Decoding IPaaS: Investigation of User Requirements for Integration Platforms as a Service

Thomas Neifer[1][a], Dennis Lawo[1][b], Paul Bossauer[1][c] and Andreas Gadatsch[2][d]

[1]*Verbraucherinformatik Research Group, University of Siegen, Siegen, Germany*
[2]*Institute for Digital Consumption, University of Applied Sciences Bonn-Rhein-Sieg, Sankt Augustin, Germany*
{thomas.neifer, paul.bossauer, dennis.lawo}@uni-siegen.de, andreas.gadatsch@h-brs.de

Abstract: Due to ongoing digitalization, more and more cloud services are finding their way into companies. In this context, data integration from the various software solutions, which are provided both on-premise (local use or licensing for local use of software) and as a service, is of great importance. In this regard, Integration Platform as a Service (IPaaS) models aim to support companies as well as software providers in the context of data integration by providing connectors to enable data flow between different applications and systems and other integration services. Since previous research has mostly focused on technical or legal aspects of IPaaS, this article focuses on deriving integration practices and design-related barriers and drivers regarding the adoption of IPaaS. Therefore, we conducted 10 interviews with experts from different software as a services vendors. Our results show that the main factors regarding the adoption of IPaaS are the standardization of data models, the usability and variety of connectors provided, and the issues regarding data privacy, security, and transparency.

1 INTRODUCTION

In the course of the ongoing digitalization, more and more cloud services find their way into organizations and companies. These services are usually used as software-as-a-service (SaaS) that address many different application domains (e.g. Customer Relationship Management or Enterprise Resource Planning) and promise possible financial advantages (Han, 2011). However, the constantly growing range of new SaaS solutions adopted by organizations requires a steady development of new Application Programming Interfaces (API) to exchange data between the different services and prevent data and application silos (Li et al., 2013). The software vendors of those organizations face the task to synchronize evolving multitenant SaaS architectures (Vuorenmaa, 2015) with the customer system and the other integrated applications (Zhou, 2013). Moreover, new costs arise from the integration as well as risks regarding security and legal compliance (e.g. privacy) (King and Raja, 2012).

In this context, Integration Platform as a Service (IPaaS) models have emerged, which are defined as "suite[s] of cloud services enabling development, execution and governance of integration flows connecting any combination of on-premises and cloud-based processes, services, applications and data within individual, or across multiple, organizations" (Pezzini and Lheureux, 2011). As they bring SaaS providers and businesses together, IPaaS platforms can be described as a multi-sided market, which aims to reduce the integration effort for enterprises, focusing on the development, management and execution of integration processes (Marian, 2012). Nevertheless, they are facing different challenges regarding their role as intermediaries like the critical mass problem (Evans and Schmalensee, 2010). Furthermore, as the majority of existing IPaaS platforms are provided by U.S. vendors, this poses a challenge to European SaaS providers and enterprise customers due to differences in trust, security, and sovereignty of data (Kushwaha et al., 2020). To promote transparency and set an open European cloud standard, initiatives such as Gaia-X have already been formed (Celeste, 2021). In the context of IPaaS platforms, for example, the Open Integration Hub could be mentioned as a European open-source data integration framework (Braun and

[a] https://orcid.org/0000-0002-7146-9450
[b] https://orcid.org/0000-0003-2848-4409
[c] https://orcid.org/0000-0001-8992-0193
[d] https://orcid.org/0000-0003-3985-8162

Deßloch, 2020).[1]

Research Gap: While prior research mainly focused on technical or legal aspects of the IPaaS, we lack a nuanced understanding of the factors that influence adoption. Ebert et al. claim that "critical success factors for using IPaaS [...] have not been investigated" (Ebert et al., 2017) to a large extent although understanding drivers and barriers to adoption from both a technical and a business perspective might contribute to a better design of those platforms. For this, it is also important to understand the current integration practices of software vendors and why they are perceived as beneficial from the vendors' perspective. Against this background, we aim to answer two research questions:

- RQ1: What are current integration practices and issues with existing IPaaS solutions of software vendors?

- RQ2: What are perceived design-related barriers and drivers to the adoption of IPaaS?

Addressing this research gap, this article reports on a qualitative empirical study with 10 experts from different SaaS software vendors. We conducted semi-structured expert interviews with an average duration of 56 minutes. The focus was on current integration practices leading to drivers and barriers to the adoption of IPaaS as well as desired functions and opportunities regarding IPaaS platforms of market participants in the form of SaaS providers.

Since IPaaS platforms are multi-sided platforms (Beimborn et al., 2011; Marian, 2012), the next chapter describes multi-sided platform markets and the role of IPaaS in the platform economy. The methodology of this work is described in chapter 3. Chapter 4 presents the results of our study in relation to our research questions. The results are discussed in section 5 and we draw conclusions in section 6.

2 IPAAS PLATFORM ECONOMY

Traditional linear business models create value through consumers buying and using their products or services. Platform-based business models, on the other hand, create value through other market participants using their platform. Here, the platform does not own and process the traditional factors of production, but provides an infrastructure that enables a transaction by using a matching algorithm to mediate the sides of the market. The strength of the platform economy lies in its ability to remove barriers to trade

by using the increased exchange of information between different actors and the dissemination of data to its advantage. This creates a more open economic system with much greater user participation. To benefit from the effects between users and providers prevailing in networks, the platforms mostly rely on multi-sided market forms (Clement et al., 2019).

2.1 Characteristics of Multi-sided Platforms

When two or more participants in a market come together to transact with each other, they are referred to as two-sided or multi-sided markets. The different market participants pursue different, complementary interests. They are networked with each other via the digital platform (Clement et al., 2019). That is why digital platforms also belong to the category of network goods. The basic rule on digital platforms is: The more users there are on the platform, the greater the benefit for all participants involved. These so-called network effects work on digital platforms primarily in an indirect way (Weitzel et al., 2000). For example, customers on a trading platform have no direct advantage if there are many other customers there. Rather, it is the different, complementary market sides that influence each other. Thus, the benefit from one side of the market depends on how many participants are active on the other side of the market. This type of interdependence is appropriately referred to as an indirect network effect (McIntyre et al., 2020). A platform becomes more interesting the more providers there are in the marketplace. This is because customers have a greater choice and can expect advantages in terms of price and possibly also the quality of the products and services. At the same time, the value of the platform also increases for the providers if more potential buyers are on the marketplace. The intermediary, i.e., the platform operator, is the entity that brings the different market sides together, develops and coordinates the market and designs the platform in such a way that it is attractive for the respective market sides (Abdelkafi et al., 2019).

When developing a new platform, the platform operator faces the challenge of convincing not just one but two or more market sides of the benefits of the platform. The question arises for the operator as to which market side it should develop first and attract to its platform. To do this, the intermediary sometimes has to make great efforts to establish a flourishing exchange between the market sides. And even if the platform is initially accepted by users and develops positively, this does not automatically mean that success will last. Not only do users need to be con-

---

vinced of the platform's benefits in the early period of market development, but they also need to recognize a benefit in the long term. So the intermediary has to deal with different coordination problems.To do so, he needs a deep understanding of his market participants (Clement et al., 2019).

2.2 IPaaS as an Intermediary

IPaaS platforms provide a cloud-based multi-tenant system that helps enterprises develop, manage and govern their integration flows between the wide range of required applications and data sources (Ebert et al., 2017). As an intermediary, the IPaaS provider thus connects the market side of the SaaS providers and the businesses.

The main task here is to design the data synchronization and mapping between the various applications. In particular, the connectivity of the various SaaS and on-prem systems and the data preparation, transformation and migration into the existing databases play a key role (Zhou, 2013). A central advantage of the IPaaS solution for companies and SaaS providers is a reduction in the number of connectors required (cf. Fig. 1), which is made possible by the platform structure. Businesses and SaaS applications no longer need to develop or provide many connectors to various other solutions and systems; instead, only one interface to all integrations is usually required. This can reduce errors and increase data security and integrity by supporting governance, management and monitoring (Potočnik and Juric, 2012).
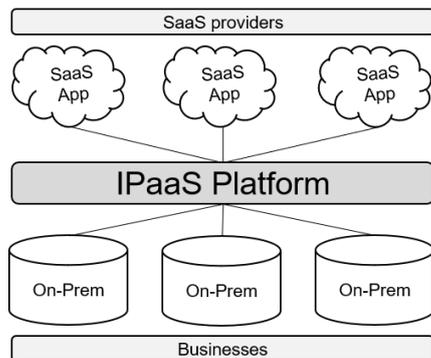

Figure 1: Relationship structure of an IPaaS market

In addition to the main focus, further functionalities become feasible in the form of orchestration of the various applications into business processes and support for the development of individual connectors, data mappings, and the execution of automated processes (Ebert et al., 2017). Due to the integrated and cross-process databases, intelligent process automation (IPA) using machine learning is also gaining in

importance here (Chakraborti et al., 2020).

The motivation of SaaS providers and companies to participate in the IPaaS platform is mainly explained by indirect network effects in addition to the simplification of integration, whereby companies can benefit from an increasing number of SaaS applications through a more diverse selection. SaaS providers benefit indirectly on the one hand through increasing business users via additional sales channels. On the other hand, direct network effects can also be seen here through the possibility of integration between further applications and the resulting increases in efficiency on both sides (Clement et al., 2019; Ebert et al., 2017).

However, platform providers face the challenge of adapting to the fast-moving cloud market and evolving in line with user needs. It is therefore of central relevance to know the requirements, barriers and wishes of their users (Sen and Sen, 2018).

3 METHODOLOGY

From a user-centered design perspective, it is of central relevance to implement user requirements in the development of artifacts (Mao et al., 2005; Lindley et al., 2017), also to promote their adoption (Chilana et al., 2015). To understand software vendors' perspectives on requirements for IPaaS platform adoption, we conducted 10 semi-structured expert interviews with SaaS providers from Germany (see Tab. 1) within an interpretive research stance (Bell et al., 2018; Collis and Hussey, 2013), which has already been applied in other studies dealing with the derivation of user requirements (Maguire and Bevan, 2002; Themistocleous and Morabito, 2012). Our sample was selected based on contacts to software vendors from previous research projects. The focus of the selection was on an inclusion of differently sized providers of various SaaS applications to gather a broad range of perspectives and possible customer and application scenarios.

The interviews lasted 56 minutes on average. After obtaining participants' consent to collect, record, and anonymously process their interview data, the interviews followed a semi-structured guideline that covered the following topics:

- Current Integration Practices and previous Experience with IPaaS to derive Drivers and Barriers to the Adoption of IPaaS

- Desired Functions and Requirements of IPaaS platforms

- Opportunities regarding IPaaS platforms

Table 1: Overview of the interview participants

	ID	Business Area	Job / Area
SaaS providers	S01	CRM	CEO
	S02	Scheduling	CEO
	S03	CMS	Product Manager
	S04	ERP	Software Engineer
	S05	ERP	Product Director
	S06	BI	CEO
	S07	BI	Integration Manager
	S08	Billing	CPO
	S09	DMS	CEO
	S10	Marketing	Managing Director
where:	CRM: Customer Relationship Management		
	CMS: Content-Management-System		
	ERP: Enterprise Resource Planning		
	BI: Business Intelligence		
	DMS: Document Management System		
	CEO: Chief Executive Officer		
	CPO: Chief Process Officer		

After transcribing the interviews, the analysis was done using the inductive approach of thematic analysis (Braun and Clarke, 2006) with a focus on 1) current integration practices and issues with existing IPaaS solutions, 2) required functionalities and Services, and 3) possible opportunities for integration platforms to improve the actual situation. After coding the interviews, the authors developed the themes collaboratively to grant a common understanding of the material.

4 RESULTS

Based on previous integration practices and problems with existing IPaaS platforms, the following section derives drivers and barriers regarding adoption as well as the functionalities and services required by SaaS providers. Additionally, ways to improve existing IPaaS approaches are discussed.

4.1 Current Integration Practices and Issues with Existing IPaaS Solutions

Especially among the smaller Saas providers interviewed, integration tools are rarely used. The required connectors are generally still implemented by the companies themselves. If IPaaS solutions are used, the large providers are mostly chosen. However, experiences with these platforms reveal a number of problems.

Although many connectors are offered for individual needs, this occasionally results in high costs. The **cost-benefit ratio** is not given in some cases, especially for small and medium-sized enterprises with specific solutions, since in most cases such an excessive offering is not needed and specific connectors are not available. Some participants therefore report a **lack of appropriateness** in the range of existing data integration tools and a **lack of added value** for their solution.

"[...] in the past we have looked at a few of these, let's call it connector suites, but honestly there's nothing there that's at least any good for our specific purpose. We've been operating on and off for a year and a half, but hardly [...] had any value add, apart from the fact that it's relatively expensive." – [S01]

The lack of added value is often explained by rudimentary suites whose connectors do not meet the requirements of the solutions. For example, various authentication mechanisms demand individual logics in the background from the solutions. Furthermore, non-uniform data structures of the connectors and the resulting need for adaptation in the form of data preparation and transformation lead to additional effort.

"[...], these solutions are too rudimentary and actually don't know where the problem lies with connectors. Most connectors have different authentication mechanisms, different data structures, and with many APIs a call is not enough, instead many calculations, logics have to take place in the background of our solution, e.g. generate synthetic tables, so that it makes sense for the customers at all. [...], that's a nagging ongoing issue for us." – [S06]

For most respondents, therefore, the issue of **standardization** is the essential factor for adopting an IPaaS solution.

"[...] the topic of standardization. If one already makes the whole effort to build a connector. Then there should also be a standard for the individual data modules. – [S04]

They are currently missing suitable definitions for data models and data exchange. Merging the data from the connectors therefore confronts the solution providers interviewed with challenges. Although the data can be analyzed in isolation for each connector, it is extremely difficult to analyze and process cross-system data. This is due to different granularities within the respective data and different data formats.

"[...] if I want to connect data from Facebook, Twitter and Google Analytics within one chart, it sounds easy from a customer perspective. But from an IT perspective, it's complex because the different sources have different granularities. [...], here I get it on an hourly basis, there I get it on a minute-by-minute basis." – [S01]

"We've been looking for years for a format for explicating documents, including our meta-information, in a meaningful way." – [S09]

Table 2: Overview of Results

Issues with Existing IPaaS Solutions	Required Functions and Services	Opportunities
Standardization	Variety of Connectors	Open-Source / Community
Cost-Benefit Ratio	Customizable Connectors	Ecosystem / Cloud Initiatives
Reliability	Intelligent Mapping	Niche Services
Usability	Detailed Documentation	User Experience
Transparency	Test Options	Intelligent Process Automation
Data Protection and Security	Data Hub	Process Optimization
Good Support	Data Enrichment / Open Data	
	Reporting (traceable data transfer)	

In general, the issue of **data protection and security** is also highly relevant for the respondents in the context of existing data integration solutions and the connectors provided.

"If an American [connector] is involved, that can also be a criterion for exclusion [for one of our customers]. [...] and then, of course, you simply have to weight up how great the benefit is for what we want to do [...]. So data protection plays an important role in the consideration, so we developed our connectors ourselves." – [S02]

The **probability of failure** plays a significant role in the considerations of solution providers for migration to a data integration ecosystem. Some providers are also hesitant about **support** expectations in the event of an outage and are weighing up between developing their own solutions or connecting to a platform.

"So if that's an integrated part of your own system, you're less likely to have a failure. So that was our consideration. [...] And good support, that's also part of it." – [S03]

In terms of usability, a **quick and simple onboarding** is of essential relevance. This also ensures continuous use of such a platform.

"I think the key is to get a moment of success within the first few minutes. After 5 minutes, I have my first functioning small solution. This moment of success has a lot of added value and ensures that people continue to use the platform." – [S01]

"From my point of view, the use and administration should be intuitive. If you do it really well, an administrator should actually be able to do it himself as a customer." – [S04]

4.2 Required Functionality and Services

With regard to expectations for the functions and services of an IPaaS platform, the respondents agree that it must predominantly provide a **wide variety of connectors**. If connectors are not available, they should be available on request within a very short time.

"[Such a platform] should offer 1000+ connectors with the ability to add new ones super fast. That's also critical. [...] a customer comes, he would like to have a specific connector, so that you can then offer it directly." – [S09]

To address the issue of a lack of standardization, **customizable templates** for the APIs are discussed. Although many different connector templates are already available for the larger providers, the smaller providers in particular do not yet offer enough of these.

"[...], templates for API interfaces also play an important role for us. We would like to adapt these to our individual needs. There are already many different templates for Google, etc., but the smaller integration providers in particular do not (yet) offer this on a large scale because this results in higher costs." – [S07]

In addition, respondents would like to see further customization of the connectors to best fit their system.

"[...], there has to be an option like: ok, you want to connect to Facebook, you can update the data synchronization in one, six or twenty-four hour intervals, so I can trigger that myself." – [S06]

If the provided data schema does not meet the requirements of the SaaS provider, an **intelligent mapping** function is desired, which merges the (standard) data model with the new data fields.

"[...] or some kind of intelligent algorithm or end-user interface where I say, this is my data schema and whatever you get back, bring that into this data schema and store it in the following database." – [S06]

Before connecting to the platform, the providers would also like to see **detailed documentation** of the interfaces and a **test option** for various requests to evaluate how the data schema is designed and whether it fits their own solution.

"[...] so one wish is that you get a detailed documentation for the interface and maybe just a test possibility. That can make things just very simple. So such a negative experience with different providers.

We would also just be able to test different requests, [...] whether that suits us." – [S02]

In addition, the platform should also provide whitelabel support in the event of a SaaS app extension through the connectors and services provided.

"[...] we would find it exciting to use such services without a front end to the platform. The frontend would have to be left to us, because that's where our USP is." – [S08]

Some participants also mentioned various added values that such a platform could provide based on the integrated data situation. They described a central **data hub** that temporarily stores the integrated data to process it for machine learning applications and enrich it with additional data. In this regard, Intelligent Process Automation was also discussed as an opportunity.

"So the big advantage would be that you have an API that you can address and could then use many data sources, for example also open data. [...] I could definitely imagine that something like this would be extremely interesting for many people regarding data enrichment." – [S07]

"Keyword intelligent processes. Data is collected everywhere in a data lake, right down to the last [process] step, and through intelligent analyses I can perhaps see automation and optimization potential at the end. That I can also say, I don't know, an alarm system that predicts that my stock will soon be empty and then directly triggers consequences. But that is still up in the air." – [S06]

However, the participants were not unanimous on this. Some spoke of added value, others were critical with regard to data protection. One participant sees a compromise in the possibility of offering such a data hub as an option. In this case, it must be ensured with the highest priority that others are excluded from access.

"I think this [data hub] lacks acceptance due to data protection, at least in German-speaking countries." – [S03]

"I wouldn't want that as a customer. Except when I can simply decide for myself: The connector is active between app 1 and app 2 and I can say where the data goes or with which systems I then want to work and it is not then automatically assumed. One fear is certainly that anyone could have access to it." – [S01]

With regard to data protection, SaaS providers would also like to have a means of **proof to their customers** in the context of the correct and error-free transfer of data between the various systems and applications.

"If you look at the issue of data protection, for example, the DMS app sent data to the ERP system. And

the ERP system got into mischief with it. Some kind of data breach or something. And then, if necessary, you could also use the platform to say: Look, on that day, we transferred this data to the ERP system on the basis of the order processing contract. You could just say that we acted within the scope of the order processing, but from then on we were out of it." – [S09]

4.3 Opportunities

One opportunity to overcome the problem concerning the lack of standardization, transparency, data protection, and security is seen in an **open-source approach** with a broad **ecosystem** of connected companies and a large **community** dedicated to the common definition of open standard formats.

"As many large companies as possible would have to get together and say "we're doing this". If this is done as part of an open-source-based approach, for example, everyone could participate and benefit from it. If you could export a standard format from such a solution, that would be a perfect side effect, also for the participating community." – [S09]

"[...] and especially open-source. There are very few people who have problems trusting it in terms of data protection, because it is transparent in that sense." – [S08]

Cloud Initiatives should also be actively involved to promote such an open-source approach and create awareness of its relevance among SaaS providers and businesses alike.

"There are such cloud initiatives in Germany and I would be very happy if they address as many [SaaS] providers and companies as possible in the direction of adaptation, because the basic idea of an open-source platform would be really great." – [S09]

Moreover, **niche services** should be integrated, as the existing platforms do not pay enough attention to them and usually do not offer them.

"I would just like such a platform to explicitly take care of relevant services, but also niche services. Because no one else offers them." – [S02]

Another point addressed is the creation of a **positive user experience**. According to the experts surveyed, some platforms lack a suitable usability and user experience concept. European platforms, in particular, have a lot of catching up to do compared to the competitors.

"The question is, for example, what does Zapier have that Flowground does not? Zapier is an American company with a high level of investment, while Flowground has a German team. And American companies have understood that they have to put user experience first. This is not done in many German and

European teams due to higher costs. The urgent recommendation is therefore to bring an employee into the team who does nothing but user experience." – [S05]

Regarding a central data hub, the issue of **Intelligent Process Automation & Optimization** became also apparent as this could support small and medium-sized companies within the digital transformation. The experts agree that this is an important topic for the future, which could sustainably increase the use and acceptance of the platforms by companies.

5 DISCUSSION

Reflecting on our research and the presented research questions, we aim to discuss the empirical results towards design implications for IPaaS that more broadly consider the business requirements. Thereby, the focus is on the main factors identified and those specific to IPaaS, against the background of identified opportunities. Therefore, generic factors such as support are less considered in this discussion.

5.1 Main Factors for Adopting IPaaS

5.1.1 Standardization

In order to promote the adoption of IPaaS platforms, the standardization of data models is required in particular, according to the interviews. This is also confirmed by Merkel et al. (2015) to reduce complexity of point-to-point integration.

To be able to offer a European alternative in the long term, a joint initiative is therefore needed to address the problem of standardizing data models and creating an adequate integration platform. Nevertheless, the experts surveyed assume that Europe can only act as an imitator here and that this will ensure a lack of economic interest with regard to the resistance to migration to the cloud, which is particularly prevalent among SMEs. This also slows down the consideration and further development of trends in the direction of intelligent process automation.

5.1.2 Usability and Variety of Connectors

SaaS providers and their customers expect a user-friendly and simply designed platform that provides a wide variety of connectors and constantly updates this offering. Furthermore, the expectation of fast and demand-oriented integration of specific connectors presents an IPaaS platform with the challenge of having to respond to individual customer requests

(Sen and Sen, 2018). For SaaS providers, however, this represents a critical point in order to be able to profit from the direct network effects on the platform as part of their own solution.

5.1.3 Data Protection, Security and Transparency

In Europe, in particular, the debate about data protection and data security is also being given a strong emphasis, which has so far kept many SaaS providers from adopting the established and predominantly American providers. Therefore, SaaS providers are demanding a European data integration solution that meets the providers' and their customers' requirements. However, the existing European approaches predominantly exhibit problems in usability and user experience compared to their American competitors. This is, according to our participants, caused by the too low willingness to invest in this direction.

5.2 Towards an open-source-based Approach

If there is no common strategy at the economic level with regard to a general standard, an open-source IPaaS solution could be a possibility to ensure a European standard through a common goal and an ecosystem of software providers, stakeholders, and a broad community, and to carry this standard into the SME sector. Through the open system, which can be seen by all, the demands for transparency and neutrality towards the existing providers could be taken into account.

Open source solutions can be "based on around solutions that could be pre-configured solutions, with a focus on implementation methodologies and diverse hosting options" (Grandhi and Chugh, 2012).

The suitability of open-source solutions for standardization has already proven to be a successful tool in several other domains. For example, it proved to be successful in the context of the definition of Decentralized Identity (DID) for blockchain solutions (Avellaneda et al., 2019).

However, the open-source approach does not offer an adequate solution for all reported issues. Due to the non-monetary structure of the open-source approach, a trade-off will have to take place between transparency and neutrality and the desired services. This applies in particular to the continuous development and individual provision of connectors. Therefore, in the sense of a multi-sided market (Abdelkafi et al., 2019), consideration should be given to the integration of an additional market participant in the form

of connector developers. Those, in return for monetary compensation, can keep the connectors up to date and develop individual connectors on request. This could provide additional indirect network effects on the platform and increase its attractiveness and acceptance.

6 CONCLUSION

In this paper, we have dealt with the current integration practices of software vendors and the perceived design-related barriers as well as drivers for the adoption of IPaaS.

In terms of practical implications, our results show that there is a significant need to create standardization of connectors and data models. According to our expert interviews, this could only be realized by a joint initiative of IPaaS and SaaS providers. In this context, the barriers of medium-sized companies in particular to migration to the cloud must also be overcome. To this end, the experts cite an open source approach as a possible solution, which, however, encounters problems in the field of tension between the expected individual and timely response to user requirements and the non-monetary, transparent structure. Therefore, such possible open source approaches as well as existing IPaaS platforms need to think about expanding to other market sides that support on-demand and customized connector provisioning. In addition, European IPaaS providers in particular should focus more on the usability of their solution in order to offer added value compared to SaaS providers and to be able to compete.

Our results are limited by the fact that the interview participants are exclusively German SaaS providers and not all industries in the SaaS sector are covered. Furthermore, further research should address the quantitative verification of the success factors as well as investigate the other market sides.

ACKNOWLEDGEMENTS

REFERENCES

Abdelkafi, N., Raasch, C., Roth, A., and Srinivasan, R. (2019). Multi-sided platforms.

Avellaneda, O., Bachmann, A., Barbir, A., Brenan, J., Dingle, P., Duffy, K. H., Maler, E., Reed, D., and Sporny, M. (2019). Decentralized identity: Where did it come from and where is it going? *IEEE Communications Standards Magazine*, 3(4):10–13.

Beimborn, D., Miletzki, T., and Wenzel, S. (2011). Platform as a service (paas). *Business & Information Systems Engineering*, 3(6):381–384.

Bell, E., Bryman, A., and Harley, B. (2018). *Business research methods*. Oxford university press.

Braun, S. and Deßloch, S. (2020). A classification of replicated data for the design of eventually consistent domain models. In *2020 IEEE International Conference on Software Architecture Companion (ICSA-C)*, pages 33–40. IEEE.

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2):77–101.

Celeste, E. (2021). Digital sovereignty in the eu: challenges and future perspectives. *Data Protection Beyond Borders: Transatlantic Perspectives on Extraterritoriality and Sovereignty*, pages 211–228.

Chakraborti, T., Isahagian, V., Khalaf, R., Khazaeni, Y., Muthusamy, V., Rizk, Y., and Unuvar, M. (2020). From robotic process automation to intelligent process automation. In *International Conference on Business Process Management*, pages 215–228. Springer.

Chilana, P. K., Ko, A. J., and Wobbrock, J. (2015). From user-centered to adoption-centered design: a case study of an hci research innovation becoming a product. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, pages 1749–1758.

Clement, R., Schreiber, D., Bossauer, P., and Pakusch, C. (2019). Internet-ökonomie, grundlagen und fallbeispiele der digitalen und vernetzten wirtschaft, 4. *Aufl., Berlin*.

Collis, J. and Hussey, R. (2013). *Business research: A practical guide for undergraduate and postgraduate students*. Macmillan International Higher Education.

Ebert, N., Weber, K., and Koruna, S. (2017). Integration platform as a service. *Business & Information Systems Engineering*, 59(5):375–379.

Evans, D. S. and Schmalensee, R. (2010). Failure to launch: Critical mass in platform businesses. *Review of Network Economics*, 9(4).

Grandhi, S. and Chugh, R. (2012). Implementation strategies for erp adoption by smes. In *International Conference on Future Generation Communication and Networking*, pages 210–216. Springer.

Han, Y. (2011). Cloud computing: case studies and total cost of ownership. *Information technology and libraries*, 30(4):198–206.

King, N. J. and Raja, V. (2012). Protecting the privacy and security of sensitive customer data in the cloud. *Computer Law & Security Review*, 28(3):308–319.

Kushwaha, N., Roguski, P., and Watson, B. W. (2020). Up in the air: Ensuring government data sovereignty in the cloud. In *2020 12th International Conference on Cyber Conflict (CyCon)*, volume 1300, pages 43–61. IEEE.

Li, Q., Wang, Z.-y., Li, W.-h., Li, J., Wang, C., and Du, R.-y. (2013). Applications integration in a hybrid cloud computing environment: Modelling and platform. *Enterprise Information Systems*, 7(3):237–271.

Lindley, J., Coulton, P., and Sturdee, M. (2017). Implications for adoption. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, pages 265–277.

Maguire, M. and Bevan, N. (2002). User requirements analysis. In *IFIP World Computer Congress, TC 13*, pages 133–148. Springer.

Mao, J.-Y., Vredenburg, K., Smith, P. W., and Carey, T. (2005). The state of user-centered design practice. *Communications of the ACM*, 48(3):105–109.

Marian, M. (2012). ipaas: Different ways of thinking. *Procedia Economics and Finance*, 3:1093–1098.

McIntyre, D., Srinivasan, A., Afuah, A., Gawer, A., and Kretschmer, T. (2020). Multi-sided platforms as new organizational forms. *Academy of Management Perspectives*, (ja).

Merkel, D., Santas, F., Heberle, A., and Ploom, T. (2015). Cloud integration patterns. In *European Conference on Service-Oriented and Cloud Computing*, pages 199–213. Springer.

Pezzini, M. and Lheureux, B. (2011). Integration platform as a service: moving integration to the cloud. *Gartner RAS Core Research Note G*, 210747:7.

Potočnik, M. and Juric, M. B. (2012). Integration of saas using ipaas. In *The 1st international conference on CLoud Assisted ServiceS*, page 35.

Sen, S. and Sen, S. (2018). ipaas–cloud solution for the cloud problem.

Themistocleous, M. and Morabito, V. (2012). How can user-centred design affect the acceptance and adoption of service oriented healthcare information systems? *International journal of healthcare technology and management*, 13(5-6):321–344.

Vuorenmaa, R. (2015). Monolith erp and current it-trends: Creating a step by step development model (ssdm) for existing monolith erp system to adapt to the current it-trends.

Weitzel, T., Wendt, O., and Westarp, F. V. (2000). Reconsidering network effect theory. *ECIS 2000 Proceedings*, page 91.

Zhou, B. (2013). Data integration as a service for applications deployment on the saas platform. In *2013 6th International Conference on Biomedical Engineering and Informatics*, pages 672–676. IEEE.