



A **PACCAR** COMPANY

# RESEARCH REPORT

DEVELOPER PORTAL

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## Contents

<b>Abstract.....</b>	<b>Error! Bookmark not defined.</b>
<b>Introduction .....</b>	<b>4</b>
<b>Methods .....</b>	<b>4</b>
<b>Research questions .....</b>	<b>4</b>
<b>Results.....</b>	<b>5</b>
<b>What specific features should an API Portal have in order to be helpful for a target group? .....</b>	<b>7</b>
<b>What can we do for the 3<sup>rd</sup> parties onboard to use our data services? .....</b>	<b>8</b>
<b>How can we improve effectiveness in the company with an API Portal? .....</b>	<b>9</b>
<b>How will the library be deployed?.....</b>	<b>9</b>
<b>Discussion.....</b>	<b>11</b>
<b>Interviews.....</b>	<b>12</b>
<b>References.....</b>	<b>18</b>

# Introduction

Current situation is PACCAR, a new organization is looking for success and they are seeking for a competitive advantage. Not having connectivity is a disadvantage that PACCAR would like to remove and also would like for customers to see inside what is happening. The idea that DAF PACCAR came up with is creating a library with which customers will be able to understand how are DAF services working. More specifically an API developer portal for 3<sup>rd</sup> parties. In order to satisfy the company needs, we need to firstly explore the topic and see if it is actually a good solution to their problem. There are a lot of questions that are popping up as a person thinks of such a portal: Is it going to satisfy 3<sup>rd</sup> party's needs, Is this the best solution to development, how will it be deployed, how is it going to be developed.

## Methods

Research questions

### *Main question:*

How can an API Portal meet the needs and preferences of developers, consumers and 3<sup>rd</sup> parties?

### *Sub- questions:*

What specific features should an API Portal have in order to be helpful for a target group?

What can we do for the 3<sup>rd</sup> parties onboard to use our data services?

How can we improve effectiveness in the company with an API Portal?

How will the library be deployed?

Sub question	Research method
What specific features should an API Portal have in order to be helpful for a target group?	Problem analysis
What can we do for the 3 <sup>rd</sup> parties onboard to use our data services?	Expert interview, Observation

How can we improve effectiveness in the company with an API Portal?	Expert interview, Explore user requirements
How will the library be deployed?	Community research

Customers and 3<sup>rd</sup> parties of DAF PACCAR Connect were informed of the idea about an API Development Portal and they are interested in it and are looking forward to see the process and the final result. It is clear that the development portal will be a good idea but there are a lot of questions that we need to firstly answer before starting the process.

## Results

Before answering the main and sub-questions of the research, we need to firstly understand what does API Portal means and what are its responsibilities.

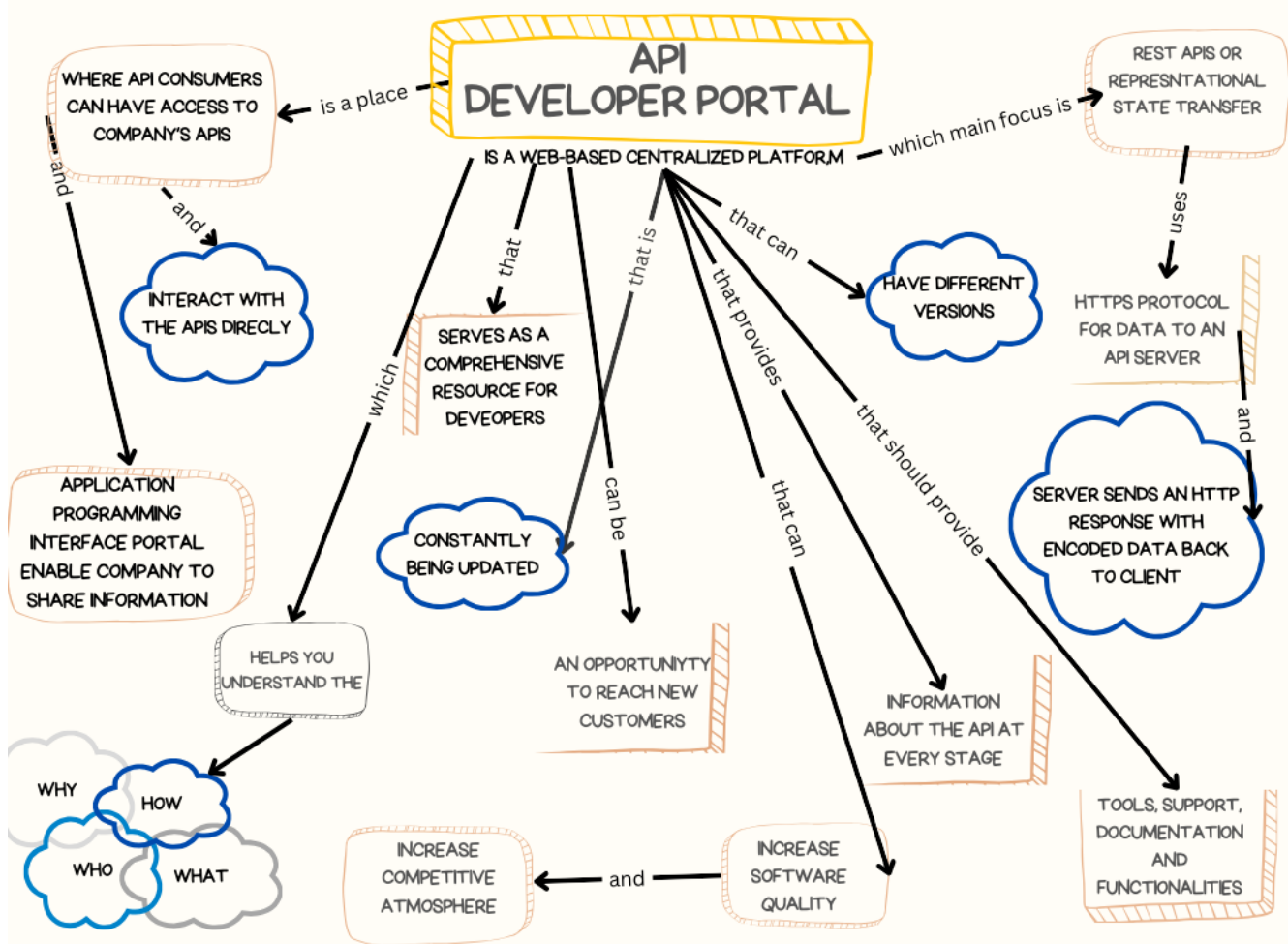


Figure 1-Cognitive scheme

As we can see from the cognitive scheme a Developer Portal is a web based centralized platform. It is often shortened DevPortal, which is serving as a central place for developers where they go and see how systems work and if they want also they can interact with them. A lot of people do not understand the difference between a normal website and the developer portal. Since the normal website only has static content the developer portal differs since it is always being updated, has dynamic content and is a comprehensive resource for developers. There are 6 types of developer portals: Developer portal API marketplaces, developer portal ecosystems, platform developer portals, market edge portals, developer portal procurement platforms and apps and integration portals. Every portal is a website with some parts like documentation of the APIs, tools and/or services. In the portals developer or even new customers can discover the different APIs, learn on what exactly they do, how they can be used and basically everything explained in a simple way so everyone can get the idea and try it out. The next question that pops up is what is an API. An Application Programming Interface serves as a communication between the different layers. Nowadays creating API portal is getting more and more popular since this a way of advertising your solutions.

API Portals are two types: internal and external. Internal developer portal, internal developer platform and external developer portal. Those are common words when it comes up to developer portal. Now let's see what is the difference between them. Each Internal developer platform differs from one organization to another since there are various stack, culture, datasets and toolsets. This platform serves as a backbone of an engineering team, since they offer a toolkit for building, testing and deploying application. And for where the front end is happening we are talking about internal developer portal. This is where the developers interact with the Internal developer platform. Lastly we are going to talk about external developer portal. This is a public API portal which is providing a self-service API ecosystem and is enhancing collaboration between different organizations and partners from companies. And it is mainly focused around APIs, where customers or 3<sup>rd</sup> parties can discover, test or just reuse the APIs.

What specific features should an API Portal have in order to be helpful for a target group?

We need to be clear about what we want from our external developer portal now that we are aware of the differences between the various platforms and portals. According to 52% of IT decision-makers, creating an API developer portal can spur innovation. The simplest method to inform people about your products and how to utilize them is to create a portal like this. API documentation, references, examples, visual results, and technical explanations should all be included on this portal. In addition to the technical aspects, we also need to have a user-friendly design and excellent documentation so that any new user who isn't a developer can grasp the goal of the portal and how to utilize it.

Features that will aid users in understanding what we specifically offer and how to use it should be included in the portal. It should include easy-to-follow examples to ensure that the structure of API requests is followed correctly, error descriptions to help us determine what went wrong and why, and a quick start to enable new users to make their first calls. We also need a user-friendly structure with clear segmentation of the various sections of the portal so that users are truly enjoying utilizing the library.

There is a one common way of creating such platform which is called the layered architecture. This is a concept that can be used for such projects and it consists of three layers: top, middle and bottom. The top layer would be a landing page with an overview of what they can see in this library, the middle one will have solution categories and the bottom- documentation. This allows us to have consistency across solution and in that way customers will learn what information to expect from the different pages.

API Versioning is something that I believe is crucial in our situation. The process of developing multiple API versions allows APIs to support a range of clients and use cases and allows for API evolution over time. With everything in place, we also need to give clients the appropriate documentation so they can apply the modifications as intended.

Another important aspect that we need to take into account is the API sandbox. As you can assume this is a place which is working like a production environment so that you can test the APIs without any damages before deploying the APIs.

What can we do for the 3<sup>rd</sup> parties onboard to use our data services?

Based on the interviews, that I conducted with Luuk Tuijelaars and Esra Esmer Ozcan, I can say that a developer portal would be the best solution possible.

In the interview with Luuk, the insights shed light on the challenges that they are currently facing and they are continuing from 2016, which are fulfilling promises to the customers and 3<sup>rd</sup> parties due to system issues. Regarding to the role of a developer portal, he believes that it would enhance effectiveness by making 3<sup>rd</sup> parties self-sufficient in accessing information from the company as the data services that we are providing. Luuk envisioned the portal as a platform where the clients can seamlessly integrate data services.

In my interview with Esra Esmer Ozcan, I managed to gather valuable insights regarding to the company current integration challenges. She mentioned that due to the company's size, involving procedures, cybersecurity rules and assignments there is a complexity for customers to properly be informed. She expressed that a developer portal would be a possibility to enhance effectiveness by setting rules for customers and 3<sup>rd</sup> parties to align with.

Based on the observational research that I had, it became evident that the majority of third parties, that were introduced to the idea and concept of a developer portal, expressed their positive opinions. They believe that implementing such portal would be a game-changer for DAF and also a life-saver for the integration process not only for them( 3<sup>rd</sup> parties on board) but for new customers too. 3<sup>rd</sup> parties that were involved with this idea also mentioned that this portal will not only simplify their integration but also streamline the journey. Based on my observation, I would say that third parties onboard would benefit directly from the implementation of a developer portal since they are going to be able to properly see and understand what our data services are.

To summarize from the interviews and the observation, having a developer portal will be one of the best solution to increase customer integration with our company. There will be an improvement between the integration between the 3<sup>rd</sup> parties and DAF since they will be able to easily navigate through the portal and find everything they need in one place which will also be beneficial for communicational issues.



## How can we improve effectiveness in the company with an API Portal?

The organization will profit from having a developer portal because it offers several important advantages. One of the primary reasons you need to create such a portal is to promote your services and allow for improved communication and self-service as well as streamlined onboarding.

For instance, adding a section of the developer portal with explanations on some addressed difficulties would be advantageous to your company since, in the first place, you are assisting clients without requiring any verbal integration, and customers are happy because they were able to get support quickly.

The integration of third parties can greatly benefit from a basic quality assurance section. Self-service can also be enabled by users through the developer portal. Both the business and outside stakeholders stand to gain from this increased efficacy and productivity. Additionally, it helps API providers like us promote our services and, most importantly, expand our horizons and perspectives.

The onboarding process will also be very beneficial to third parties, as it will enable them to get beyond any obstacles they may have while implementing a new API. The core of our contemporary software development will be this developer portal. By marketing the APIs within our API community, we will raise their discoverability, boost their reuse, and ultimately foster greater collaborations.

The company's future will be greatly boosted by the development of this kind of product, which is also in line with the user requirements that I have gathered. After all, the goal of doing this is to gain customers by interacting with them, thus meeting the needs of your audience is a crucial signal that we should consider. Real examples with supporting documentation are the most crucial features that the target audience would like to see on the portal.

According to several of the users, "how to" guides would also be helpful. A sandbox where users may test the APIs is also a good idea, and the onboarding procedure is crucial.

## How will the library be deployed?

When it comes to managing the deployment approach, the thoughtful decision is implemented by a Java-written Spring Boot backend that works with a React frontend. The frontend will be designed as DX(developer experience) architecture

since in that way we are prioritizing the development process together with the developers and end-users experience. This strategic alignment promises a stable and scalable application architecture by taking use of the technologies' wide popularity within the industry.

Adopting fundamental concepts such as SOLID and KISS (Keep It Simple, Stupid) demonstrates a dedication to developing a codebase that is more than just functional. The program is protected by KISS's simplicity and SOLID's structural integrity, which are particularly important for bolstering security and dependability in the system.

Specifically, SOLID stands up as a key component for improving the application's security and dependability. The principles of Liskov substitution, Interface Segregation, Dependency Inversion, Open/Closed, Single Responsibility, and Dependency Inversion offer a robust framework that strengthens the application against vulnerabilities and establishes a durable foundation.

There are going to be 3 layer. The data access layer will be responsible for retrieving the data from the database while maintain a clear separation between business and presentation logic. The controller takes charge of user interaction, executing business logic and delivering appropriate results to the user. The service layer manages the business aspect of the library(adhering SOLID principles). Each service is will be separate from the other so future expansion is possible and so that maintaining is easier to make. Having each element functioning separately we are going to have a secure and easy to maintain application without disturbing the system.

Here's where Git configuration comes in, acting as version control's pivot. This promotes work in development and gives people confidence to oversee the project's ongoing changes. Concurrently, a broad range of testing approaches is integrated into the development process, guaranteeing a multimodal approach to confirming the dependability of the application in a variety of circumstances.

Continuous Integration (CI) takes front stage in order to amplify the commitment to quality. This automated technique serves as the foundation, methodically coordinating the deployment and testing processes. As a result, errors are reduced to a minimum and the development process reaches a degree of efficiency and dependability that is commensurate with the requirements established by the deployment strategy as a whole.

# Discussion

In summary, creating a developer library is going to perfectly fit with what developers, consumers and third parties need. After exploring the different aspects, we believe that the developer portal will be a game changer for the company. It will provide clear guidance, powerful tools and most importantly a place where the user can get all the information they need. This will meet the needs of developers, giving them exactly what they need and for us bringing a smooth integration and perhaps broadening our company borders. When thinking of meeting the needs of the clients, we got new ideas about the portal and we would like to create a place where people can be easily navigated to our services and to integrate with them.

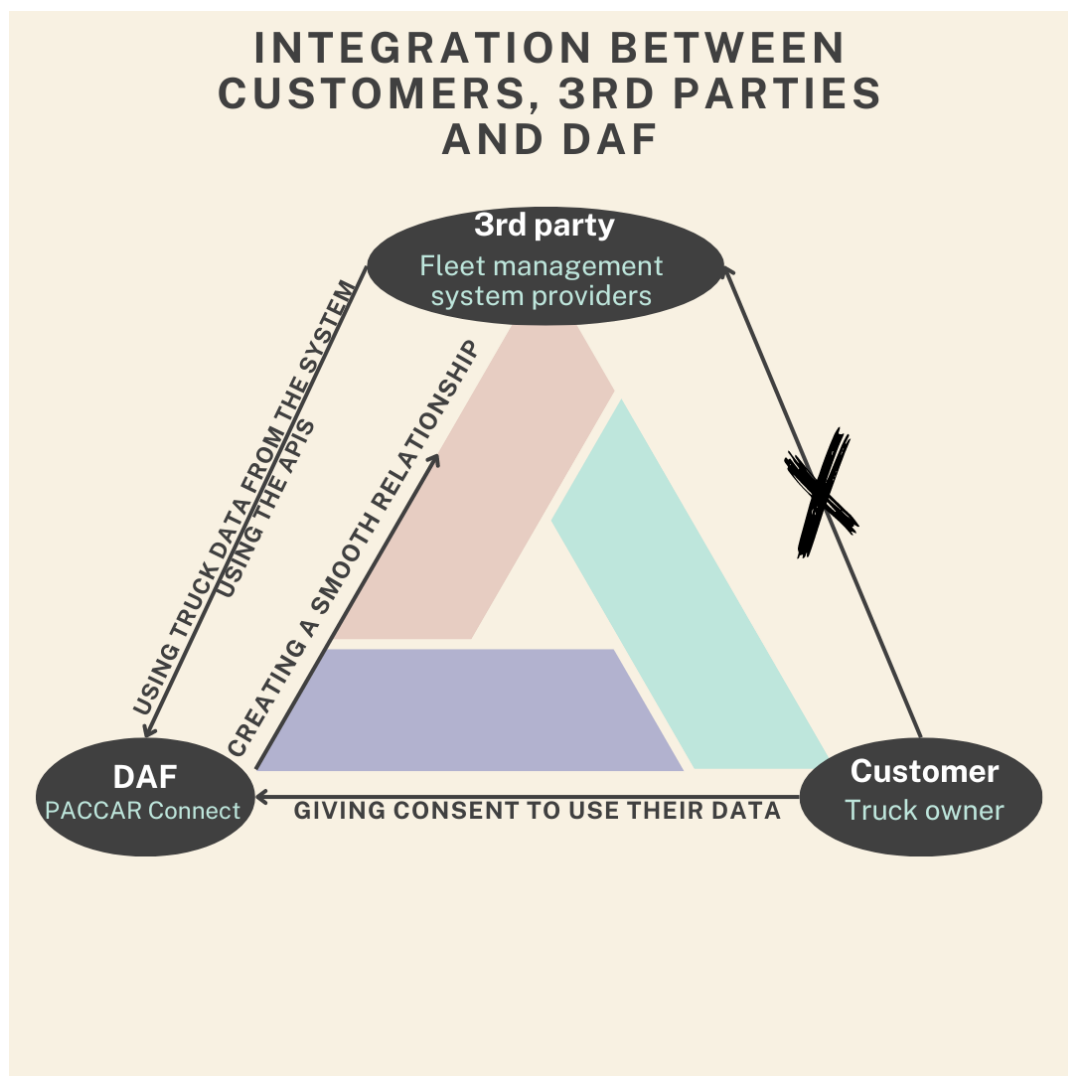


Figure 2- Integration between parties

# Interviews

## Interview with Luuk Tuijelaars- Director Revenue Services Europe

Denitsa Goranova [00:00:00] I am going to pursue with the questions and afterwards we can go through if you have any questions for me, of course. First question is, can you share your experience with your company's current way of integration?

Luuk Tuijelaars [00:00:20] So, PACCAR Connect is now seven years old, I think. So we started with our connected activities in 2016. So it's actually seven and a half. And in our first communication, we already said we are a very open platform, meaning we're able to share data. We already got a lot of questions from customers back then and third parties. However, the system wasn't ready to share data, so we had a lot of customers and third parties that are lining up already for seven years. Barton will also say that who haven't had the opportunity to integrate or to do something with our data, so actually and I think in total we have been live for three months or two months with an open platform. However, for all of the third parties that once have applied to us, we always have said, no, we're almost there or sorry it's not working anymore or no, we don't have a solution yet so we have promised a lot. We have never delivered something. So with April and with the releases and the onboarding journey that we're going to do, we finally have a starting ground to start with the integrations. And therefore, it's also important for me that if we are now promising something, we're also able to deliver something and maybe even, uh, gift wrap the service towards a customer, like a third party, like, we have managed it well. So, we're coming from the back foot with low trust. And I want to make sure that we increase our trust. So therefore, I would like to go a step beyond of what a customer thinks or third party thinks, which is necessary.

Denitsa Goranova [00:02:07] And my second question was, do you think that a developer portal will be used to improve effectiveness in the company?

Luuk Tuijelaars [00:02:14] Absolutely. Because, if we give them an opportunity to very easily access all the information, the questions don't come back to one person being the support desk. They become self-sufficient, and therefore they have the

opportunity to get more and more information out of our data. So therefore yes. Absolutely yes.

Denitsa Goranova [00:02:44] So you think that the API portal will be the best solution to meet the needs of the third parties and the customers?

Luuk Tuijelaars [00:02:53] Yes. So we offer the service via our connect portal, and we need to have a library to offer them. And maybe there's another way of doing it. I don't know, but if you're looking at what other developers are doing or other truck manufacturers or the people who share data, it's mainly via a developer portal. So, yes.

Denitsa Goranova [00:03:20] And have you been working with such a portal until now?

Luuk Tuijelaars [00:03:25] Yeah, not within DAF. So for my own time, I liked to sometimes do some app development. Flutter.io. I think, they have a developer portal. They have how to movies. So also the “how to” movies that we are making, that you may have seen are based on the ideas that I got from there. And I think that Google knows what they're doing. So for me, flutter is a benchmark.

Denitsa Goranova [00:04:21] And you mentioned that you've been seeing another API portals from other companies. And what features do you find most helpful?

Luuk Tuijelaars [00:04:31] For me, real examples. If you have a full working part of coding that just says this is what it does, only almost line by line, you can copy paste it and by line by line updating. What does this do? And if you change this, this happens for you. And if you change this, this happens. So not just explaining the snippets to only the small coding, but actually giving the full information and then giving the opportunity to edit that.

Denitsa Goranova [00:05:10] So having an API portal will be supporting people understanding of available data services that you have in the company?

Luuk Tuijelaars [00:05:19] Yes, yes.

Denitsa Goranova [00:05:22] Are there any specific challenges or concerns related to the deployment of the API portal that you think we can encounter during the process?

Luuk Tuijelaars [00:05:31] Yeah, limitations of what our website can do. So, our website is based on Sitecore, which is the CRM. It's actually the backbone of our Daf.com website. And there are limited functionalities in there which we could want to have for a development portal. But I think there we can do with recommendations and really have a discussion with the people who create the website for us. What can we do and what can't we do? For example, if you want to test an API, which would be nice, however that on the website itself, you need to have an integration. That's probably not possible, but that some recommendations can come out of that. So I think we can have short term accomplishments and to really make a next step, what do we need for that. And I think both are valuable since for me April is just a starting point of our DAF PACCAR including data services. So I feel that we are going to grow in how we address the market in the next year as well.

Denitsa Goranova [00:06:43] Beside the API portal, what suggestions do you have so third parties on board can start using more data services ?

Luuk Tuijelaars [00:06:50] Well, also the movies that we are making are helpful, but you want to do is help a third party end to end to create a integration. We're doing the Hackathon actually, and there are people who have never seen our data services. So somebody who is just getting familiar with what's an API and how can it work, even those we should be able to guide through the process, because maybe we can spur up new integrations, new services, all to help our customers in thinking well, DAF is not just saying they're open, they're really open. And the more integrations we have, the more sales we have, since for every connection we make, we ask a fee per month per vehicle. So that's adding up.

Denitsa Goranova [00:07:43] And my last question is how do you see the portal? What do you imagine that it's going to have?

Luuk Tuijelaars [00:08:07] I see a library, example data, so example outcomes. Um, also limitations , I'm not against being honest. Like okay we could have for example, we still have some data quality issues. I'm not against mentioning that. If you call this

we see sometimes that the mileage is missing. How can you circumvent that. Well if the mileage is missing that probably means I know the truck is already off and therefore it's sending data, but without the mileage. So the best thing you can do is go for a moment two minutes ago and use that moment as having the correct mileage. So something like that, so that we don't scare away from our issues that we sometimes could have and also are open in that. I think that then we are also open not just in oath platform but also in open in our communication.

Luuk Tuijelaars [00:09:10] Well, actually, what I hope to have a me as a third party, I want to integrate my customers data in my portal. I'm going to the DAF page and I give an end to end solution how to do this. And if I'm able to fully integrate it, I think we have a successful journey and that's explaining how to get the data, how to get the visibility, how to use the APIs, how to troubleshoot, and maybe even a troubleshoot person here that fully understands the data or and who the who can receive the coding check. Why is it not working and send back the best possible outcome?

Denitsa Goranova [00:09:25] Okay. Do you have something that you would like to add besides the question that I asked you?

Luuk Tuijelaars [00:09:30] Uh, no. I wish you a lot of luck. We're always available. I always try to be available for questions and also brainstorming if you think, well, I'm just stuck. I just want to openly discuss what is possible or what not or what you have seen. I'm always open for that, so don't hesitate. Um, I also understand that it's a project with a lot of open sides, so it's difficult to find your position in that.

## **Interview with Esra Esmer Ozcan- Customer Experience Manager**

Denitsa Goranova [00:00:00] First question is, can you share your experience with your company's current way of integration?

Esra Esmer Ozcan [00:00:34] Yeah, it's a big company. So we have procedures. We have cyber security rules. And we have some assignments for not only internal but also the US wise. Uh, so the integration as a customer point of view is hard for us. So we have some specific rules to be obeyed. So we need to continue accordingly.



**Denitsa Goranova [00:01:01]** Okay, good. Do you think that the developer portal will be used to improve effectiveness in your company?

**Esra Esmer Ozcan [00:01:08]** Yes. Because, uh, first you're setting your rules and your style of working at the beginning that the other third parties can arrange themselves accordingly.

**Denitsa Goranova [00:01:21]** Okay. So do you think that the API portal can best meet the needs of the developer, consumers and third parties?

**Esra Esmer Ozcan [00:01:30]** Uh, yes, because it is just an example. And mainly they are creating their APIs according to that examples and the examples helps them to understand our way of working.

**Esra Esmer Ozcan [00:01:40]** So there is going to be a change in the situation for sure. Of course.

**Esra Esmer Ozcan [00:01:45]** Yeah. Because each and each and every example means you're creating something for a use case. And the use cases can differ from the third party and the customers.

**Denitsa Goranova [00:01:58]** Okay. Have you been working with API portals until now?

**Esra Esmer Ozcan [00:02:10]** Uh, yes, for an API integration, my previous company used to integrate with different systems, internal systems to make it very clean and to use for each and every department. But it's again a big company and mainly the IT people say : “Oh the integration is a two day thing”. But my experience is at least six months to work properly. Mainly the procedure is the cyber security checks, the audits and that's it's taking time.

**Denitsa Goranova [00:03:03]** My next question is uh what features do you find most useful in an API portal.



**Esra Esmer Ozcan [00:03:24]** Mainly the most useful thing is the examples. Because they can try that example and fix it according to that, what they want. But the example helps makes life easier to understand what is going on there.

**Denitsa Goranova [00:03:44]** Do you think having an API portal can better support people's understanding of your data services?

**Esra Esmer Ozcan [00:03:54]** Yes, that's why we need a developer portal.

**Denitsa Goranova [00:03:57]** Are there any specific challenges or concerns related to deploying an API portal in your company that you think we can encounter during the process?

**Esra Esmer Ozcan [00:04:07]** The most important challenges are tools for setting a website. Our is very limited and old fashioned. So we need to find a better UX experience according to that tool. That could be the main challenge for us.

**Denitsa Goranova [00:04:26]** Okay. And what suggestions do you have so third parties on board can start using more of the data services?

**Esra Esmer Ozcan [00:04:35]** We need a proper call to action for them. So we need to find a way in which we can present information for them as easily as possible. Since the APIs are something that needs to be properly explained for the customers and 3<sup>rd</sup> parties.

**Denitsa Goranova [00:04:55]** And my last question is, how do you see the portal? How do you see it in deployment?

**Esra Esmer Ozcan [00:05:10]** Um, I think we have a proper call to action for them. And it's a very industry first thing for creating the relationship with the customer. So for the developer portal, and the knowledge base will be used a lot because we need to direct them to learn more, and we have enough content for them so they will use it.

**Denitsa Goranova [00:05:40]** Do you have anything that you would like to add that you didn't mention during the interview?

Esra Esmer Ozcan [00:05:45] No. Okay, then.

Denitsa Goranova [00:05:46] Thank you very much.

Esra Esmer Ozcan [00:05:47] You're welcome.

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