

## **Definition of the Enterprise Integration Platforms as a Service—Towards a Common Understanding**

Hyrnsalmi Sonja M.

This is a Author's accepted manuscript (AAM) version of a publication  
published by Springer, Cham

in International Conference on Software Business ICSOB 2022: Software Business : Lecture  
Notes in Business Information Processing

**DOI:** 10.1007/978-3-031-20706-8\_12

### **Copyright of the original publication:**

© 2022 The Author(s), under exclusive license to Springer Nature Switzerland AG

### **Please cite the publication as follows:**

Hyrnsalmi, S.M. (2022). Definition of the Enterprise Integration Platforms as a Service—Towards a Common Understanding. In: Carroll, N., Nguyen-Duc, A., Wang, X., Stray, V. (eds) Software Business. ICSOB 2022. Lecture Notes in Business Information Processing, vol 463. Springer, Cham. [https://doi.org/10.1007/978-3-031-20706-8\\_12](https://doi.org/10.1007/978-3-031-20706-8_12)

**This is a parallel published version of an original publication.  
This version can differ from the original published article.**

# Definition of the enterprise integration platforms as a service — Towards a common understanding

Sonja M. Hyrynsalmi<sup>1</sup>

LUT University, Lahti, 55800, Finland  
sonja.hyrynsalmi@lut.fi,  
WWW home page: <http://www.lut.fi>

**Abstract.** Integration platforms are modern way to governance, develop and deploy integrations, the connections and data transferring between systems. Integration platforms can be build as an in-house solution, but nowadays the more common way is to buy enterprise integration platforms as a service (EiPaaS/iPaaS) product. However, integration platforms are evolving fast and in our literature review we found out that the definition in the academic research about enterprise integration platforms as a service is outdated. For that, we created a new definition to describe more the capabilities, importance and evolution of enterprise integration platforms as a service by analyzing the leading EiPaaS product descriptions. Our results helps academics and companies gain further understanding about the enterprise integration platforms as a service solutions.

**Key words:** EiPaaS, iPaaS, Integrations, Integration platforms, Taxonomy

## 1 Introduction

The management of the integrations, connections between systems, has evolved during the years. At first integrations were build as a point-to-point implementations, simple connections between one system to another. Around the year 2000, the terms enterprise application integrations (EAI) and enterprise service bus (ESB) become more popular int the field of software engineering [1, 2, 3]. At the same time integration environments moved from the on-premises for more hybrid environment, combining on-premises and cloud, or fully to the cloud-environment [4].

More efficient integration management solutions are needed, as the number of the integrations are growing as the world is digitalizing. The industry has already showed that enterprise platforms as a service is successful product for their need, as the 2020 iPaaS market generated 3.47 billion dollar in revenue but also grew by 38.7% compared to the year 2019 [5].

For this reason, there has been coming new enterprise integration platforms as a service products, usually referred as acronyms iPaaS or EiPaaS. These products are usually cloud-based platforms, where one can manage, deploy and develop

integrations between systems. They support real-time processing, are scalable and have usually graphical user interface to ease the use. The architecture in these platforms is usually distributed and they can work both in on-premises and cloud [6, 7, 3].

Choosing the right enterprise integration platforms as a service product or implementations model is not easy [8, 9]. There is still a lack of wider research around the topic and past research works have focused on a lot on just technical details [3]. Lately there has been more empirical research published around the enterprise integration platform as a service [10, 8]. In our research we want to build a common understanding about the definition of the enterprise platforms as a service. Our motivation is also to find out what kind of features are associated to the enterprise integration platforms as service and is there difference between researchers and practitioners.

We are approaching our topic via two research questions:

- RQ1 Are there any differences between how 'enterprise integration platforms as a service' is defined in the literature and by practitioners?
- RQ2 Are there any differences on what kind of features and capability definitions are associated to the 'enterprise integration platforms as a service' in the research and by the practitioners?

For answering our research questions we go through a scoping review both academic literature about enterprise integration platforms as a service as well the feature definitions used by the leading enterprise integration platforms companies in their products.

The rest of the paper is structured as following: In the Chapter 2 we go through the background research about terminology and the more specific definition about the enterprise integration platform as a service. Chapter 3 goes through our scoping review research process and Chapter 4 is for the results. Chapter 5 is a discussion chapter with the limitations and future research remarks. Chapter 6 is ending this research by conclusions and Chapter 7 is for acknowledgements.

## 2 Background

Software industry is a fast-paced field where concepts and technologies are changing rapidly. Therefore, it is not surprise that sometimes it is also hard to keep up with the change in terminology in the industry. Furthermore, some of the researchers have pointed out that even misuse and mixing of terms can lead to the meaning of the terms changing or becoming vague altogether [11]. It is stated that in the software engineering, the understanding of the terms can differ between academics and the industry professionals. there can be also misunderstanding or misuse inside the field or in some point there is a change that some terms can become as living deaths, *Zombie* terms, because they have been used so vaguely and carelessly. [12, 13, 11]

Software engineering is not the only field which is suffering from the terminological challenges. In the management research, there has been already decades discussion about 'fads', terms which are borrowed from some other field or setting, rely on jargon and are presented either as complex or deceptively simple [14]. Fads frequently also become discredit soon after they have been widely propagated [15].

The term 'integration' has a long history in a relatively short software engineering research field. However, as a term integration also has its own terminological challenges although it is a common term in the enterprise system research [16]. Still, enterprise integration platform as a service is easier to categorize, as it is a subscription type service and therefore it belongs to the aaS, as a service, family [17]. In this, enterprise integration platforms as a service follow the wider trend in the software engineering, where software business has moved from software-products weighted industry to a service industry [18].

However, any of the terminological challenges does not seem to interfere with the success of enterprise integration platform as a service: Overall iPaaS market is growing fast and new competitors come every year to the market. In the Gartner's recent forecasts [5], it is expected that iPaaS market will exceed 9 billion dollars in revenue by 2025. Already in 2020 iPaaS market generated 3.47 billion dollars in revenue and grew by 38.7% compared to the year 2019. These numbers give insight that there is a growing need for the integration management and for that reason it is important to understand how and why enterprise integration platforms as a service is understood both in academia and industry.

### 3 Research Process

In this research we use scoping review method. Scoping reviews are often performed to examine and clarify definitions that are used in the literature. [19] For that reason, they are better for our research motivation than, for example, systematic literature review (SLR). SLR is also a popular review method in the software engineering field but focuses more on summarising previous research findings and finding research gaps [20].

The research process used in this study consists of two phases: a review of academic work and a review of the popular tools. These phases are discussed in the following subsections.

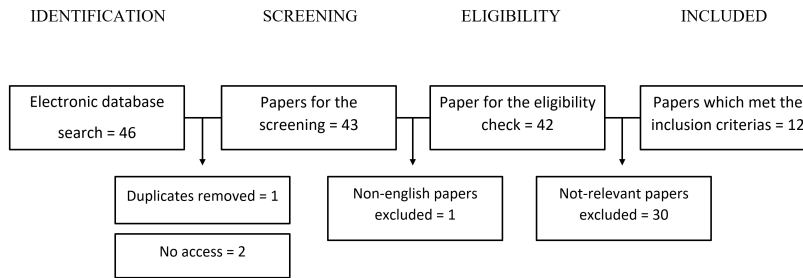
#### 3.1 Review on the academic EiPaaS/iPaaS literature

In our research we are approaching the definition of enterprise integration platform as a service via academic literature and leading EiPaaS product descriptions. The first phase of the research was to conduct a scoping review on iPaaS and EiPaaS research. The search was conducted in July 2022 from the academic

research database Scopus. Scopus is one the largest research databases which offers accurate search tools to go through academic publications. The search query was adjusted to go through the title, abstract and the keywords.

The search query was adjusted to be specific one, because 'integration platform' was a common term also in management and organizational research areas, but would not mean the same technical solution. The search query used for this research was:

TITLE-ABS-KEY ( "iPaaS" OR "EiPaaS" OR "Integration Platform as a Service" OR "Enterprise Integration Platform as a Service" )



**Fig. 1.** Inclusion and exclusion process from the academic research papers selected to the review

Overall 46 documents were found by this search query. Then we went through the inclusion and exclusion phase, described in the Figure 1. The inclusion and exclusion criteria for this phase were following:

**Exclusion:**

- Duplicates
- Non-english research papers
- Conference proceedings summaries, editor notes etc.
- Not accessible research papers
- Paper not about iPaaS or EiPaaS

**Inclusion:**

- Original research
- Peer-reviewed, accessible research study
- Short/Full conference papers, book chapter, journal article
- Paper is about iPaaS/EiPaaS

### 3.2 Review on leading EiPaaS product descriptions

The second phase of the scoping review was to analyse the leading enterprise integration platform as a service companies and their product definitions. These

leading companies were chosen because they are presented in the consulting and research company Gartner’s yearly report called ‘Magic Quadrant for Enterprise Integration Platform as a Service’ [6]. In this report Gartner divides their Magic Quadrant for Enterprise Integration Platform as a Service (EiPaaS) (formerly Magic Quadrant for integration platforms as a service (iPaaS)) to four categories, which we describe with their definitions in the Figure 22.

2022 MQ	Leaders	Challengers	Visionaries	Niche players
<b>Products</b>	<ul style="list-style-type: none"> <li>Boomi AtomSphere Platform</li> <li>Informatica Intelligent Cloud Services (IICS)</li> <li>Microsoft Azure Integration Services (AIS)</li> <li>Mulesoft Anypoint Platform</li> <li>Oracle Integration</li> <li>SAP Integration Suite</li> <li>TIBCO Cloud Integration</li> <li>Workato Workspace</li> </ul>	<ul style="list-style-type: none"> <li>Talend</li> <li>Tray.io Platform</li> </ul>	<ul style="list-style-type: none"> <li>IBM Cloud Pak for Integration as a Service Jitterbit Harmony</li> <li>Snaplogic Intelligent Integration Platform (IIP)</li> <li>Software AG webMethods.i</li> </ul>	<ul style="list-style-type: none"> <li>Celigo Integrator.io</li> <li>Huawei ROMA connect</li> <li>Integromat</li> </ul>
<b>Definition</b>	<ul style="list-style-type: none"> <li>Have an insightful understanding of the EiPaaS market</li> <li>Have a reliable record of strong execution, an ability to influence the market’s direction and an ability to attract and keep a following.</li> <li>Continues to expand their capabilities and bring significant value to customers by addressing new types of business problems.</li> </ul>	<ul style="list-style-type: none"> <li>Offer mature or evolving offerings that have proven value in multiple integration scenarios.</li> <li>May lack a coordinated strategy for the various products in their platform portfolio, or their platform roadmap may be less robust than the Leaders.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate a strong understanding of emerging technology and business trends by aligning their EiPaaS capabilities with current demand.</li> <li>May lack recognition or credibility beyond their customer base or particular domain.</li> </ul>	<ul style="list-style-type: none"> <li>Specialize in a vertical, geographical or functional area and only address a segment of the broader EiPaaS market.</li> <li>Potentially compete with companies from the domain-specific iPaaS market that are targeting this sector.</li> </ul>

**Fig. 2.** Magic Quadrant for Enterprise Integration Platform as a Service products and category definitions, modified from the original Magic Quadrant 2022 [6]

The report is popular both in research use and with the practitioners. It is also one of the best listing about features of the enterprise integration platform as a service products.

In the 2021 edition of the Magic Quadrant, there were 17 companies. Two new companies were added to the list (Integromat and Huawei) and two were dropped from the list (Adaptris and Cloud Elements). Authors of the Magic Quadrant emphasize that a vendor’s dropping out from the list does not necessarily indicate that they have changed their opinion of that vendor. Moreover, they see that it may be a reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

Overall, it is important to remember that these 17 products are not representing all of the EiPaaS products in the world. As a EiPaaS Magic Quadrant evaluation criteria Gartner uses eight weighted criterias:

- Market Understanding → High weighting
- Marketing Strategy → High weighting
- Sales Strategy → Medium weighting

- Offering (Product) Strategy → High weighting
- Business Model → Low weighting
- Vertical/Industry Strategy → Medium weighting
- Innovation → High weighting
- Geographic Strategy → Medium weighting

When reading the original Magic Quadrant picture, it is also important to realize that Gartner simplifies products in the figure (For example Microsoft Azure Integration Services is shortened just for 'Microsoft'). That can create some confusion on the product names and companies, as many of the vendors has multiple products,

In this research we are focusing on eight Leader products from the Gartner's list:

- Boomi AtomSphere Platform
- Informatica Intelligent Cloud Services (IICS)
- MMicrosoft Azure Integration Services (AIS)
- Mulesoft Anypoint Platform
- Oracle Integration
- SAP Integration Suite
- TIBCO Cloud Integration
- Workato Workspace

In the next section we are presenting the results of the scoping review and forming an updated definition of the enterprise integration platforms as a service.

## 4 Results

### 4.1 Phase 1: Definition of enterprise integration platforms as a service from the literature

As a results of our inclusion and exclusion of academic enterprise integration platform as a service papers, we got 12 papers which were matching our research criterias (Figure 3).

When going through the definitions, citations and citations sources (Figure 4), we found out that there were nine different sources used for the iPaaS definition and one from this nine sources was also used for the EiPaaS definition [6]. Three of the sources were blog posts from iPaaS vendors, and one of them was not anymore accessible (Mulesoft blog post used in the paper P3). Two of the citations were from the academic research papers, two from the Magic Quadrant Report from different years and one, the most earliest citations, was also from Gartner's report, published by Pezzini et al [21].

Gartner's reports were the main source for the enterprise integration platforms as a service definition and the second popular source was a paper from Serrano et al. [7]

ID	Authors	Title	Year	Venue
P1	Bolloju N., Murugesan S.	Cloud-based B2B systems integration for small-and-medium-sized enterprises	2012	ACM International Conference Proceeding Series
P2	Jafarov N., Lewis E.	Reinterpreting the principles of SOA through the cybernetic concepts of VSM to design the ESB as iPaaS in	2015	Proceedings of the 2015 Science and Information Conference, SAI 2015
P3	Suzic B.	User-centered security management of API-based data integration workflows	2016	Proceedings of the NOMS 2016 - 2016 IEEE/IFIP Network Operations and Management Symposium
P4	Ebert N., Weber K., Koruna S.	Integration Platform as a Service	2017	Business and Information Systems Engineering
P5	Rosa-Sequeira F., Basto-Fernandes V., Frantz R.Z.	Enterprise application integration: Approaches and platforms to design and implement solutions in the cloud	2017	Advances in Engineering Research
P6	Srimathi H., Krishnamoorthy A.	Integration of student system using iPaaS	2019	International Journal of Scientific and Technology Research
P7	Cestari R.H., Ducos S., Exposito E.	IPaaS in Agriculture 4.0: An Industrial Case	2020	Workshop on Enabling Technologies: Infrastructure for Collaborative Enterprises, WETICE
P8	Zhang X., Yue W.T.	Integration of on-premises and cloud-based software: The product bundling perspective	2020	Journal of the Association for Information Systems
P9	Frantz R.Z., Corchuelo R., Basto-Fernandes V., Rosa-Sequeira F., Roos-Frantz F., L. Arjona J.	A cloud-based integration platform for enterprise application integration: A Model-Driven Engineering approach	2021	Software - Practice and Experience
P10	Neifer T., Lawo D., Bossauer P., Gadatsch A.	Decoding IPaaS: Investigation of user requirements for integration platforms as a service	2021	Proceedings of the 18th International Conference on e-Business, ICE-B 2021
P11	Hyrnynsalmi S.M., Koskinen K.M., Rossi M., Smolander K.	Towards the utilization of cloud-based integration platforms	2021	2021 IEEE International Conference on Engineering, Technology and Innovation.
P12	Hyrnynsalmi S.M.	The State-of-the-Art of the Integration Platforms as a Service research	2022	5th International Workshop on Software-Intensive Business, IWSiB 2022

Fig. 3. Result of the scoping review of the enterprise integration platforms as a service research

Citation source	Paper ID	Citation	
Pezzini et al.	P1, P2, P3, P10	"A suite 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 organisations."	iPaaS
Mulesoft Blog post, not accessible anymore	P3	"A platform for building and deploying integrations within the cloud and between the cloud and enterprise. With iPaaS, users can develop integration flows that connect applications residing in the cloud or on-premises and then deploy them without installing or managing any hardware or middleware."	
The Magic Quadrant Report from 2017	P4, P9	"Enterprise Integration Platform as a Service (iPaaS) according to two parameters: ability to execute and completeness of vision. The former assess the ability of iPaaS providers to deliver platforms that respond to the expectations of software engineers and ensure their integration projects succeed. The later assess the capacity of iPaaS providers to support emerging requirements and lead the market and at the same time grow as a profitable and self-sustaining business."	
Serrano et al.	P5, P11, P12	"iPaaS is a suite of cloud services that enable users to create, manage, and govern integration flows connecting a wide range of applications or data sources without installing or managing any hardware or middleware."	
TIBCO 2018	P6	"The iPaaS comprise of set of automated tool, which helps in connecting software from different environment and deployment."	
Mulesoft Blog post, 2018	P7	"iPaaS is a cloud-integration platform service that not only offers connectivity with cloud services but also provides a secure method of accessing on-premises software."	
Techtarget blog post, 2017	P7	"iPaaS provides prebuilt connectors, business rules, maps, and transformations facilitating integration flows and application-programming interface management."	
Ebert et al.	P8, P12	"A suite of cloud services that enables managing and integration flows by connecting a wide range of applications or data sources without manually installing or managing any hardware or middleware."	EiPaaS
The Magic Quadrant Report from 2021	P12	"A cloud-based platform solution which allows integration of multiple systems and solutions in different environments."	
The Magic Quadrant Report from 2021	P12	"Gartner emphasizes that EiPaaS implementations are looking more strategic integration platform use for multiple, often business-critical integration projects"	

Fig. 4. Citations sources, citing papers and the definitions used in the citation for iPaaS and EiPaaS in the Academic literature

From the Gartner’s reports, the report by Pezzini et al. [21], is the earliest mention of enterprise integration platforms as a service. It was cited by four of the papers [P1], [P2], [P3] and [P10]. The definition emphasizes that iPaaS is a suite of cloud services and the governance, deployment and development of the integration on the iPaaS platforms.

The Mulesoft Blog post, which is not anymore available, was referred in the paper [P3] and this blog post seems to follow the same idea as Pezzini’s



definition. It also underlines that there is no need for any middleware or hardware in between when using the iPaaS.

The citations from the Magic Quadrant Report 2017 [6], used by [P4] and [P5], states already more clearly that iPaaS is a business-critical systems which support profitable and self-sustaining business. This is also the first source which uses a 'enterprise integration platform as a service' name, which is just shortened 'enterprise iPaaS'. In the latest report's Gartner has changes the acronym to the EiPaaS and do not use iPaaS acronym anymore.

Papers [P5] and [P11,P12] used Serranon et al. [7] definition of the enterprise integration platform as a service, which is close to the Pezzini et al. and 2017 Magic Quadrant definition. TIBCO's [27] definition used in the paper [P6] highlights also the automation side of iPaaS.

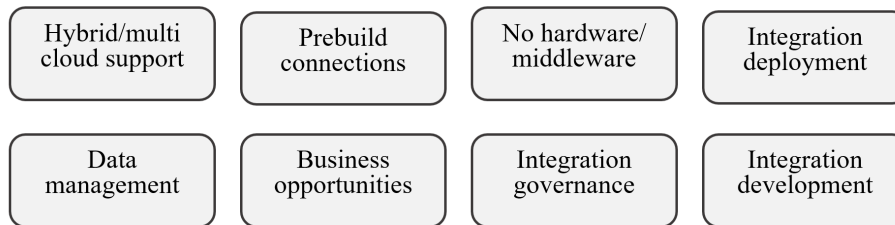
In the meantime, the another Mulesoft's Blog post [29] from the year 2018 continues with the same hybrid environment capabilities and service viewpoints as previous definitions and is used as a citation in the paper [P7]. Techtarget's blog post [31] also add to the TIBCO's automation viewpoint the application-programming interface (API) addition.

Research paper of Ebert et al. [3] is a clear and compact definition for iPaaS, which combines a lot from previous sources and both [P8] and [P10] used it as a iPaaS definition citation.

The enterprise integration platforms as a service citations used in the papers [P11] and [P12] are not direct quotations, but they highlight the Magic Quadrant Report from the year 2021 [6] moving toward the EiPaaS term, as the [P12] is also the only paper which uses the new EiPaaS acronym.

However, it seems to be that there is a shared understanding about what is iPaaS/EiPaaS in the research. The movement from the iPaaS to the EiPaaS acronym was not yet so clearly showed in the research, but Gartner has used that acronym only for couple years now. Furthermore, it is important to understand that iPaaS and EiPaaS means almost the same, but it seems to be that Gartner has wanted to underline the enterprise side of iPaaS more and evolved the acronym.

According our scoping review from the enterprise integration platforms as a service related research papers, we formed a product capabilities and features list of enterprise integration platforms as a service, illustrated in Figure 5.



**Fig. 5.** Enterprise integration platforms as a service product capabilities and features according to the research

We found out that in the research the integration governance, deployment and development capabilities were raised up in the enterprise integration platform as a service definitions. The pre-built connections, hybrid or multicloud supported environment, opportunities for new business ideas, data management and the no need for hardware or middleware were also shared among the enterprise integration platform as a service descriptions in the research.

## 4.2 Phase 2: Analysis on enterprise integration platforms as a service product's own descriptions

Although Gartner has started using more specific acronym from the enterprise integration platforms as a service, EiPaaS, it seems to be that most of the companies which are represented as a leading EiPaaS companies in the Garner's Magic Quadrant for enterprise integration platforms as a service, still use the acronym iPaaS.

Especially Mulesoft [33], Boomi [34], Informatica [35], TIBCO [27], SAP [36] and Workato [37] used as a definition either full term 'enterprise integration platforms as a service' or 'iPaaS' in their integration service webpages and blog posts (see Figure 6).

iPaaS as a term seems to be taken positively in the vendor side. Company Boomi, with the product Boomi AtomSphere, highlights in the top of their web page proudly:

*"Not only did we invent iPaaS, we continue to push the boundaries and lead the evolution of what iPaaS means and the value it brings to your organization."* [34]

However there were couple companies which were not using the iPaaS term so visible in their web page: Microsoft [38] focused more on talking about integration services from the viewpoint of API management, service bus and data factory. Oracle in the other hand was talking mostly about 'cloud integrations' [39].

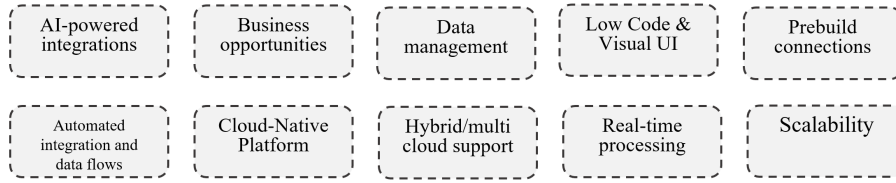
Only SAP was talking about iPaaS and EiPaaS as a separate terms in their web page [36]. For their EiPaaS definition they used direct quotation from Pezzini et al. [40]:

*An enterprise integration platform as a service (EiPaaS) is a suite of cloud services that addresses a variety of scenarios, including application and data integration, as well as some combination of process, ecosystems, mobile, AI-enabled systems, and IoT integration and API management and digital integration hub capabilities.*

When looking through the product capability and feature definitions from the product web pages (Figure 7) we found out that common features and definitions used were scalability, low-code and Visual UI, AI-powered integrations, real-time processing, cloud-native platform, automated integration and data flows, business opportunities, hybrid and multicloud support, prebuild connections and data management. From these the last four were same with the definition findings from the academic research papers.

Company	Product	iPaaS/EPaaS Description	Product capabilities
Boomi	Boomi AtomSphere Platform	"Integration Platform as a Service (iPaaS) enables companies to achieve their digital transformation goals faster by unifying application and data integration, API management, workflow automation, B2B/EDI partners, data catalog and preparation, and master data management in a single, scalable, cloud-based solution."	Cloud-native Platform, Distributed Architecture, Low Code & Visual UI, Pervasive Intelligence, Unified Platform, Support for Varied Skill Levels, Enterprise Grade Security
Informatica	Informatica Intelligent Cloud Services (IICS)	"Integration platform as a service (iPaaS) is a suite of cloud-native services that enables organizations to perform cloud-native data integration, application and API integration and data management via private, public, hybrid or multi-cloud. Companies often use iPaaS for exchanging common data between and among a company's applications, for example, to use the same source data within both ERP and CRM systems."	Cloud-native services, API integration and data management, Different environments
Microsoft	Microsoft Azure Integration Services (AIS)	" A cloud-based iPaaS tool to modernize integration"	Integration for application, data and processes, On-premises and cloud environments, Consistent and scalable business workflows, APIs for developer, New opportunities and business models.
Mulesoft	Mulesoft Anypoint Platform	"Simply put, an iPaaS is a cloud integration platform as a service, enabling connectivity to SaaS and cloud services and providing a secure method of accessing on-premises applications behind a firewall. An iPaaS can solve the problem of cloud silos by providing businesses a way to integrate cloud-based services with each other as well as with on-premises enterprise applications in a hybrid integration model. iPaaS is emerging as the next-generation integration technology, gradually replacing traditional forms of integration middleware. iPaaS will provide the last essential component to realizing the benefits of a cloud architecture."	Hybrid and multicloud environments, prebuilt connectors, Low-code customization, centralized integration management,
Oracle	Oracle Integration	"iPaaS adoption growing to handle integrations in cloud architectures"	Automate business & processes, visual environment, real time processes, analytics
SAP	SAP Integration Suite	"Integration platform as a service (iPaaS) delivers a cloud service for application, data, process, and service-oriented architecture (SOA) integration scenarios. It's a multitenant platform that supports cloud-to-cloud, cloud-to-on-premise, on-premise-to-on-premise, and B2B integration. It supports real-time integration and scales to meet the high-volume demands of mobile, extract, transform, and load (ETL), and electronic data interchange (EDI) environments."	Management of Data streams, API-led integrations, Real-time processing, DevOps support, cloud-native environment, AI-assisted B2B integrations, EDI libraries, AI-powered development and recommendations
TIBCO	TIBCO Cloud Integration	"An integration platform-as-a-service, or iPaaS, is a cloud-based service that connects your applications and data. An iPaaS simplifies integration activities, making it easy to connect applications and data deployed both in cloud environments and your data centers. With an iPaaS, you can build and deploy integrations in the cloud without having to install or manage any middleware or hardware."	Graphical Development and low-code environment, Library of connectors, deployment & monitoring & management tools, Hybrid environment, Automation, Application integration, Data migration
Workato	Workato Workspace	"iPaaS is a cloud-based platform that lets you connect your systems, whether they live on-prem or in the cloud. Once connected, the systems can share data securely via API endpoints, allowing teams that use different tools to easily access the same types of data. All the while, it can provide data security through API policies, such as authentication and authorization. "	Automation, centralized management, low-code/no-code interface, prebuilt connections, scalability

Fig. 6. Definitions of enterprise integration platforms as a service according to the Leading enterprise integration platforms as a service companies



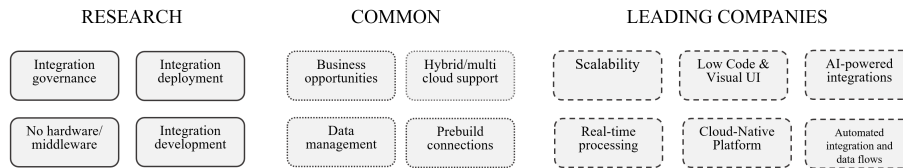
**Fig. 7.** Product capabilities and features of the leading enterprise integration platforms as a service products

**4.3 Definition for the enterprise integration platform as a service**

In their recent Magic Quadrant for enterprise integration platforms as a service report [6], Gartner defines enterprise integration platform as a service (EiPaaS) as a:

*Combination of integration technology functionalities that are delivered as a suite of cloud services and designed to support enterprise-class integration initiatives. An EiPaaS provider offers high availability, disaster recovery, security, SLAs and technical support. It also enables users to develop and execute multiple integration scenarios by providing support for multiple personas. The EiPaaS vendor must fully manage platform operations, patching and upgrades. EiPaaS offerings are public, stand-alone products that subscribers use directly, as opposed to integration capabilities embedded in another offering (such as a SaaS application or application PaaS).*

What we can see when we combine the leading enterprise integration platform as a service product definitions and definitions found from the research literature (Figure 8) is quite close. High availability, disaster recovery, security, SLAs and technical support, multiple personas and demands for the EiPaaS vendors are missing but the idea is the same.



**Fig. 8.** Common capabilities of enterprise integration platforms as a service products

The definitions from the research were missing scalability, real-time processing, low-code or no-code & Visual UI, Cloud-native platform, Automated integration & data flows and AI-powered integrations when compared to the leading

enterprise integration platform as a service product definitions. What was common was Business opportunities, Hybrid or multicloud support (Which is almost the same as Cloud-native platform), Data management and pre-built connection. From the research side the integration governance, integration deployment, integration development and no need for hardware or middleware were especially pointed out.

When combining a compact definition of the enterprise integration platform as a service, from the results of the scoping review, it would be following:

*Enterprise integration platform as a service is a hybrid and multicloud environment with pre-built connection and data management. It enables business opportunities with automated and AI-powered integrations, scalability and real-time processing. It offers Cloud-native, Low-code platform where one can deploy, develop and governance integration without any hardware or middleware needed.*

## 5 Discussion

Gartner has dominated the definition and the evolution of the Enterprise integration platform as a service term — that is clear at least from our research. Furthermore, the enterprise integration platform as a services has not gained popularity in the research, but vendors seems to taken at least the acronym iPaaS in the use.

However, it would still be beneficial to ask could EiPaaS/iPaaS be described as one of the 'fads' terms - terms which has taken to use and they have not been successful [14, 15].

### 5.1 Key findings

Our research showed at least that enterprise integration platform as a service does not qualify the idea that it would misused or misunderstood in the literature and in that way to be described as one of the 'fads' terms. There was also no sign that it would be turning as a 'zombi-term' [11, 41, 42] without real content, as there were so much similarities in the definitions both in the researchers and the practitioner's descriptions. However, we found out that researchers definition of enterprise integration platform as a service was little bit outdated compared to the practitioners definitions.

One notion was about the movement from the iPaaS acronym to the EiPaaS acronym: If a big vendor as SAP uses the EiPaaS and iPaaS as a separate terms can maybe tell that the difference between terms is not yet clear. Gartner has not opened in their Magic Quadrant reports why they have changed the acronym, but as this research showed there is not much of difference between iPaaS and EiPaaS term and that the academic or industry people have not adapted the term.

It could be that integrations overall are not so attractive topic in the research area. However, as the number of integrations is growing and their management and governance is getting harder, maybe they are more valued in the research in the future. Especially the AI-powered integrations and data utilization could be topic which are interesting for the researchers. Therefore we hope that both practitioners and researchers will find help with our enterprise integration platform as a service definition.

## 5.2 Limitations and future research

The limitations of our study lies in the research method we used. Scoping review method is a method for scoping the definitions, as our motivation in this research was. However, if we would like to see that would there be some other term used to describe integration management and integration platforms, the scoping review method would not be the best possible method to use.

In the future research we could focus on the all of the companies represented in the Magic Quadrant and see, if there is for example some new features and definitions used in the 'Visionaries' or 'Challenger' companies.

## 6 Conclusions

In this research we conducted a scoping review of the definition of 'enterprise integration platform as a service' term. We found out that the research and the industry has similar understanding about the term, but research are has not yet added the newest features such as low-code environment or AI to their definitions. As a result, we formed a modified definition for the enterprise integration platforms as a service, to help both researchers and practitioners approach the topic properly.

## Acknowledgements

This research was supported by Academy of Finland, project #328737: *Strategic approach to scalable platform based software and systems development* and the Finnish Foundation for Technology Promotion.

## References

1. Linticum, D.S.: Enterprise application integration. Addison-Wesley Professional (2000)
2. Chappell, D.A.: Enterprise service bus. " O'Reilly Media, Inc." (2004)
3. Ebert, N., Weber, K., Koruna, S.: Integration platform as a service. *Business & Information Systems Engineering* **59**(5) (2017) 375–379

4. Kleeberg, M., Zirpins, C., Kirchner, H.: Information systems integration in the cloud: scenarios, challenges and technology trends. In: Future business software. Springer (2014) 39–54
5. Dsilva, V., Wurster, L., Biscotti, F., Bhullar, B., Medford, B., Menon, S., Upadhyay, S., Yadav, R., Mukhyala, C., Schumacher, R.: Forecast: Enterprise infrastructure software, worldwide, 2019-2025. Technical report, Gartner Research (2021)
6. Thoo, E., Guttridge, K., Bhullar, B., Pillai, S., Singh, A.: Magic quadrant for enterprise integration platform as a service. Technical report, Gartner Research (2021)
7. Serrano, N., Hernantes, J., Gallardo, G.: Service-oriented architecture and legacy systems. *IEEE software* **31**(5) (2014) 15–19
8. Hyrynsalmi, S.M., Koskinen, K.M., Rossi, M., Smolander, K.: Towards the utilization of cloud-based integration platforms. In: 2021 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC), IEEE (2021) 1–8
9. Hyrynsalmi, S.M.: The state-of-the-art of the integration platforms as a service research. In: 2022 IEEE/ACM International Workshop on Software-Intensive Business (IWSiB), IEEE (2022) 17–22
10. Neifer, T., Lawo, D., Bossauer, P., Gadatsch, A.: Decoding ipaas: Investigation of user requirements for integration platforms as a service. In: Wijnhoven, van Sinderen (Eds.): Proceedings of the 18th International Conference on e-Business, ICE-B 2021, July 7-9, 2021, SCITEPRESS-Science and Technology Publications (2021) 47–55
11. Hyrynsalmi, S., Hyrynsalmi, S.M.: Ecosystem: A zombie category? In: 2019 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC), IEEE (2019) 1–8
12. Suominen, A., Seppänen, M., Dedehayir, O.: A bibliometric review on innovation systems and ecosystems: a research agenda. *European Journal of Innovation Management* **22**(2) (2019) 335–360
13. Bazarhanova, A., Yli-Huumo, J., Smolander, K.: How do practitioners understand external platforms and services? a grounded theory investigation. In: Advances in Information Systems Development. Springer (2019) 113–131
14. Birnbaum, R.: The life cycle of academic management fads. *The journal of higher education* **71**(1) (2000) 1–16
15. Eccles, R.G., Nohria, N., Berkley, J.D.: Beyond the hype: Rediscovering the essence of management. Beard Books (2003)
16. Gulledge, T.: What is integration? *Industrial Management & Data Systems* (2006)
17. Duan, Y., Fu, G., Zhou, N., Sun, X., Narendra, N.C., Hu, B.: Everything as a service (xaas) on the cloud: origins, current and future trends. In: 2015 IEEE 8th International Conference on Cloud Computing, IEEE (2015) 621–628
18. Cusumano, M.A.: The changing software business: Moving from products to services. *Computer* **41**(1) (2008) 20–27
19. Munn, Z., Peters, M.D., Stern, C., Tufanaru, C., McArthur, A., Aromataris, E.: Systematic review or scoping review? guidance for authors when choosing between a systematic or scoping review approach. *BMC medical research methodology* **18**(1) (2018) 1–7
20. Kitchenham, B.: Procedures for performing systematic reviews. Keele, UK, Keele University **33**(2004) (2004) 1–26
21. Pezzini, M., Lheureux, B.: Integration platform as a service: moving integration to the cloud. Gartner RAS Core Research Note G **210747**(7) (2011)

22. Bolloju, N., Murugesan, S.: Cloud-based b2b systems integration for small-and-medium-sized enterprises. In: Proceedings of the International Conference on Advances in Computing, Communications and Informatics. (2012) 477–480
23. Jafarov, N., Lewis, E.: Reinterpreting the principles of soa through the cybernetic concepts of vsm to design the esb as ipaas in the cloud. In: 2015 Science and Information Conference (SAI), IEEE (2015) 850–858
24. Suzic, B.: User-centered security management of api-based data integration workflows. In: NOMS 2016-2016 IEEE/IFIP Network Operations and Management Symposium, IEEE (2016) 1233–1238
25. Rosa-Sequeira, F., Basto-Fernandes, V., Frantz, R.Z.: Enterprise application integration: Approaches and platforms to design and implement solutions in the cloud
26. Frantz, R.Z., Corchuelo, R., Basto-Fernandes, V., Rosa-Sequeira, F., Roos-Frantz, F., L. Arjona, J.: A cloud-based integration platform for enterprise application integration: A model-driven engineering approach. *Software: Practice and Experience* **51**(4) (2021) 824–847
27. TIBCO: What is ipaas <https://www.tibco.com/reference-center/what-is-ipaas>, Accessed August 2022.
28. Srimathi, H., Krishnamoorthy, A.: Integration of student system using ipaas. *International Journal of Scientific and Technology Research* **8**(9) (2019) 602–606
29. Mulesoft: What is ipaas? gartner provides a reference model <https://www.mulesoft.com/resources/cloudhub/what-is-ipaas-gartner-provides-reference-model>, Accessed August 2022.
30. Zhang, X., Yue, W.T.: Integration of on-premises and cloud-based software: the product bundling perspective. Forthcoming in *Journal of the Association for Information Systems* (2020)
31. techtarget: ipaas <https://searchcloudapplications.techtarget.com/definition/iPaaS-Integration-platform-as-a-service>, Accessed August 2022.
32. Cestari, R.H., Ducos, S., Exposito, E.: ipaas in agriculture 4.0: An industrial case. In: 2020 IEEE 29th International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE), IEEE (2020) 48–53
33. Mulesoft: Integration platform as a service <https://www.mulesoft.com/resources/cloudhub/ipaas-integration-platform-as-a-service>, Accessed August 2022.
34. Boomi: What is ipaas <https://boomi.com/platform/what-is-ipaas/>, Accessed August 2022.
35. Informatica: ipaas definition <https://www.informatica.com/services-and-training/glossary-of-terms/ipaas-definition.html>, Accessed August 2022.
36. SAP: Integration suite <https://www.sap.com/products/technology-platform/integration-suite.html>, Accessed August 2022.
37. Workato: ipaas versus etl <https://www.workato.com/the-connector/ipaas-versus-etl/>, Accessed August 2022.
38. Microsoft: How modern integration platform-as-a-service (ipaas) enables business strategy <https://idcdocserv.com/download/US48618721.pdf>, Accessed August 2022.
39. Oracle: Oracle ipaas <https://www.oracle.com/pe/news/announcement/oracle-gartner-mq-ipaas-data-integration-092520/>, Accessed August 2022.
40. Pezzini, M., Lheureux, B.: Technology insight for enterprise integration paas. *Gartner Research Notes* (2019)



41. Pritchard, A.J.: Beck, Ulrich (1944–2015). In Wright, J.D., ed.: *International Encyclopedia of the Social & Behavioral Sciences (Second Edition)*. Second edition edn. Elsevier, Oxford (2015) 396–400
42. Beck, U., Beck-Gernsheim, E.: *Zombie categories: Interview with ulrich beck*. In: *Individualization: Institutionalized Individualism and Its Social and Political Consequences*. SAGE Publications (2002)