Engineering and Business Aspects of SaaS Model Adoption: Insights from a Mapping Study

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Abstract. Transition to Software-as-a-Service (SaaS) model is revolutionizing the software market with significant impact on both SaaS providers and consumers. Research on business aspects of SaaS was usually limited to exploring adoption factors from a consumer perspective. Research on engineering aspects of SaaS focuses primarily on cloud computing architecture and software development. The prime aim of this paper is to assemble these engineering and business aspects of SaaS while building a better understanding of the servitization transformation of software companies as well as classifying, analyzing and putting in correspondence state-of-the-art studies focused on SaaS product and project management, business practices and engineering processes. The mapping study findings and interpretations are summarized to emphasize the significant research challenges regarding the required engineering and business efforts needed for the adoption service-oriented model. The performed study creates an appropriate basis for the further research.

Keywords: Software-as-a-Service, SaaS, Software Engineering, Software Business, Software Product Management, Systematic Mapping study

1 Introduction

Nowadays, Software-as-a-Service (SaaS) is a software licensing and delivery model frequently used by software companies both in B2B and B2C markets. The global public cloud services market is expected to grow 18% in 2017 to total $247 billion [42, 53]. These studies also predict Cloud Application Services or SaaS market segment to be ranked second with the capitalization close to $46 billion inferior just to Cloud Advertising.

SaaS as licensing and delivering model suppose that service consumers receive remote access to the software on a subscription basis rather than buying a software license and installing the software on their computers and servers. The software itself is owned, developed and managed by a service provider. The rational economic analysis of the SaaS model has persuaded developers as well as consumers to consider shifting toward the SaaS model. For software companies, the service-oriented model in comparison to traditional software product development offers benefits related to revenue and profit

as well as customer acquisition and retention [59]. However, in both B2B and B2C markets, the new model also promises significant benefits for consumers ranging from cost reduction and scalability to remote access and compatibility [3]. These advantages ensured the rapid diffusion and adoption of the model on the market.

SaaS adoption has become the topic of interest for scientists in different research domains. It has gained considerable attraction in IT management as well as software business domains due to its capability to make a significant influence on business practices and software market structure [11]. The broad range of studies in this domain was mainly focused on the identification and evaluation core SaaS model adoption drivers and inhibitors, assessing economic benefits of the service-oriented model as well as propose solutions to further market growth challenges. At the same time, the SaaS paradigm, as well as overall cloud computing, has also been the center of attraction in software engineering and information technology research domains. Mostly often studies in these domains investigated engineering and technological challenges of cloud computing including among others issues of service-oriented architecture and cloud development methodologies [27].

Persistent efforts in these research domains, even being often performed without the necessary integration, made it possible to find solutions to the major challenges facing the development of emerging service-oriented model including consumers concern regarding SaaS adoption [3] and the transition of Software-as-a-Product (SaaP) companies to SaaS providers [60]. However, both technological and methodological transition in existing software companies took place without proper support and to what extent companies adopted the service paradigm remain unclear for the researchers. Even though SaaS market is proliferating driven by payoffs on both supply and demand sides, undiscovered aspects related to the adoption and acceptance of service-oriented model by SaaS providers can be real obstacles to an active and efficiently adoption of SaaS.

This paper presents the results of the systematic mapping study on adoption SaaS by software companies, mainly the factors affecting their readiness and acceptance of the SaaS model. This study investigates the role of technological/engineering and management/business aspects of SaaS adoption and proposes a taxonomy of factors that should be considered while re-engineering or establishing development process, product management practices and overall business model. The current study includes several contributions to software business and cloud computing research domains.

2 Background and Motivation

In the 2000s with the rapid development of the Internet, SaaS model as one of the cloud computers paradigm pillars started to supplant both the traditional SaaP model and the software outsourcing one called ASP [51]. The first attempts to explicitly define this model were able to convey the essential characteristics but were different regarding architecture [43]. Nowadays the most common and widely accepted definition is the one presented in 2011 by United States National Institute of Standards and Technology (NIST) as “a model for enabling ubiquitous, convenient, on-demand network access to

a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction" [44].

2.1 SaaS Model Adoption

A narrow interpretation of the SaaS as licensing and delivery model assumes considering it as process innovation. From an economic perspective, SaaS model is an example of innovation [13, 19] identified four categories of innovation by area of focus: product/service innovations, process innovations, organizational innovations, and technological innovations.

However, nowadays broader interpretation is more widely-accepted that recognizes the unique process, technological and organizational innovations behind this model [22]. SaaS model also comes with a radical shift of the means by which software is engineered and developed as well as its product strategy and pricing, lifecycle management, customer involvement, and relationship management. Besides different engineering and business practices and processes, the service-oriented paradigm requires new software architecture [57]. Given the above considerations, the service-oriented paradigm adoption process takes place across different dimensions that for the purpose of this study we will identify as engineering and business ones.

SaaS market is populated with both new companies, established initially as service companies, and companies that entered this market from the SaaP market with software services developed on the basis of existing software products [36]. Companies of the first type followed the "development from scratch for SaaS" approach considering features and capabilities of the SaaS model, while the ones of the second type were "re-engineering for SaaS" with the plan either to supplement the already existing on-demand software with specific SaaS solutions, or to implement the full transformation within some period [4]. Adaption of the SaaS model requires significant efforts and expertise from software companies in establishing or transforming their business modeling and re-engineering their business processes.

2.2 Previous studies and reviews

The literature on cloud computing adoption, acceptance and diffusion issues is growing fast. We were able to identify 34 reviews and mapping studies among the initially collected body of literature related to different issues of SaaS. [14, 23, 64, 67] observe and explore the overall research of cloud computing with SaaS as one of its pillars identifying characteristics and market structure as well as further development prospects and benefits for various market participants. Additionally, several reviews had a specific context like SMEs [49], healthcare [17] or education [15].

As SaaS model is much more demand-side driven compared to the traditional SaaP [61], a broad range of studies was devoted precisely to cloud computing and SaaS adoption issues. Reviews [3, 20, 46, 51] classify and assess legal, technical and managerial factors that have the most significant impact on this process.

We were not able to find any review that systematically discusses the adoption of SaaS model by software companies, although some aspects have been investigated sufficiently. [41] systematically review the existing software product management practices in companies developing cloud services. [4, 56, 57] reviews studies on SaaS development processes practices, while [34, 63] investigate software development methodologies widely used in SaaS development. Finally, [55, 66] focus on such business aspect of SaaS model adoption like value proposition and organizational integration respectively.

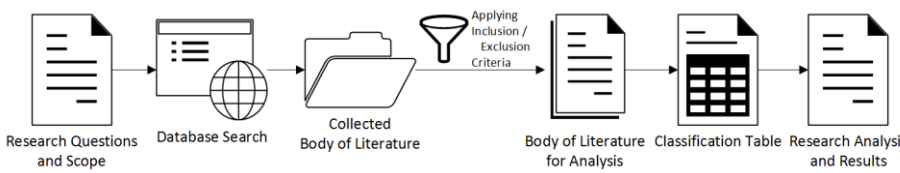
The mapping study goes beyond the existing studies and is intended to bring the same depth of analysis that exist in existing studies on the demand side to the issues of adoption SaaS model by service providers and developers. The review serves as a bridge between recently conducted studies regarding particular aspects of software business at the age of SaaS, and it provides a taxonomy of SaaS adoption challenges and factors facing service providers and considering existing interplay between the engineering and business aspects.

3 Research Methodology

Grounded in the protocol outlined from the guidelines [32, 47], the mapping study was conducted according to the process depicted in **Figure 1**. It focuses on aspects that characterize and define the adoption of SaaS by software companies across various research domains and types of studies. To get an integrated and comprehensive look into the area of SaaS adoption and distribution of existing research in it, this mapping study answers the following research questions:

- **RQ 1:** What are the critical factors regarding SaaS model adoption by software companies that have been identified in academic literature?
- **RQ 2:** What are the aspects of SaaS adoption and challenges facing software companies that have been addressed in the research studies?

Figure 1. Research process



The overall primary research scope is as follow:

- Population: We were looking for papers published since 2010. Publication venue was also limited to articles in peer-reviewed journals and conference proceedings.

- Intervention: Following approaches were implemented to obtain relevant mapping study: prime literature body was collected with further data extracted and analyzed in the form of answers to research questions.
- Comparison: The mapping study compares various issues and aspects regarding SaaS model adoption from multiple dimensions.
- Outcome: The primary body of literature covers a wide range of existing studies. Mapping study conducted upon the body of literature provides clear perceptions regarding SaaS adoption including critical challenges across multiple domains, significant trends in the further development of the concept both in industry and academy.

Given the large body of literature regarding the research topic, the data collection routine was based on automatic across multiple scientific databases and digital libraries. We defined primary search terms that could form the search queries for major scientific databases and libraries as well as set search limitations regarding time, publication type, and research area. The first list of terms included different possible synonyms for SaaS such as "software as a service", "cloud service", "web service", "digital service" and "cloud computing". The second one includes terms that can be used in papers related to different aspects of SaaS adoption by software companies: "software product management", "business model", "pricing", "service architecture", "service engineering", "software development", "deployment models", "adoption" and "servitization".

A manual one supplemented automatic search. Using looking back method (exploring reference list of already identified papers) as well as by looking forward one (analysis of papers which cited the already identified ones), we were able to collect additional studies relevant to the research scope. The Inclusion Criteria was applied while screening identified papers' title, keyword and abstracts to evaluate the compliance with quality and availability criteria. Once the Inclusion Criteria was implemented, we explored full-text of the papers to determine the ones that provide a definite contribution to SaaS model adoption in software companies and exclude those that consider the adoption issues as a context or motivation for the research. The initial scope of literature was limited from 758 to 48 items by applying Inclusion/Exclusion Criteria.

Multistage formal content analysis process was implemented to extract a taxonomy of aspects, factors, and challenges that affect SaaS model adoption by software companies with further analyzing and reporting.

4 Results

The results of the research are presented in the form of answers to the research questions followed by a reflection on research findings.

4.1 Rationality of SaaS Model Adoption

The rationality factors regarding SaaS model adoption by software companies were identified in the answer of RQ1. The vast majority of found papers discuss the attractiveness of the SaaS model for software companies. They also most often highlighted concerns that are more challenges rather than real obstacles towards SaaS adoption.

Regardless of whether companies adopt SaaS by transiting from SaaP model, developing SaaS that complements existing solutions or creating a SaaS from scratch, most often the adoption process is based on Electronic Data Interchange (EDI) adoption model [9, 25]. This model suggests three significant groups of factors that influence the adoption decision and process: Benefits, Readiness, and Pressure. The identified factors fully correspond to the logic of the EDI model. They are presented in **Table 1.**

Table 1. Factors of SaaS model adoption

Factor	Source
Business and Engineering Benefits	
Obtain long-term higher profit margin and revenue	[38, 40, 65]
Reduce opportunity costs and utilize the economy of scale benefits	[18, 33, 38]
Expand the range of services provided	[16, 38]
Obtain market leadership and changing “rules of the game”	[30, 31, 38]
Increase the reliability of customers relationships	[40, 54, 65]
Facilitate the geographical expansion	[18, 54]
Facilitate upgrading, modification and customization processes	[57, 65]
Obtain agility and scalability of the development and deployment	[27, 45]
Obtain better quality of business analytics for decision-making	[21, 48]
Avoid to a certain extent the software piracy	[38, 50]
Organizational and Technological Readiness	
Financial resources availability and investors’ readiness for changes in revenue structure	[54]
Investors, top-managers, and personnel intention	[30]
Availability of personnel with required competencies	[30, 31]
Internal and External Pressure	
Competitors pressure	[31]

4.2 Aspects and Challenges of SaaS Adoption

Publications regarding aspects of SaaS adoption and challenges facing software companies (**RQ2**) shows dissimilar results as most of the papers do not explicitly property formulate them. The findings are grouped into three subcategories, namely: Business Model, Operations, Product and Project Management as well as Technology and Engineering Practices. **Error! Reference source not found.** summarizes the adoption aspects and the underlying challenges.

Table 2. Aspects and Challenges of SaaS adoption

Aspect	Challenges	Source
Business Model and Strategic Product Management		
Business model and strategy	Redesign the business model and strategy to address such issues as the economy of scale, servitisation, and shift from on-premises to on-demand	[29, 31, 33, 35, 58]
Value proposition	Ensure that pricing scheme provides a sufficient level of flexibility and total cost reduction for consumer	[2, 6, 33, 66]
Value proposition	Provide customers with tangible arguments about the SaaS benefits including cost reduction, performance increase and share best practices	[6, 24, 36, 54, 66, 68]
Cost and revenue structure	Design flexible and value-based pricing policy based on subscription and pay-per-use models	[5, 8, 12, 16]
Customer segmentation and relationship management	Redefine the customer segments to address geographical expansion and deeper customization	[54]
Customer segmentation and relationship management	Provide customers with strong arguments against prejudices about high risks of security and privacy while using SaaS	[6, 39]
Distribution channels	Focus on using the direct Internet and platforms-related channels as major communication, distribution and sales channels	[16, 54]
Partners collaborations	Reconsider partners' network to address the new structure of distribution channels and include PaaS and IaaS providers	[12, 18, 54]
Legal affairs	Design reliable SLA and ensure its compliance with the SaaS model	[6, 12, 26, 66]
Legal affairs	Ensure that data storage and processing following the legislative regulations that may vary across countries and industries	[26, 66]
Tactical Product and Project Management		
Transformation and integration management	Design the process through which the SaaS adoption will take place	[10, 30, 31, 65]
Transformation and integration management	Design incentives policies and organize personnel training to overcome personnel resistance	[65]
Project schedule management and monitoring	Reconsider metrics to plan SaaS development projects and track performance and implementation of the SaaS model	[34]
Project and product resources management	Integrate SaaS infrastructure and related resources in the existing resource management practices	[54]

Customer support and services	Develop a higher level of integration between consumer and provider to the required level of quality	[37, 54, 66]
Customer support and services	Ensure proper data-recovery, data-migration, billing and auditing processes	[52, 66]
Operations, Technology and Engineering Practices		
Architecture and infrastructure	Ensure technical level of data security to mitigate risks of data loss and manipulation	[1, 6, 39, 66, 68]
Architecture and infrastructure	Ensure technical level of data privacy to mitigate risks of unauthorised access	[1, 6, 26, 66, 68]
Architecture and infrastructure	Adopt service-oriented and multi-tenancy architectures (technology, principles)	[12, 27, 28, 54, 61, 62]
Architecture and infrastructure	Ensure availability of the SaaS as this is one of the most critical issue for the consumers	[7, 26, 66]
Architecture and infrastructure	Ensure high level of interoperability that allow integration with other IT-systems and services	[7, 26, 66, 68]
Requirements management and quality assurance	Adopt new principles to involve customers in requirements prioritisation	[57]
Requirements management and quality assurance	Finding a balance between providing standard solutions and satisfying customized demand	[26, 38, 66]
Development practices and processes	Adopt agile software development methodologies with corresponding metrics	[4, 34, 54]
Testing and Maintenance	Update development and management processes including testing, release, and maintenance that are based on the principles of customers' involvement and collaboration	[31, 54, 57]

5 Discussion and Conclusion

The prime objective of the ongoing research presented in this paper is to address the interplay between business and engineering aspects of the SaaS model adoption. Companies were able to extend or establish a new business SaaS model and product management. However as highlighted in this paper, several adoption challenges may compromise the promises of the SaaS. The comprehensive systematic analysis of the literature aims to gain a deeper understanding of the factors, aspects, and challenges of SaaS adoption both the business and engineering ones. While answering the two research questions, the study makes two principal contributions and draw a roadmap for a research agenda on how to address the SaaS model adoption.

Regarding **RQ1**, it appeared that SaaS adoption is driven mostly by competitive pressure and expectations of potential benefits rather than consumers demand and partners pressure. Moreover, achieving the expected benefits requires significant efforts in consumers' and partners' relationship management, many of which are highly doubtful regarding SaaS. A little is known about the various aspects of organizational readiness for SaaS adoption.

RQ2 reveals a wide range of challenges discussed in the academic literature. From the business side the most frequently discussed challenges are related to the business model design, value proposition, and customer relationship management. From the engineering perspective, fundamental challenges were identified including the required security, privacy, scalability, and availability of the SaaS. The study also revealed that the literature appeared to be scarce and scattered regarding organizational as well as product and project management aspects of SaaS adoption. This situation is a real obstacle to achieving the advantages of the new model.

The research conducted may have certain limitations. First, providing a taxonomy of factors and challenges is not enough. We also need to study the interdependencies, mediation and moderation effects. It also needs to prioritize the identified factors and challenges. Second, the research should be extended to include a large number of studies from various domains and companies.

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References

1. Ali, M. et al.: Security in cloud computing: Opportunities and challenges. Information Sciences. 305, 357–383 (2015).
2. Alshamaila, Y. et al.: Cloud computing adoption by SMEs in the north east of England: A multi-perspective framework. Journal of Enterprise Information Management. 26, 3, (2013).
3. Asatiani, A.: Why cloud? - A review of cloud adoption determinants in organizations. In: ECIS Proceedings. pp. 1–17 (2015).
4. Baliyan, N., Kumar, S.: Towards software engineering paradigm for software as a service. In: International Conference on Contemporary Computing (IC3) Proceedings. pp. 329–333 (2014).
5. Baur, A.W. et al.: Customer is King? A Framework to Shift from Cost- to Value-Based Pricing in Software as a Service: The Case of Business Intelligence Software. In: Conference on e-Business, e-Services and e-Society Proceedings. pp. 1–13 (2014).
6. Benlian, A., Hess, T.: Opportunities and risks of software-as-a-service: Findings from a survey of IT executives. Decision Support Systems. 52, 1, 232–246 (2011).
7. Bokhari, M.U. et al.: Cloud Computing Service Models: A Comparative Study. IEEE International Conference on Computing for Sustainable Global Development, INDIACom. 16–18 (2016).
8. Chun, S.-H., Choi, B.-S.: Service models and pricing schemes for cloud computing. Cluster Computing. 17, 2, (2014).
9. Chwelos, P. et al.: Research Report: Empirical Test of an EDI Adoption Model. Information Systems Research. 12, 3, 304–321 (2001).
10. Clegg, B. et al.: Transformation of a small-to-medium-sized enterprise to a multi-

organisation product-service solution provider. International Journal of Production Economics. 192, 81–91 (2015).
11. Cusumano, M.A.: The changing software business: Moving from products to services. Computer. 41, 1, 20–27 (2008).
12. D'souza, A. et al.: Software-as-a-Service: Implications for Business and Technology in Product Software Companies. In: PACIS Proceedings. (2012).
13. Damanpour, F., Gopalakrishnan, S.: The dynamics of the adoption of product and process innovations in organizations. Journal of Management Studies. 38, 1, 45–65 (2001).
14. Durao, F. et al.: A systematic review on cloud computing. The Journal of Supercomputing. 68, 3, 1321–1346 (2014).
15. El-Gazzar, R.F.: A Literature Review on Cloud Computing Adoption Issues in Enterprises. In: International Working Conference on Transfer and Diffusion of IT Proceedings. pp. 214–242 (2014).
16. Erek, K. et al.: Common Patterns of Cloud Business Models. In: AMCIS Proceedings. (2013).
17. Ermakova, T., Fabian, B.: Secret sharing for health data in multi-provider clouds. In: IEEE International Conference on Business Informatics, CBI. pp. 93–100 IEEE (2013).
18. Ferri, L. et al.: Analyzing Cloud-based Startups: Evidence from a Case Study in Italy. International Business Research. 10, 5, 73 (2017).
19. Gopalakrishnan, S., Damanpour, F.: Patterns of generation and adoption of innovation in organizations: Contingency models of innovation attributes. Journal of Engineering and Technology Management. 11, 2, 95–116 (1994).
20. Haag, S., Eckhardt, A.: Organizational cloud service adoption: a scientometric and content-based literature analysis. Journal of Business Economics. 84, 3, 407–440 (2014).
21. Hartmann, P.M. et al.: Capturing Value from Big Data - A Taxonomy of Data-driven Business Models Used by Start-up Firms. International Journal of Operations & Production Management. 36, 10, 1382–1406 (2016).
22. Heart, T. et al.: Software-as-a-Service Vendors: Are They Ready to Successfully Deliver? In: International Workshop on Global Sourcing of Information Technology and Business Processes. pp. 151–184 (2010).
23. Hoberg, P. et al.: The business perspective on cloud computing - A literature review of research on cloud computing. In: AMCIS Proceedings. 5 (2012).
24. Hsu, P.-F. et al.: Examining cloud computing adoption intention, pricing mechanism, and deployment model. International Journal of Information Management. 34, 4, 474–488 (2014).
25. Iacovou, C.L. et al.: Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology. MIS Quarterly. 19, 4, 465–485 (1995).
26. Janssen, M., Joha, A.: Challenges for adopting cloud-based software as a service (SAAS) in the public sector. In: ECIS Proceedings. 80 (2011).
27. Joachim, N.: A Literature Review of Research on Service- Oriented Architectures (SOA): Characteristics, Adoption Determinants, Governance Mechanisms, and Business Impact. In: AMCIS Proceedings. 339 (2011).
28. Kabbedijk, J. et al.: Multi-tenant Architecture Comparison. In: European Conference on

Software Architecture. pp. 202–209 Springer, Cham (2014).
29. Kaltencker, N. et al.: The disruptive potential of software as a service: Validation and application of an ex-ante methodology. ICIS Proceedings. 3808–3826 (2013).
30. Kaltenecker, N.: Managing Disruptive Change: Successful Transformation from On-premises to SaaS in B2C Software Companies. PACIS Proceedings. (2015).
31. Kaltenecker, N., Hess, T.: From on-Premises To on-Demand: Learning From Two Cases of Transformation of Software Companies. ECIS Proceedings. 1–15 (2014).
32. Kitchenham, B.A. et al.: Using mapping studies as the basis for further research - A participant-observer case study. Information and Software Technology. 53, 6, 638–651 (2011).
33. Kranz, J.J. et al.: Understanding the influence of absorptive capacity and ambidexterity on the process of business model change – the case of on-premise and cloud-computing software. Information Systems Journal. 26, 5, 477–517 (2016).
34. Kupiainen, E. et al.: Using Metrics in Agile and Lean Software Development - A Systematic Literature Review of Industrial Studies. Information and Software Technology. 62, 1, 143–163 (2015).
35. Labes, S. et al.: Success Factors of Cloud Business Models. In: ECIS Proceedings. pp. 1–14 (2015).
36. Labes, S. et al.: Successful Business Model Types of Cloud Providers. Business and Information Systems Engineering. 59, 4, 223–233 (2017).
37. Lewandowski, J. et al.: SaaS Enterprise Resource Planning Systems: Challenges of Their Adoption in SMEs. In: IEEE International Conference on e-Business Engineering. pp. 56–61 (2013).
38. Liao, H.: SaaS Business Model for Software Enterprise. In: IEEE International Conference on Information Management and Engineering (ICIME) Proceedings. pp. 604–607 (2010).
39. Loske, A. et al.: Perceived it security risks in cloud adoption: The role of perceptual incongruence between users and providers. In: ECIS Proceedings. (2014).
40. Luoma, E.: Examining Business Models of Software-as-a-Service Firms. In: International Conference on Grid Economics and Business Models. pp. 1–15 Springer, Cham (2013).
41. Maglyas, A. et al.: What do we know about software product management? - A systematic mapping study. In: International Workshop on Software Product Management, IWSPM. pp. 26–35 (2011).
42. Mahowald, R.P. et al.: Worldwide Software as a Service and Cloud Software Forecast, 2017-2021. (2017).
43. Mäkilä, T. et al.: How to define Software-as-a-Service - An empirical study of Finnish SaaS providers. In: International Conference of Software Business Proceedings. pp. 115–124 (2010).
44. Mell, P.M., Grance, T.: The NIST Definition of Cloud Computing. (2011).
45. Misra, S.C., Mondal, A.: Identification of a company's suitability for the adoption of cloud computing and modelling its corresponding Return on Investment. Mathematical and Computer Modelling. 53, 3–4, 504–521 (2011).
46. De Paula, A.C.M., De Figueiredo Carneiro, G.: Cloud computing adoption, cost-benefit relationship and strategies for selecting providers: A systematic review. In: Proceedings

of the International Conference on Evaluation of Novel Software Approaches to Software Engineering. pp. 27–39 (2016).
47. Petersen, K. et al.: Systematic Mapping Studies in Software Engineering. In: Proceedings of the International Conference on Evaluation and Assessment in Software Engineering. (2008).
48. Resceanu, I.C. et al.: SaaS solutions for small-medium businesses: Developer's perspective on creating new SaaS products. In: International Conference on System Theory, Control and Computing (ICSTCC) Proceedings. pp. 140–144 (2014).
49. Rodrigues, J. et al.: Software as a Service Value and Firm Performance - A literature Review Synthesis in Small and Medium Enterprises. Procedia Technology. 16, 206–211 (2014).
50. Saltan, A. et al.: A dynamic pricing model for software products incorporating human experiences. In: International Conference on Software Business (ICSOB) Proceedings. pp. 135–144 (2016).
51. Schneider, S., Sunyaev, A.: Determinant factors of cloud-sourcing decisions: Reflecting on the IT outsourcing literature in the era of cloud computing. Journal of Information Technology. 31, 1, 1–31 (2016).
52. Da Silva, E.A.N., Lucrédio, D.: Software Engineering for the Cloud: A Research Roadmap. In: Brazilian Symposium on Software Engineering (SBES) Proceedings. pp. 71–80 (2012).
53. Smith, D.M. et al.: Predicts 2017: Cloud Computing Enters Its Second Decade. (2016).
54. Stuckenberg, S. et al.: The impact of software-as-a-service on business models of leading software vendors: experiences from three exploratory case studies. In: PACIS Proceedings. Paper 184 (2011).
55. Stuckenberg, S. et al.: Understanding the role of organizational integration in developing and operating Software-as-a-Service. Journal of Business Economics. 84, 8, 1019–1050 (2014).
56. Stuckenberg, S., Heinzl, A.: The impact of the software-as-a-service concept on the underlying software and service development processes. In: PACIS Proceedings. Paper 125 (2010).
57. Stuckenberg, S., Stefan, B.: Software-as-a-service development: Driving forces of process change. In: PACIS Proceedings. Paper 122 (2012).
58. Su, N.: Emergence of Cloud Computing: An Institutional Innovation Perspective. In: ICIS Proceedings. pp. 1–12 (2011).
59. Suarez, F.F. et al.: Services and the Business Models of Product Firms: An Empirical Analysis of the Software Industry. Management Science. 59, 2, 420–435 (2013).
60. Suresh, S., Ravichandran, T.: Firm transitions from products to services and mode of entry. In: HICSS Proceedings. pp. 1400–1409 (2015).
61. Tariq, A. et al.: Requirements Engineering process for Software-as-a-Service (SaaS) cloud environment. In: Proceedings of the International Conference on Emerging Technologies (ICET). pp. 13–18 (2014).
62. Tsai, W.T. et al.: Software-as-a-service (SaaS): Perspectives and challenges. Science China Information Sciences. 57, 5, 1–15 (2014).
63. Tuli, A. et al.: Empirical Investigation of Agile Software Development: A Cloud Perspective. ACM SIGSOFT Software Engineering Notes. 39, 4, 1–6 (2014).

64. Venters, W., Whitley, E.: A Critical Review of Cloud Computing: Researching Desires and Realities. Journal of Information Technology. 27, 3, 179–197 (2012).
65. Vial, G., Rivard, S.: From On-premises Software to Software-as-a-Service: Transforming C3 Solutions. International Journal of Case Studies in Management. 15, 3, 1–18 (2017).
66. Walther, S. et al.: Success factors and value propositions of software as a service providers - A literature review and classification. In: AMCIS Proceedings. 1 (2012).
67. Yang, H.-I. et al.: A Framework for Service Morphing and Heterogeneous Service Discovery in Smart Environments. In: International Conference on Smart Homes and Health Telematics Proceedings. pp. 9–17 (2012).
68. Zhang, Y. et al.: Converting legacy desktop applications into on-demand personalized software. IEEE Transactions on Services Computing. 3, 4, 306–321 (2010).