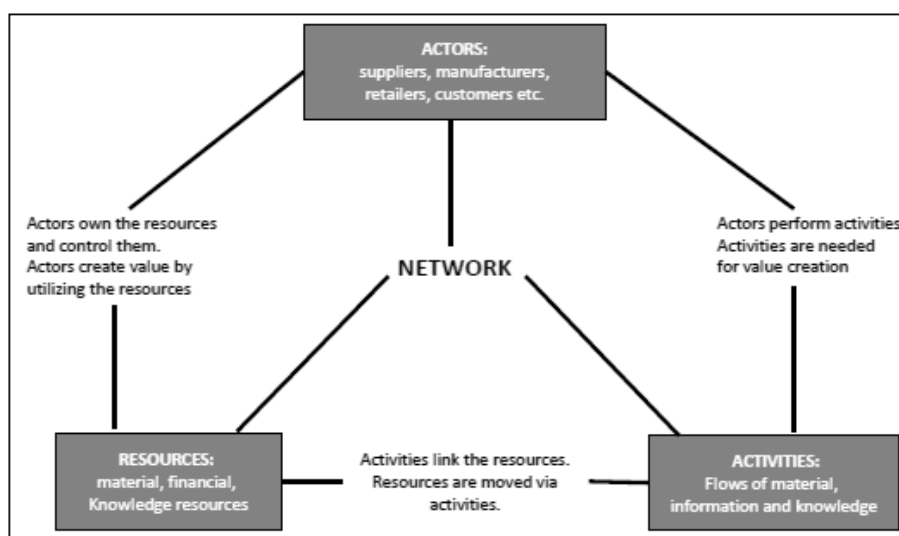


Figure 9. ARA model. (Håkansson and Johanson, 1992).

From a theoretical and analytical standpoint, understanding the importance and interconnections between the value net and ARA models, often referred to as the Strategic Value Net Approach, enables a researcher to obtain a more comprehensive understanding of the supply side and its connections in the wider reality of networks and networking, as it moves beyond looking at a single actor to include the importance of customers, competitors, suppliers and, complements; in creating a sustainable business that moves beyond just economic profit.

#### **4.5 SaaS and Cloud Computing Value Chain**

Traditionally, in IT service outsourcing the value chain is usually divided into four areas: *infrastructure, applications and business processes*; which can be complemented by *strategy and consulting activities*. In each of these four value chain steps the whole cycle of IT services, often referred to as “plan, build, and run”, must be supported and implemented. Therefore, single aspects of individual value chain steps may be outsourced, such as the development of applications.

Purchasing and operating IT hardware as well as hosting can be further divided into services that are done by the customer them self and such that use resources of a hosting provider. Here, the myriad possibilities of combination may lead to complex outsourcing relationships. (Leimester et al. 2010). This complexity and division into a myriad of different combination of actors and their interactions depict the network approach to business relationships as has been discussed, rather than a sequential chain. Part of this new complexity can be found in a general trend from products to services (Jacob and Ulaga 2008). The trend does not only lead to more outsourcing, but also a move away from the classical hardware-based outsourcing of data centers to computing as a service. A similar trend can be found in the software business, which leads away from delivering software products off the shelf towards offering SaaS. Cloud Computing links these two areas of a stronger service-oriented hardware outsourcing to the “as-a-service” concept for software. Here, Cloud Computing shows two big facets: infrastructure-based services are now offered dynamically to the needs of customers, often referred to as utility computing, where the customer is charged according to its actual usage. (Leimester et al. 2010).

Additionally, as new Cloud Computing platforms have emerged, to integrate both hardware and SaaS offerings; new, single as well as composed applications and services

that support complex processes and interlink multiple data sources have developed. From a technical point of view these platforms provide programming and run-time environments to deploy cloud computing applications. Looking at these platforms from a value chain perspective, they can be perceived as some kind of market place, where various Cloud Computing resources from different levels (infrastructure, platform services and applications) are integrated and offered to the customer. By composing different services, complex business processes can be supported and accessed via a unified user interface. (Leimester et al. 2010).

In this context, a network is also referred to as a “value net” reflecting the fact that is a dynamic, flexible network in which the actors create both tangible and intangible value through collaboration and complex dynamic exchanges. Collaboration and information sharing is the key for value creation (value co-creation) and is created by combining resources and capabilities, and enables open information sharing. This enables all members of a network to benefit and add value through increase flexibility and agility to react to dynamic and rapidly changing operating environments. This in turn business nodes are able to better focus on and satisfy the demands of their end-customers, and generate repeat and new business, and create new value streams.

Of particular relevance to this thesis research is the importance of the use of technology and intangible assets in value networks. Modern technologies are enabling businesses and their associated networks to take advantage of new forms of collaboration, closer collaboration with existing partners, more efficient information sharing, reacting to information rapidly and networking via technology. This is what is particularly being witnessed in the areas of Cloud Computing and SaaS, which is breaking down previous obstacles such as geographical distance between network members and resource intensity of legacy systems that required the manual keying of data. This is now being conducting automatically in a matter of seconds and at a much higher level of accuracy. These intangible assets are the real source of value creation.

The key characteristics of Cloud Computing and SaaS, are proactive innovation and key enablers of value networks and nets, as they enable members to focus on value-creating activities rather than individual clients. They are future-oriented and long-term solutions to business processes and enable partners to focus on long-term benefits. By their very nature they are also being constantly developed enabling network members to benefit from and add value through the use of the most up to date software solutions, without



having to think about or commit resources to it as updates are automatically undertaken by the software provider as part of the service they provide to their clients.

## **5. Analysis of the Results**

To this point this Master's Thesis has provided a comprehensive view of Cloud Computing, SaaS and integrations through these online platforms, but what does this mean in the context and perspective of the UK business environment, and more directly from the perspective of the main accounting actors in SaaS and their readiness for automated integrations? This Section attempts to answer these questions and the primary and supplementary questions posed in Section 1.1 of this research, by firstly providing a brief overview of the current SaaS and Cloud landscape in the UK, and then an in-depth analysis from the perspective of the accountancy sector. This analysis is formed based on the collection of qualitative data gathered through both telephone interviews and a detailed questionnaire described in section 1.2.3. For this analysis the researcher employed the "content analysis" technique to make sense and meaning of the data collected and to highlight the important messages, features or findings. In order to facilitate this analysis QDA Miner Lite was used to assist in the categorisation and analysis of the data and then turn the results of this analysis into concrete findings and conclusions. Finally, this section cross references and compares the results of this analysis against Forrester's SaaS maturity model described in Section 3.5; to provide the researchers assessment of the maturity of UK accounting actors in SaaS and their readiness for automated integrations.

### **5.1 Overview of SaaS and Cloud Services in the UK**

The UK SaaS and Cloud Services supplier landscape is both diverse and highly dynamic. To date it has been the established IT services providers that are securing the biggest slice of the cloud opportunity, as large enterprises look to work with big international suppliers under broad-scope deals as they build first- generation private and hybrid cloud environments. But they are by no means the only winners in the cloud-related services market. A vibrant community of boutique consultancies and integrators has developed around fast-growing SaaS and IaaS providers; who typically target the SME market. Some of these companies are positioning themselves as orchestrators or aggregators of third-party offerings, and others resell services delivered by other providers.

Despite an unclear business outlook due to factors such as Brexit and a general downturn in the business operating environment, it is forecasted that UK SMEs will continue to

invest in cloud based business applications and SaaS, with key areas of investment being in the fields of CRM, analytics, mobility, and industry-specific software. In a 2012 report on the '*Business Applications & SaaS in the UK SME Sector – Identifying Hot-Spots and Mapping the Vendor Landscape*,' produced by Pierre Audoin Consultants (PAC); a leading independent European research and consulting firm for the software, IT services and digital transformation industry; the impact of SaaS on the strategies of vendors addressing the SME market and SaaS adoption rates among small businesses in the UK was evaluated. In this report, PAC stated that it expects the SME market for business applications and SaaS to grow to over £2.1bn by 2015, which is a faster rate than in the large enterprise segment. It added that fast-growing start-ups, enterprises expanding overseas, and subsidiaries of international companies expanding into the UK, will present the strongest opportunities for business applications and SaaS suppliers. There are big differences in terms of customer needs and level of IT complexities within the SME marketplace. However, the UK SME market is entering into a major phase of transformation as buyers are increasingly attracted to Cloud-based services which enable them to access enterprise-class functionality on affordable and flexible commercial terms. Growing at a little under 30% annually for the next three years, PAC expects the SaaS market for SMEs in the UK will more than double its size by 2015 to over £500m.

That said SaaS remains a work in progress for many ISV's, and established players have displayed reservations and wariness of breaking up existing revenue streams. Of the top 20 application vendors who are servicing the UK SME sector, PAC rates only Salesforce.com and Fidessa as currently having a mature SaaS proposition. The majority of traditional business apps vendors are continuing to work out their SaaS strategy or are putting into place early piecemeal SaaS offerings. The most common tactic is to gradually move clients to Cloud delivery firstly through a specific SaaS module, then incorporating a broader suite. For this reason, the approach to SaaS tends to be focused on a particular application functionality set, rather than a holistic/application-wide approach, re-writing the whole application module.

## **5.2 The UK Accountancy Sector**

An "Accountancy Firm" is a company that specialises in accounting services for clients. These firms typically handle a clients' book keeping, payroll, accounts receivable and accounts payable, taxes and/or any number of other services including auditing or advisory services. An SME typically employ an accountancy firm in order to ease some of

their workload and to allow them to focus on core business activities. In addition, using an external accountancy firm has the advantage of reducing overhead costs as the cost of their services is often less than hiring an employee.

The number of accountancy firms operating in the UK has steadily declined in recent years. As of 31 December 2015 the number of accountancy firms in the UK was 6,331 as at, a fall of 304 firms (4.6%) since 31 December 2014. The sector is dominated by the so called “Big Four” companies, these being in order of revenue generation in 2014: PricewaterhouseCoopers (PwC) Deloitte Touche, Ernst & Young (E&Y) and Klynveld Peat Marwick Goerdeler (KPMG). In comparison to the general picture which has seen declines in the rate of growth across nearly all categories of fee income, the Big Four have collectively experienced increases in growth across all categories of fee income. (FRC, 2016).

This general decline can be mainly attributed to extensive mergers and acquisitions across the sector, as more companies amalgamate their activities in an effort to benefit from economies of scale, such as reduced administrative expenses and accessing a broader range of skills. Mergers are also seen as a catalyst for many accountancy firms to enter the next stage of their development, as it provides them with a means to invest in better IT systems for example; which are becoming more relied upon by the industry as the UK Government is driving for more financial returns and associated activities to be completed on line. Mergers are also enabling the partnering companies to strengthen their market position by opening new geographical, service or sector line focus; if the fit is right. This is particularly the case for smaller firms who merge with larger firms as they can expect their client base and revenue streams to increase. In recent years the trend for new technologies and means of doing business has also developed as a new generation accountants brought up using technological solutions, are entering the workplace and replacing the older generation; and are demanding different ways of working. (Kirton 2015).

### **5.3 Online Software in the Accountancy Sector**

Online accounting applications first hit the marketplace in the 1990s; the world was anything but ready for them. Whilst the accountancy sector has traditionally been viewed as being prudent and reluctant to change, preferring to watch other sectors exploit new business innovations from the side-lines and to use legacy systems such as written

records and Excel Spreadsheets; these preconceived images are being erased along with many of the technological and psychological barriers to online accounting, such as security; which exist particularly amongst some of the accountancy firms clientele demography. However, with new regulatory requirements such as new mandatory electronic filing of statutory returns by Her Majesty's Revenue and Customs (HMRC), becoming increasingly the norm, online accounting now seems less like a 'big risk' and more like an idea whose time has come or at least is being mandated by Central Government – bringing some significant business benefits along with it.

Cloud Computing offerings and delivery models, including SaaS; are being pushed into the main stream by a new generation of accountants and clientele. Companies that rose to prominence during the PC revolution like Microsoft and Sage, are now being challenged by new innovative companies whose business model is mainly focussed on mobile and cloud applications; who are creating opportunities for new business processes and ways of networking with staff and clients through social media platforms, which have demonstrated how consumer focussed Cloud based services have infiltrated the traditional business landscape. The internet offers unlimited opportunities to develop one-to-one relationships and prospects. Rather than trying to hold back the tide, smart accountants are exploring how they can adapt these facilities to their changing practices. (Biafore 2015).

Many larger accountancy firms still purchase accounting software and install it on the hard drives of their own computer systems. However, increasing numbers of accountancy firms are keen to explore the possibilities offered by online accounting and the use of systems and services offered by SaaS vendors – or are already doing so. This is particularly true amongst SME accountancy firms to who value creation through more effective and efficient systems are often critical to their ongoing operations and development of future offerings for their clients. It is can also be assumed that by their size, switching to online services may be easier than for larger accountancy firms who may have invested significantly in their own custom designed software and are reluctant to write off such large investments.

The use of SaaS accounting solutions offers its users numerous advantages. At a practical level, using the internet to access and maintain business accounting records can simplify tasks such as bookkeeping, accounts production, payroll administration and statutory compliance. It can also help eradicate many of the tasks associated with

installing, updating and maintaining the hardware and software needed to run traditional on site applications (from back-ups to system upgrades), and reduce the need for in-house IT expertise. The knock on benefits includes improvements in time management, productivity and flexible working practices. Due to the fact accounts data can be stored on a third party server it can be remotely accessed and worked on at anytime, anywhere, by any authorised individual with internet access and a browser. So those who need to can share information quickly and easily, which minimises the need for re-keying of information and the potential for input errors and misunderstandings. The online approach also has financial benefits. Saving time and working more efficiently can obviously save money, and being able to upgrade software at any time convenient to the user, rather than the software supplier; can act to minimise your equipment costs, as a company is effectively “leasing” software and data storage, the up-front costs are lower, and the associated monthly/yearly costs are easier to control.

A key advantage of SaaS is that such systems by their nature require the initiating company (the accountancy firm), often seen as a “Vendor Partner”; to work closer together with their clients. As they are often the one promoting the use of a SaaS vendors solution to their clients, and they are typically not using the SaaS solution in their day to day operations other than integrating their clients information into a usable format, including removing issues such as incompatibilities if they are using a different version of the accounting software. Accountancy firms can also exploit online accounting systems to take a more pro-active approach to offering advice and services. In addition, such an approach also makes it easier for accountancy firms to spot mistakes, meet deadlines, and offer advice on key transactions. It can also create a foundation for alternative revenue generating streams, such as providing real-time transaction and tax planning advice.

A fundamental benefit of SaaS solutions is that it allows businesses of all shapes and sizes to potentially benefit from online accounting, particularly SMEs. This is because it is easier for accountants to access the information they need to produce clients’ monthly management accounts, reports, annual accounts, and so on. They can also make any necessary amendments more easily. This can be a great benefit to SME clients, as they are no longer required to key in their accountants’ adjustments, or worry about what will happen if they have not done so accurately. Whilst accountancy firms may already have strong business continuity measures and information security procedures in place, many of their small business clients will not, so the online approach to accounting can offer big

improvements in these areas too. How much accountants, and their clients, actually gain from adopting online accounting depends on many factors, ranging from their choice of vendor, through the system in use, to how extensively they allow this to influence the way they run their businesses. This issue is considered further in this Section of the Master's Thesis.

## **5.4 SaaS and Cloud Computing usage within the UK Accountancy Sector**

In traditionally conservative business sectors areas; such as finance and accounting; SME accountancy firms provide strong market opportunities for SaaS accountancy vendors such as KashFlow, Liquid Accounts, Aqilla, FreeAgent and Xero. These companies are attacking the traditional base of well-established vendors in the small enterprise segment, such as Sage and IRIS Software. A 2013 study undertaken by Thomson Reuters titled "IT in Practice Survey;" found that accountancy firms in the UK are slower in adopting and using cloud-based services, including SaaS; than other corporate sectors. It estimated that by the end of 2013, only three out of 10 accountancy practices would be using Cloud Computing as compared with seven out of 10 UK businesses using some form of Cloud. The study of more than 1,300 accountancy firms found that the accounting sector has started its cloud journey with 11% of respondents citing the use of cloud platforms in their practices. About 23% of respondents also said that they were planning to use cloud to host all or part of their workloads in the next 12 months. (Thomson Reuters 2013).

The report also found that cloud services were considered to be an important part of the future IT strategy of many UK accountancy firms, with the main reasons for accountancy firms looking to move to cloud-based solutions being to allow employees to work remotely; for example, from a client's premises and to enable use of new mobile devices such as smartphones and tablets. It was also estimated that in a few years all software and data will be on the Cloud. The same report found that despite Cloud Computing and SaaS use accelerating quickly within the accountancy sector, users were unable to describe the benefits that such services deliver with as many as 22% of respondents were unable to quantify the benefits. Those respondents that could see Cloud benefits; stated that enhanced flexibility was the number one benefit. Easier upgrades and support came in second followed by IT cost savings in third place, while 36% said that the ability to save money would definitely influence their decision to adopt it.

However, the study revealed that the majority of accountancy firms still face a steep learning curve and cite data security as an ongoing hurdle. When considering moving software and data to a Cloud environment, 44% of respondents stated they were worried about system availability and reliability while just over a third (34%) expressed concern that broadband speeds are too slow in their part of the country. Many respondents also displayed resistant to change because they do not see the need to use Cloud or feel they would not derive any additional benefit over their existing hosting service. Respondents also quoted implementation time and quality of support as other big concerns.

## **5.5 How UK Accountancy firms select SaaS Vendors**

The number of bookkeeping and accounting systems available online is growing, so accountants, business users and their clients; are not short of systems to choose from. These systems range from basic cashbook systems, through multi-ledger systems, to full-blown Enterprise Resource Planning (ERP) systems. Some offerings are aimed at SME users with basic bookkeeping needs and little or no bookkeeping experience, while the more fully featured systems have been designed for multiple users with finance expertise, and may be aimed at organisations with more complex multi-site set-ups, so the significance and availability of training and support will vary. In this thesis the views as to the maturity of the UK accounting actors in SaaS and their readiness for automated integrations, was sort from SaaS vendors who are particularly focused on the UK SME accountancy market and who have offices located in the UK, as well as the views of their users (partners).

There is no 'one size fits all' SaaS solution, and there are lots of variations in terms of available features, ease of use, pricing models, upgrade paths, and so on. It is often the case that a vendor will choose a certain solution path to differentiate itself from its competitors and to gain market traction, and ideally become the dominant market actor. An accountants choice of SaaS vendor is often based on a standard set of requirements, including the SaaS ability to import and export data to and from other software tools and specialist systems; accessibility from mobile devices; automatic feed to bank account data; availability and range of add-ons; bank reconciliation; management reporting; out of the box integration with specific on premise systems and online banking to name a few. The importance of these requirements will vary in significance and requirement depending on the size and type of accountancy services being provided, but when making a decision it is important for accountancy firms to take into account how good a fit the system is for



its business today as well as in the future. This forward thinking approach is of key relevance to this Master's Thesis and the broader issues it addresses, including does the system integrate with other on premise and online systems, and how seamlessly? Can data be exported in a format that can be imported into a spreadsheet, a desktop accounting program, or any other specialised online or offline application? Will the system be able to meet the needs of the business as it grows? If not, what is the upgrade path? and what is the exit route if the system proves unsatisfactory?

## **5.6 Maturity level of SaaS and Cloud Based Computing**

In order to gain an in-depth understanding of the current maturity of the UK accounting actors in SaaS and their readiness for automated integrations; it is important to have a high level understanding of the current maturity level of its delivery platform i.e. "the Cloud" and "Cloud Computing." This has been introduced in Section 2 and 3 of this Master's Thesis, but examining this issue further from a qualitative research perspective based on evidence from previous research on this topic undertaken by such groups as the Information Systems Audit and Control Association (ISACA), the Cloud Security Alliance (CSA), North Bridge and Rightscale. It can be stated Cloud Computing" continues to evolve from a concept to revolutionise the way computing resources are managed and distributed to a proven solution that delivers many benefits to enterprises of all sizes.

A recent ISACA (2015) assessment of the top 10 technology trends found that Cloud Computing continues as a leading business trend driving business strategy. Cloud Computing is no longer considered an emerging technology, due to its exponential growth in recent years. However, it cannot yet be considered a mature and stable technology, and offers both the benefits and the drawbacks that come with innovation. According to the market maturity model in Table 3, Cloud Computing is in the growth stage: "Adoption and innovation are on the rise and enterprises are experiencing the promised benefits." However, roles and responsibilities are still unclear, especially in the areas of data ownership and security and compliance requirements.

STAGE	DISTINGUISHING ELEMENTS OF THE CLOUD MARKET
<b>Infancy</b>	The market is small with a potential for growth and innovation that has not been realized. The definition of cloud and related roles and responsibilities is not clear. Return on investment (ROI) is uncertain. Users and providers can be considered early adopters.
<b>Growth</b>	The market demonstrates significant adoption, rapid growth, and notable innovation in terms of product offerings and use. Definitions of cloud computing and how it can be leveraged are clear. Roles and responsibilities for cloud within the enterprise have evolved to address cloud's unique aspects. Cloud computing is being integrated into core business activities. ROI is clear and examples of successful use are well known. Innovation leads to new product offerings not possible in earlier stages.
<b>Maturity</b>	Market growth has reached its peak. The level of innovation is slowing. New entrants have a difficult time distinguishing themselves from established service providers. Organizational roles and responsibilities are stable, as are relations between users and providers. Cloud computing is business as usual.
<b>Decline</b>	The cloud market is saturated with suppliers. Cloud computing is a commodity. Market leaders are clearly defined. There is little room for new entrants or new product offerings. Users and providers are looking for the next big opportunity.

Table 3. Cloud Computing Maturity Model. (ISCA 2012).

This conclusion is based on factors used by all of the mentioned research parties including:

- Cloud adoption and growth
- Cloud use for business as usual (BAU) or strategic purposes
- Level of user satisfaction
- Extent of innovation in the cloud and who is driving it
- Objectives and value expectations delivered
- Common understandings, definitions, and assignment of roles and responsibilities
- Issues that need to be addressed
- Optimism that issues are being addressed and can be solved

It is also concluded that the main technology drivers for cloud adoption remain consistent: enterprises' expectations for scalability, agility and cost reduction. (ISACA/CSA 2015)

Turning to the Cloud Model delivery models (SaaS, IaaS and PaaS), ISACA/CSA (2015) has found that SMEs favour SaaS because it provides ready-to-use applications that are procured under pay-per-use terms fit their strategic goals, and enable enterprises to channel capital into the development of their core competencies. At the opposite end of the scale, large enterprises may have goals or obligations that require applications to be hosted in-house, eliminating SaaS as a viable option. However, large enterprises recognise that using cloud services in the early stages of the application life cycle has value. Using IaaS, PaaS or both can help increase developer productivity, reduce time to market and save money in the process. In conclusion, SaaS remains the most adopted

type of cloud service, and PaaS had the most growth between 2012 and 2013 (54.8 percent). (See figure 9)

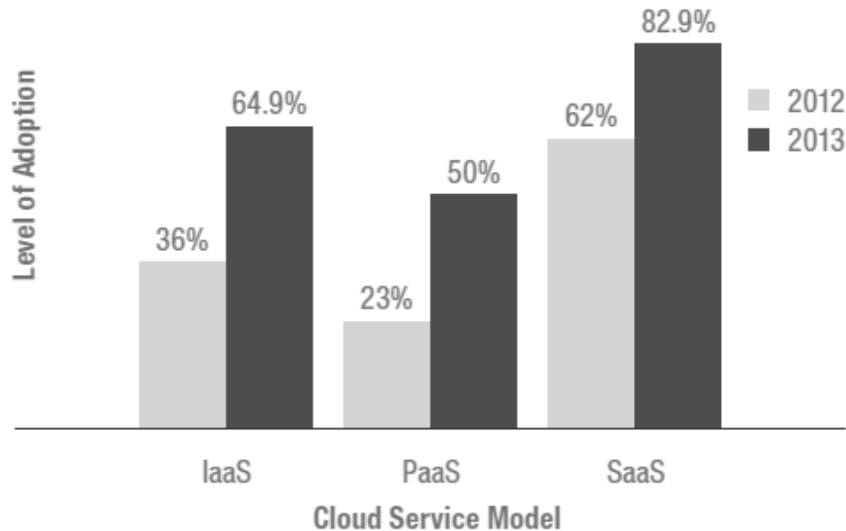


Figure 10. ISACA/CSA Cloud Use and Growth (2015).

The long-term expectation is that Cloud services will be more important for business-as-usual (BAU) than strategic plans. The proliferation of ready-to-use SaaS applications is already an essential part of BAU, and most cloud market analysts predict that SaaS will continue to grow and become more intrinsic to day-to-day and some mission-critical business processes.

## 5.7 Perspective of the main accounting actors in SaaS

Figure 7 provides an overview of the three key players in the Accountancy SaaS Business Network i.e. the Product Vendors, Service Providers (the Accountancy Firms), and the Customers/Users (the Accountancy Firms clients). This section addresses the main issue this thesis seeks to address, that being ““What is the maturity of United Kingdom (UK) Accounting Actors in Software as a Service (SaaS) and their Readiness for Automated Integrations?” and the supporting primary and supplementary questions from a Vendor and Partner/User perspective. In addition, this section also looks at the reasons why Accountancy Firms have chosen the current vendors they are using and the reason why there has been a relatively low uptake of SaaS in the sector given the size of the potential market.

### 5.7.1 Overview of Empirical Evidence Results

Section 1.2 of this Master’s Thesis introduced the Research Methodology, including the tools; used to analysis the results of the theoretical and empirical data gathering process. In order to gain an in-depth insight into and to obtain pertinent and meaningful conclusions from the empirical evidence, QDA Miner Lite was utilised as it allows a researcher to analysis textual data such as interview and news transcripts, as well as open-ended responses which are a theme in this type of qualitative research. It also enables a researcher to code their data in order to identify common themes and points of differentiation in interviewee’s responses. The following sections of this Master’s Thesis provide a statistical and narrative analysis and interpretation of the empirical evidence gathering that was undertaken as part of this Thesis Research.

From the interview and questionnaire responses 4 Key and 15 Sub Themes emerged and are presented in Figure 11.

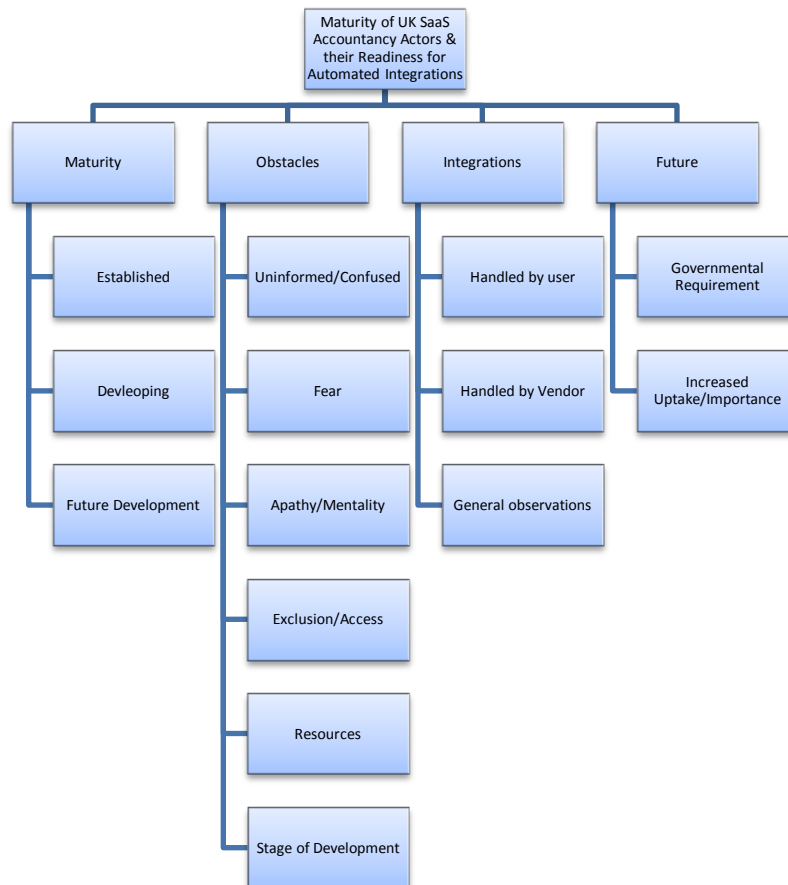


Figure 11. Key and Sub Themes that Emerged from the Empirical Evidence.

As is supported in previous theoretical and empirical research on Cloud Computing and SaaS, and more narrowly on their use within the UK Accountancy Sector; there was a clear consensus amongst all interviewees that the UK SaaS Accountancy Sector is in a “Development” stage with a relatively small current uptake amongst Accountancy Firms and their clients given the size of the potential market. Figure 12 presents an overview of the Frequency Distribution keywords linked to the key stages of “Maturity” in a typical business cycle that emerged through the empirical research. The keyword “Developing” was used on 12 occasions and by all interviewees, which supports this conclusion. That said there are distinct and incremental levels of maturity SaaS Accountancy Vendors, with many vendors being well established multi-national companies providing sophisticated software services that are constantly evolving to meet customer specific requirements, and the keyword “Mature” was used on 5 occasions to describe the development stage of SaaS Vendors operating in the UK. In support of this hypothesis 3 out of the 4 interviewee’s commented that SaaS Vendors are “Mature,” stage of company development, particularly in terms of the level of service and technology that they are able to offer to their partner and client firms, and they are well placed to continuously update and modify these offerings to meet current and future partner/client needs.

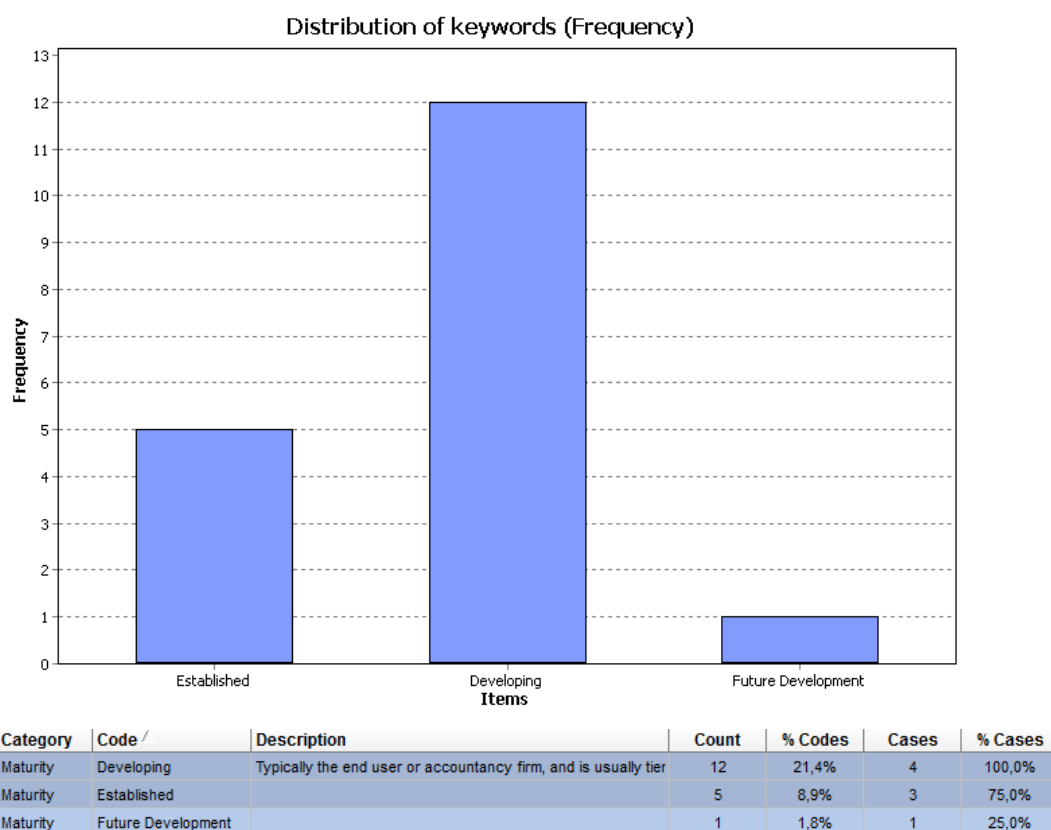
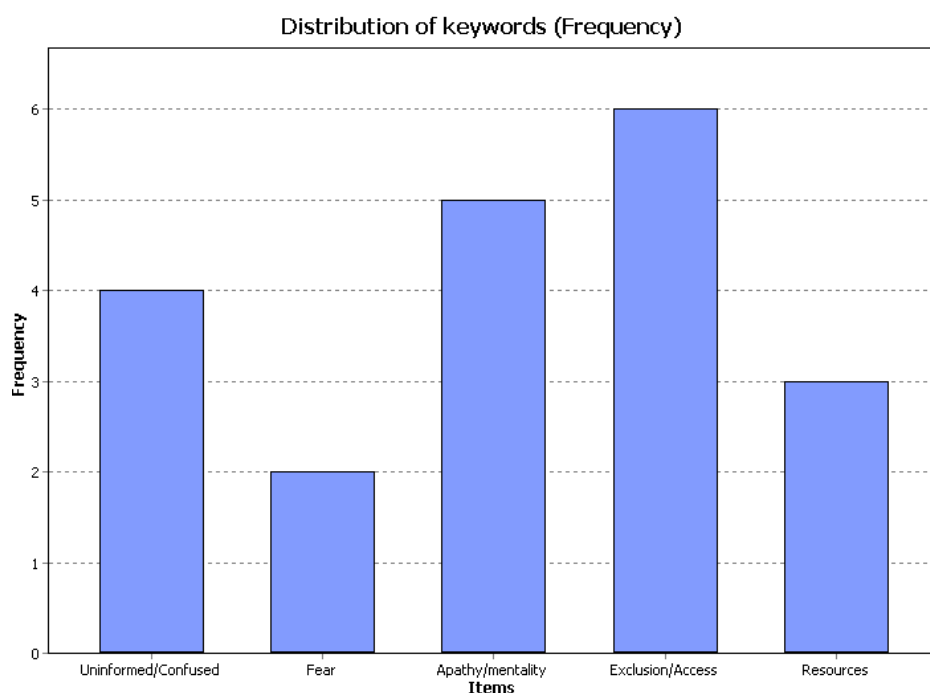


Figure 12. Keyword Frequency concerning the maturity of UK SaaS Accountancy Actors.

A key topic that has emerged through both the theoretical and empirical evidence is the issue that the UK Accountancy sector appears to be lagging behind other business sectors in the uptake of Cloud Computing and SaaS solutions, particularly given the relatively large size of the consumer market and the business benefits such solutions can provide to all sizes of businesses. The empirical data (Figure 13) observed a number of key reasons for this most notable “Exclusion/Access” and being either “Uninformed” or “Confused” of the benefits, and how SaaS solutions can be used to improve business operations, were cited as key reasons for a slow SaaS adoption rate. This is particularly relevant to areas that may not be seen as traditional or key target markets/regions for SaaS Vendors, who sometimes are seen as focusing their marketing activities primarily on what may be termed as “cosmopolitan” areas, such as London and Manchester; and exclude more outlying regions. Another key issue in this area is the fact that in many regions of the UK, particularly rural areas; there is still relative low access to Wi-Fi and high speed internet connections, which limits the use of SaaS solutions. Apathy and a mentality of fear of change are also considered as factors hindering the wider uptake of SaaS within the UK accountancy sector. Many accountancy firms and their clientele are still affected by a mentality of “if it ain’t broken, why fix it,” and prefer to continue using their current systems. However, with a new generation of accountants and clients, who have been brought up using nothing else other than internet based solutions; there is an increasing demand for accountancy solutions that can be provided through Cloud Computing and SaaS.



Category	Code	Description	Count	% Codes	Cases	% Cases
Obstacles	Uninformed/Confused		4	7,1%	2	50,0%
Obstacles	Fear		2	3,6%	2	50,0%
Obstacles	Apathy/mentality		5	8,9%	3	75,0%
Obstacles	Exclusion/Access		6	10,7%	3	75,0%
Obstacles	Resources		3	5,4%	3	75,0%
Obstacles	Development stages of vendors		1	1,8%	1	25,0%

Figure 13. Keyword Frequency concerning the factors affecting the adoption of SaaS solutions by UK Accountancy Actors.

A key issue that this Master's Thesis attempts to address is "what is the readiness of UK SaaS Accountancy Actors for Automated Integrations?" The empirical evidence demonstrates that UK SaaS Vendors are already providing some form of Automated Integrations as part of the overall SaaS solutions that they offer to their existing and potential partners and clients. These integrations are either handled by the Vendor themselves or by the user (partner/client) through a specifically designed "app" that is provided through an "app designer company" that works in partnership with the SaaS vendor (Figure 14).

Category	Code	Description	Count	% Codes	Cases	% Cases
Integrations	Handled by user		1	1,8%	1	25,0%
Integrations	Handled by vendor		1	1,8%	1	25,0%

Figure 14. Keyword Frequency concerning the readiness of UK SaaS Accountancy Actors for Automated Integrations.

Looking ahead, 3 interviewees believed that SaaS Accountancy solutions will be of increasing importance to the sector in the future, allowing accountancy firms and their clients to concentrate on their core value delivery activities by allowing many of their routine accounting activities, such as re-keying of standard data; to be automatically undertaken by SaaS programmes on "the Cloud" in real-time. Furthermore, all interviewees believed that Government requirements to digitise accountancy returns by 2020 will make the need to use "Cloud" delivery platforms, including SaaS; a mandatory requirement.

Category	Code	Description	Count	% Codes	Cases	% Cases
Future	Government requirements		4	7,1%	4	100,0%
Future	Increased uptake/importance of SaaS to business as usual		4	7,1%	3	75,0%

Figure 15. Keyword Frequency concerning the future of UK SaaS Accountancy solutions

The following sections of this Master's Thesis provide an in-depth analysis of the empirical evidence gathered through telephone interviews and specially designed qualitative questionnaires, so as to answer the primary and supplementary questions posed in Section 1.1 of this Thesis report. This is done from a SaaS Accountancy Vendor, Accountancy Firm and Accountancy Firm Client perspective, so as to accurately reflect the different stages of development, attitudes and use of SaaS Accountancy solutions.

### **5.7.2 Maturity Level of UK SaaS Accountancy Vendors and their solutions**

It is evident that there are a large and growing number of SaaS vendors offering a wide ranging and diverse portfolio of services to UK accountancy firms and their clients. Taking this into account, there are discernible tiers of maturity and readiness for automated integrations amongst vendors. This means that the overall readiness for automated integrations is either pulled down as a whole, if the metric includes "all" the current SaaS accountancy vendors operating in the UK being assessed against the same measurement criteria; or at distinct and incremental levels of maturity, whereby vendors are categorised using a tiered matrix of competencies and functionality capabilities. For those SaaS accountancy vendors leading the market, such as FreeAgent and Xero the respective readiness for automated integrations is both demonstrable and absolute. However, one pitiful in this variety in choice of SaaS vendors is the potential for confusion amongst accountancy firms and their client users; of what is being offered, what the differences between the services being offered by the different SaaS vendors and what is the most suitable service for them. This is particular relevant as SaaS is a relatively new innovation, and many firms and potential users are uninformed as to what it is and the benefits it can bring them. Rather they may see it as a "non-profitable" business activity that brings them little quantifiable business value and is not worth investing time and resources into.

There is also the question of "how integrations are managed"; "who are the integrations directed towards", and "whether or not vendors publicly and/or privately cater to mass authorisations." A SaaS vendor will either undertake the development of integration systems themselves, employing a team of staff who will collect all the relevant information and integrate it for their clients. Alternatively they will enter into a partnership with another software company who offer complementary services such as integrations. Often this decision is based on the maturity and business focus of the SaaS vendor. Integrations are relatively straightforward in incidence's where there is a single end user level integration



authorisation that allows for a single user Application Programming Interface (API) query between application A and application B. Whilst the integration architecture is developed and maintained by the SaaS vendor, a user is normally responsible for the set-up and management of a partner or client user when they wish to connect one application to another – assuming that they have accounts for both – by authorising access. These integrations are seamless, near instantaneous and require minimal effort from the SaaS vendors' clients and are included in the subscription fee the Accountancy Firm pays to the SaaS vendor.

Examining the markets readiness for mass authorisation, for a SaaS accountancy vendors respective resellers and/or partners (an accountancy firm) for example; in order that a Partner Loading reseller is able to authorise API queries between app A and app B for a multitude of their own users and clients who had each previously authorised such resellers to act on their behalf under legacy systems. The market can be said to be in its infancy. When SaaS accountancy vendors can provide and support such bulk integration authorisations over and above their own bulk action functionality, vendors are moving into the realms of providing the potential for automating significant aspects of historically manually dependent work. Material changes such as this has the potential to have a very real and positive impact on the activity of the market as a whole, increasing competitiveness and pushing entire sections of UK industry forward.

The biggest perceived issue going forward for SaaS vendors is not a technology one, but a resource one. Every SME is different and they cannot be treated in the same way and a generic one size fits all solution is not an option. This can be a challenge for a vendor, particularly from a resource and time management perspective. The most successful SaaS vendors are addressing this issue by engaging with accountancy firm partners to get a better understanding of what is needed by the end-user, what needs to be fixed, what categories need to be looked at and developed or removed, and so on. Without this intelligent input from accountancy firms the vendors would not have access to the information they need to develop relevant and appropriate solutions for the market. The importance of these vendor-accountancy firm partnerships has seen many SaaS vendors develop "Partnership Programs," including Xero's Champion Partner Program, FreeAgent Partnership, Iris Kashflow Partner Programme and Intuit QuickBooks Programme; through which accountancy firms are rewarded with a range of benefits that they can tailor to their own practice goals.

### **5.7.2 Accountancy firm's maturity**

SME Accountancy Firms are typically ever subscribers to or key partners with SaaS Accountancy Vendors. The maturity level of SME accountancy firms using SaaS and Cloud based solutions, and their need for automated integrations; is varied and is dependent on a number of key factors including the size of the firm and their attitude to technology and openness to move away from their legacy system; technology requirements dependent on the service(s) they provided to their clients; ease of use and interface; geographical location; broadband and connectivity availability; willingness to take on another expense in a difficult operating environment; and a firms' awareness of SaaS and Cloud Computing and the benefits that they can bring to a firm and its clients.

Cost, ease of use, a systems interface, the number of add-on facilities offered such as CRM systems and invoicing, and usability are considered critical factors and point of differentiation for Accountancy firms when selecting SaaS Vendors. Some SaaS solutions are intuitive and simple to use, requiring minimal prior knowledge of accountancy to use; whereas other are more complicated and less straight-forward, often requiring a user to have knowledge of accounting practices. Linked to usability is the need for constant development, updating and horizon scanning by SaaS vendors to remain relevant, and evidence has demonstrated that vendors who fail to invest enough time and resources into these areas quickly lag behind their competitors and consequently loose users. In addition the level of perceived and actual security of SaaS and Cloud Computing is a key factor when accountancy firms select a SaaS vendor. In particular live bank feeds are seen as a key SaaS security feature due to the fact that are probably the safest way to get information into the system.

A significant challenge facing SaaS Accountancy vendors is an apparent apathy to the technology amongst accountancy firms and particularly their clients who are often the main day to day users of the SaaS service. Convincing the digitally excluded, opposed to digital native; of the benefits of switching from their legacy systems, particularly Excel; is seen as a current challenge for both SaaS Vendors and their Accountancy firm partners, who are trying to convince their clients to switch to Cloud based services and systems. There are measures that SaaS Accountancy Vendors can take in order to abate many of these inhibiting factors, including developing and offering an extensive range of digital applications. This has resulted in a turn in the tide in Accountancy firms and their clients attitudes towards Cloud based working, such as SaaS; and users of accountancy

products are increasingly switching to SaaS offerings as they become more aware of the efficiencies that they bring to them, such as enabling the automatic processing and updating of information for statutory accountancy reporting such as Quarterly and Annual returns, which has to be done manually every time on systems such as Microsoft Excel. However, it ultimately comes down to the motivation and urgency the business owner has towards the ownership of their financial position.

Scaling is also regarded to be an important consideration. If a SaaS vendor was making an enterprise sale they would typically go into a meeting, make a presentation and hopefully, a long term investment would be made by the purchasing company creating a regular revenue stream for the vendor. However, this is no longer the case in the modern business environment, particularly in the SME demography and Cloud based solutions. In the SaaS Accountancy market it is often the case that vendors are selling their service at a monthly fee of an average 20 GBP per time. The challenge is that SaaS vendors are asking companies and individuals to change the way they work and their approach to accountancy systems investment. This is a challenge as most companies and individuals are currently not prepared and open to this change of operating behaviour. There is also a common belief amongst users that SaaS is an expensive service due to the fact that in the past they may have had to pay a significant amount of money for onsite software and additional fees for maintenance and updates. Many accountancy firms and their client users are now getting over this preconception and are realising that they only have to pay a fixed monthly flat rate that includes services such as software updates and maintenance.

### **5.7.3 Accountancy firms' clients maturity**

The clients of accountancy firms are the least developed link in the SaaS Business Network. SME Accountancy firms have a broad spectrum of clients ranging from one-man firms who use paper files through to companies who are using their own ERP systems, or some other form of desktop Accountancy Software. In addition, geographical location and Broadband connectivity is also a contributing factor. To contextualise this, an accountancy firm and its clients located in what can be considered as a cosmopolitan area, such as London or Manchester; are more likely to be aware and proactive in using or open to using a SaaS accountancy system; has a high level of connectivity in terms of Broadband access and speed and are often the first to be targeted as part of marketing campaigns and involvement in the development of new technologies by SaaS vendors i.e. they are

usually first or early adopters of new innovations. At the other end of the scale are accountancy firms and their clients located in more provincial regions of the British Isles where the uptake of SaaS and Cloud computing traditionally takes a little more time to take root due to contributing factors such as not being a main focus or target for the Software Vendors. Internet speed and broadband is also a factor, particularly in rural areas where accountancy firms cannot get their clients on it. Once broadband is more readily available it will be easier to get clients to use such online services.

It is often the case that it is the responsibility of the accountancy firm to inform on and sell the benefits of switching to a SaaS approach to their clients. This has seen accountancy firms prioritising on what can be termed as the “lowest hanging fruit” and “the quickest wins” clients, who are typical those clients who are using paper records and are considered to be the easiest to get on board. Evidence has demonstrated that whilst these clients can take a bit of convincing in terms of technology and security, with many accountancy firm clients not understanding what the Cloud or Cloud Software means, and that Web-based accounting has the same level of security as Internet Banking. Once these clients understand the reasoning and benefits of converting to a SaaS and Cloud based accountancy system they are more ready to accept using them. The challenge going forward will be once this low hanging fruit has been harvested is to convince larger clients who use desktop based electronic accountancy records systems, which often has involved a financial outlay; to convert to an alternative system and way of working.

A common theme visible in all client demographics is that the attitude that there is no need to change what they are currently doing unless there is a good reason to do so. Clients have to be shown how something new will benefit them, what digital accounts will bring them and make their lives easier. It is a change of doctrine and the benefits of adopting of it have to be sold to people who have a traditional approach to business practices. Otherwise nobody would change as they are worried about change when faced with it.

Looking forward, convincing people to adopt SaaS and Cloud Based Accountancy activities is not considered to be a significant problem. As more people use SaaS Accountancy services this issue should be self-fulfilling as people will get the experience of friends, family and business partners doing it. The main issue going forward is seen as a resource one. Companies operating in this segment believe that SaaS is on the brink of becoming an everyday business requirement; being able to manage projects

with the resources companies currently have is likely to be the biggest hurdle to overcome in it becoming an industry wide standard. As one responder stated "... it can quickly mushroom into a situation where everybody is really keen and we want to get these clients on board, and we support and train them, but they find they have too many they can deal with, with limited resources. It is not so much the convincing as I think this is taking care of itself. Managing client expectations with the resources that we have is the major issue." This also underlines the fact that there is a lot of untapped potential market opportunity and this is where Vendor focus is needed going forward to take advantage of the latent market growth.

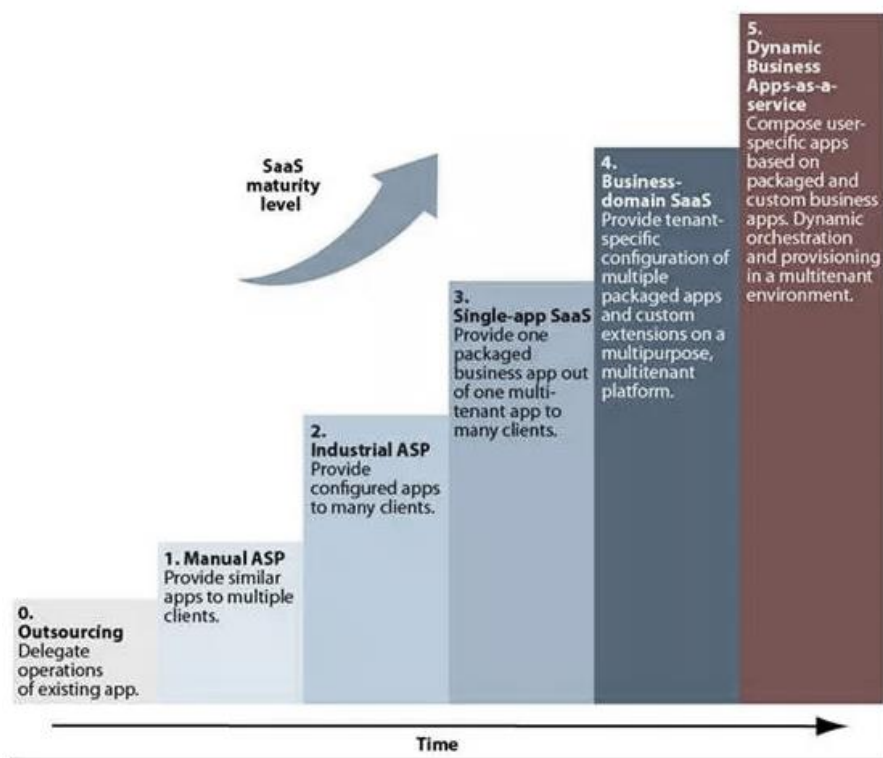
## **5.8 Assessing the maturity of UK SaaS Vendors using Forrester's SaaS maturity model**

Throughout the empirical section of this Master's Thesis, there is evidence that there are different levels of maturity within and between each link of the SaaS Accountancy Business Network (Figure 6). This Section of the Master's Thesis provides an assessment of the overall maturity level of the SaaS Vendors operating in the UK as they are the link in the chain responsible for providing the overall business solution, and connected integrations and developments, to the other links in the Business Network (accountancy firms and their clients); through which the overall business relationship is conducted and maintained. This assessment is based on Forrester's SaaS maturity model described in Section 3.5.

SaaS vendors operating in the UK Accountancy sector range from small domestic niche service providers through to multi-national companies who have offices located within the UK. When assessing the maturity of a SaaS vendor a number of factors need to be taken into consideration most notable that every SaaS vendor client is different and thereby have their own unique needs and requirements, therefore they cannot be treated in the same way and a generic one size fits all solution is not an option. A surface level assessment of a SaaS vendor may suggest that it is at a lower level of maturity than it actual is due to the fact that it is currently providing services that are define at a lower level of the development chain proposed by Forrester. However, in reality they may have the competences and abilities to fulfil the capabilities defined at higher levels of the model, but they currently do not do so because there is not a current market demand. Likewise, a vendor may choose to focus its business activities and offerings at a lower level of the

model to differentiate itself from its competitors. As the empirical evidence has suggested SaaS Accountancy vendors are generally at a relatively advanced stage of development in terms of their Software/Service offerings, particularly well-established vendors whose respective systems and readiness for automated integrations is both demonstrable and absolute.

If an overall summary approach is taken factoring in issues such as size and head office of the vendor, current product offering, (automated) integration model and estimated number of clients (this figure is continually changing or is not currently publicly available). It can be concluded that the maturity level of UK SaaS Accountancy Vendors covers the whole spectrum of Forresters' Model. However, looking more deeply into the maturity level and assessing companies interviewed as part of this thesis work UK SaaS Accountancy Vendors can be said to be between at Level 4 and Level 5 of the Model, shown in Figure 4 (copied below).



A target market that is distinguished by a broad client demographic and legacy systems that require different levels of handling, management, configuration, maintenance, business relationships and evolutions; require even the smallest and immature SaaS Accountancy vendor to offer current and potential clients and partners a “Business Domain SaaS” service (Level 4) that is advanced and sophisticated enough so as to serve

the needs of accountancy of various sizes and their specific business domain requirements. At this level the vendor may also provide a platform for other business logics which can be automatically integrated with previous SaaS applications available at Level 3 of the model. The applications can also be customised to suit requirements of accountancy clients and their client users, allowing a vendor to target a broader market. However, in some instances it has been witnessed that whilst an SaaS vendor may have the capability to offer a broader selection of applications to the market, they have tactically chosen to limit their offerings to target an accounting software for “small business” accounting suitable for small businesses with 5 - 99 employees; or limiting their applications that enable users to set up and manage their accounts, invoices, cash flow, banking, customers, suppliers and VAT; in an attempt to carve out a niche in the market where they are the turn to specialist. At the other end of the spectrum we see firms who are moving more towards Level 5 on the maturity scale, with vendors offer a much broader and significant number of add-on applications.

## **5.9 The importance of Business Relationships between UK SaaS Accounting Actors and its Associated Value Creation**

In Section 4 of this Master’s Thesis, the importance of Business Relationships and their associated Value Creation in Cloud Computing and SaaS was discussed. If we revisit these earlier principles it can be concluded that these are also relevant and applicable to the UK SaaS Accounting Actors. Figure 6 (copied below) provides an overview of the three key Business Network Actors in the UK SaaS Accounting sector.



In the UK there is currently a large number of both domestic and international SaaS Accounting Vendors, who offer potential clients a wide variety of “services” and who are at different levels of “service” and company development - ranging from start-up vendors with a very limited service offering and associated applications, through to multinational vendors who offer complex services and hundreds of associated applications. The next stages in the network are the “Service Providers” who are typically Accountancy Firms

who act as “Partners” to the “Product Vendors,” and promote the use of SaaS Accountancy solutions to their clients who are seeking accountancy services and final link Business Network – “The Customers/Users.” Figure 16 provides a revised “Business Network” reflecting the players associated to each link.

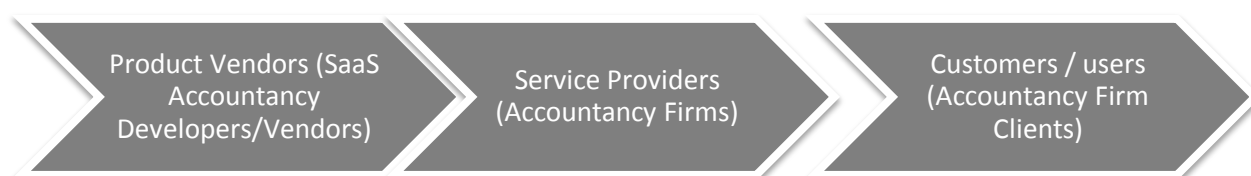


Figure 16. UK SaaS Accountancy Actors “Business Network.”

Whilst the “Business Network” chain provides a useful overview of the main actors in the UK SaaS Accountancy market it fails to take into account the dynamic and varied role each member plays, and the positions of “Power” amongst the associated actors. It also gives the impression that “Value” only travels in one direction and does not take into account the co-dependency of each link in the Network. An alternative management technique that is now being widely recognised is that of “Business Ecosystems,” described as dynamic webs of interdependent organisations, which rely on each other for success. A business ecosystem finds its roots in the idea of value networks and can be seen as a group of companies, which simultaneously create value by combining their skills and assets. Business ecosystems create value for an individual participant only when the participant is not capable of commercialising a product or service relying on its own competences. Such ecosystems are organised as complex networks of firms whose integrated efforts are focused on addressing the needs of the end customer. There is a growing consensus that business ecosystems provide entrepreneurial firms with resources and information to navigate in a constantly changing competitive environment. In a business ecosystem, inter-organizational networks consist of both collaborative and competitive relationships which results in a “cooperation” structure. Companies co-evolve capabilities around a new innovation: They work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations.” Like an individual species in a biological ecosystem, each member of a business ecosystem ultimately shares the fate of the network as a whole, regardless of that member’s apparent strength (Iansiti & Levien 2004). As a result, it is the competition among ecosystems, not individual companies, that largely fuels the next round of innovations (Clarysse et al 2014).



Ecosystems vary considerably in their organisation and business models, thereby influencing the strategic choices made by both established companies and new ventures. There also appears to be more cross over in interaction, and co-evolution seems to be a much important factor, as the evolution of one company affecting the evolution of other companies, which reduces competition and the negative impacts this can have on all interested parties (Zahra & Nambisan 2012). In this context, a “Business Ecosystem” can be viewed as an evolutionary or next step forward on from “Business Network” thinking. It is evident “ecosystems” and “networks” have many similarities, and the principles of network management are applicable to all types of business systems as a means to raise awareness amongst each member of their position and contribution to the ecosystem. As well as providing information and a system by which each member can improve their position within the ecosystem. It has been suggested that “Business Ecosystems” are just another form of “Business Network.” It is true that network management principles can just as easily be applied to ecosystem management. These principles include:

- The establishment of improved communication pathways
- Increased human development and innovation from the sharing of skills and experiences
- Better long-range planning and experimentation due to the spreading of financial risk,
- Strength in numbers
- Increased feedback from customers, employees, and participants
- Improved problem solving due to in-depth discussion and implementation particularly when it comes to servicing niche or specialized markets.

This view is supported by Peltoniemi and Vuori (2008) who consider “Business Ecosystem” to be the new approach to complex adaptive business environments, and state that "Like Business Networks, biological ecosystems are characterized by a large number of loosely interconnected participants who depend on each other for their mutual effectiveness and survival."

When assessing the business environments that UK SaaS Actors are operating within, their associated business relationships demonstrate a tendency towards “Business Ecosystem” way of working as shown in Figure 17.

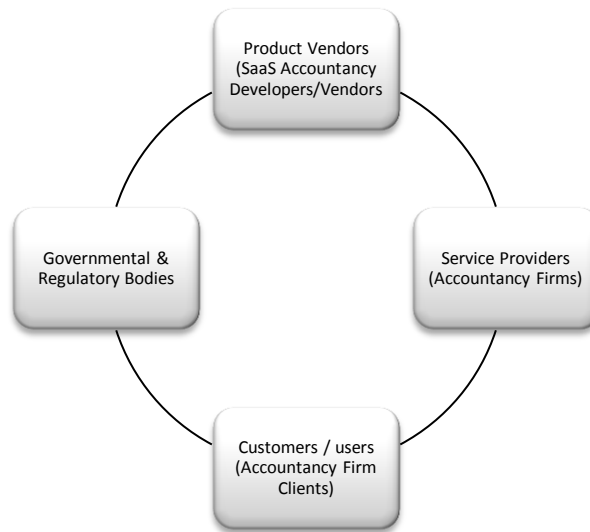


Figure 17. UK SaaS Accountancy Actors Business Ecosystem.

The Business Ecosystem technique reflects the reciprocal nature of the relationships amongst the UK SaaS Accountancy Key Actors. Whilst SaaS Vendors hold a position of power in terms of their ability to develop, offer and update software services that can improve the efficiency and associated benefits to Accountancy Firms and their clients. They are also typically reliant on Accountancy Firms as a “Partner” to communicate and sell the benefits of using the SaaS service to their clients who are often the main user of the SaaS service. As many Accountancy Firms use SaaS in-house to a limited extent, with it mainly being used as a communication tool their clients use to provide them with the necessary information to prepare and maintain their accounts for statutory, and personal reasons. SaaS vendors are often reliant on Accountancy Firms and their clients for feedback to develop their offerings further, so as to stay ahead of the game and remain relevant to their target market. SaaS Accountancy Vendors are also unable to establish a dominant power position due to the nature of contracts, which are often based on relatively low monthly rolling contracts. This means that Accountancy Firms and their Client can easily switch SaaS Vendors relatively easily and at short notice.

Accountancy Firms are reliant on their clients adopting and using SaaS solutions to improve their own efficiencies and effectiveness. Ultimately if their clients agree to use this technology it allows the Accountancy Firms to focus on other core and higher revenue stream business activities. However, the Accountancy firm are in a position of power whereby they can chose to drop clients who do not agree to use SaaS services, although

this comes at a price of lost revenue from that client. Though the Accountancy firm may conclude that they can make additional revenue through other means to make up for the loss of the client – this may not be an issue if the client is small and brings a limited revenue stream, but will increase in complexity and impact if the client is a large and profitable patron.

These interactions demonstrate the complexity of business relationships and the importance for meeting, talking, trusting, sharing, collaborating, experimenting, and grow together. When an ecosystem thrives, it means that the people have developed patterns of behaviour – or culture – that streamline the flow of ideas, talent, and capital throughout a system. The Business Ecosystem also takes into account other interested stakeholders in the UK Accountancy Sector such as Governmental and Regulatory Bodies. This is a particularly important factor given the drive by UK HM Revenue and Customs to require businesses and individuals to return all financial related reporting online by 2020, raising the importance of Cloud Based financial service delivery models such as SaaS.

Assessing the “Value” of operating within such a business relationship structure for each key actor: SaaS Vendors, Accountancy Firms and Accountancy Firms Clients; it can be determined that:

- **SaaS Vendors** derive “Value” through mid to long-term business relationships with accountancy firms who provide them with access to valuable service development requirement information; a regular revenue stream and potential access to a wider customer base through the accountancy firms business network contacts and clients.
- **Accountancy Firms** derive “Value” through dedicated client support from the SaaS vendor, as well as training and learning for both Accountancy Firm and client employees (the level of this service differs between Vendors and the level of Partnership Agreement); it is relatively fast to implement; flexibility to customise and cherry pick applications that are relevant to the firms operating level – it is important to be aware that this may not be possible on multi-tenant SaaS; support and maintenance, as well as upgrades are undertaken by the SaaS vendor freeing up resources and time in the accountancy firm that can be redirected to more business critical activities. SaaS solutions offer a high level of security with most vendors offering expert supervision of network and server security. SaaS solutions are easily scalable either upwards or downwards with little time or effort. SaaS software also

provides a user with the benefit of predictable costs both for the subscription and to some extent, the administration. This allows for much more accurate budgeting, especially as compared to the costs of internal IT to manage upgrades. SaaS software is also typically pay-as-you-go so switching software vendors is a relatively easy process.

- **Accountancy Firms Clients** derive “Value” through enabling a user to access their accountancy information anywhere and at any time since the software is hosted in the cloud and accessible over the internet; users can access it via mobile devices wherever they are connected. Likewise it enables a user to have access to real time data and removes the requirement for the user to rekey information multiple times in different databases or systems. SaaS systems also enable users to be in constant contact with their accountant through electronic communication and vice versa. Finally, because SaaS software is accessible via familiar web browsers, SaaS apps tend to have lower learning curves and higher adoption rates. This can be especially significant given the high cost of on-premises software development and implementation, versus the low cost of entry for SaaS.

Many of the benefits of SaaS to UK Accountancy Actors are reciprocal and crossover actor boundaries, reflecting the “Business Ecosystem” management dynamics of SaaS Accountancy Actors relationships.

## 6. Discussion & Conclusions

This Master's Thesis is unique in the fact that it provides an in-depth assessment of the level of maturity of the main UK SaaS accountancy actors and their readiness for automated integrations from both the researchers perspective, as well as against an existing framework for assessing the maturity of SaaS vendors. It is also provides an insight into the type of business relationships, and division and influence of power amongst the key relationship stakeholders. Returning to the original main and supplementary questions posed in Section 1.1 of this Master's Thesis, Table 4 provides a summary of the main findings that emerged through the theoretical and empirical evidence gathering and analysis:

<p><b>What is Software as a Service (SaaS) and what are the potential benefits and pitfalls of using such a Cloud-Based service in a business environment?</b></p>	<ul style="list-style-type: none"> <li>• SaaS is an internet based platform that provides a user with the capability to use a vendor's applications that are routed through a cloud-based infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser, or a program interface.</li> <li>• The main benefits of using SaaS include reduction of workloads and associated costs for users, increased flexibility, streamlined business, fewer input errors and higher satisfaction amongst customers.</li> <li>• The main pitfalls include a perceived security risk amongst some users and Wi-Fi and/or broadband access requirement.</li> </ul>
<p><b>What kind of software services are currently being used/available?</b></p>	<ul style="list-style-type: none"> <li>• The kinds of software services offered by SaaS Vendors in the UK varies from all-encompassing offering with hundreds of add-ons; to focussing on specific accountancy fields solutions i.e. bookkeeping, payroll, etc.; with add-on provided by app partners.</li> <li>• Accountants and their clients use a mixture of software and associated accountancy services ranging manual (paper) files, Excel Spreadsheets to SaaS and other Cloud Solutions.</li> </ul>
<p><b>How do these software providers handle the connections/integration now if a customer requires one?</b></p>	<ul style="list-style-type: none"> <li>• All Vendors offer some form of Automated Integration either directly or indirectly through an app partner. This is typically included in the subscription price for the whole SaaS solution being offered/provided.</li> </ul>
<p><b>What types of Business Relationships govern the interactions between the Key Accounting Actors that enable SaaS to develop in the sector?</b></p>	<ul style="list-style-type: none"> <li>• Business Relationships are typically reciprocal in nature and can be seen as a "Business Ecosystem" where each member benefits through co-operation and communication with the other relationship members. Consequently the position of power in such relationships is blurred as each member has critical factor or role that the other members are dependent upon.</li> </ul>
<p><b>How mature are UK Accounting Actors in Software as a Service (SaaS) and what is this readiness for Automated Integrations?</b></p>	<ul style="list-style-type: none"> <li>• There are different levels of maturity between SaaS Vendors, Accountancy Firms and clients; and it can be said that Vendors are typically between at Level 4 and Level 5 of the Forrester's Model, although on the surface it may appear that they are less developed due to issues such as a business strategy to focus on specific areas of accountancy rather than have a large service offering.</li> </ul>

Table 4. Summary of answers to the Thesis Main and Supplementary Questions.

The main research question posed in this Master's Thesis was: "What is Software as a Service (SaaS) and what are the potential benefits and pitfalls of using such a Cloud-Based service in a business environment?" Interviewees were not asked for their opinions on what they understood SaaS and Cloud-Based Computing to be, therefore this part of the question cannot be discussed from an empirical standpoint. However, theoretical evidence is in consensus that SaaS is an internet based platform that provides a user with the capability to use a vendor's applications that are routed through a Cloud-Based infrastructure. These applications are accessible from various client devices through either a thin client interface, such as a web browser, or a program interface (Buyya et al. 2009, Kim et al. 2012, Lenk et al. 2009, NIST 2010, Walraven et al. 2014).

In terms of core business benefits that can be achieved through SaaS and Cloud-Based services, the empirical evidence was consistent with previous academic and industrial research findings in that it demonstrated that SaaS and Cloud-Based computing can deliver benefits to an outsourcing business in terms of cost, quality, flexibility and competency advantages. The SaaS model enables the outsourcing company to reduce the need to and the cost associated with employing a dedicated in-house ICT team to oversee the management of specially designed accountancy software package, and have more predictable associated expenses. The fact that the SaaS model allows a user to access the software provided by a vendor via the Internet typically for a set monthly charge eliminates the need for users to establish an in-house system by themselves or purchase specific software, and manage the costs associated with maintaining such a system. This in turn allows a business, in this case Accountancy Firm's and/or its clients; to focus on their core business activities, and enables them to deliver better value for themselves and to their key stakeholders. This is of particular importance to SMEs who are often less resilient to fluctuations and changes in their operating market due to factors such as limited access to resources and finance than larger companies. (Leimeister et al. 2010; Kim).

Hansen et al. 2003 identifies a number of core challenges and pitfalls SaaS vendors and users encounter when they consider developing and using SaaS solutions. These include semantics, modularisation of business process, security and trusted intermediaries, quality and source selection, licensing and payment mechanisms and development tools. Empirical evidence gathered as part of this Master's Thesis found that as the use of SaaS and Cloud-Based services has become more prevalent and accepted within the UK

Accountancy Sector, many of these challenges and pitfalls have reduced in primary significance. However, security and trust still remain an ongoing issue, particularly amongst some of the Accountancy Firms clients who are unfamiliar with such technologies and are reluctant to change. These concerns should reduce as SaaS and Cloud Computing matures and becomes a prerequisite to doing business. In addition, a new generation of user's who have been brought up with using such technologies as part of their everyday lives, are demanding such solutions, therefore these issues should diminish over time. A new issue that arose through the empirical evidence was the impact of internet speed and broadband as an inhibitor to the wider uptake of SaaS in the UK. Connectivity still remains an issue in some parts of the UK, particularly in rural areas. Once broadband is more readily available it will be easier to get users to routinely use such online services and increase the adoption rate of SaaS and Cloud-Based services more broadly.

There is not an extensive catalogue of previous academic researches on the uptake and the types of SaaS solutions being offered and used in the UK. Previous analysis has typically been conducted by professional consultancy companies or international news agencies. Research by Thomson Reuters (2013) and Biafore (2015) has found that companies that rose to prominence during the PC revolution like Microsoft and Sage; are now being challenged by new innovative companies, such as KashFlow, Liquid Accounts, Aqilla, FreeAgent and Xero; whose business model is mainly focussed on mobile and cloud applications and focussed on the small enterprise segment. Empirical evidence gathered as part of this Master's Thesis supports these conclusions, and demonstrates that SME Accountancy firms and their clients are primarily entering into agreements with these new innovative companies who offer a broad range of services that can be tailored to meet their current business requirements, and have the functionality to allow a user to adapt the SaaS applications it subscribes to as needs arise. Such arrangements also enable a user to terminate agreements with SaaS vendors at short notice, as they are typically based on a monthly subscription basis. Whilst this Master's focuses on Accountancy Firms that can be defined as SME's, it is worth drawing a reader's attention to the fact that whilst secondary empirical evidence suggests that larger companies currently still prefer to use on site and specifically designed accountancy software, either built in-house by a tech team or provided through traditional software companies such as Microsoft and Sage. It can be foreseen that this will change in the future due to internal and external factors including the increased desire amongst these companies to reduce overhead costs through outsourcing of non-core activities. Cloud services such as SaaS

offer such companies the same benefits as SME's derive through their use in terms of providing them with the flexibility to adapt their accountancy applications to meet different and rapidly evolving business demands. However, the rate of change is likely to be much slower than has been witnessed within the SME community, and it is probable that such services will be delivered through a company specific private Cloud network rather than through the Public Cloud as is the case with current SaaS Vendor offerings, to tackle control and compliance issues which remain barriers to SaaS adoption within larger firms.

This Master's Thesis also attempts to understand the readiness amongst UK Accountancy Actors for "Automated Integrations." "Automated Integrations" allow real-time and continuous data exchange between business applications, which is critical in permitting a company and their client users to streamline their business processes and reduce their workload, and thereby enabling them to focus on other business priorities. Systems that allow such integrations in the modern business environment are key value contributors enabling system flexibility, maintenance, and ease of evolution; and are proving legacy systems to be inefficient. (Perrey et.al, 2004). In terms of the UK Accountancy Actors readiness for "Automated Integration," many of the well-established SaaS vendors in the UK offer a form of direct or indirect "Automated Integrations." This is usually done through employing an in-house team who are specifically responsible for managing these integrations or through a partnership with a "third party app" software developer whose technology manages these integrations on behalf of the SaaS Vendor. Instigation of these integrations is usually triggered at the request of the Accountancy Firm/Partner who either directly liaise with the Vendor or through sending commands through a relevant "app." However, characteristic of "Automated Integrations" once a connection has been established, data and information flows will occur in real-time or scheduled (batch) integration flows between the respective SaaS apps and back-end systems. These "deploy-and-forget" flows run automatically in the background to share information and require no manual intervention except to handle exceptions and errors. In addition to this, these integration flows can be bi-directional, so data can move in both directions into and out of the hosted applications.

Evidence also suggest that the building of such software requires or desires multiple integrations and bolt-on's, usually typifies a deficient service or one that attempts to create "a one size fits all" ubiquity. Such an approach usually does not work due to a number of factors including the size of the partner/client firm, the target industry's predisposition to risk and scope of partner/client current operating systems and internal capabilities.



SaaS solutions transform financial software from a licensed, in-house product to a leased service. Since companies no longer own the software, they do not buy it either. Rather than making a capital expenditure, payments are spread over time. As companies look to reduce overhead costs, while extending functionality to distributed workforces, SaaS is becoming a popular option. The increased popularity of SaaS is also the result of some larger technological trends within the accountancy sector, including increased user confidence of conducting business through the internet and more confidence in issues such as security; access to broadband is generally pervasive in the UK, although some connection issues still exist, particularly in remote regions. Web services are also becoming the norm and users have a growing appetite to conduct multiple aspects of their life online such as conducting banking and shopping on a regularly on the internet.

Whilst the UK Accountancy Sector may be less mature and lagging behind other business sectors in terms of the adoption of SaaS and Cloud-Based operating system, this is definitely changing. Thomson Reuters 2013 survey, titled "IT in Practice Survey;" found that accountancy firms in the UK are slower in adopting and using cloud-based services, including SaaS; than other corporate sectors. It estimated that by the end of 2013, only three out of 10 accountancy practices would be using Cloud Computing as compared with seven out of 10 UK businesses using some form of Cloud. This suggests that UK SaaS Accountancy Actors are definitely still at a development state. However, this theoretical evidence and the empirical research conducted in support of this Master's Thesis, has demonstrated that whilst the UK SaaS Accountancy Actors are definitely still at a development stage, there is an increasing trend amongst accountancy firms and their clients to migrate their financial information systems to SaaS accounting software. SaaS is considered to be an important part of the future IT strategy of many UK accountancy firms (Thomson Reuters 2013). UK SaaS Accountancy vendors, such as Xero, FreeAgent and Quickbook have advanced and dynamic service offerings for a sector, which is increasingly becoming aware of both the business opportunities and improvement in functionality that using such systems bring both to themselves and their clients. With this in mind and the continued streamlining of business efficiencies it is likely that SaaS and IaaS will become commercially attractive to third parties, whilst at the same time be incredibly progressive for the end-user.

The sector is still affected by a deep rooted and outdated perception of what an accountant is – a grey old man hunched over a desk, with a really old desktop computer

and lots of paper files – and this is seen as a possible reason for the sector lagging behind others. However this is not the case with new graduates and a younger generation of accountants and clientele coming in who do not know what desktop software is, and who are demanding online services that can be accessed through multiple mobile devices such as laptops, tablets and smart phones; and Cloud Based applications. It is this younger generation and forward thinking firms who do not have a knowledge of old technologies such as fixed desktop software alongside an increasing number of forward thinking accountancy firms out there who will be the main proponents of SaaS adoption. The visibility of SaaS Accountancy solutions is also becoming increasingly more common place in the UK, with advertisement's common place on public transport and television.

The use SaaS and its associated integrations will become a prerequisite for doing business rather than just “as a nice to have” in the future, and there is an increasing movement and desire to work using different technologies and at non-fixed locations. There is also increasing evidence that the UK Government and Regulatory Authorities will require people and businesses to convert to Cloud Based Services, rather than traditional means such as paper returns. Government Departments such as HM Revenue and Customs (HMRC) are increasingly requiring individuals and businesses to file statutory returns online. HMRC for example, plans by 2020 to have a fully implemented “Making Tax Digital (MTD),” which will see the movement away from one annual tax return to quarterly tax return, for businesses. This move, whilst being seen as a controversial by some will bring together many of the previously described non-consumers onto various SaaS platforms, and doing so will bring many vertical specific business requirements; many of which will be catered for by 3<sup>rd</sup> party services for example through Electronic Point of Sale (EPOS) systems and Z (cash drawer final balance) reporting integrations for more traditional and cash based businesses. This will mean that integration with SaaS accountancy vendors will provide opportunity for an increased market share for many third part service providers. However, this will require SaaS accountancy vendors to have the capacity to support such partnerships with their respective users. If either party fails to lead on integrations, then their position will most likely be filled by an API broker service, such as Zapier.com who is already providing such solutions.

In conclusion, if SaaS Vendors and the accounting industry operating in the UK cannot support these requirements then there will be trouble ahead. There is a real need for the industry to think and act reactively and quickly, so as to enable clients to get the best service they can; and whilst SaaS and automated integrations offer significant benefits to

accountancy firms and their clients they also present a risk for some smaller accountancy firms, particularly those offering services to niche market; as their clients may find it easier and cheaper to use the services of an SaaS vendor directly cutting out the middle-man i.e. the accountancy firm; which could see some of these smaller firms go out of business.

## **6.1 Trustworthiness, reliability and validity of the research**

Demonstration of the trustworthiness, reliability and validity of data collection and analysis is one aspect that supports a researcher's ultimate argument concerning the trustworthiness of a study. Selection of the most appropriate method of data collection is essential for ensuring the credibility of content analysis and is essential if findings are to be accepted, incorporated and utilised in practice. As is explained in Section 1 of this Master's Thesis, a "Qualitative" approach was adopted in this research. When analysing and evaluating the quality of such research a "Qualitative Content Analysis" is commonly used for analysing the supporting data. The trustworthiness, the linked reliability and the validity of qualitative content analysis and its results, is often presented by using terms such as credibility, dependability, conformability, transferability, repeatability and authenticity. The aim of trustworthiness in a qualitative inquiry is to support the argument that the inquiry's findings are "worth paying attention to". This is especially important when using inductive content analysis as categories are created from the raw data without a theory-based categorisation matrix, as was the case in this research. Validity is concerned whether the findings are really about what they appear to be about, and reliability of the study can be linked to the way of how data has been collected, processed and analysed. (Elo et al. 2014; Saunders, Lewis & Thornhill 2009).

From the viewpoint of sampling strategy, it is essential for a researcher to ask questions such as: What is the best sampling method for my study? Who are the best informants for my study and what criteria to use for selecting the participants? Is my sample appropriate? Are my data well saturated? Thoroughness as a criterion of validity refers to the adequacy of the data and also depends on sound sampling and saturation. It is important to consider the sampling method used in qualitative studies. In qualitative research, the sampling strategy is usually chosen based on the methodology and topic, and not by the need for generalisability of the findings. Types of qualitative sampling include convenience, purposive, theoretical, selective, within-case and snowball sampling. The most commonly used method in content analysis studies is "purposive sampling" this is appropriate for qualitative studies where the researcher is interested in informants who

have the best knowledge concerning the research topic. When using purposeful sampling, decisions need to be made about who or what is sampled, what form the sampling should take, and how many people or sites need to be sampled. However, a disadvantage of purposive sampling is that it can be difficult for the reader to judge the trustworthiness of sampling if full details are not provided. (Hirsjärvi et al. 2013).

Purposive sampling was used in this Master's Thesis as UK based SaaS Vendors and Accountancy Firms using SaaS solutions are deemed to have the most appropriate and up-to-date operational knowledge and opinions on the state of play within the focus business area of this research. Whilst there is a risk by focusing on these chosen sample groups that the responses that were received maybe biased in favour of the responding company and therefore may not accurately reflect the real situation. This issue is overcome by using specific wording in the questions that were posed in both the interviews and questionnaires and by sampling both SaaS Vendors and their clients. This enabled the researcher to analysis and produce balanced conclusions from the responses, and by keeping the details of the sampled companies anonymous, responders were able to express their opinions without the fear of publicity or a reader being able to assign responses to a company. The sampling for this research was four different organisations and professionals, which can be considered to be a good sample size for a qualitative research. All of the interviewed persons had knowledge about the topic and told their experiences in a reliable way and according to their best knowledge. The interviewees had either a developer or user/partner knowledge of SaaS solutions. The number of interviewees increased the reliability of this research and the findings generally resulted in similar results, which can be stated to express the reliability. In addition to the sample size, also the data collection method used can be stated to be a reliable procedure since all the techniques used were similar to one another across all the interviews and questionnaires, and the data collected was analysed in a similar way.

The data that was gathered as part of this research was handled in a transparent manner by transcribing the interviews and by analysing the interviews in detail during the study. The data collection methods, data collection itself and analysis phase was also described in detail in the research methodology section of this Master's Thesis, which increases the transparency of the research and thus contributes to the reliability of the study. However, it needs to be noted that this study only focused on well-established SaaS Vendors and SME Accountancy firms using SaaS solutions, therefore experiences and opinions, and thus the findings could vary amongst different sized firms and those firms not using such

solutions, or are in an early stage of adoption. In addition, the use of SaaS solutions is still at a relatively early phase of uptake within the UK Accountancy Sector and thus the findings could and are likely to be different if the same companies were to be interviewed at a future point in time. That said, previous empirical studies and academic journals indicated similar findings and thus the belief is that the results would remain quite similar even though if the companies were to be interviewed at a later date.

## **6.2 Limitations & Suggestions for Further Research**

This thesis is limited by the fact that it only investigates the maturity of SaaS and associated automated integrations in one business sector i.e. Accountancy; operating in the UK. Additionally, it is limited to examine the state of play directly affecting SME accounting firms and their clients, and does not undertake a deep analysis of what is happening in larger and multi-national accountancy firms and their client base in the UK, other than a very brief description of the perceived current situation based on the researchers interpretation of theoretical evidence. It is highly likely the situation and the attitude toward SaaS and automated integration solutions is very different within this community, and this subject would benefit from further research to gain a broader and more encompassing picture of the current maturity level of SaaS Accountancy Actors in the UK. Likewise, the maturity levels and attitudes towards Cloud Computing and SaaS is not the same in different UK business sectors therefore, further research on different business sectors would be beneficial in the future to identify market and partnership opportunities for SaaS and Cloud Computing Vendors/solution providers considering entering the UK market.

Additionally, this thesis does not investigate the Software Development Life Cycle (SDLC) of Cloud Computing and SaaS - being the structured sequence of stages in software engineering to develop the intended software product through to "Disposition," whereby the software may decline on the performance front, become completely obsolete or may need intense upgradation. Typically, leading to the need to eliminate a major portion of the system including: archiving data and required software components, closing down the system, planning disposition activity and terminating system at appropriate end-of-system time. This thesis research only examines the current market conditions and maturity within the main actors in the UK SaaS and integrations sector.

This thesis examines “maturity” with regards to the stage development of the services SaaS vendors currently offer accountancy firms and their clients, and the level of uptake within the accountancy community – both accountancy firms and their clientele. It does not look at the stage at which a particular company or the industry is within its business lifecycle (seed and development, start-up, growth and establishment, expansion, and maturity and possible exit), as this would make the research too large and this work is intended to give an overview of the overall market conditions rather than of particular companies.

Finally, this Master’s Thesis only examines the maturity level of SaaS amongst UK Accountancy Actors, and does not look at the maturity level of other Cloud Computing platforms, namely Platform as a Service (PaaS), and (iii) Infrastructure as a Service (IaaS). Further research on these models would be beneficial to identify additional market opportunities for any Cloud Computing service vendor looking to make an inroads and impact in the UK Accountancy Sector and beyond.

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## **Appendices**

### **Appendix 1: Questions used in SaaS Vendor Questionnaire and Interviews**

1. What kind of software services are you offering at the moment?
2. Is your software already connected/integrated to other software?  
Yes  
No

#### **Please Answer Questions 3 to 7 if you responded "Yes" to Question 2**

3. Which software/types of software are supported?
4. Are some software types (web shop, accounting, warehousing, etc.) missing?
5. How do you handle the connections/integration now if a customer requires one?
6. Are you and your customers happy with this model? (i.e. in terms of implementation, time, costs and effort, etc.)
7. Considering that there would be a service connecting or integrating your software to any other would you be interested in offering such a service to your customers?  
  
Yes  
Maybe  
No

#### **Please Answer Questions 8 to 13 if you responded "No" to Question 2**

8. What would be the main benefits of such a service for you?
9. What would be the typical cases of usage for connecting the applications? (i.e. What data would be most often transferred from a software to another one?)

10. Imagining those integration projects are finished and the connections are available as a service, what would be the price your customers would be willing to pay?

11. Are you happy for me to contact you if I require any further information or clarification on any of the issues raised in your responses to this questionnaire?

Yes

No

If "Yes" who would be the most appropriate person to contact and what is the best way to contact them?

12. Is there any additional information you would like to add that has not been covered in the previous questions? (i.e. what do you see as the future direction of software development in the accountancy sector)

## Appendix 2: Questions used in SaaS Vendor Questionnaire and Interviews

1. What kind of software services are you currently using in your company?
2. What made you choose your current SaaS partner as your software provider, and what other options did you consider before selecting your current providers?
3. Is your software already connected/integrated to other software, for example that used by your clients?
4. Are there any other software options that you use other than your current SaaS system? If so what are they?
  - a. Do they fulfil all your needs? If not what do you feel is missing?
5. What did you do/use before?
6. What do you believe to be the benefits of Cloud Accounting and what benefits has the SaaS solution you use brought to your company and its customers that are using it?
7. What have been the biggest challenges you have encountered? What do you think is currently missing (if anything) from the service your current SaaS Vendor provides you?
8. What do you see as the biggest hurdles going forward?
9. So in a nutshell you are currently happy with the Software and Service provided by your current Vendor?
10. (I'm also interested about integration and how the use of your current SaaS system at enable you to interact with your customers applications) How does integration currently work is it through the SaaS system or through a 3<sup>rd</sup> party application ("app")?
  - a. Does it only apply to those clients who are currently using your subscriptions? If so how many clients are currently using this subscription?
    - i. If so how are others dealt with?

ii. Which software/types of software are supported if any?

b. Are you happy with how the integration is managed?

i. If not how could it be improved?

11. What do you see as the next steps for your company with regards to SaaS and cloud computing?

### **Industry in General**

12. With your experience what is the general opinion of Software as a Service and Cloud Computing within the Accountancy Sector?

13. In your opinion what are the most commonly used applications?

14. What do you see as the future trends, particularly in relation to technology advancements in the UK accounting sector?