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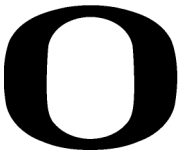

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Implementing and Integrating SaaS Solutions at Small Businesses

CAPSTONE REPORT

Bob Bemrose
Technical Operations Support Coordinator
ManageForce

University of Oregon
Applied Information
Management
Program

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Academic Extension
1277 University of Oregon
Eugene, OR 97403-1277
(800) 824-2714

Approved by

_____

Dr. Kara McFall
Lecturer, AIM Program

Implementing and Integrating SaaS Solutions at Small Businesses

Bob Bemrose

ManageForce

Abstract

Small businesses often operate with limited IT resources (Dai, 2010). SaaS solutions are appealing, as they provide opportunities to have access to high-end software without supporting high-end infrastructure (Dai, 2010). Integration can help businesses achieve business objectives (Lheureux, Pezzini, Thompson, & Malinverno, 2012), but is often difficult to achieve. This annotated bibliography explores SaaS integration at small businesses, with the goal of helping small businesses successfully implement and integrate SaaS solutions.

Keywords: SaaS, software as a service, small business, SMB, SME, integration, integration platform as a service, iPaaS

Table of Contents

List of Tables and Figures

Introduction

Problem

Technology is changing the way companies achieve business objectives, particularly for small and medium sized businesses (Lanz, 2013). Small businesses face different challenges than larger organizations (Lee & Runge, 2001), but research is most often focused on larger organizations (Tan, Fischer, Mitchell & Phan, 2009). In 1981 John Welsh and Jerry White wrote an article for the *Harvard Business Review* that included the idea that "a small business is not a little big business" (as cited in Tan, Fischer, Mitchell & Phan, 2009, p. 233). Though research on small business has often consisted of testing enterprise theories on small businesses, small business research should be viewed through its own lens (Tan, Fischer, Mitchell & Phan, 2009). Small business is generally lumped into a class of business called small and medium sized business (SMBs) in the US or small and medium sized enterprises (SMEs) in Europe. The Small Business Administration (SBA) typically defines small business as companies that have fewer than 500 people; this number however can vary drastically based on industry (U.S. Small Business Administration, 2014). The European Union (EU) has its own set of guidelines and considers businesses with fewer than 10 employees micro, fewer than 50 small, and fewer than 250 medium ("What is an SME?", 2014).

Small businesses face unique challenges in operating their own IT infrastructures. Among them is the ability to have and maintain datacenters capable of supporting the business. Even businesses that specialize in IT service may not have the specific expertise to manage the IT infrastructure (Mahesh, Landry, Sridhar, & Walsh, 2011). As a result, small businesses are prone to use internet resources to fulfill business needs (Li, Wang, Wu, Li & Wang, 2011). A popular option for small businesses is cloud computing, which may further help alleviate IT

resource and expertise gaps. Possible benefits of cloud computing include lower capital expenditures, lower maintenance costs, and the ability to redirect resources toward core business activities (Garrison, Kim & Wakefield, 2012).

Cloud computing consists of three main models: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) (Garrison, Kim & Wakefield, 2012). SaaS delivers application to the business online, instead of having software installed and run by the business (Garrison, Kim & Wakefield, 2012). SaaS is of interest to small businesses as it's sold on its ability to deliver high-end features with lower investment and overhead than onsite solutions (Di Bona & Swanson, 2007). Small businesses will typically benefit from decreased deployment and IT infrastructure costs (Duhon, 2007).

One area of concern when it comes to SaaS implementation is integration. Di Bona and Swanson (2007) argue SaaS has a higher total cost of ownership than is typically predicted. The authors note that these higher costs are partly predicated on the need to integrate SaaS applications with on-premise applications. Though cloud technology may provide cheap and effective methods for small businesses to deal with their technology needs, there is the risk of the adoption of multiple cloud solutions, which will cause problems related to integration (Li, Wang, Wu, Li & Wang, 2011).

Typically the key issue in integrating cloud services with other applications is building a communication method between services (Li, Wang, Wu, Li & Wang, 2011). One of the reasons for the integration challenges is cloud computing platforms do not share common standards. (Cavalcante, Lopes, Batista, Cacho, Delicato & Pires, 2011). Application programming interfaces (APIs), development tools, virtualizations methods, and governance tools all can vary from cloud provider to cloud provider and organization to organization which makes it difficult

to integrate cloud services with other applications (Cavalcante, Lopes, Batista, Cacho, Delicato & Pires, 2011). In addition, organizations must consider communication protocols between SaaS solutions and on-premise applications (Hai & Sakoda, 2009). Many organizations use domains, network address translation (NAT), and firewalls which can act as a communication barrier between SaaS applications and on-premise applications (Liu, Guo, Zhao & Chou, 2010).

Despite the issues inherent with SaaS integration, most applications benefit from integration (Hai & Sakoda, 2009). Integration allows companies to avoid data problems and out of sync business processes (Lheureux, Pezzini, Thompson & Malinverno, 2012). A successful data integration solution can save organizations money and help them achieve business objectives (Lheureux, Pezzini, Thompson & Malinverno, 2012).

Purpose

There is a need for caution when selecting SaaS solutions; though small and medium sized businesses can see increased efficiency with the implementation of SaaS applications, which can translate to increased revenue, a strategic misstep can also cause significant economic loss (Ergu & Peng, 2014). The cost of integrating a SaaS application can drive up the total cost of ownership (Di Bona & Swanson, 2007) and choosing an integration method can be complicated (Lheureux, Pezzini, Thompson & Malinverno, 2012). To exacerbate the issue lack of experienced IT resources is common in SMBs. SMBs do not usually invest sufficient resources in IT to gain a competitive advantage (Dai, 2010) and often struggle with deficiencies in the resources that are necessary to maintain data centers (Mahesh, Landry, Sridhar, & Walsh, 2011). Because of the risk in selecting a SaaS product, the purpose of this annotated bibliography is to explore the use of Software as a Service in small business environments with a need to integrate two or more applications.

Research Question

This annotated bibliography looks to explore the topic of SaaS in the small business environment by asking the following research question:

What are the best practices for small businesses to implement a SaaS solution when there is a need to integrate multiple systems?

To further explore the topic this annotated bibliography seeks to answer the following sub questions:

1. *What are the best practices in selecting a SaaS?*
2. *What solutions are available for integration?*
3. *How will these solutions effect SaaS selection?*

Target Audience

Small Business owners and IT decision makers within small businesses are the target audience for this annotated bibliography. Small business owners and IT decision makers who are responsible for planning SaaS implementations that require the integration of SaaS with other applications may benefit. The study should be of particular use to the audience as small business technology research typically focuses on theories that were originally designed for larger businesses (Tan, Fisher, Mitchell & Phan, 2009).

Search Report

Search strategy. In an attempt to answer the research question and its sub questions, the search for appropriate literature focuses on two areas: small business technology and SaaS integration. Though the most relevant sources describe the intersection of these two topics, small business research has not been a robust area of study (Tan, Fisher, Mitchell & Phan, 2009). In addition to articles that specifically address SaaS implementation and integration in a small

business environment, this annotated bibliography also explores how SaaS integration and implementation projects are completed in general

Search databases and terms. To find articles relative to SaaS implementation and integration within small business, this annotated bibliography uses primarily the University of Oregon Library System to search peer-reviewed journals. Exceptions to using the University of Oregon Library System include the MIT Sloan Management Review website, which was selected based on its history of articles with intersecting business and IT subjects, though the search yielded no relevant articles. Additional searches outside of the University of Oregon Library include a Google search specifically designed to find whitepapers on the topic, as well as Google Scholar, and the Gartner website. The search uses a wide variety of databases and terms in an effort to find the best resources. Not all searches were successful and thus not repeated. A table of the searches is below.

Table 1

Search Summary

Databases	Search Terms (Search 2 term indented)
Academic Search Premiere	SaaS Small Business Cloud Implementation Cloud Implementation Cloud Integration IT Implementation IT Integration IT Strategy SaaS System Design Technology Technology Implantation Technology Integration Software As A Service API

	Implementation Integration Middleware
Business Source Complete	Integration as a Service SaaS Implementation Integration Integration As A Service Interoperability Small Business Cloud Implementation Cloud Implementation Cloud Integration IT Implementation IT Integration IT Strategy SaaS Technology Technology Implementation Technology Integration Software As A Service
Computer Source	API Integration Interoperability Cloud API Integration Interoperability Integration API Application Service Providers Web Services Interoperability Web Services SaaS API Integration Plug-Ins Web Services Small Business Application Service Providers

	ASP Middleware System Design Web Services Small Enterprise Middleware SMB Middleware SME Middleware Web Services Software as a Service API Integration Web Services Plug-Ins
Gartner	Integration as a service and SaaS SaaS and Small Business SaaS and SME SaaS and SMB
Google	SaaS Integration Whitepaper Small Business SaaS Integration Whitepaper
Google Scholar	SaaS Integration Integration as a service and SaaS SaaS Integration and Small Business SaaS Integration and SMB SaaS Integration and SME
IEEE Computer Society	Integration As A Service SaaS SaaS Adapters Connectors Integration Interoperability Plugins Plug-Ins Small Business SME
JSTOR	SaaS Implementation Integration Interoperability Small Business

	Software As A Service Software As A Service Implementation Integration Interoperability Web Services Implementation Integration
MIT Sloan	SaaS Integration Small Business Technology Software As A Service

Information Evaluation Criteria

Bell and Frantz (2013) suggest evaluating articles on five criteria: authority, objectivity, quality, currency and relevancy. The criteria are addressed in the following ways:

- *Authority* – To ensure the authority of sources, searches focus on peer-reviewed journals and articles.
- *Objectivity* – Articles are analyzed for bias. This step includes analyzing the source of the article as well as content.
- *Quality* – Sources are included that embody logical structure, cleanly flowing text, clearly stated arguments and are free from grammar and typographical errors.
- *Currency* – Because SaaS is a relatively new technology approach, and the rapidly changing landscape of IT, articles are limited to those published in the last decade.
- *Relevancy* - Articles are read and analyzed to determine if they address the research question.

Based on time and logistic constraints articles are limited to those available in electronic format.

Documentation Method

To ensure articles are available to researchers from multiple devices, Google Apps are used to document sources. Searches are tracked by a Google spreadsheet used to record the search engine, and the search terms used. Articles that are relative to the research question are downloaded and then uploaded to Google Drive. Google Docs allows for notes to be added to a document. This field is used to store citation information, and the article abstracts. During the review of articles the description field is also used to store notes about the article; in some instances this information will include keywords or concepts discussed in the article that do not stand out in the article's title or abstract. In other instances this information may include reasons for the article's exclusion from the annotated bibliography.

Information Evaluation Process

Articles are initially evaluated using an elimination process. Search results with titles that obviously do not address the research are not considered. If the title either looks promising or it is unclear if the article addresses the research questions the abstract is read. Abstracts that seem to address the research question, even minimally are saved for later investigation. If it is still unclear if the article addresses the research topic, the article is skimmed until the researcher can ascertain if the paper applies to the research question. Related articles are saved for later use in folders that match the annotated bibliography headings of background information, SaaS selection criteria, and SaaS implementation and integration. The articles that have been saved are later skimmed for relevance and those that don't seem to address issues revolving around SaaS implementation and integration are removed from consideration from the annotated bibliography.

Any articles deemed to relate to SaaS implementation and integration in small businesses are read thoroughly. In addition to analyzing for quality, and bias, a summary is written.

Articles not eliminated for issues with authority, objectivity, quality or currency are selected for the annotated bibliography based on relevancy. Relevant topics for consideration in the bibliography include:

- Background information
- SaaS evaluation criteria
- SaaS integration techniques
- SaaS integration technologies

The purpose of the annotated bibliography is to provide an overview to small business owners and those responsible for IT decisions on the challenges of implementing and integrating SaaS solutions as well as possible solutions. As a result, the annotated bibliography presents articles that address implementation, and integration from multiple perspectives.

Annotated Bibliography

The following annotated bibliography contains 15 references that explore the process of implementing and integrating SaaS solutions in a small business setting. The references are selected to educate small business owners and small business IT decision makers on factors involved in selecting and integrating SaaS solutions. Each annotation includes a citation of the reference listed in APA format, an abstract from the article, and a summary of the article. The literature is organized in three sections. Background information includes two articles designed to give small business owners an overview of IT challenges of small businesses, and a baseline for understanding some of the jargon used in integration architecture. Section two, SaaS selection criteria, includes five articles whose content may help small businesses select the appropriate SaaS solution. Lastly, section three, SaaS implementation and integration, includes eight articles that discuss different methods and criteria for integrating SaaS solutions with other

applications. The bibliography is designed to provide small businesses with the knowledge to better plan SaaS implementation and integration projects.

Category A - Background Information

Dai, W. (2010). The impact of emerging technologies on small and medium enterprises (SMEs). *Journal of Business Systems, Governance & Ethics, 4*(4), 53-60.

Abstract. This paper explores the potential of emerging technologies in transforming and automating the business processes of Small and Medium Enterprises (SMEs) and enable them to engage with trading partners and customers in global networks. The technologies are associated with Services Oriented Architecture (SOA) through Software as a Service (SaaS), cloud computing and innovative application environment developed through the Phoenix research program at Victoria University. A service framework based on the emerging technologies from the Phoenix program is presented and discussed in response to the SME barriers raised in accessing those technologies. [ABSTRACT FROM AUTHOR]

Summary. This article provides background in to some of the struggles small businesses have in implementing technology as well as discusses ways cloud computing and SaaS can alleviate some of these issues. Despite the fact that IT can be used to gain a completive advantage, small businesses tend to focus on short-term problems that can be solved by IT instead of how technology can be used to help achieve long-term strategic goals. Size tends to be an issue in terms of ability to leverage technology, and as a result smaller businesses tend to not commit adequate IT resources. This can cause issues as small businesses do not have the awareness, knowledge or skills to select the right technology. In addition, the author notes that not all solutions are suited for small

business needs. Cloud computing is presented as allowing small businesses to have access to best of breed software infrastructure without the need to invest in the actual infrastructure and resources. In addition, by paying as you go, the author notes small businesses avoid large upfront costs, and receive an immediate tax deduction without needing to factor in depreciation. Maintenance costs are also avoided.

The article concludes with a description of a Victoria University research process that uses a SOA framework to manage resources. The author contends this approach may be advantageous to small businesses as its features compare favorably to ERP systems, but in a more cost effective way.

Laplante, P., Zhang, J., & Voas, J. (2008, May/June). What's in a name? Distinguishing between SaaS and SOA. *IT Professional, 10*(3), 46-50.

Abstract. Considerable confusion arises in distinguishing between software as a service (SaaS) and service-oriented architecture (SOA). Zachman's framework can help to try to make sense of the alphabet soup of Web services and utilities that form the basis for both SOA and SaaS.

Summary. This article explores the differences between Service Oriented Architecture (SOA), and SaaS. In doing so, the article describes basic system architecture and SaaS's place within the architecture. Though SOA and SaaS often work hand in hand, they are often confused. SaaS is a delivery model that essentially separates software ownership from the user. Users connect to vendors' on-demand through client-side architecture through the internet. The SOA model is structured around individual, reusable services that are able to interact with each other through standard interfaces. SaaS and SOA are interconnected by the ability of SOA to recognize published SaaS services and adopt

them as part of the SOA. Web services, which are programmable web applications that use a standard interface, are the most common way for SOA and SaaS to be linked. This article is included in the bibliography as it provides background on the SOA concept, which is a concept that regularly appears in integration research. The inclusion of this article should help small business owners better understand some of the integration literature.

Category B - SaaS Selection Criteria

Bibi, S., Katsaros, D., & Bozanis, P. (2012, May/June). Business application acquisition: On-premise or SaaS-based solutions*?*. *IEEE Software, 29*(3), 86-93. doi:10.1109/MS.2011.119

Abstract. The benefits of migrating business software applications to the cloud is a dominant IT topic among consultants, software managers, and executives. The broad interest in cloud computing is motivated by the prospect of quick, painless deployment and maintenance of applications that are now a burden of the enterprise. The authors propose an analytical method for deciding whether the features and cost of a cloud solution are appropriate to the business IT problem and whether the risks are reasonable and manageable.

Summary. This article uses a case study to illustrate a model for determining the total cost of ownership of migrating applications to the cloud. The model includes considering installation costs, annual costs and operation costs to determine the total cost of ownership (TCO). The case study compares the cost of an in-house solution, a SaaS solution and an IaaS solution using open source software. In this particular instance it was cheaper to use the IaaS model, but the point of the study was to illustrate how to

calculate TCO using their method. The model can be of use to businesses executives and IT resources who need a means to analyze proposed SaaS solutions in order to select the best alternatives for their companies.

Ergu, D., & Peng, Y. (2014). A framework for SaaS software packages evaluation and selection with virtual team and BOCR of analytic network process. *Journal of Supercomputing, 67*(1), 219-238. Doi:10.1007/s1127-013-0995-7

Abstract. Software packages evaluation and selection is one of the most important activities encountered by software as a service (SaaS) users in the high performance networked computing environment, especially for the small or medium-sized enterprises. In this paper, we propose a framework for SaaS software packages evaluation and selection by combining the virtual team (VT) and the BOCR (benefits, opportunities, costs, and risks) of the analytic network process (ANP). Different from the traditional application of the BOCR model of ANP, the proposed VT-BOCR model attempts to solve the complex ANP model and overloaded pairwise comparisons by decomposing the tasks to four parts, and performed by benefits virtual team (B-VT), opportunities virtual team (O-VT), costs virtual team (C-VT), and risks virtual team (R-VT) separately. The interactive networked media on distributed environments not only makes the proposed framework possible without the limitations of time, space, and human resources, but also can take full advantage of the talent experts who are geographically dispersed. The proposed framework also shows great potentials for aiding practitioners and researchers concerned with the cloud services. [ABSTRACT FROM AUTHOR]

Summary. The authors of this case study argue that when small to medium size businesses select a SaaS they should do so by using a method in which the business ranks and weights criteria in the following categories

- Benefits - positive, definitive near future results
- Opportunities - Long Term or uncertain positive results
- Costs - Short term negative factors
- Risks - long term or uncertain negative factors

To improve the results the study recommends using virtual teams clusters. The authors argue that by using virtual teams, organizations are able to use the most appropriate resources to analyze specific areas an implementation would affect. This allows for subject area experts to be more involved in the selection of a SaaS solution. The authors further suggest that a team should be formed to develop strategic criteria as well as assign team members to perform assessments for each of the categories. The article is of interest to small businesses that need to decide between SaaS solutions, as it provides criteria and a framework for making a decision.

Kaisler, S., Money, W., & Cohen, S. (2012). *A decision framework for cloud computing*. Paper presented at the 2012 45th Hawaii International Conference on System Sciences. Retrieved April 2, 2014 from IEEE Computer Society. Doi:10.1109/HICSS.2012.52

Abstract. Cloud computing technology is garnering success and wisdom-like stories of savings, ease of use, and increased flexibility in controlling how resources are used at any given time to deliver computing capability. This paper develops a preliminary decision framework to assist managers who are determining which cloud solution matches their specific requirements and evaluating the numerous commercial claims (in many cases

unsubstantiated) of a cloud's value. This decision framework and research helps managers allocate investments and assess cloud alternatives that now compete with in-house data centers that previously stored, accessed, and processed data or with another company's (outsourced) data center resources. The hypothetically newly captured corporate value (from cloud) is that resources are no longer idle most of the time, and are now much more fully utilized (with lower unit costs). This reduces high ownership and support costs, improves capital leverage, and delivers increased flexibility in the use of resources.

Summary. This paper is based on a survey of over 80 research articles. It compares developing a cloud framework to making a salad. When making a salad ingredients can be purchased separately, or packaged in a mix. Cloud services vary greatly in architecture and package offering, which makes it very difficult to compare services. An accepted framework for deciding between services has yet to be adopted.

The authors argue the complexity in choices makes it imperative that small and medium sized businesses use a clear and well understood decision process that assesses the needs of the service, understands the relationship with the vendor, and selects a service that will solve initial needs but also evolves over time.

The authors suggest organizations considering a move to the cloud should consider the following:

- When, how, and how many services should be moved?
- How will expenses be managed overtime?
- What is the optimal mix of services and how will it be achieved?
- How does the organization assure the vendor is compliant with organization requirements?

- How will the organization manage the flow of data between the cloud provider and the organization's other systems.

They suggest a cloud decision framework in which organizations first determine if the service will meet their business objectives. Once this is determined, businesses should assess the quality of the services, and then make a decision on how to integrate the service with the business. To assure viability, organizations need to verify that the architecture of the cloud service, the architecture of the organization, and the affected business applications are all able to interact. This paper is of importance to organizations embarking on a SaaS implementation as it lays out key questions to be asked before selection and implementation.

Lee, S., Park, S.B., & Lim, G.G. (2013, November). Using balanced scorecards for the evaluation of "Software-as-a-service", *Information & Management*, *50*(7), 553-561.

Abstract. To overcome the problem of limited resources, increasing numbers of small- and medium-sized companies (SMEs) are adopting "Software-as-a-service" (SaaS) as an efficient tool for IS implementation. The balanced scorecard (BSC) has been adopted by SMEs to evaluate SaaS via four measures: learning and growth, internal business processes, customer performance, and financial performance. The survey results for 101 Software-as-a-service adopters indicate that learning and growth, internal business processes, and customer performance are causally related to financial performance. The results show that these four key elements for SaaS success are interrelated, supporting the core premise of the BSC.

Summary. This study examines the use of a balanced scorecard for the evaluation of SaaS. The authors argue financial performance is not sufficient to evaluate the

effectiveness of a SaaS and other factors must be taken into consideration. To ensure the best selection, authors suggest using a balanced score card system that takes into account the affect SaaS has on the business. The effect can be looked at through 4 categories: learning and growth, internal business process, customer performance, and financial performance. Though organizations need to decide how to weigh each category based on their strategies, the authors also state that for a balanced score card to be accurate causal relationships between categories need to be taken into consideration. One example that the authors propose is that learning and growth influences both customer performance and internal processes because companies that are able to harness organizational learning and knowledge are able to improve interaction with customers, as well as use the knowledge to continually improve business process. The article is of importance to this bibliography as it offers another set of criteria that organizations can use to ensure they are selecting the correct SaaS solution.

Mahesh, S., Landry, B. J. L., Sridhar, T., & Walsh, K. R. (2011, July/September). A decision table for the cloud computing decision in small business. *Information Resources Management Journa*l, *24*(3), 9-25. doi:10.4018/irmj.2011070102

Abstract. An issue facing the manager of a small business is the use of cloud computing to meet the information technology (IT) needs of the firm. These businesses typically have limited in-house IT capabilities and often outsource much of their IT This paper discusses this rapidly evolving technology and provides a framework for businesses to decide on harnessing the power of cloud computing. It recommends the appropriate decision based on the way in which IT is currently used in the enterprise and future needs to meet competitive challenges. The potential cost savings, technology insurance from

cloud computing, and security risks are discussed and factored into the decision. [ABSTRACT FROM AUTHOR]

Summary. This authors of this paper explore the use of cloud computing in a small to medium sized business environment. It summarizes the difference between Software as a Service, Platform as a Service, and Infrastructure as a Service. It then charts when firms should adopt each of these services. The authors argue the following criteria should be taken under consideration when deciding whether to move to a cloud service:

- *IT Experience* - Does current staff have the expertise to maintain current systems in house?
- *Cloud Application Performance* - Will performance be hurt by moving to the cloud?
- *Savings from Cloud Computing* - What is the cost of moving to the cloud versus remaining in house?
- *Archiving Data and Auditing Site* - Does the cloud service meet industry standards for audit and archiving?
- *Security* - Does the cloud service provide adequate security?
- *Cloud Interoperability* - If developing applications with PaaS or IaaS, are applications portable?

The authors then describe a framework for decisions based on three factors:

- *Size of IT Application Portfolio* - Organizations with a dominant application are better candidates for a move to the cloud. Organizations also need to consider the need for integration between applications.

- *Customization* - Environments with highly customized applications are harder to move to the cloud than those that are more 'vanilla'.
- *Business Demand* - It is also important to look at the demand on the servers. The company in the case study is concerned about applications being accessed by customers outside the company, but this same type of demand could also apply to internal applications. Is it necessary to be able scale based on fluctuating use, or anticipated increase in usage? If so scalability becomes an important factor.

The article argues that based on these factors a comparison should be made between current systems, SaaS, PaaS, IaaS, and hybrid models to determine if a move to the cloud should be made.

Category C - SaaS Implementation and Integration

Garrison, G., Kim, S., & Wakefield, R. L. (2012, September). Success factors for deploying cloud computing. *Communications of the ACM*, *55*(9), 62-68. doi:10.1145/2330667.2330685

Abstract. The article discusses the implementation of cloud computing systems in an organization's information technology (IT) system, which can increase data storage capacity while decreasing IT expenditures. An overview is presented of the types of service models offered by cloud vendors, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Various competitive advantages of successful cloud computing deployment are reviewed, such as technical, managerial, and relational organizational capacities.

Summary. This paper argues that implementation of cloud technologies may only lead to short-term competitive advantage, and as competitors begin to use cloud technologies, any competitive advantage will disappear. In order to maintain a competitive advantage using cloud technology, deployments must be done in a way that realizes unique organizational advantages. These advantages can be gained in three categories

- *Strategic* – The ability of an organization to shift its focus from IT to business activities
- *Economic* – The ability to use cloud technologies to reduce cost
- *Technological* – The ability to use state of the art technologies and personnel offered through the cloud to an organization's advantage.

The authors suggest using three keys to cloud deployments that ensure long-term competitive advantage.

- Focusing on the use of an organization's technological expertise to drive reduced IT expenditure and greater efficiency through the use of cloud technology
- Having management in place to coordinate a cloud deployment who have the ability to recognize emerging technologies and business processes and the knowledge to use cloud computing to enhance the overall business performance.
- Building a relationship with the Cloud vendor. Having a relationship where the cloud vendor understands the needs of the client, and the client trusts the cloud vendor can lead to a special relationship between vendor and client,

which can lead to a competitive advantage over competitors without the same relationship.

Hai, H., & Sakoda, S. (2009, July). SaaS and integration best practices. *Fujitsu Scientific & Technical Journal, 45*(3), 257-264.

Abstract. The rising adoption of software-as-a-service (SaaS) applications by enterprise organizations has been driven by deep dissatisfaction with on-premise applications, which require organizations to purchase and deploy infrastructure, overstock on licenses, and pay for expensive resources for customizations, upgrades, and on-going maintenance. The large upfront investments combined with unpredictable costs and an immeasurable return on investment have prompted organizations to seek cheaper less-risky alternatives. Many have found that SaaS applications, which require minimal or no infrastructure and maintenance, can be deployed quickly and have a predictable cost model representing less risk and a faster return on investment. The new demand has led to rapid innovation in SaaS applications, SaaS platforms, third-party SaaS add-ons, and SaaS integration tools. However, enterprise organizations still have the burden of integrating these applications with their back-office systems and on-premise applications, without which the SaaS applications have little to no value. Complex enterprise integration requirements challenge even the best SaaS solution providers today; there are still limitations and pitfalls to be wary of. In this paper, we describe some SaaS integration best practices, present a case study, and highlight emerging integration technologies that can help ease the burden of integrating SaaS applications.

Summary. This article gives an overview of the integration of SaaS technologies. The article explores issues with integration architecture and design including: working with

large volumes of data, and governance of service oriented architecture (SOA). When developing an architecture, it's important to consider locations of both source and target applications, network and organization protocols that intersect the sources, as well as defining performance metrics. When moving large data between SaaS solutions and other applications, it's important to work with the SaaS provider to determine any limits that may be in place that could be in the form of storage limits, or number of API calls allowed. Organizations also need to ensure that as APIs are updated, they remain backward compatible with custom-built business services.

The authors move from discussing integration best practices to a discussion of integration on demand. Integration on demand allows for non-technical end users to design integrations through menu driven wizards. Some of the capabilities include configuring data sources, data targets, mappings, transformations, and integration processes and scheduling jobs. They also often come with pre-built connectors. The value of integration as a service is high for small and medium businesses that lack the resources for integration projects. The authors expect larger enterprises to continue to use on- premise tools for the ability to perform more complex integrations.

Also of note is the fact that the authors foresee SaaS providers incorporating integrations between different SaaS application as part of their offerings.

Joha, A., & Janssen, M. (2012). Design choices underlying the software as a service (SaaS) business model from the user perspective: Exploring the fourth wave of outsourcing. *Journal of Universal Computer Science, 18*(11), 1501-1522.

Abstract. Software as a Service (SaaS) can be viewed as the fourth wave of outsourcing. SaaS is a relatively new type of service delivery model in which a service provider

delivers its services over the web to many users on a pay per use or period basis. In the scarce literature available, the SaaS business model is almost always analyzed from the perspective of the service provider perspective, and rarely from the user organization. Using the unified business model conceptual framework, two case studies are investigated to understand the design choices underlying the SaaS business model from the user organization perspective. The analyses on the business model dimensions provided insight into the differences between the case studies and helped to identify eight discriminating design choices that are important when designing SaaS business models. These include the (1) SaaS service characteristics, (2) SaaS value source, (3) SaaS user target group, (4) data architecture configuration and tenancy model, (5) SaaS governance and demand/supply management core competencies, (6) cloud deployment model, (7) SaaS integration and provider strategy and the (8) SaaS pricing structure. An appeal is made for more research into the impact of cloud business models.

Summary. This study explores the implementation of SaaS products through the lens of the implementing organization's SaaS business model. It does so by examining two case studies, a private manufacturing firm using SaaS to manage Human Resource functions, and the federal government who in 2010 stared requiring agencies to consider cloud computing first when implementing new applications. Using two organizations with different models and goals allows the research to explore a SaaS implementation from many angles. Findings of note are listed below:

- *SaaS Service Characteristics* – The authors argue there are two criteria by which to judge service characteristics: maturity and complexity/required security. The authors state the less mature a SaaS provider the greater the risk

of failure. The authors also argue implementation projects with complex security requirements have higher risk.

- *Data Architecture Configuration* – The authors contend that there are three models to consider for data architecture configurations:
    - *Separate Databases* – In this instance databases remain separate. The cost in this model is generally higher.
    - *Shared Databases, Separate Schemas* – In this case multiple tenants are housed in the same database, but maintain their own schema. The advantage is this configuration isolates data and can support a larger number of tenants per database server. This method is harder to restore however.
    - *Shared Database, Shared Schema*. – This configuration involves using the same database and the same tables to host multiple tenants. The benefit of this approach is that it has the lowest hardware and backup costs, but may require additional spending to provide security and poses the greatest security risk.
- *SaaS Integration* – The authors identify three integration models:
    - The first model involves picking a SaaS provider who can offer services for all applications that need to be integrated
    - The second option allows for multiple SaaS providers and the organization integrates the applications.

    - The third option also allows for multiple SaaS providers but in this model the organization uses a SaaS integrator to handle the integrations.

Lheureux, B.J., Pezzini, M., Thompson, J., & Malinverno, P. (2012, May 3). *How to identify the right basic approach for your application integration project*. (ID G00233991). Retrieved from Gartner database.

Abstract. There are four basic approaches for implementing integration projects. We outline the essential evaluation criteria for each one to help IT leaders choose the best solution to ensure project success.

Summary. This article seeks to define and summarize four primary methods for organizations to implement integration projects. This is included in the bibliography as these methods can be used in SaaS integration projects. Though most midsize and large companies use multiple approaches to integrate data, the most successful integrations tend to use one approach. The four methods and their strengths and weaknesses are listed below:

- *Point-to-point integration* - This involves integration between two systems using custom code.
    - Strengths
        - No middleware requirements
        - Implementations can be done based on the most suitable approach.
    - Weaknesses
        - Development and maintenance costs grow as interfaces increase
        - It is difficult to monitor manage and govern integrations.

- *On-Premise Integration Middleware* – This approach involves purchasing a commercial off-the-shelf (COTS) middleware solution.
    - Strengths
        - The ability to use a mature integration middleware product
        - A familiar process for companies currently using middleware for on-premise integrations.
    - Weaknesses
        - Middleware rarely comes with a full suite of integration adapters, business to business protocols, or SaaS API connectors.
        - Finding skilled middleware personnel is typically challenging
        - Projects can become complex and expensive.
- *Integration Platform as a Service (iPaaS)* - In this model integration is delivered through the cloud.
    - Strengths
        - Platform and operations are done in the cloud which reduces strain on the organization's IT infrastructure.
        - Development time is generally reduced.
        - Services often include a wide range of adapters, interfaces and templates.
    - Weaknesses
        - Less control over performance than on-premise solutions.
        - Requires ongoing integration development and maintenance.
        - It is difficult to find personnel with appropriate experience.

- *Integration Brokerage* – In this model for integration projects, both the implementation and management are outsourced.
    - *Strengths*
        - Access to high-quality infrastructure with minimal investment
        - Frees up IT staff for other projects.
        - Provides a single point of contact for implementation and management of integration.
    - Weaknesses
        - A loss of project control
        - The vendor relationship is key to a successful integration a troubled vendor relationship may cause issues in the project
        - The possibility of being locked in with a vendor.
        - Vendor mergers prevelant

Li, Q., Wang, C., Wu, J., Li, J., & Wang, Y. (2011, November). Towards the business–information technology alignment in cloud computing environment: An approach based on collaboration points and agents. International *Journal of Computer Integrated Manufacturing, 24*(11), 1038-1057

Abstract. With the development of extended enterprise and information technologies (IT), a new business pattern with its infrastructure, cloud computing, is emerging. More and more small and medium enterprises do not implement significant parts of their information systems (IS) in-house. Instead, they prefer to use the software services and even infrastructure services provided by professional information service companies. Their business strategy, IT strategy, business processes and information technologies

shall be re-aligned. Furthermore, no cloud computing service vendor can satisfy the complete functional information system requirements of an enterprise. Sometimes, enterprises have to simultaneously use software services distributed in different clouds in conjunction with their intra-IS. These bring great challenges for business–IT alignment of an enterprise in the cloud computing environment (CCE). This study reviews business–IT alignment problems and models in CCE. The concept of collaboration point (CP) is proposed, and a CP-based business processes collaboration modelling technique is developed to improve the feasibility of IS in CCE. A framework to integrate applications and services deployed in public clouds and intra-IS is designed and a run-time platform with the collaboration agent technique is developed to realise the concept of CP. The case study illustrates the implementation of techniques developed in this article. [ABSTRACT FROM AUTHOR]

Summary. This article proposes a method for integrating cloud technologies with internal IT systems, in a way that aligns the business and reduces the manual work needed to accomplish the integration. The authors suggest designing a single portal for users, then using a combination of Web Services, SOA, and API's to synch the data between the divergent systems. Key to this strategy is the creation of collaboration points that operate in the boundaries of organizations and combine processes from different organizations. The ultimate goal should be:

- Cloud services should be available through a platform interface
- A dedicated mechanism should be built to support communication between clouds and intra-IS

- The cloud services should be organized to support business process, and accessed through the platform interface
- The cloud services, business processes, and other applications should be monitored, and managed
- Users should be free of multiple logins.

Though this article outlines a strategy that may be difficult for smaller businesses with limited IT resources to successfully implement, it is included in the bibliography as a complete example of the engineering an of an integration solution. The article is of value as it provides a full view of the system architecture required to implement an integration solution.

Liu, F., Guo, W., Zhao, Z.Q., & Chou, W. (2010). *SaaS integration for software cloud.* Paper presented at the 2010 IEEE 3rd International Conference on Cloud Computing. Retrieved May 12, 2014 from IEEE Computer Society. doi:10.1109/CLOUD.2010.67

Abstract. Software as a Service (SaaS) has been adopted in a fast pace for applications and services on software clouds. However, the success of SaaS in software cloud cannot obscure the integration challenges faced by developers and enterprise infrastructure IT. Among those challenges, firewall/NAT traversal and security issues often pose a serious bottleneck as enterprises may not be entirely comfortable running mission critical applications outside the corporate firewall. On the other hand, SaaS applications in the cloud need to access enterprise on-premise applications for data exchange and on-premises services. The current approaches through opening special pin-holes on firewall or using dedicated VPNs have encountered a number of limitations and drawbacks. This paper presents a Proxy-based firewall/NAT traversal solution for SaaS integration

(PASS). It allows SaaS applications to integrate with on-premise applications without firewall reconfiguration, while maintaining the security of on-premise applications. In addition, this approach is platform and application independent, making the SaaS integration seamless. Moreover, PASS is consistent with the enterprise web browsing infrastructure, and it requires little or no change to enterprise firewall/NAT configurations. In this paper we present the architecture of PASS and address SaaS integration challenges in software cloud, such as security/firewall, performance, and scalability. Experimental study based on our implemented system shows that the proposed approach of PASS is promising to resolve firewall/NAT traversal for SaaS integration with on-premise services.

Summary. In this paper the authors argue SaaS applications have limited customer configurability which means much of a SaaS applications functionality is realized outside of the SaaS application. To complicate matters, SaaS applications often need to access business processes which can operate across multiple applications and services. This can cause communication issues between the SaaS and the organization as many organizations are protected by firewalls, domains, and network address translation (NAT) devices. The authors state there are three SaaS integration models:

- In the first model the SaaS application is part of the business process and on-premise applications query the SaaS for data. The data in this method is typically pulled within an organizations firewall, and is typically allowed by the firewall.
- The second model consists of SaaS application acting as the business process engine and pulling data from within the organization's firewall. This type of communication is typically blocked by firewalls. One way to get around the

firewall blocking this sort of communication, is to have the on-premise application push data to the SaaS application at regular intervals

- The third model consists of the SaaS application and on-premise applications communicating in both directions. This model is also typically blocked by firewalls.

A popular solution to address the communication issues between SaaS applications is to change the configuration of the firewall to allow traffic from the SaaS. Depending on the sophistication level of the firewall, allowing SaaS traffic can cause a significant amount of work. The authors argue the ideal solution will allow the following through the firewall/NAT:

- Resolve and map internal URL to a routable address
- Support inbound web services
- Be transparent to SaaS applications
- Require minimal change to the firewall/NAT

The authors suggest a proxy-based firewall/NAT transversal solution for SaaS (PASS) will address the communication issues posed by integrating SaaS and on-premise applications. PASS solutions consist of two primary components, a PASS agent, and a PASS server. The PASS server is typically in a public network, which generally resides within the SaaS provider. Both the organization and the SaaS provider deploy PASS agents. The solution works by opening a secure tunnel that is initiated from within the organization's firewall. The PASS agents then communicate with each other through the PASS server. The process makes it unnecessary for communication between SaaS

applications and on-premise applications to pass through the organization's firewall/NAT.

Marian, M. (2012). iPaaS: Different ways of thinking. *Procedia Economics and Finance, 3*(2012) 1093-1098. doi:10.1016/S2212-5671(12)00279-1

Abstract. The concept of iPaaS is in its infancy, and very few vendors and users even recognize the term. Some see iPaaS as an evolution of integration as a service, which has been widely adopted for cloud services integration. Another point of view presents iPaaS as an emerging form of delivering application and data integration capabilities, consolidating multiple cloud services in a suite aimed at the integration and governance of any combination of on-premises and off-premises applications, within or across organizations. The iPaaS is designed to act in the middle and help connect to a number of services across the layers. Issues come from the convergence and consolidation process toward iPaaS, which will be turbulent. Many providers will disappear; in the race to leadership, vendors will bring to market immature technologies; some mergers and acquisitions will fail; some vendors will not be able to effectively scale up their platforms to support large cloud workloads; and other vendors will struggle to provide quality support to a growing number of clients.

Summary. This article discusses approaches and trends in iPaaS. The author argues iPaaS is an emerging technology that as of 2012 had failed to gain widespread notoriety among vendors or users. The basic premise of iPaaS is to offer a suite of services in the cloud that allows development, governance, and execution of integrations. These integrations include cloud-to-cloud, cloud to on-premise, on-premise to on-premise, and business to business integrations. The largest benefit of such an integration model is that

it eliminates the need to purchase and manage the application infrastructure needed for on-premise integrations. Some factors limiting the adoption of iPaaS include fears over higher long term costs, a lack of industry skills and established best practices, as well as a lack of trust in emerging technologies. The article is included in the bibliography as iPaaS is an integration method that allows small businesses to integrate without investing in middleware technology.

Wadwa, B., Jaitly, A., & Suri, B. (2013). *Cloud service brokers: An emerging trend in cloud adopting and migration.* Paper presented at the 2013 20th Asia-Pacific Software Engineering Conference. Retrieve April 2, 2014 from IEEE Computer Society. doi:10.1109/APSEC.2013.129

Abstract. With the advent of cloud, a large number of cloud providers have surfaced in the market. Cloud Consumers are rapidly using cloud services (IaaS, PaaS, and SaaS) to meet their business needs while cloud providers are rapidly developing much needed tools and environments. This rapid growth however is creating a significant need to develop fast and controlled mechanisms for managing costs, capacity and resources at agreed service levels in order to have a smooth adoption, management and maintenance of cloud for both consumers and providers. Cloud Services Brokerages (CSBs), an intermediary between the consumer and providers, emerges as a solution to address above need. In this paper we focus on reviewing the significance, role and services of a CSB, followed by a categorization of CSBs on the basis of the services they provide, and a method to select a CSB from a pool of CSBs.

Summary. The authors of this paper explore the use of Cloud Service Brokerages (CSBs). CSBs develop and maintain relationships with cloud vendors and manage the use and delivery of cloud services by providing these roles:

- *Aggregator* – A broker that takes multiple services from different cloud providers and combines them into one service.
- *Integrator* –A provider that merges services from multiples vendors to create a new business process.
- *Governance Services* – This type of broker assures organization, industry, and government regulations are being met.
- *Customizer* – These vendors create extensions to existing cloud services.

The authors suggest CSBs can be helpful in 18 areas of cloud management. Some of these areas include:

- Facilitating cloud adoption by analyzing advantages, disadvantages and viability; helping with vendor selection; engaging with the vendor and providing cloud engineering guidance
- Providing implementation and automation services
- Providing integration services that include integration analysis, development and management
- Providing aggregation between multiple cloud vendors into one service
- Assuring interoperability between cloud providers

The article concludes with suggestions for selecting a CSB. The first step is to determine if an organization would most benefit from an aggregator, integrator, customizer, or governance service. Once decided, an organization should obtain a list of

known CSBs and use a priority matrix based on the 18 categories of services a CSB should provide to make a determination.

Conclusion

Small businesses typically do not have the IT resources of larger businesses and as a result they struggle to leverage their limited IT resources for competitive advantage (Dai, 2010). They often do not even have the resources to effectively maintain their own data centers (Mahesh, Landry, Sridhar, & Walsh, 2011). These factors make the adoption of SaaS solutions attractive to small businesses, as they can access high-end software without needing to install the infrastructure internally to support the software (Dai, 2010). However, there are risks involved with SaaS solutions. Small businesses typically do not have the IT resources to select the appropriate technology solution (Dai, 2010). Once a solution is chosen, it is common for that solution to need to be integrated with other applications (Hai & Sakoda, 2009). SaaS solutions often do not share common communications standards, which makes integration difficult (Cavalcante, Lopes, Batista, Cacho, Delicato & Pires, 2011).

This annotated bibliography attempts to help small businesses mitigate these risks by exploring common technology issues in small businesses, methods for selecting a SaaS, and best practices for SaaS integration. The remainder of the conclusion focuses on discussing SaaS selection and SaaS integration and concludes by identifying areas for further research.

SaaS Selection

Kaisler, Money, and Cohen (2012) argue that it is crucial for small businesses to have a process in place for selecting cloud solutions. Though the literature presented in this annotated bibliography contains selection techniques that vary, each article contains a specific set of criteria to be investigated. The articles explore the selection process from two perspectives:

selecting solutions based on current internal needs, and selecting solutions based on the benefits a solution can provide. Kaisler, Money, and Cohen (2012) argue for a three step process which involves first determining if a business solution will meet business requirements, followed by assessing the quality of services, and finally exploring how the organization will integrate a SaaS solution with other applications. Small businesses often struggle to use their IT resources for long term strategic goals (Dai, 2012). When small businesses analyze the features important in a potential SaaS solution, as well as the benefits the SaaS solution actually provides, small businesses can use the SaaS selection as a way to further long-term strategic goals. Successful data integration can also help to meet business objectives (Lheureux, Pezzini, Thompson & Malinverno, 2012), which points out the need for organizations to also understand their internal system needs.

Though each piece of selected literature proposes a different method for evaluating cloud services, each article provides insight that may help small businesses select a SaaS solution that best fits their needs, both from a strategic, and internal systems fit. Recommended areas within an organization that small business owners and IT decision makers should examine when selecting a SaaS are listed below:

- *IT Experience* - Mahesh, Landry, Sridhar, and Walsh (2011) argue that if an organization does not have the IT expertise to administer a system in house, the system should be moved to the cloud. IT experience should also be considered when exploring how a potential SaaS application is going to be integrated with other applications (Lheureux, Pezzini, Thompson & Malinverno, 2012*)*. Part of understanding an integration strategy is understanding if an IT departments has the capability to integrate a SaaS solution with other applications (Lheureux, Pezzini,

Thompson & Malinverno, 2012). The level of SaaS integration skills an organization has will be a major factor in selecting the integration method of the organization (Lheureux, Pezzini, Thompson & Malinverno, 2012), which will also be a factor in how an organizations system is integrated with a SaaS solution.

- *Flow of Data* – Organizations need to determine how data will flow between the SaaS and an organization's other applications (Kaisler, Money & Cohen 2012). Some areas to consider include:
    - How will the SaaS communicate through an organization's firewall (Liu, Guo, Zhao & Chou, 2010)?
    - What method is the organization going to use for communication between the SaaS application and other applications (Liu, Guo, Zhao & Chou, 2010)?
    - How do organizations ensure the flow of data meets organizational, government and industry security standards (Mahesh, Landry, Sridhar & Walsh, 2011)?
- *Customization Level* – Organizations need to consider how customized their software is; the more customization, the more effort required to integrate and maintain interfaces between the SaaS solution and the customized applications. (Mahesh, Landry, Sridhar, & Walsh, 2011).
- *Vendor Compliance* – Organizations need to assess how they are going to assure vendors remain compliant with industry and organizational data and security requirements (Kaisler, Money & Cohen 2012).
- *Total Cost of Ownership* - When determining the cost of a SaaS solution it is important to consider, installation, annual costs and operational costs (Bibi, Katsaros

& Bozanis, 2012). While one SaaS solution may have the lowest installation cost, the total cost of ownership compared to other solutions may be higher.

- *Benefits, Opportunities, Costs and Risks (BOCR)* – One method for determining the overall impact of a possible SaaS solution is to weigh positive near term benefits and positive long term possibilities against short term negative results, and long term negative factors of a solution (Ergu & Peng, 2014).
- *Balanced Score Card* – Another method to help ensure a SaaS solution meets an organization's strategy is to evaluate a SaaS based on its effect on an organization's: learning and growth, internal business processes, customer performance, and financial performance. When using this approach it is important to take note of how one factor may influence others (Lee, Park & Lim, 2013).

SaaS Integration

There are many factors to consider when integrating SaaS applications with other applications. Considerations include: building communication between the SaaS application and other applications (Li, Wang, Wu, Li & Wang, 2011), bypassing firewalls (Liu, Guo, Zhao & Chou, 2010), data architecture (Joha & Janssen, 2012), and data transfer limits (Hai & Sakoda, 2009). Lheureux, Pezzini, Thompson and Malinverno (2012) state there are only four methods for integrating SaaS applications with other applications: point-to-point, on-premise middleware, iPaaS, and the use of an integration broker. Point-to-point and on-premise middleware put the infrastructure burden on the organization, can be difficult to maintain, and can become complex and expensive (Lheureux, Pezzini, Thompson & Malinverno, 2012). These two methods have their benefits, as they both allow more control than iPaaS or using an integration broker (Lheureux, Pezzini, Thompson & Malinverno, 2012), but Mahesh, Landry, Sridhar, and Walsh

(2011) and Dai (2010) cite a lack of IT resources as an issue with small businesses, and a factor in small businesses choosing to use SaaS solutions. In instances where IT resources are limited, an on-premise integration maybe difficult for a small businesses to perform.

iPaaS and integration brokers may provide more feasible solutions for small businesses that lack the resources to host integration solutions within their infrastructure. iPaaS eliminates the need to purchase or manage the hardware and applications needed to integrate SaaS solutions (Marian, 2012) and often includes pre-built integration connectors (Lheureux, Pezzini, Thompson & Malinverno, 2012). The use of an integration broker allows organizations to outsource the work required to complete an integration and provides a single point of contact for managing integrations (Lheureux, Pezzini, Thompson & Malinverno, 2012). Solutions involving iPaaS and integration brokers have their weaknesses, as both offer less control than doing an on-premise integration (Lheureux, Pezzini, Thompson & Malinverno, 2012). Though IT resources are less taxed using iPaaS instead of an on-premise solutions, IT resources may still be an issue as the solution requires continued integration development and maintenance, and finding skilled personnel may be difficult (Lheureux, Pezzini, Thompson & Malinverno, 2012).

Further Research

Tan, Fisher, Mitchell and Phan (2009) argue that small business research is often done by testing large business theories on small businesses. This theory appears to also apply for small business research concerning SaaS implementation and integration, as most articles seem to ignore small businesses resource limitations. Further research may help to illuminate SaaS integration and implementations solutions and best practices for small businesses. Joha and Janssen (2012) present three integration models; in one model the SaaS provider offers multiple applications that are integrated as part of one SaaS service. Research exploring how small

business can best utilize a single SaaS provider may provide an alternative integration model that small businesses could potentially find attractive. Hai and Sakoda (2009) predict that SaaS providers will start to incorporate pre-built connectors with other SaaS providers. This approach may represent another integration model of interest to small businesses as it provides another solution that does not require on-premise infrastructure resources to provide integrations.

Closing Remarks

Though there was too much variance in the SaaS selection, and SaaS integration literature to identify clear best practices, this annotated bibliography furthers the conversation by presenting 15 articles that explore small business technology issues, SaaS selection, and SaaS integration. Further research in the topic is needed, but this paper should help small businesses avoid risk in SaaS selection and SaaS integration as it provides an overview of the issue as well as possible approaches to both SaaS selection and integration.

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