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Pathway to the successful integration platform management

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Abstract

All industrial domains are currently digitalizing in a fast pace. As a consequence, the amount of integrations, i.e. connections between different digital systems, are increasing. In addition, the growing number of integrations is causing scalability, stability and system outage problems which usually affect directly to the performance of the company. Therefore, new integration management solutions are developed and offered.

In this dissertation research, we interviewed 20 software vendor professionals and 20 clients, who have gone through an integration platform project recently. Using grounded theory methodology, we aim to identify what kind of risks and responsibilities there are in the integration platform projects. Our preliminary results reveals also that the decisions making process and communication in the integration platform projects are insufficient.

As the results of this dissertation project we aim to offer understanding and clear steps how to choose right integration platform, avoid the potential challenges in the integration platform project and offer understanding about risks and responsibilities in the different integration platform implementations.

Keywords

Integration management, Integration platform. iPaaS, EiPaaS

1. Introduction

Platforms are technologies that can be used as a tool for creating new application, services, and technologies. They are usually seen to appear in high-technology industry and the most well-known platform companies are, e.g., Apple, Microsoft, and Intel. [1] In this research, the focus is on one subcategory of platforms, so-called *integration platforms*, and especially those ones which are offered as a service.

The adoption and use of new technologies is an important factor when growth seeking companies are looking for benefits from the information technology solutions.[2] One example of the new technologies, that has been growing their share, are enterprise integration platforms as service (EiPaaS), formerly referred just an integration platform as a service (iPaaS) [3]. Integrations between systems are one of the key elements in software projects as they link different software applications together to act as whole. However, the role of functioning integrations is becoming more important, as the number of different systems linking together is growing because of digitalization.[4] So more stable, scalable, and innovative product are coming to the markets – enterprise integration platforms as one example.

2. Integration management

Integration as a term can be sometimes challenging, as people tend to refer to it always little bit differently [5]. That is also because integration has been managed and build differently over the years [6]. The most basic way to build integration, connections between different systems, is point-to-point integration – a simple way to connect only two apps. Over the years the need for more efficient integration grew up because there was a need to connect more systems with each other. For that there were developed for example EAI (Enterprise Application Integration) as a process where software

applications and software systems are integrated across enterprises [7]. One other popular way to develop and manage integrations was ESB (Enterprise service bus) which provides a middleware model for integration of applications and architectures [8].

However, integration platforms are built for developing, execution and governance platforms for services, applications, and data [6]. The integration platform can be customized and built for your company's needs in on-premises, but most commonly integration platforms run in the cloud, as a service, to achieve more scalability and speed compared for example ESB model. [3,9]

Research consulting company Gartner publishes every year a Gartner's Magic Quadrant for Enterprise Integration Platform as a Service report where they compare different integration platforms capabilities and market shares. They divide the product to the leaders, challengers, visionaries, and niche players. In the leader category there are for example represented the most well-known integration platform products such as MuleSoft, Informatica, Boomi and Jitterbit. [10].

Enterprise integration platforms as service projects have conquered the market very fast and in the year 2020 iPaaS market generated \$3.47 billion in revenue and grew by 38.7% compared with 2019. They are estimated to exceed \$9 billion in revenue by 2025. [10] One reason why enterprise integration platforms as a service are growing their popularity is that they can support a significant number of use cases, such as receiving data and transforming it, and integrate ecosystems, events, and API's (such as syncing record in multiple systems or connect partners and marketplaces) [9]. That comes in need because Gartner predicts that by the year 2022, 65% of the large companies have implemented a hybrid integration platform, iPaaS as a one example, to power company's digital transformation [11].

3. Research process

The aim of this dissertation research is to find out how companies make decisions about integration platforms and how they see the risks, the responsibilities, and the challenges in these projects. Moreover, we are interested to see how companies take advantage of the possibilities of the integration platforms.

We approach the topic via three research questions:

- [RQ1] How advanced the companies are in harnessing the possibilities of integration platforms as a service products?
- [RQ2] What are the key drivers and the most common challenges in the integration platform project?
- [RQ3] How risks and responsibilities are seen in the integration platform projects and are there any gaps seen?

3.1. Data collection

The data collection for the research was done in two parts. Both of the interview rounds were conducted as a semi-structural interviews and the topics were about the change in the platform and integration management, the decision making and challenges, risks and best practices.

Interview Data 1 was collected February 2020 – April 2020, N=20. Focus was on experienced professionals from software vendor companies, which provided integration projects. Respondents were Project or Team managers, consultants or developers and there was also one CEO.

Interview Data 2 was collected during May 2021 – March 2022, N=20. Focus was on IT managers and other professionals in the companies, which has gone through and an integration platform project recently. Respondents represented mostly IT or Business managers.

Except one interview, all the other interviews were made in Finnish. The interviews were recorded, by recording device or by Zoom/Teams recording, and in one case researcher was making notes during the interview. The length of the interviews varied from the 41min to 119min. The respondents were found via researchers' networks or searching from the internet, especially from the professional networking platform LinkedIn. Special attention was paid to the customer interview round (Data 2) that

we did not collect just a successful case companies provided by software vendors, but we wanted to include the more diverse representation of the companies, their sizes, and industries.

The interviewees in both data collection round were individually approached by their expertise and role in the integration platform projects. The criteria were that they had been in an important role in the projects. We were especially looking for people, who had longer experience from the field, so we could also get understanding on how integration platforms projects have changed during the years. We also wanted to get more diverse views on the topic and get deeper understanding about the decision process, so therefore people from various roles were interview.

3.2. Research method

For developing the model from Data 1 and Data 2 and the results of the previously already published articles from the data sets, we are using grounded theory method. Grounded theory is a qualitative research method where one can generate theories from data and for example get understanding how people see and resolve problems [12,13]. For that reason, we decided to use grounded theory in this dissertation. The version we are using is Strauss and Corbin’s Grounded theory version [14].

In already accepted papers we have used thematic analysis to get understanding and categorization of the data. One paper is also a scoping review from the integration platform literature and product descriptions. However, in the next phase of this dissertation project the aim is to get deeper understanding about the risks, responsibilities, and potential gaps in these. For that, the grounded theory is used to go through both Data 1 and Data 2 sets.

4. Planned timeline

As seen from Table 1, the dissertation project is over the midpoint, so this is a mid-stage PhD submission to the retreat. Right now, the plan is to use grounded theory methodology and found out how power, responsibilities and risks are shared in the integration platform management and are there some gaps. Alongside published research papers there is requirement of 40 ECT in LUT University and from those, 27 ECT has completed for this point. During the dissertation project I have also made a research exchange to the Chalmers University of Technology, Sweden.

The estimated timeline has hold until this day and the plan is to stay in the planned timeline. Succeeding in that the estimated day for the dissertation would be in December 2023. After that the plan is to try find a new position from some other university than LUT University to support career development and continue with the integration platform research and with some other, new research topics.

Table 1
Planned timeline for the actions during the PhD process

Action	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Spring 2023	Fall 2023
Data 1	Collecting	Analysis	Analysis	Analysis		Analysis		
Data 2				Collecting	Analysis	Analysis		
Maternity leave	Part-time	Full-time	Part-time	Part-time				
Exchange					Exchange			
Finalizing							Finalizing	
Dissertation								12/2023

5. Funding

This dissertation project is funded by the Academy of Finland project named SASSE (Strategic approach to scalable platform-based software and systems development) for years 2019-2023 by the full-time junior researcher position in LUT University, Department of Software Engineering. In addition, the research work has been funded with various grants as illustrated in Table 2.

Table 2
Confirmed fundings

Amount (€)	Grant & Provider	Time
5 000	Support grant: TOP association / TOP-säätiö	December 2018
500	Travel grant: UTUGS MATTI	May 2019
2 000	Travel grant: Turku University Foundation	April 2019
500	Travel grant: UTUGS MATTI	September 2019
5 000	Support grant: Nokia Foundation, Nokia scholarship	December 2019
7 000	Support working grant: Foundation for Economic Education	December 2019
5 000	Support grant: The Finnish Foundation for Technology Promotion	April 2021
5 000	Travel grant for research exchange: LUT Research Foundation	January 2022
Paid position	Full time Junior researcher position, LUT University	12/2019 – 11/2023

Right now, there are no further grant applications planned, as the paid position from the SASSE project will cover the travel and salary expenses.

6. Results achieved

In this stage of the dissertation project, there are three accepted conference papers, which will be published in the dissertation. Alongside them there is at least one journal article and one conference article in preparing (Table 3).

Table 3
Table title

Article	Schedule	Topic	Publication channel
A	Accepted	Towards the utilization of Cloud-based Integration Platforms	ICE 2021
B	Accepted	Definition of the enterprise integration platforms as a service — Towards a common understanding	ICSOB 2022
C	Accepted	Between The Rock and The Hard Place - Conflicts in Implementing Integration Platforms	HICSS 2023
D	Fall 2022	Responsibility gaps in the integration platform projects	TBA/Journal
E	Spring 2023	TBA	ICSOB 2023

Article A has been published in 2021 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC). In this research we found out that the most common integration implementations environment types are on-premises implementations, hybrid, and cloud-based environments (Figure 1). The study found out how software companies choose especially between cloud-based and on-premises implementations and what pitfalls and benefits there were between these implementations (Figure 2). By using the cultural lag theory framework, we explain that the adoption of new cloud-based integration platforms is in a maladjusted situation. Furthermore, our results shows that choice between on-premises and cloud-based integration solutions is not always clear as there is frequently a lack of a broader strategy behind integration decisions.

Article B is a scoping review about the terminological challenges of integration platforms. We found out that the definition in the academic research about enterprise integration platforms as a service is outdated. In our research, 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:

“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.”

Article B has been accepted for publication in ICSOB 2022 conference.

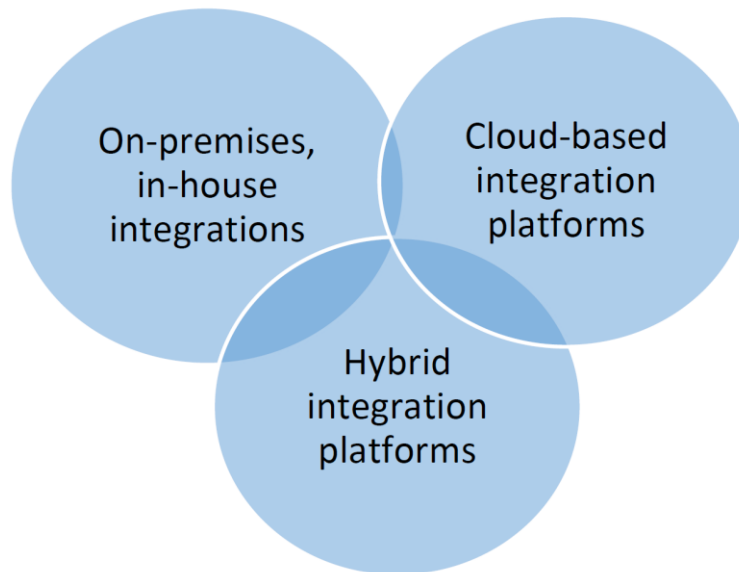


Figure 1: The most common integration implementations environment types

	On-premises	Cloud-based
Benefits	Control in own hands. Independence to make changes. No middlemen.	Easy to use, graphical user interface. Scalable. Governance and maintenance are easier.
Pitfalls	Dependence on high expertise. “Spaghetti” solutions. Hard to scale.	Different pricing options. Wide range of options in the markets. GDPR, security.

Figure 2: Pitfalls and benefits between on-premises and cloud-based integration platform environments

Article C focus on Data 2 and goes through the experiences of the professionals, who have gone through an integration platform adoption project in their company recently. In our analysis, we found out that the technical challenges of the companies were easier to solve. However, if the organization does not have clear management, strategy or understanding on how to get the most from the new integration platforms, the capabilities of the integration platform are not used in their full scale. In the paper, we make visible the intervention points for a successful integration project (Figure 3). Article C is accepted to be published in Hawaii International Conference on System Sciences (HICSS).

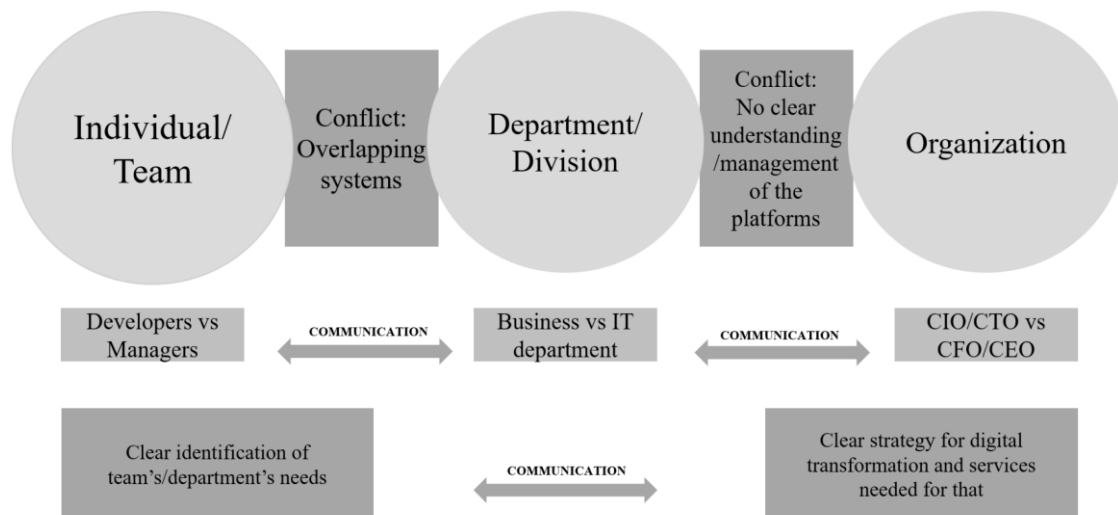


Figure 3: The different organizational levels, decisions makers, conflict and intervention points for the conflicts in the integration platform project

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