DEPARTMENT OF INFORMATICS
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TECHNICAL UNIVERSITY MUNICH

Master's Thesis in Management & Technology (Informatics)

Identification of API-Enabled Value Creation Archetypes and their Implications for Organizations

Identifikation von Archetypen API-gestützter Wertschöpfung und deren Implikationen für Organisationen

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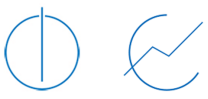

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Munich, 15.10.2019 Benjamin Strobel

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Abstract

In recent years, application programming interfaces (API) gained considerable importance for companies. Especially data-driven organizations like Google, Facebook and Expedia make use of the automatic and standardized exchange of data between different stakeholders. They can be considered as successful drivers in the so called API economy.

However, some organizations still struggle finding the value proposition offered by potential APIs within their business. "[They] are still in an identification stage regarding potential business models." (Koch 2019, S. 46)

In this research, the goal is to create a comprehensive overview of the corresponding API ecosystem and – based on this – define archetypes of API-enabled business models.

The author wants to point out central elements of API value creation archetypes, how the respective value can be created, and what differences appear across industries. This work can serve as a guideline for organizations which are considering implementing APIs as a part of their business (model).

Therefore, a qualitative approach of gathering strategies and experience across several industries by interviewing deciders and insiders in the respective field of API business models is considered.

Keywords: API, API Economy, Value Creation, API Business Models

Contents

1. Introduction

1.1. Motivation

Application Programming Interfaces, APIs, connect data, functionalities and systems. Therefore they enable and create networks between people and organizations in today's interconnected era. (C. A. Technologies 2018) However, an API, in the meaning of data interface, is not a new development. In fact, the basic technology has been deployed at the beginning of structured programming. (Collins and Sisk 2015, p. 23) From the creation of basic interoperability functionalities to exchange information, to interface with logic and remote interaction, to service interfaces in the context of platforms and finally to business driven offerings and cloud orchestration: APIs did evolve over the preceding 60 years. (Collins and Sisk 2015, p. 22) But why have they gained considerable importance only recently, as automation and optimization within companies have been pushed since decades? (Schallmo, Reinhart, and Kuntz 2018, pp. 42–43)

APIs have released their full potential only now for three reasons. First, there is increased process maturity and a higher degree of digitized processes, that allow people to better collaborate. Second, the trend of self-service and self-development within the active public developer community. And third, the technological maturity and the amount of ways to consume APIs over the web, in particulare due to the with rise of mobile devices, apps, cloud computing and IoT applications (Jacobson, Brail, and Woods 2011; Schallmo, Reinhart, and Kuntz 2018, pp. 8-11/pp. 42–43). Furthermore, business is gaining more interest in streamlined connections between actors. The topic has shifted "from a technical need to a business priority." (Collins and Sisk 2015, p. 23) With the rise of cloud computing applications, the former technical interfaces have become a key factor for strategic business decisions. (Rohde & Schwarz Cybersecurity GmbH 2018)

Besides the growing need for instant communication and reliable data exchange, especially the growing importance of strong partnerships, value exchange and extensive ecosystems, to foster innovation and strengthen the competitive advantage, are key focus topics to which APIs can bring a valuable solution (Schallmo, Reinhart, and Kuntz 2018, pp. 46–51). A recent study stressed this importance by showing that

organization, that are widely adopting technologies like APIs, are more mature in their digital business strategy and that they "grew twice as fast as those with a lower adoption rate." (C. A. Technologies 2018). Companies like Expedia (travel)[1], Uber (mobility services)[2], Stripe (payment services)[3], Amazon (retail, media, cloud computing)[4] are especially successful in integrating and providing APIs to drive competitive advantage and improve internal and external operations. (Iyer and Subramaniam 2015a)

While mainly recently founded digital companies drive business and success through APIs, however, only few traditional organizations benefit from the development and adopt APIs also for non-internal use. (Evans and Basole 2016, pp. 27) According to Iyengar, Khanna, Ramadath, and Stephens (2017) "most [organizations] do not have a formal API strategy, are unclear about the true value at stake, and are uncertain about how to implement a program that quickly maximizes consumer and business impact." Numerous organizations are "still in an identification stage regarding potential business models" (Koch 2019, p. 46) and the goal-oriented use of APIs for their companies.

The goal of this work is to explore and create a comprehensive business focused overview on the corresponding API ecosystem with actors, goals and value streams and – based on this – define API-enabled value creation archetypes. Additionally, central success elements, how the respective value can be created, and the difference across industries, will be outlined. This work can therefore serve as an insightful support for organizations that consider implementing APIs as a part of their business (model) and want to be aware of the relevant implications for them.

1.2. Research Questions & Approach

This section outlines the research questions (RQ) that derive from the lack of transparency for organizations of how to overcome the orientation phase related to API-enabled value creation. An extensive literature review, semi-structured expert interviews and the e3 value modeling approach will serve as the basis to respond to the defined research questions (see chapter 4 for further details).

- **RQ1** - *Who are relevant actors (stakeholders) within the API environment?*
  The goal of this first research question is to derive an extensive overview on possible actors within the API environment. Existing, but not actor-dedicated

[1] https://www.expedia.com/; see Distinguin, Delepelaire, Vart, et al. (2012)
[2] https://www.uber.com/; see Iyer and Subramaniam (2015a)
[3] https://www.stripe.com/; see MachineShop (2015)
[4] https://www.amazon.com/; see Jacobson, Brail, and Woods (2011)

literature as well as findings out of the expert interviews serve as a basis. A visual support as well as an actor categorization can help to increase readability and further use in other research topics.

- **RQ2** - *What are potential (value creation) goals through APIs for API providers?*
  The second question aims to create an extensive list of possible goals for organizations providing non-private (partner / public) APIs. Similar to the initial research question, both literature and interviews deliver the relevant information. Additionally, a goal categorization will provided.

- **RQ3** - *What are typical API-enabled value creation archetypes used to achieve those goals?*
  To answer the final research question, the preceding results and insights will be used to provide graphical models that present actors, goals and value streams in the API environment and set them in a logical relationship. Each model is dedicated to a specified use case for one or several industries. Especially, but not exclusively, the explanations during previously conducted expert interviews serve as a data source.

1.3. Thesis Structure

In order to facilitate the reader's understanding of this work, this section gives an overview of the chapters' content and goals, beginning with the next chapter 2.

Chapter 2: Foundations provides an extensive overview on relevant terms and concepts for this work. It represents the basic understanding of the API topic in order to properly understand the suceeding content.

Chapter 3: Related Work summarizes existing literature, that are beneficial and / or treated similar topics and therefore provide a significant knowledge source and valuable insights, relevant for this work.

Chapter 4: Research Design briefly describes the academic concepts that served as a guideline for this scientific research. Furthermore, it presents the academic research process throughout this thesis and explains the detailed research process of the author.

Chapter 5: Actors directly answers RQ1 and gives a structured and extensive overview on relevant actors and stakeholders within the API economy. It contains a base model of actor relations, that serves as a blueprint for the visualized value models in chapter 7.

Chapter 6: Goals responds to RQ2 and lists potential goals for API offering organizations, that were retrieved from literature and conducted expert interviews. They are additionally clustered into different categories from existing literature and serve as a building block for chapter 7.

Chapter 7: Archetypes visualizes the preceding findings in combination with possible value streams, and therefore corresponds to RQ3. It first provides an overview of associated concepts and then structures different archetypal use cases into numerous selected industries.

Chapter 8: Discussion provides gathered insights and results, structured into five subsections.

Chapter 9: Conclusion summarizes and maps the key findings of this work to the associated research questions. Finally, the author explains limitations and provides stimuli for enhancements and potential starting points for future work.

2. Foundations

In order to provide a common understanding for the topic, essential terms and concepts related to APIs will be defined in the following sections.

2.1. API Fundamentals

2.1.1. Basic definitions

API

API is an acronym for *Application Programming Interface*. It represents an interface that allows developers to interact with software or websites. (Palmieri 2018). More technically spoken, APIs let computer applications "talk to each other over a network (predominantly the Internet) using a common language that they both understand." (Jacobson, Brail, and Woods 2011, p. 15) It can be considered "a set of procedures and functions that allow to perform specific tasks such as interacting with a program and a software platform or allowing applications to access data and services within a network." (Palmieri 2018)

The data exchange format of an API most commonly used are, among others, *JavaScript Serial Object Notation (JSON)* or *Extensible Markup Language (XML)*. The advantage of JSON e.g. it its "compact and human-readable way of representing data in an implementation agnostic way." (Ashby and Jensen 2018, p. 6)
An API can also be seen as a contract according to Jacobson, Brail, and Woods (2011). Due to the reliability aspect of such a contract, "[it] increases confidence [for developers], which increases use. The contract also makes the connection between provider and consumer much more efficient since the interfaces are documented, consistent, and predictable." (Jacobson, Brail, and Woods 2011, p. 14)

> Simply speaking, an API helps systems “talk” to each other. A well-structured API is the glue that connects data together and allows authorized applications or machines to easily access it. (Meyer 2019)

It is interesting to note, that APIs are actually not a new technology. They are recently

becoming more and more prominent in business context and increase their importance for organizations, internally as well as externally. (C. A. Technologies 2018)

Service

A service can be defined as "operant and operand resources that are made available to/are accessed by external actors in a service system." (Beverungen, Lüttenberg, and Wolf 2018, p. 379) Being more specific in the API environment, according to De (2017, p. 10) a (web) service "is a software function provided at a network address over the Web, with the service always on".

API Management

With the rising importance and increasing number of APIs within organizations, API management solutions[1] have become an essential tool to organize and manage them. (Doerrfeld, Wood, Anthony, et al. 2016, p. 74) API management itself "is the process that provides publishing, promoting, developer selfhelp, and governance of APIs in a secure and scalable environment. Optionally, it also enables creation of end-user support artifacts, forums and collaboration environment." (Rudrakshi, Varshney, Yadia, et al. 2014, p. 8)

2.1.2. Differentiation API types

APIs appear in different technological design approaches, orientations and roles.

Technological Differentiation

Historically, APIs do not represent a new technology (C. A. Technologies 2018) but are still evolving from a technology perspective.

Service-oriented architecture (SOA) was the original approach to APIs and has been dominant for several years, especially for internal purposes. (Ashby and Jensen 2018, p. 27) One of the first universally adopted API formats was SOAP for Simple Object Access Protocol[2], a protocol that specifies the communication method as well as the structure of the messages, mainly via XML" (Williams 2018; MachineShop 2015). However, SOAP APIs "are not particularly well suited for the World Wide Web and certainly not for asynchronously connected [services]". (MachineShop 2015)

[1] from API management solution providers, such as: C.A. Technologies, Apigee (Google), Mulesoft, Axway, IBM, 3Scale, etc. (Hellbe and Leung 2015, p. 50)

[2] this full name was dropped with version 1.2., today only 'SOAP' is used

The dominant technology today is REST or *Representational State Transfer (RESTful) architecture*. "Although SOAP still has some place in existing internal applications and infrastructure, it is not designed for mass consumption." (Ngeow, Kohut, Flynn, and Mallick 2016, p. 6) RESTful provides benefits like scalability, performance, simplicity and two-speed IT for APIs and API enablement platforms." (Ngeow, Kohut, Flynn, and Mallick 2016, p. 6) "In a well-defined REST service, there is no tight coupling between the REST interface and the underlying architecture of the service. This is often cited as the main advantage of REST". (Williams 2018, p. 67)

Some companies already use GraphQl, a data query language, as a more recent, more flexible and more performing version to provide API. "While typical REST APIs require loading from multiple URLs, GraphQL APIs get all the data an app developer needs in a single request enhancing speed of response even on slow mobile network connections." (Williams 2018, p. 67) However, companies currently mainly set their efforts on REST (see section 8.4).

API Orientation

Apart from the technology, APIs also differ in their orientation respectively their "degree of visibility and access" (De 2017, p.21). They can be private, partner oriented or public. However, in practice, a clear differentiation is not always respected, especially when talking about APIs (see section 8.3). In literature they are defined as follows:

- private (internal) API: They are mainly used by developer within the enterprise and to streamline internal integration, reduce costs, increase efficiency and enhance security. (Brodsky and Oakes 2017; De 2017)
- partner API: Partner APIs are used by business partners to reduce costs, monetize services and enhancy security by improving and deepening integration. (Brodsky and Oakes 2017) They are available only to a selected list of business partners and are mostly governed by service level agreements (SLAs). (De 2017, p. 117)
- public (open) API: They provide access of functionalities and data to external (and often unknown) partners and developers in order to increase innovation and extend market reach. (Brodsky and Oakes 2017) "Public means that the API is available to almost anyone with little or no contractual arrangement (beyond agreement to the terms of use) with the API provider". (Jacobson, Brail, and Woods 2011, p. 17). In chapter 6, more detailed goals of partner/public APIs will be presented.

Roles of APIs

Internally as well as externally APIs can have different roles. Up-to-date, literature mainly see four different roles (Willmott 2012; Tschanz 2017; Seeger 2014):

- API is the product: the API is the primary source of revenue and is not an extension of the product. This logic is applied in the case of Amazon Web Services or PayPal for example.
- API projects the product: the API is the central means for externals to use and integrate the product. It also extends the market reach of the product. Music streaming provider Spotify serves as an example here.
- API promotes the product: the API's goal is to advertise the actual product, generates interest and increases the brand awareness, like it is the case for Amazon.com or Expedia.
- API powers the product: the API serves as channel to get new content or value into the service / platform. Prominent examples are Facebook or Twitter.

However, there is also another clustering approach by Moilanen, Niinioja, Seppänen, and Honkanen (2019). Their classification partially is comparable to existing roles mentioned above. Where "API is the product" fits to "Productized service", "API projects the product" mostly matches with "Interface to resources" and "API projects the product" corresponds to "Interface to platform", there is no significant overlap with the remaining categories.

Table 2.1.: Different Roles of APIs within an Organization, adapted from Moilanen, Niinioja, Seppänen, and Honkanen (2019)

API is ...	Description Row	Example
Important feature of a tangible product	API is part of a tangible product or productized service. Customer gets the API as part of the deal when buying the product.	Internet of Things (IoT) APIs for controlling and analyzing purposes
Productized service	API in itself is a productized service, offered to all customers in the same way.	Translation APIs, Payment APIs
Part of a digital or real-world service	API is part of the service experience, e.g. maintenance service is ordered with an API, or possibility to monitor package delivery with an API.	Logistics API

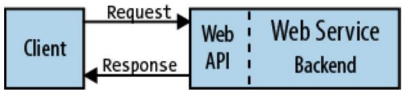

Figure 2.1.: Logical relationship between web services, APIs and API actors, according to Massé (2012, p. 6)

Table 2.1 Different Roles of APIs within an Organization (Cont'd)

API is ...	Description Row	Example
Customer-specific service	API is part of a service offered to customers as a tailor-made solutions including e.g. an integration to a service providers system.	APIs in customer specific applications
Interface to resources	API is just a means to access a resource the company is selling.	Company info APIs (risk category, owners, contact information)
Interface to platform (boundary resource)	API is a means to connect with a platform and get added value through participation in the interconnecting relationships of the platform.	Online auction API, Apartment sharing API
Part of an integration	API is means to connect to applications and devices.	Product API, Employees API, Business Transactions API

End of Table

2.1.3. Difference between Microservices, Web Services and APIs

Non-private APIs mostly refer to web APIs. Both terms, APIs and Web (Service) APIs, are often used as a synonym. (Williams 2018, compare to p. 67). However, literature sees a web API "as a subset of a web service." (De 2017, p. 10) or considers web APIs as "the face of a web service, directly listening and responding to client requests" (Massé 2012, p. 6), as illustrated in Figure 2.1.

In the same way, microservices and web services are often mixed up and used interchangeably. However, they are "two different concepts of Application Development

Architecture, which can be differentiated from its layered architecture and development style." (TatvaSoft Software Development Company 2016)

On the one hand, the microservice approach breaks up monolithic software "into loosely coupled modules" (TatvaSoft Software Development Company 2016), "each running in its own process and communicating with lightweight mechanisms." (Koren 2016, p. 3)

Web service, on the other hand, "is a way to expose the functionality of an application to other application, without a user interface [and] allow applications developed in different technologies to communicate with each other through a common format like XML, Jason, etc." (TatvaSoft Software Development Company 2016)

Microservices are made available trough APIs to reach more internal and external developers through its standardized interface. "Though APIs are necessary to expose microservices, APIs and microservices are not the same. APIs can expose systems and digital assets beyond microservices, for example, and APIs support deeper levels of management functionality. API management is vital to enforcing policies, and potentially upholding service-level agreements (SLAs), around the use of those microservices." (Apigee 2018, p. 9)

To summarize this section from a value driven point of view: a service generates value for an organization or an individual whereas an API itself does not generate value but acts as an interface to offer services.

2.2. API Economy

Apart from the technical and isolated view on APIs, there are additional terms and concepts to be considered, especially when it comes to business-related topics.

2.2.1. Key Terms

API Economy

The term is mentioned in existing literature. (De 2017; Jacobson, Brail, and Woods 2011). However, according to Moilanen, Niinioja, Seppänen, and Honkanen (2019), there is no clear definition, as the term itself is “vague”, but the following definition captures the main ideas: “In the API Economy, a company utilizes resources efficiently

and quickly to create added value for cusomers. These resources can be, for example, data or a function provided by other organizations. [...] Defining characteristics of the API Economy are competition for popularity among application developers and consideration of them as primary customers. In brief, services are offered as B2D business-to-developer". (Moilanen, Niinioja, Seppänen, and Honkanen 2019, p. 227)

Value / Value Proposition

When trading goods or services, those elements inherit a certain value. The value itself can be tangible (e.g. money, service) or intangible (e.g. trust, increased reputation).

In the API environment the value or "value proposition is not the same as the API, which is a technical solution. More precisely, the value proposition describes what value [is offered] to the customer and why the customer should buy it. The API describes how you provide the value to the customer." (Bouza 2019)

API-fication

For many years, companies have focused on internal improvements and increasing internal knowledge. Additionally, they store "valuable data about their customers, products, supply chains, operations, and more, but they're not always good at making it available in useful ways. That's a missed opportunity at best, and a fatal error at worst." (Collins and Sisk 2015, p. 27). The term API-fication describes the approach of making internal knowledge, data and functionalities in "existing systems and applications accessible through APIs and shift into using service-oriented architectures using API-based communication." (Hellbe and Leung 2015). This means not only for external but also for internal stakeholders. Historically, this is not necessarily a new approach. However, knowledge, data and functionalities may mostly have been "exposed via archaic interfaces such as Electronic Data Interchange files (EDI) or many other EAI products." (Accelirate 2018)

2.2.2. API Value Chain

There are classical approaches to define the API value chain (see (De 2017; Jacobson, Brail, and Woods 2011)). Within the abstracted API value chain, there are different user groups involved, such as data / functionality providers (represent the business

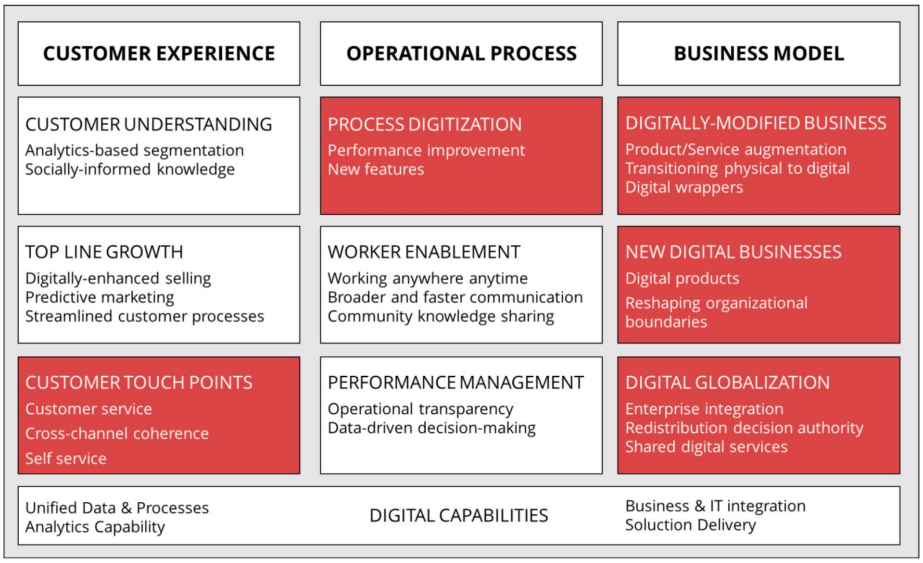

Figure 2.2.: Building blocks of the digital transformation and the importance of APIs (red bricks = enabled or enhanced by APIs), according to Hellbe and Leung (2015, p. 55)

asset), API providers (expose the asset through an API), API consumers (in general a developer, that uses the API to build an application) and end user (who uses the created application).(Jacobson, Brail, and Woods 2011). However, when considering the actual value streams within the API economy, this traditional view is not necessarily the best way to represent the value flow any more, as more actors are participating in the API economy. In chapter 5 an alternative overview of the actors will be given.

2.2.3. Digital Transformation

According to Bouza (2019), the "digital transformation is the profound transformation of business activities, competencies, and business models to fully leverage the opportunities of digital technologies." Within the digital transformation and the corresponding disruption of industries and more traditional business models, APIs play a central role as network enabler (Hellbe and Leung 2015, p. 2), but also strategically represent a major driver, according to Figure 2.2

Furthermore, there are industries that are more vulnerable and will be impacted faster and more intensely than others. According to Harting, Kolev, Redweik, et al. (2015, p. 5), especially industries like retail, ICT(Information and communication technolo-

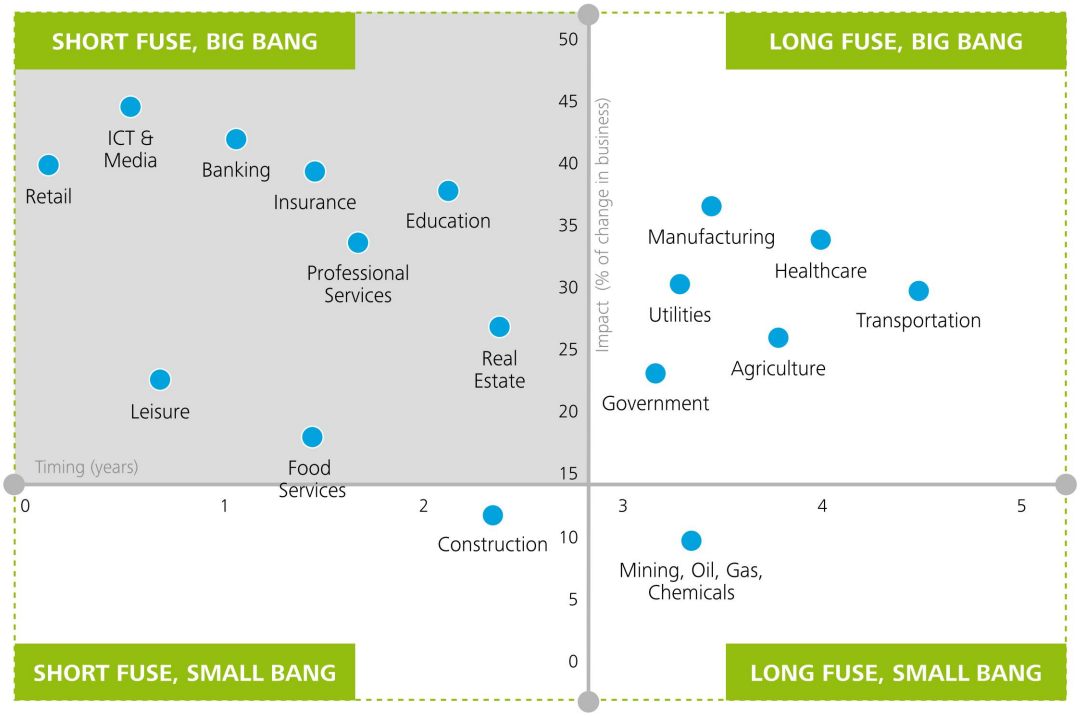

Figure 2.3.: Temporal impact of the digital transformation on industries, according to Harting, Kolev, Redweik, et al. (2015)

gies), media, banking and insurance run into danger to be heavily impacted.

2.3. API Business Models

Osterwalder (2004) describes a business model "as an abstract conceptual model that represents the business and money earning logic of a company [and] as a business layer (acting as a sort of glue) between business strategy and processes."

When considering APIs, many companies still struggle monetizing their APIs and finding a suitable business model. (Koch 2019, p. 46)

2.4. Legislative Initiatives

2.4.1. openBanking (PSD2)

The UK initiative 'Open Banking' as well as the EU initiated 'Payment Services Directive 2' attempt to foster innovation within the banking sector as well as to effort to harmonize payments regulation. One central aspect of the PSD2 is the duty of banks to provide an API-enabled access to third-party providers, as long as the account holder grants access. Opening up the account information lead to new data driven innovations and services, offered by TPPs or the bank themselves. (Brodsky and Oakes 2017)

2.4.2. Public Transports Initiatives

In recent years, there have several initiatives to create a multimodal travel info system in order to plan a journey. However those systems only had a municipal or regional focus.

The core of the European technical specification "Intelligent Transport Systems — Public Transport — Open API for distributed journey planning" (European Commission 2017) is an API, that will link different regional systems. This approach is called "distributed travel planning", as a central consolidation of data is not necessary an more. (Bundesministerium für Verkehr and Innovation und Technologie 2018). Furthermore, Finnish Government recently passed a law stating that all public transport data (for intermodal transport, such as bus or train) must be publicly made accessible via API [3]

2.4.3. EU General Data Protection Regulation (GDPR)

The EU General Data Protection Regulation (GDPR) is an initiative by the European Union, aiming to unify the personal data protection for the whole EU. It has influence on all parts of business and personal life and provides individuals a right to be forgotten under a data provisioning point of view (Brodsky and Oakes 2017). The were recent discussion, who owns data, that is created by a machine or a service (Hegmann 2019). Especially in the domain of APIs, were data is continuously transferred (content data, services) and created (customer usage data, data log), this is a relevant topic.

[3] https://erticonetwork.com/finlands-transport-code-focuses-digitalisation-transport/

3. Related Work

API technology The technology behind APIs is not new, but has evolved during the last decades. Currently REST interfaces represent the most prominent type of APIs. There are several reference works (Massé 2012; Jacobson, Brail, and Woods 2011; De 2017) that treat technical aspects and implementation topics primarily, besides brief explanations of economic facets. Especially Massé (2012) goes into more details on API design features, whereas Jacobson, Brail, and Woods (2011) and De (2017) provide a more holistic overview, with a more technical bias concerning APIs.

Digital Transformation Within the digital transformation and the corresponding disruption of industries and more traditional business models, APIs play a central role as network enabler. Schallmo, Reinhart, and Kuntz (2018) in his work provides an extensive overiview on historical evolutions that led to todays changes and gives insights on industries that are especially impacted. Their work serves as a baseline for all researchers intending to get a broad overview on this topic. However, it does not treat APIs in detail.

API Business Bringing API technology and digital transformation together is an important aspect to understand when thinking about business related topics. In the research work of Hellbe and Leung (2015), the focus is on the business impact that is created in digital transformation related to the use of APIs. Furthermore, other scientifically based publications (Moilanen, Niinioja, Seppänen, and Honkanen 2019; Iyer and Subramaniam 2015b; Evans and Basole 2016) provide a comprehensive overview respectively concrete examples for API-related business impact. Finally, there are several well developed consultancy reports that give additional insights to the API business area (Iyengar, Khanna, Ramadath, and Stephens 2017; C. A. Technologies 2018) or specific industries, e.g. banking (McIntyre and McFarlane 2018).

Value & Business As one central aspect of this work is the value exchange, the terms value and business play a prominent role. Even if existing literature treating those topics do not consider technical content, but rather fundamental research (Vargo and Lusch 2008), they valuably treat business models and strategies to maintain and foster

business improvement (Gassmann, Frankenberger, and Csik 2016).

Modeling One central element of this work is modeling relationships and value exchange actors. Modelling facilitate making associated analyses.Even if there is no dedicated work on concrete goals and actors and the corresponding modeling, there is interesting literature that (partially) covers all three components. Gordijn and Akkermans (2001) represents the reference work for holistic value modeling, namely e3 value modeling. Henkel, Johannesson, Perjons, and Zdravkovic (24/10/2007 - 26/10/2007) used this basis for adapting the modeling for e-services, whereas Riasanow, Galic, and Böhm (2017) dedicated their work to the automotive industry. Both preceding works however did not focus on API-enabled systems. This was finally done in research works by Horkoff, Lindman, Hammouda, and Knauss (2018) as well as by Debbiche, Störmberg, and Liao (2017). The former focused on the advantages and disadvantages of applying e3 value modeling in an API environment, the latter's purpose was on goal modeling, but no necessarily on value exchange.

4. Research Design

The following chapter describes the research design of this work. The underlying research questions (see section 1.2) RQ1 - RQ3 will be answered by means of an extensive literature review (section 4.1) and semi-structured expert interviews (section 4.2) which represent the main source for e3 value models in section 7.2.

4.1. Literature Review

In order to get an holistic overview of the API environment and linked topics, an extensive literature review was conducted. The primary focus was on getting a deep understanding of concepts, terms and definitions, which then serve as a basis for following explanations and discussion throughout this work (also see RQ1). Furthermore, the focus of the literature review was to get a profound understanding and establish a broad knowledge base of modelling approaches, different actors, values and goals, in case those topics were already treated in existing publications.

Initially a set of keywords in both German and English language was defined, which included *API Business Model, API Value, API e3 Value Model, e-business Models, Value Streams, Value Creation, Value Maximization, API Stakeholder, API Actors, API Monetization*. The main source of relevant academic literature was found via the bibliographic search engine of the Technical University of Munich[1], where scientific books, journals and articles were accessible. Additionally, other scientific search engines like Google Scholar[2] or Scopus[3] were helpful to discover an initial set of literature. Due to a distinct lack of scientific literature and the preceding technical focus on the API topic, additional case studies and published articles from non-academic sources (practice reports by consultancies, existing expert interviews, non-scientific articles from experts) where retrieved. The resulting documents (around 250 in total) were scanned for relevant content, keeping in mind the scientific background of this work. According to Webster and Watson (2002), relevant content was directly used or employed in an additional forward and backward search was conducted. Additionally, suitable results were searched

[1] https://www.ub.tum.de/
[2] https://www.scholar.google.com/
[3] https://www.scopus.com/

through for other relevant keywords and topics. These then were used for additional (scientific) web searches. Finally, the retrieved pieces of information like quotes or relevant text passages were saved and categorized via Citavi 6[4], a widely used software for reference management and knowledge organization. In total over 250 references (books, journal articles, degree theses, newspaper articles, other publications) were screened and 183 relevant references where then categorized within Citavi, containing 673 knowledge items[5]. The result of the just described extensive literature review will used and presented throughout this work.

4.2. Interview Methodology

The grounded theory methodology (GTM) by Wiesche, Jurisch, Yetton, and Krcmar (2017) will serve as the baseline for the qualitative research approach of this work.

In order to follow the GTM approach and to collect the qualitative data, 17 semi-structured expert interviews in total were conducted. When conducting semi-structured interviews, the interviewer sticks to a set of predefined but unrestricted questions. Having this guidance, the interviewer will keep more control over the interview than in the case of an unstructured conversation. Additionally, open-ended questions will allow the interviewee to give own additional ideas and answers, which have not been defined to date. Previous to performing the interview, a written outline of the interview questions should be developed. This guideline will help the interviewer to stick to the relevant questions and topics, even when the interviewee will cover several aspects during his or her answer. The guideline contains topics that can be derived from the researcher's research question. This work's interview guideline will be further explained in detail in .

As this work had to stick to a limited time frame, the approach of theoretical sampling, advised by GTM, was not fully adapted. However, the initial selection of interview partners was based on the past experience of the advisor of this work as well as on the extensive expert network of the chair and the author of this work. The selection was performed with the goal of having several different industries covered[6] as well as the interview partners having a distinct expertise in API related business topics for several years. After some successfully conducted interviews, a review of the interview outcome

[4]https://www.citavi.com/

[5]However, not all references nor knowledge items were used in the final version of this work.

[6]main focus on industries, which are experiencing / will experience a considerable business impact, that resolves to a change in business higher or equal to 25%, see Figure 2.3 for more information

was conducted, analyzing the relevance and order of questions and working definitions in order to further improve the written guideline. In this specific case, rather technical questions from the initial guideline version were eliminated in order to focus on the relevant value-oriented questions as well as giving more time for extensive expert answers. Additional interview partners were partially derived from the professional network of already interviewed experts.

The author's intention was to record all expert interviews for a later transcription of the spoken content. Throughout the interview period, three interviewees rejected being recorded. Instead of a transcription, written notes were taken and analyzed afterwards. Both notes and transcribed interviews were anonymized in order to prevent any personal or professional inference to the interviewed expert or his/her employer. This was an important factor, as the anonymity was a precondition for several interviewees. Following the iterative coding approach in GTM, the transcribed interviews were coded, i.e. text passages were analyzed and highlighted with associating labels, in order to derive relationships and content patterns throughout all interviewees. MAXQDA Analytics Pro 2018[7] was used to perform the coding and keep relevant findings in a structured manner. The coding process was performed twice to ensure that no pertinent actor, goal, use case or statement is missed out, when reviewing the interview transcriptions. The coding process started with an initial number of six seed categories to cluster the findings. Finally, throughout the process, this evolved to a total number of 240 categories, containing around 1.600 code snippets.

Furthermore, this work was created with the support of constant comparison and using memos, as proposed by Wiesche, Jurisch, Yetton, and Krcmar (2017). The approach has turned out to be especially helpful, to better organize, summarize and paraphrase different topics and link them accordingly, creating a clearer structure in the process of academic research. The approach of creating a mind map[8] was especially enriching. Additionally, for the categorization of goals, memoing helped keeping the overview, despite the large amount of single goals throughout several iterations of coding and categorizing them. The summarized outcome of the analysis is described in chapters 5 - 9.

[7] https://www.maxqda.com/products/maxqda-analytics-pro

[8] the author used the free mind mapping solution 'WiseMapping', see http://wisemapping.com/

4.2.1. Interview Guideline

The interview guideline (see appendix A) itself is structured into four major sections.

The first section introduces the interviewee to the overall topic of APIs and value creation, followed by the actual problem statement and goal of the work, as described in section 1.1.

Section two, states additional information for the intervieweee. The purpose of the interview itself, terms of confidentiality, planned structure of the interview and contact information are given here.

Section three contains the actual questions. Whereas the first four questions aim to get a better understanding of the interviewee in terms of industry, company, role and API experience, the following five questions target the actual content of the expert interview. Answers to API offerings, goals, business models, actors, value streams, use cases and further interview opportunities, among others, were intended to retrieve.

The fourth section aims closing the interview procedure. Besides an outlook on further actions to follow, five working definitions (including references) are presented. They serve as a framework to a common understanding for interviewer and interviewee or can be utilized for further research. They were intentionally placed at the end of the interview guideline to avoid an information overload for the interviewee on first sight.

4.2.2. Interview Participants

Throughout the period of approximately two months, the qualitative data collection via 17 semi-structured and recorded interviews has been performed. Among these interviews, 14 different companies, from eight different industries[9], were involved, which placed a total number of 18 different interviewees at the author's and advisor's[10] disposal. This implicates, that four times two experts were working for the same company, and one single interview was held with two interview partners from the same company. 14 interviews were audio recorded and transcribed, three interview partner preferred a discussion without them being recorded. The total duration of all

[9] Finance, Insurance, (Operational / Strategic) IT Consultancy, Manufacturing (Machinery/Chemicals), Retail, Software Publishing, Transportation

[10] the author mainly conducted the interviews (abreviated as 'BS'), the advisor was broaching the subject again, if neccessary (abbreviated as 'GB'), see Table 4.1 for interviewer's distribution

interviews account for 13 h 34 mins, where the average duration is 47 mins 52 secs. Refer to Table 4.1 for a detailed overview.

Table 4.1.: Interview Participants

ID	Company Classification (NACE Reference)	Role	Experience (in years)	#Employees	Duration (hh:mm:ss)	Interviewers
I1	62 – Computer programming, consultancy and related activities	Director IT Business Unit	>15	5.001-10.000	01:19:25	BS, GB
I2	27 – Manufacture of electrical equipment	Solution Architect	2-4	> 100.000	00:27:37	BS, GB
I3.1	58 – Publishing activities	Business Developer	10-15	1.001-2.000	00:54:41	BS, GB
I3.2	58 – Publishing activities	Solution Architect	10-15	1.001-2.000	00:54:41	BS, GB
I4	64 – Financial service activities, except insurance and pension funding	Process Expert	2-4	51-250	00:33:06	BS
I5	70 – Activities of head offices; management consultancy activities	IT Consultant	2-4	2.001-5.000	00:48:02	BS, GB
I6	47 – Retail trade, except of motor vehicles and motorcycles	Product Owner	2-4	50.001-100.000	00:52:46	BS, GB
I7	65 – Insurance, reinsurance and pension funding, except compulsory social security	Enterprise Architect	10-15	> 100.000	00:44:52	BS, GB
I8	58 – Publishing activities	IT Business Analyst	5-9	5.001-10.000	00:44:38	BS

Table 4.1 Interview Participants (Cont'd)

ID	Company Classification (NACE Reference)	Role	Experience (in years)	#Employees	Duration (hh:mm:ss)	Interviewers
I9	52 – Warehousing and support activities for transportation	Portfolio Manager	2-4	2.001-5.000	00:47:32	BS, GB
I10	62 – Computer programming, consultancy and related activities	Director IT Business Unit	5-9	251-500	01:00:35	BS
I11	62 – Computer programming, consultancy and related activities	IT Consultant	2-4	5.001-10.000	00:58:16	BS, GB
I12	27 – Manufacture of electrical equipment	Business Developer	>15	10.001-50.000	00:45:00	BS
I13	24 – Manufacture of basic metals	IT Consultant	2-4	5.001-10.000	00:46:32	BS
I14	65 – Insurance, reinsurance and pension funding, except compulsory social security	Enterprise Architect	10-15	> 100.000	00:33:53	BS
I15	62 – Computer programming, consultancy and related activities	IT Consultant	2-4	251-500	00:41:42	BS
I16	20 – Manufacture of chemicals and chemical products	API Strategist	10-15	> 100.000	00:55:00	BS
I17	20 – Manufacture of chemicals and chemical products	CTO	10-15	51-250	00:40:00	BS

End of Table

When considering all 14 organizations, five companies are located in the manufacturing sector, in each case 2 for operational IT consultancy respectively software publishing, and 1 in each case come from finance, insurance, retail, strategic IT consultancy and transportation industry.[11] Regarding the number of staff per company, 8 organizations have more than 5,000 employees, 3 companies have more than 100,000 employees. (see Figure 4.1

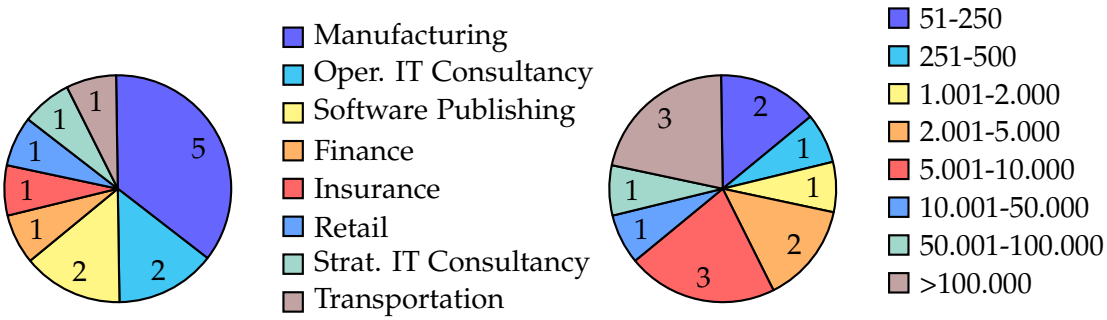

Figure 4.1.: Distribution of Industry (left) and number of employees (right) on interviewed organizations (N=14)[12]

Considering the interview partners, they represented various roles, among others, reaching from IT consultant (four times), to business developer (2x), to director of IT business unit (2x), to enterprise architect (2x), to solution architect (2x). In terms of experience, the majority (10/18) had more than 5 years of working experience in the area of APIs. (see Figure 4.2)

4.3. Modeling Business Value

4.3.1. Modelling Approaches

A visual representation of relationships and value exchanges within an ecosystem facilities making analyses on a global level as well as per actor. Additionally, it supports the reader's understanding of the concept. (Horkoff, Lindman, Hammouda, and Knauss 2018, p. 3, p.7)

Hence, one central element of this work is the visualization of those relationships and value streams between actors within the API environment (see chapter 7). In order to do so, an appropriate modeling approach is necessary. For this reason, the search for

[11] note that especially the consultancy partners were able to provide extensive insights into former projects and customer experience from various industries

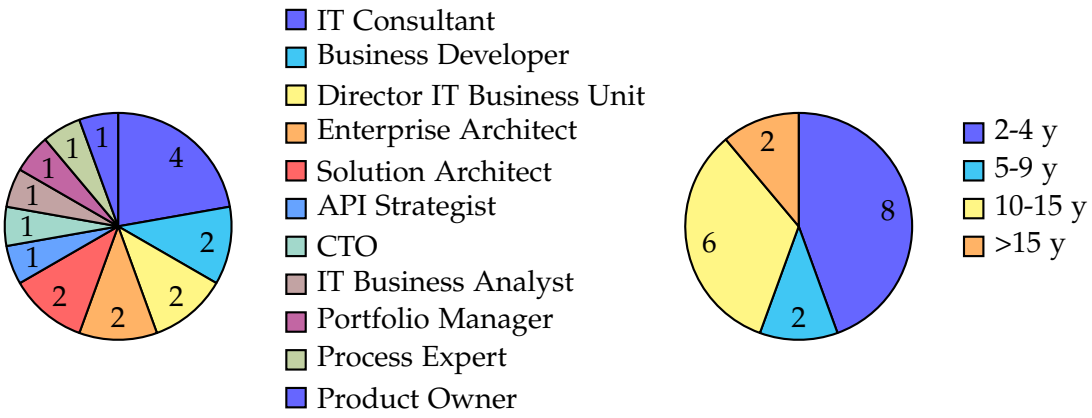

Figure 4.2.: Distribution of role (left) and years (y) of experience (right) on interviewed experts (N=18[13])

suitable modelling languages and concepts was an important element, throughout the literature research.

The requirements to the modeling concept of this research work where especially the possibility to include elements like value streams, different actors, ecosystems or logical relationships between those actors [1:n e.g.]. Additionally, it is beneficial if the modeling language is easy read and allows the reader to intuitively grasp the content. For academic reason

There are several methodologies that visually represent the above mentioned elements and (partially) fulfill those requirements (among others, Value Map by Allee (2000), Value net, as presented by (Parolini 1999)or Value stream map by (Pynnonen, Hallikas, and Savolainen 2008))

However, among the observed models, only few provide the possibility to visualize and explain all of those elements in one concept(Osterwalder 2004)

Apart from the completeness of visualizing all needed elements for this work, the reasons for choosing the e3 value modeling approach are the following (adapted from Horkoff, Lindman, Hammouda, and Knauss (2018, p. 7–8):

- The model itself is relatively easy to read and uses a simple language.
- It puts its emphasis on value (exchange).

- It is especially useful for ecosystem mapping.
- The model facilitates comparison (to other e3 value models).
- Extensive supporting material and tooling[14] is available
- The model has got a concrete graphical syntax
- There is continued interest in the language from the research community.

4.3.2. e3 Value Modeling

e3 value models traditionally contain actors in a value exchange network. Several actors of the same type are represented by market segments. So called value objects get exchanged from one actor or market segment to another via value ports respectively value interfaces. The actual element containing the value, are the value activities (compare (Gordijn and Akkermans 2001; Horkoff, Lindman, Hammouda, and Knauss 2018)).

Even it does not follow the original methodology presented in the original paper, the start stimulus was used by the author of this work to represent needs and goals. Adaption has also been used in other papers, including a paper from the creator of the modeling language himself (Gordijn, Yu, and van der Raadt 2006; Horkoff, Lindman, Hammouda, and Knauss 2018).

[14] https://research.e3value.com/tools/

5. Actors

In this chapter, the relevant actors[1] of the API environment shall be further explained. Using the findings and insights from literature research as well as expert interviews, the focus is on stating the role and the relations between different actors. It is important to note, that for the sake of abstraction, not every single actor will be listed and explained, but rather cluster them in more abstract actor categories. Furthermore, all actor categories where divided into two main groups: directly involved API actors and mostly influencing or getting influenced) actors. The first group 'directly involved API actors, has several actors, that are directly involved in the value exchange on an API basis. This is different to the second group, 'influencing API actors', in which the involved actors do not directly get involved in a value exchange via API but are rather influencing one or several actors (or get respectively influenced by actors) within the first group. In total 15 actor categories could be found.

Note, that there is very little information in existing research literature, that describes or defines actors within the API environment. Hence, the information used below are taken from only few sources (Bouza 2018; Rudrakshi, Varshney, Yadia, et al. 2014)) and were enriched with impressions from the expert interviews, without directly citing single interview partners. References to the interviews are indicated by [Ix]. See Table 4.1 for further information.

5.1. Directly involved API Actors

As stated previously, all actor categories where divided into two main groups. The first group 'directly involved API actors, has several actors, that are directly involved in the value exchange on an API basis.

[1] the author mainly sticks to the term 'actor' to describe a stakeholder. This aims at keeping the same designation of the chosen modeling approach by **Gordijn.xxx** which was presented in chapter 4.

Data / Functionality Provider

This is the actor, that contains the actual data / functionality that will be then exchanged via an API to others, that are within the organization (private), or outside of the company (partner, public). The data / functionality provider can be part of the organization (traditionally), or be placed outside the organization (e.g. marketing data bought from other companies).

Web Service Provider

The Web Service Provider (WSP) is the traditionally known 'API provider', a term that is mostly used in literature (Bouza 2018; Schäfer 2019). However, the author decided no to use this term to be more precise and to differentiate from an 'API Enricher / Orchestrator'. Both WSP as well as the enricher / orchestrator can be defined by existing definitions for API providers[2], but are in reality different actors. A WSP builds, exposes and operates APIs, without integrating other externally sourced APIs (which would the case for an enricher or orchestrator).

(Technical) API Supporter

The (technical) API supporter provide assistance for API offering organizations (WSP) in terms of API Managemet tools, consultancy services (strategic, legal, operational), API creation services (e.g. companies specialized on building APIs for dedicated purposes and selling them to the WSP) or API registries respectively API catalogues (for finding suitable APIs and connecting demand and supply). The generally support the WSP only for a limited time frame (except of API management).

Open Development Community

Next to API supporters, the open development community own substantial technical knowledge. The community gives feedback on existing APIs, discusses technical feature or even develop entire APIs [I11]. Note that, in general, the involved developers do not get paid for those supporting or creating activities. Their motivation is of intrinsic nature: reach a certain status on a development platform or improve the own reputation for future career possibilities, as headhunters are specifically searching for talents in the kind of community [I11]. Jacobson, Brail, and Woods (2011, p. 8) even argues, that in "the most successful developer communities, the most active members don't work

[2] "API providers build, expose, and operate APIs. In other words, API providers are the ones that provide APIs to others." (Bouza 2018)

for the company that provides the API — rather, they help because the API is critical to what they do and they love helping others see its value."

Platform Provider

The platform provider, as an organization, provides, manages and fosters the platform, where the API can demonstrate its value and serves as a linking element between WSP and platform. The platform itself serves as a central place where several actors come together (see section 5.3).

UI / App Developer

An important actor is the UI[3] / App developer, that primarily links the API to the end user of the actual data / functionality source. It develops software solutions that utilizes APIs and/or integrate in his/her applicatoin or website. However, they are not the customers, even if the are " the most important stakeholders for API providers because they interact the most with the APIs and the related developer portal", according to Bouza (2018). Again, comparable to the WSP and the traditional term 'API provider', the UI / App developer is often called 'API consumer'. As this also might cause ambiguity when considering the enricher / orchestrator, who also consumes existing APIs, the author prefer to stick to the term 'UI / App developer'.

API Enricher / Orchestrator

As an actor that (re-)combines internal and external resources (Beverungen, Lüttenberg, and Wolf 2018), the API Enricher / Orchestrator plays a central role within the API environment. The rising number and importance of APIs asks for an actor that aggregate existing APIs to customize them for specific needs an use cases. Therefore this actor is often called 'API Aggregator' (Borysowich 2017, p. 5). The reason for this new naming is the slight difference between enricher and orchestrator. The former utilizes an existing API and enhances its functionality with own data[4], whereas the latter exclusively combines existing APIs. In both cases the aggregated APIs are called 'mashups' and are created to a large extent in recent years (Evans and Basole 2016). As mentioned earlier, the API Enricher / Orchestrator is the reason for not using the traditionally used terms 'API provider' and 'API consumer', but instead naming them 'Web service provider (WSP)' respectively 'UI/App developer'.

[3] An UI can be (a graphical user interface of) a software or a website that use APIs.

[4] "There are currently many TPPs, that use one single API and add some more TPP on this. From this they create a business model." [I4]

Partner

According to Schallmo, Reinhart, and Kuntz (2018) the importance of partners for organization increases steadily due to the impact of the digital transformation. This can be a supplier, customer or another stakeholder of the organization, that is tightly coupled to internal process (e.g. production process, warehousing, etc.), and therefore has access to more sensitive data or functionalities. In the area of APIs, a partner is an actor, that uses partner APIs, i.e. APIs that are not accessible by everyone, but only by those having registered before (e.g. PSD2) or having a closer relationship to the API offering organization. A partner utilizes more sensitive data / functionalities and are often involved in improvement process for APIs, where the provide valuable feedback [I3].

End user

Finally, there is the end user. According to Bouza (2018), the end user of the API "don't use APIs directly. Instead, they use apps or [w]eb sites that use APIs in the background." Furthermore, the dictionary defines an end user as "the ultimate consumer of a finished product"[5]. When reconsidering the roles of an API from section 2.1.2, positioning the API as a product, this original definition from literature might be ambiguous, as an end user can be the ultimate consumer, directly or indirectly, of the API as a product (see e.g. [I3]). Therefore the author suggests using the following definition: the end user is an actor, that primarily benefits from the provided API access (data / functionality). This can be e.g. an organization that uses the API to directly integrate information on stock availability from the WSP into their ERP software (internal UI provider). This organization directly utilizes the API and primarily benefits from this data access (e.g. as it can make better availability forecasts).

Interestingly, there is an additional actor mentioned in literature. The so called 'API Customer' decides on which API to use and pays for using it (Bouza 2018), assumed that the API is monetized. Furthermore, API customers "look for solutions to their problems", due to missing resources, time or data, (Bouza 2018). Since they don't have the resources, the time, or the right data, they choose APIs from API providers." However, these specifications can also be required by the UI / App developer, API enricher / orchestrator, partner or end user. Therefore, the term 'API customer' is ambiguous and will not be used within this work.

[5] https://www.merriam-webster.com/dictionary/end%20user

5.2. Influencing API Actors

In the second group, 'influencing API actors', the involved actors do not directly get involved in a value exchange via API but are rather influencing one or several actors (or get respectively influenced by actors) within the first group.

Legislative Authority

Regulators or legislative authorities provide the framework conditions, within a certain industry or business can operate in. In case of the API environment, these are governmental institutions or banking supervisors. The are forcing change by legislative initiatives, PSD2 for instance.

Lobby Alliance

A loose association of companies (or a very powerful single organization), that influence legislative authorities and design rules, is another prominent actor to mention. In the area of APIs , this can be a tech organisation, aiming to push the own interface standard, so that it becomes a market standard, approved by legislative authorities.

Inter-Trade Organization

Comparable to a lobby alliance, an inter-trade organization[6] aims at influencing legislative authorities and design rules. It works on standardization issues within the corresponding industry and differs in its degree of organization, namely, is better organized and more integrated. BiPro[7] is an example of an inter-trade organization for the insurance industry [I5].

Competitor

As competition drives innovation and fosters market development, the competitor is a relevant actor within the API environment. In general the competitor is influencing the need to innovate (efficiency, customer touchpoints, increase market access, among others) but also can directly participate in platforms or partners. However, for the sake of simplicity, this latter role of the competitor is not considered relevant in this case and will also not be considered in the visual model.

[6] in Germany called 'Standardgremien'
[7] https://bipro.net/

Job Market

The job market provides workforce for organizations. In the area of APIs, this would be API developers or API business strategists. It gets influenced by the reputation of an organization.

Society

Similar to the job market, the society gets influenced by the reputation of an organization. Positively by innovative products and services, negatively by bad user experience or careless treatment of sensitive user data.

Shareholder

Caring about in the financial conditions of a company, shareholders influence innovation (or innovative initiatives) and economic value of a firm.

Other unknown actors

Other unknown actor represents a placeholder for unknown or future actors within the API environment, which seem to be not relevant today, but in the future.

5.3. Actor Base Model

To end this chapter, the before defined actors will be set in a logical relationship, visualized in an overview which is followed by a description of specific connections between actors, and highlighted areas. Rudrakshi, Varshney, Yadia, et al. (2014) proposed a very basic connection model between different actors. As it does not serve the purpose of this research work, a newly created overview was created, which also will be the baseline for use case models in chapter 7

The base model is not following the e3 value modeling approach, as no value exchange (*"what is exchanged"*) is declared. Instead, connection types between single actors are presented here (*"how is the value exchanged"*). One reason for not utilizing the e3 value modeling approach (and its tool) is the flexibility in drawing coloured and labelled category areas (e.g. *"functional Relation"*)

However, the methodology of connecting value interfaces (including the value ports) and multiplicity of actors (so called market segments) were used.

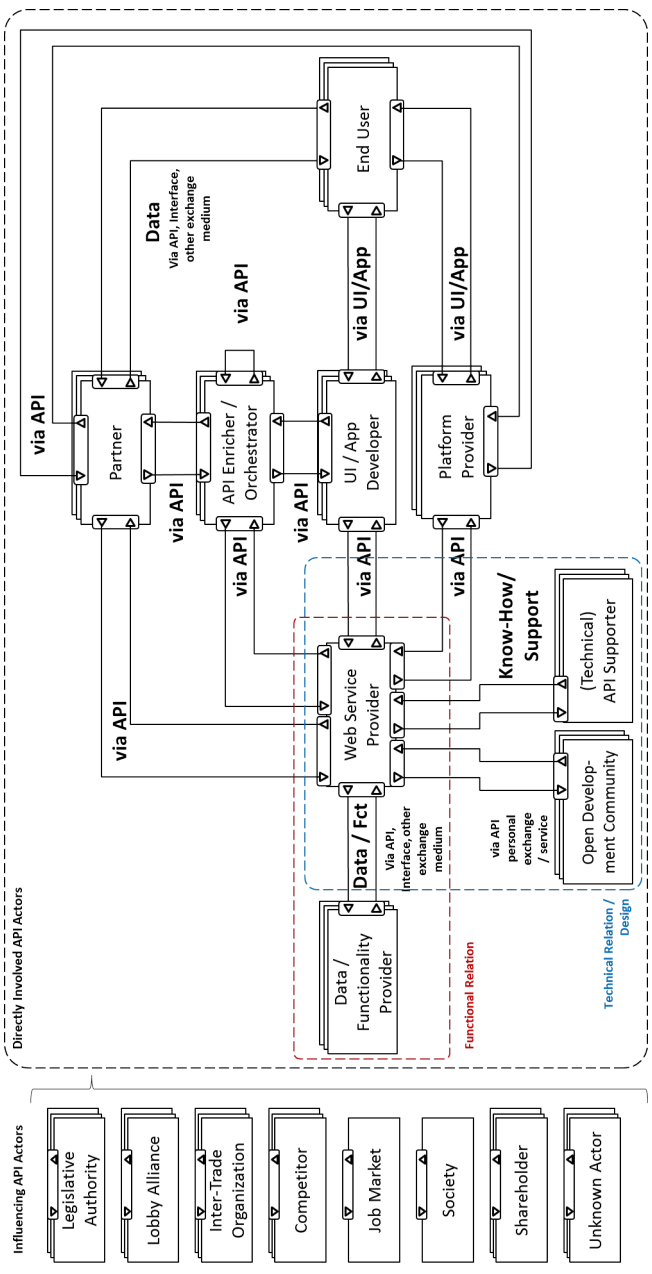

Figure 5.1.: Base model archetype: an abstracted view on relevant actors within the API environment

The model gives a comprehensive, but abstracted, overview on possible connections between different actors in the API environment. Different to the original e3 value modeling, the the connections do not consistently stand for value exchange, but abstract the connection types between single actors or market segments.

There are some points to highlight here:

- As described in subsection 4.3.2 market segments represent a multiplicity of single actors. This base model contains only market segments, besides three exceptions: the 'Web Service Provider' (WSP; as it is the point of view of the API offering organization) the 'Job Market' and 'Society' (both to be considered single elements in natural language).
- Furthermore, one WSP ('represents' the API) can connect to several 'Platform Providers' ('represents' the platform).
- The 'API Enrichter / Orchestrator' market segment connects to itself, as an enriched API can be orchestrated again by another 'API Enrichter / Orchestrator'.
- Also consider the division of 'Influencing API Actors' on the left, and 'Directly Involved API Actors' indicated by a dotted circle in central position.
- 'WSP' and 'Data / Functionality Provider' have a functional relation (WSP utilizes data / functionalities), whereas WSP and 'Open Development Community' as well as '(Technical) API Supporter' have a more technical and/or design driven relation, due to the technical nature of APIs in the backend.

Please note, that there might exist further connections in specific use cases (e.g. 'API Enricher / Orchestrator' to 'Platform Provider', or 'Web Service Provider' to 'End user'). However, for readability reasons, this base model captures a more standardized overview.

6. Goals

6.1. Goal Categorization

When retrieving a large number of goals it is advisable to categorize those goals. Parolini (1999), in her work on value nets, proposed an identity kit of companies, that "respond successfully to current environmental changes". As stated in chapter 2, the API as an important part within the digital transformation foster such a change in the business environment. Therefore, the author decided to orientate along those categories: 'Focus on Core Competences', 'Participation in More Than One Value creating System', 'The Interconnected Company', 'Integrated and Lean Companies', 'Internal and External Flexibility' (Parolini 1999, p.43–49).

The author oriented towards the proposed classification of Parolini. However, some aspects were altered and newly clustered to fit to the retrieved set of goals.
Eventually, the following categories have been formed:
The category 'revenue connections' (RC) host revenue-related goals. Obviously, a lot of company goals lead to value, and therefore revenue increase. Hence, this category can be considered as a result pool of goals, as several goals need to be achieved first, in order to increase revenue (e.g. improve customer processes, lead to a higher customer loyalty). Parolini (1999) did not provide a category that matched this revenue related topics. It is to state, that the majority of interview partners mentioned at least once the overall goal to 'increase revenue' by the provision of APIs.

The 'organizational core' (OC) clusters all goals that aim at improving respectively influencing central elements of daily business within an organization. It is very close to Parolini's 'Focus on Core Competencies' cluster. Core competencies are, according to Parolini, developing knowhow, strengthening competencies underlying the companies' products and services and reinforce ability to share common skills (Parolini 1999). Topics like innovation, data analyses or customization are placed here.

The third category, 'Customer Satisfaction' (CS), include all goals related to direct customer satisfaction. Parolini's section 'The Interconnected Company' would corresponds to this (it has the "ability to ensure organic connections with other economic

players”). However, the author split ‘The Interconnected Company’ into two categories, as the customer satisfaction respectively the customer relation has a prominent influence on the API offering organization. Therefore the author slightly altered the original classification, and sees the customer relation too important to cluster into a category of external connections.

‘Internal compactness’ (IC) as the fourth category designates especially internal efficiency topics, which Parolini named ’’Integrated and Lean Companies ’. She considers goals here, that address compactness and strategic agility, but on an internal focus. As this work’s focus is on providing API, only internal goals that derive from offering (external) APIs (point of view: web service provider) are considered here.

The external focus is presented in the category ’external business fluidity’ (EBF). Those goals aim at a higher external agility and increased flexibility. Often goals of ’internal compactness’ serve as a prerequisite for external business fluidity goals (e.g. ’brake up silos’ might be a prerequisite for ’diversify application areas’). Thus, a clear division of both categories might not be immediately obvious. This category comes close to Parolini’s ’Participation in More Than One Value creating System’ category ("Ability to participate simultaneously in several valuecreating systems: capable of offering other (intangible) goods that can be applied to different fronts / customers.").

The sixth category ‘establish strengthen connections’ host goals, that are aiming at building and foster connections between directly involved API actors (see chapter 5). Hence, there might already be existing connections, that can be deepened. A good example is the topic of ecosystems or platforms, that is mainly treated here. Parolini defined her ‘The Interconnected Company’ category as goals that aim at the "ability to ensure organic connections with other economic players" in order to transmit information quickly. There is an obvious proximity to the ”Participation in More Than One Value creating System ’ category, already used in the ’external business fluidity’ cluster, as well as the ‘Customer Satisfaction’ (already presented above). ’Establish strengthen connections’ focuses on the connection itself (goal for example "strengthen customer/partner/actor integration"), whereas ’external business fluidity’ sees the flexibility as its core differentiation aspect ("Increase flexibility in acquiring partners").

Finally, there is the ’Utilize and modify relationship’ cluster, that contains relationship-related goals outside of the directly involved actor group. Those goals consider compliance, reputation and compliance, among others. Parolini linked them to the ability to modify the external relationships (’Internal/External flexibility’).

6.2. Goal Overview

In the following all relevant goals for API offering organizations are listed including a description and references to literature, interview partners and use cases if relevant.

During the research process and analysis of literature, there were different goal-levels giving. Some very general or high-level goals [1], have not been added into Table 6.1, as they are not specific enough, but are still valuable mentioning here. Furthermore, goals referenced with [author] are goals derived from reasoning by the author of this research.

When clustering single goals and goal categories the author followed the so called 'MECE' approach, in order to separate the goal items into non-overlapping subsets, that are mutually exclusive and collectively exhaustive. The overall goal is to better categorize them and make them more structured for the reader. As some goals are partially strongly linked, those might seem to be duplicates, but are slightly different when applying them to examples.

When having a closer look at the concrete goals, one main target to achieve when talking about API offerings is the increase of revenue for providing organization. Please note, that the terms 'revenue', 'turnover', 'sales' are often used interchangeably in dictionaries[2], academic literature as well as during the conducted expert interviews. However, from a business perspective their meanings do slightly differ[3]. This work will therefore stick to the 'revenue' term[4] to avoid ambiguous explanations.

[1] 'increase revenue' in category 'revenue connections', 'foster innovation' in category 'organizational core', 'increase customer satisfaction' in 'customer satisfaction', 'change internal mindset' in category 'internal compactness', 'foster business agility' in 'external business fluidity'

[2] https://www.merriam-webster.com/dictionary/revenue

[3] https://smallbusiness.chron.com/difference-between-turnover-revenue-24796.html; access date: 10.09.2019

[4] total sales income, including income received from allowing others to use property or assets (royalty)

Table 6.1.: Goal Overview

ID	Name	Description
Revenue Connections		
RC1	Increase number of sale channels	The organization is looking to expand their number of sales channels. APIs can be integrated into several different devices, operating systems, apps or websites (sales omnichannels). "The main point is always revenue" [I14]
RC2	Sell gathered & aggregated data (raw data, processed data, insights)	Gathered data from several sources (external APIs, own data base, consumer panel data via excel), is sold and provided via API, or is processed or further analyzed before. This is compliant, as long as it sticks to the GDPR and the consent of the underlying data provider / owner. "That are insights, that are primarily requested by small companies to re-calibrate their recommendation engine. These are valuable insights for them" [I6]
RC3	Offer additional premium services	Next to compulsory and not monetized APIs (e.g. compare to PSD2 regulatory initiative), companies can use the existing infrastructure and workforce to offer monetized APIs. Deutsche Bank (Schmiechen 2018) is successfully pursuing this goal. [I4, I16]
RC4	Strengthen customer stickiness/loyalty	When increasing the loyalty of customers by valuable offerings or API-enable platforms, they will stay paying customers (license cost for software). The API itself is not necessarily monetized in this case, but the monetary flow comes from the mentioned license payments [I3]. "Our business model is to sell licenses" [I2]

Table 6.1 Goal Overview (Cont'd)

ID	Name	Description
RC5	Sell know-how as a (API-ficated) product	Not only data, but also already available functionalities within the company can be directly monetized via APIs. This is also called 'API-fication', make internal know-how accessible to accessible to externals (not necessarily in exchange of money). In this case, the API is the product [I6, I16]
RC6	Increase product sales where API is part of	API is not directly marketed or monetized, but it enhances the actual product (role: Important feature of a tangible product), so that the product itself offers more value to the customer. [I1, I3]
RC7	Alternate source of revenue (up-selling/cross-selling/outsource sales)	When the vendor sells a product, a partner can use the ongoing sales process to offer his product (e.g. vendor sells smart phone, partner offers device insurance) at the same time, or let others do the sales and only link in when your product fits to the complementary one. You will in both cases normally share the margins of the additionally sold product or service [I6, I8]. "We financially participate through additional services, that where generated through our solution" [I3.1]
Organizational Core		
OC1	Focus on core competencies	From the provider's point of view, it is beneficial to focus on own competencies and offer this functionality via an API. The other way round, from a consuming perspective, additional functionalities can be purchased and integrated into the own offer, without having special knowledge in this field. [I8]
OC2	Create new insights on partner/customer/other	Using available data deriving from offered APIs (usage data, input data), new insights or forecasts on customer / partner behavior and systems can be derived [I3.1, I5]. "The one who controls the API, controls the data"[I1]

Table 6.1 Goal Overview (Cont'd)

ID	Name	Description
OC3	Create new/improve services/products (through insights)	The same logic as in OC2, especially the usage data and the derived insights can be used to create new products or enhance existing APIs. "The data flows back and can be re-used to improve the products."[I7] . An author's use case could be, e.g. when big data volume is always transferred at a special time range, the server capacities can be made available at this point in time. "We also see which systems are connecting to us."[I3.1]
OC4	Externalize & accelerate research and development	opening up the API development, other developers and actors outside the own organization can access and test the API (design, documentation, performance, etc.). Especially actors from open development platforms often give valuable feedback or improvements due to their rich experience. They are not paid, but have an intrinsic motivation (happy to help, own development, career perspectives) [I2, I11]. "Widely useful functions [...] have often been invented by extension developers." (Parker, van Alstyne, and Choudary 2016)
OC5	Increase quality level	When using a partner (but also open) API, in general, both parties (WSP and partner) have an interest in having a stable performance. Due to relevant feedback or co-development, the quality of the connection (as well as their depth of integration) between those two organizations normally increase [I8].

Table 6.1 Goal Overview (Cont'd)		
ID	Name	Description
OC6	Analyze customer data for customer	Content related data, e.g. coming from a business case on an accounting platform, where the API was the interface between both parties, can be analyzed as well, to improve the partner's / customer's business environment (e.g. analyze bank account and available invoices to forecast cash flow in three months; advice to talk to bank to prepare new credit level if cash flow is not sufficient). "We want to shift from accounting to an automated advisory system" [I3.1]
OC7	Enable customizing products/services	Adapt product or service to specific needs and conditions, without handling those requests manually. Price conditions for customers are automatically provided via an API with updated price levels.[I13]
Customer Satisfaction		
CS1	Lower manual rework & error rate	By API-enabled automated connections and integration, semi-manual input (excel sheet) and possible handling errors can be avoided, which will then lead to a higher customer satisfaction. [I16]
CS2	Improve general user experience	Once integrated, the data or functionality via API can be consumed within the original UI at the customer's workplace, he or she is used to, which might lead to the impression of a familiar user experience, [author] But there are also other examples from business. (Ranade, Scannell, and Stafford 2014)
CS3	Enable time efficiency for customer	Following the same logic as in CS2, being used to the environment and having the data / functionality within the system without having to manually request it, saves valuable time. "You can avoid direct contact via the sales staff and that leads to a more efficient order" [I13]

Table 6.1 Goal Overview (Cont'd)

ID	Name	Description
Internal Compactness		
IC1	Modularize, streamline & standardize functionalities internally	By offering partner / public APIs, the organization's internal structures are created with modularization, streamlining and standardization in mind. This improves internal and external compactness and agility.[author]
IC2	Increase employee productivity due to customer self-service	Especially in sales intensive industries as manufacturing, daily prices are requested by mail, phone or other means of communication. When opening a dedicated API providing this information to the customer, own staff can be delivered by such 'unnecessary' information requests, and can concentrate on value generating tasks. [I13]
IC3	Break up silos	Similar to IC1, when working on interdisciplinary solutions provided via an API, this mutual work bringing together different departments can foster internal and department-overarching thinking and regular exchange [I6, I16]
IC4	Improve decision making due to increased internal transparency	Architectural modularized organizations generally have a better overview and documentation on existing data sources and services. Additionally they can better make use of those elements to initiate analyses. This leads to more transparency [I16] and eventually a more precise decision making process. (MuleSoft Inc 2019)

Table 6.1 Goal Overview (Cont'd)

ID	Name	Description
IC5	Increase time-to-value/-market due to module re-use	Market trends or needs may change quickly. When internally having available functionalities, comparable to Lego bricks, that can quickly be combined to adapt an upcoming user demand, this significantly leads to a higher speed and faster reactivity, compare to the situation in which a comparable solution needed to be developed from scratch first.[I6] Time-to-market can be reduced by up to 90%. (Pamidighantam and P. Agarwal 2018)
IC6	Lower internal costs	Following up on IC5, not having to build entire new functionalities, leads to a higher efficiency of use of internal workforce as well as less external requirements purchases (work force, hardware, operational expenses).
External Business Fluidity		
EBF1	Offer pre-integrated solutions	Offering pre-integrated solutions via APIs bring additional flexibility to the offering organization, due to an increased ease and efficiency of integration. This additionally leads to less effort and, hence, less costs for both parties
EBF2	Enable scalability	One core goal achievable via APIs is scalability. Not only from a technical point of view, but especially when talking about the number of people that can be serviced by a single API, compared to the efforts necessary to reach a similar amount of actors [I7, I8, I14]
EBF3	Increase security level	Similar to EBF1, the general security level for both parties, can be higher. Prerequisites are, that the used security modules are well tested and already proved their reliability in real-world environments [I1]

Table 6.1 Goal Overview (Cont'd)

ID	Name	Description
EBF4	Enable external interoperability (via increase standardization & modularity)	When fostering and (internally) utilizing open and well adapted API standards (can refer to documentation, as well as interface standards/protocols), this helps to simplify external interoperability, when assuming that the probability of using an open standard is high. This avoids non-value generating additional rework and discussions [I2].
EBF5	Increase flexibility through modular structure	Comparable to IC1 (more internally focused) modular structures provide additional flexibility to the offering organization, as elements like authorization modules, payment solutions, etc. are already available and can be adapted or replaced "on the fly" for external use. "And in the end, I only plug together some APIs - and a new business model is born. That's actually the developer's mindset"[I6]
EBF6	Enable omnichannel capabilities	Comparable to RC1 and EBF2, offering APIs enable omnichannel capabilities, which allow organizations to flexibly provide information or functionalities over a large number of devices or channels, without having to adapt the content each time
EBF7	Diversify application area - 'beyond own industry'	Being able to expose an internal and/or industry specific functionality, allows an organization to bring valuable know-how to an area where this knowledge or services is unknown and can be utilized. A bank having the knowledge about a customer having a certain age (he/she had to prove is identity at registration) can provide this knowledge to a third party, looking for this to fulfill certain requirements (in consent with the verified customer) [I16]
EBF8	Offer service without UI development (headless approach)	Service can be provided without having to care about the actual user interface later in the process, when doing so via APIs, saving time and budget. [I1, I12]

Table 6.1 Goal Overview (Cont'd)

ID	Name	Description
EBF9	Hide information, if necessary	When offering APIs, the offering organization is in full power, which information to which actors (via authentication on a partner level) will be provided. If certain actors should not receive sensitive data, the scope can be customized or the API can be (temporarily) made unavailable (as far as there is no SLA or the SLA does not restrict this)
EBF10	Enable new business models	As APIs are flexibly usable, new business models can be created [I6]. For example the freemium business model (see Gassmann, Frankenberger, and Csik (2016)) allows offering organizations to deliver only basic functionalities via the API to foster interest. If desired, the free access can easily (API customizing) be turned into a premium access with enhanced features (e.g. more functionalities, no advertisement, higher performance).
EBF11	Increase fluidity in business goals/experimentation - let it go approach	Contrary to advises from existing literature (e.g. Pettey (2017)), offering an API without a concrete goal or strategy can be valuable. This is the case when having the necessary resource available. The experiment can create new business relations, even for small organization, and valuable feedback on usage behaviours of partners, customers, or other 'users' (McIntyre and McFarlane 2018).
EBF12	Increase flexibility in acquiring partners	Through API capabilities, e.g. on prominent platforms, offering organizations can attract new partners more easily, as they are aware of a more flexible connection and interaction. "I first need a certain amount of platform users. We already had that when launching the API, and that was attractive for partner." [I3.1].

Table 6.1 Goal Overview (Cont'd)

ID	Name	Description
EBF13	Utilize Co-opetition	Let another organization offer, what the WSP cannot deliver to the end customer. Especially in traditional industries (e.g. banking) co-opetition, as a form of partnering, is a popular way of job sharing: the WSP offers the functionality, the App developer provides the UI, which is not part of the WSP capabilities (C. A. Technologies 2016))
Establish & Strengthen Connections		
ESC1	Strengthen / foster platform / ecosystem	With the help of APIs, platforms and ecosystems can be supported to become more relevant, e.g. by feeding data into the platform and offer data from there [I3.1]. Therefore also refer to the role "API powers the product".
ESC2	Foster interface standard	Especially for early movers and/or large companies in the API economy, it it possible to define the own design as a quasi market standard. The General Transit Feed Specification (GTFS), originally developed by Google to allow intermodal travel in the USA, has become the standard format for public transportation schedules. [I12]
ESC3	Strengthen customer/partner/actor integration	Offering (open) APIs can be beneficial for WSP as well as partners or UI developers. For Facebook and Walgreens, the stronger integration and the use of access via a popular ecosystem helped them reaching their goals (Iyer and Subramaniam 2015c).
ESC4	Decrease data breaks	Data channels (APIs) provided by the source data provider, helps decreasing data breaks and leads to a stronger integration of the requesting party.[I8, I16]

Table 6.1 Goal Overview (Cont'd)		
ID	Name	Description
ESC5	Diversify & Increase number of customer touchpoints (no sale channels)	Not only sales channels improve integration and connection between actors, but also the diversity of information retrieval. Voice commanded devices (e.g. Amazon Echo incl. Alexa, API ready) can be such an example, where an additional touchpoint was created, to provide information on insurance rates, without having the possibility to purchase. "Each customer touchpoint has a value and can strengthen the customer relation and therefore increase the customer lifetime value, as I can keep the the customer longer (loyalty)" [I7].
ESC6	Connect API offer and demand ('there is an API for that')	Through (open) API catalogues (e.g. https://www.programmableweb.com/) the own interface can be displayed to a large number of potential actors. Similar to the mobile application mindset, such an API store foster the "there is an API for that" reasoning within organizations.
ESC7	Enable market access for partner / actor	Fintechs can only take part in the banking environment due to the APIs of those financial service institutions, possessing a banking licence. The API therefore enables the Fintech, not having such a licence, to participate in this market. The WSP benefits from new ideas and a compelling user interface, for example.[author]
ESC8	Improve customer/partner/actor onboarding	Through existing interfaces an onboarding with new actors avoid a lot of additional administrative work, by utilizing APIs especially when more than 2 parties are involved and have to communicate (**Nordic.2015**).

Table 6.1 Goal Overview (Cont'd)		
ID	Name	Description
ESC9	Foster co-marketing	When a WSP and a partner having a comparable client base, both can use each other's sales channels or customer touchpoints to promote and process mutual marketing campaigns (reputation, revenue) and/or mutual product/service offerings like bundle offers [I3.1].
ESC10	Expand ecosystem via API	Explore growth opportunities by employing the API to expand the existing ecosystem. An organization gathering data within its core ecosystem can use this to participate in another ecosystem with similar requirements. Uber and UberFresh in the food-delivery ecosystem is a prominent example (Iyer and Subramaniam 2015a).
Utilize & Modify Relationships		
UMR1	Increase societal reputation & brand awareness	When offering an API to externals, especially traditional organizations, can raise brand awareness (Rudrakshi, Varshney, Yadia, et al. 2014), but also tech company do this: "I can show what I am capable of"[I1]
UMR2	Increase job market attraction & attract workforce	As in UMR2, the same awareness boost is possible to attract new developers, most probably via developer communities, where the awareness can be risen by the organization's API being subject for discussions. (McIntyre, S. Agarwal, Olijve, et al. 2018).
UMR3	Be compliant to regulatory framework	Being compliant with the regulatory framework is a key goal to achieve, currently a very popular topic after the introduction of the PSD2 in banking [I4,I5,I16]

Table 6.1 Goal Overview (Cont'd)

ID	Name	Description
UMR4	Avoid falling behind (offer hygiene features) & save market position	APIs can provide so called hygienic (or standard) features, e.g. aggregating bank account information after PSD2 or other basic functionalities. They have to be offered, unless the offering organization wants to fall behind competition, which is offering it. The 'falling behind' term could additionally contain the fear of desintermediation, i.e, that the frontend (and therefore the customer touchpoint) is occupied by others. "Our boss already said this a long time ago: he does not want to become the mobility provider of Google"[I9]
UMR5	Improve competitive position (offer delighting features)	Opposite to the hygienic features in UMR4, API can also be the interface to provide features that will help to improve market position and outpace competition. "The solution on our went through the ceiling"[I3.1]
UMR6	Utilize market power (exclusive data, force standard)	Powerful organizations, in terms of API impact (exclusivity of data, reputation, market share) can utilize APIs to expand their importance in terms of business and revenue. "If you open your knowledge/data only you can deliver, you will become the monopolist of your data, that other companies cannot ignore;" [I17]

End of Table

7. Archetypes

This chapter serves as a visual explanation for the interaction between actors (chapter chapter 5) and goals (chapter 6), where concrete value exchange become transparent. Due to the extensive number of different goals listed in chapter 6, a selection of frequently stated goals will be applied here, mainly elaborated and explained in detail by experts during the conducted interviews (see section 4.2). Several industries and use cases will be covered in these archetypes[1]

In order to point out the relevant information, the author decided not to model and visualize all goals of all use cases of one industry in one big picture. This would lead to confusion and would decrease the practical value for readers and organizations trying to capture the practical value of API providing. Instead, single use cases will be modeled where several goals can be achieved with. Only the dedicated value streams for the relevant use case will be captured, which will bring higher value for organizations due to less complexity.

Additionally the following constraints for the then presented models are important to notice (compare to Parolini (1999)):

- The value creating system archetypes do not entail all possible interrelations between the actors.
- Only the most common or most likely value streams between the specific actors were conceptually modeled.
- In addition, the values streams are not weighted by importance.

7.1. Overview and Categorization of Use Case Types / Models / Archetype

There are

[1] the author defines an archetype as a recurrent logical relationship between actors, their connections to each other and corresponding value streams in specific industries

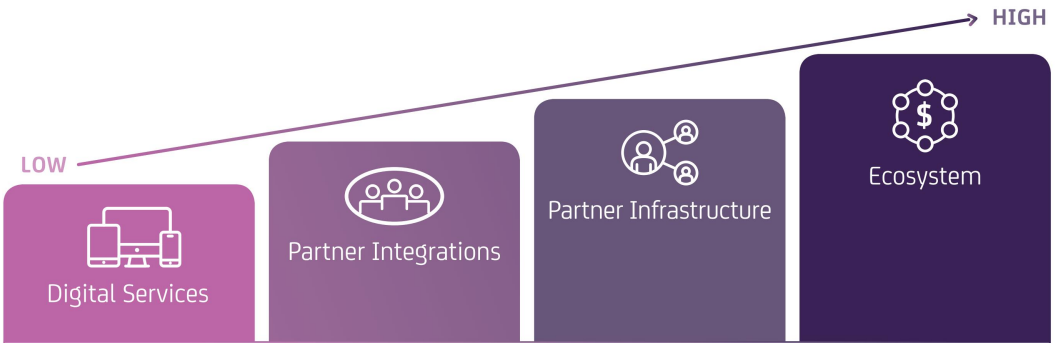

Figure 7.1.: API Maturity Level for Business Models and Use Cases, from low maturity to high maturity, according to C. A. Technologies (2016)

7.1.1. API Archetypes Maturity

-present maturity of business models and use cases - and categorize them?

7.1.2. St.Galler Business Model Navigator

-map API use cases to "The 55 business model patterns of the St.Galler Business Model Navigator" (Gassmann, Frankenberger, and Csik 2016)
.basis for industrycastypes: 4 questions how to create pictures in e3 value model: st gallen business modell, example etc

.!!try to make a connection to the roles of APIs in section 2.1.2.
refer to roles overview of industry case types, compare (Moilanen, Niinioja, Seppänen, and Honkanen 2019, p. 63-64)

As stated in section 5.3, the actor base model is based on statements and business model examples from interview partners and other explanations of the API value chain (De 2017; Jacobson, Brail, and Woods 2011). This model served as a template to create the following e3 value models for industry specific use cases.

7.2. Industry Use Case Types/Models

In this section the actual e3 value models will be presented, including some industry or use case specific introductory explanations. These use cases have been selected with

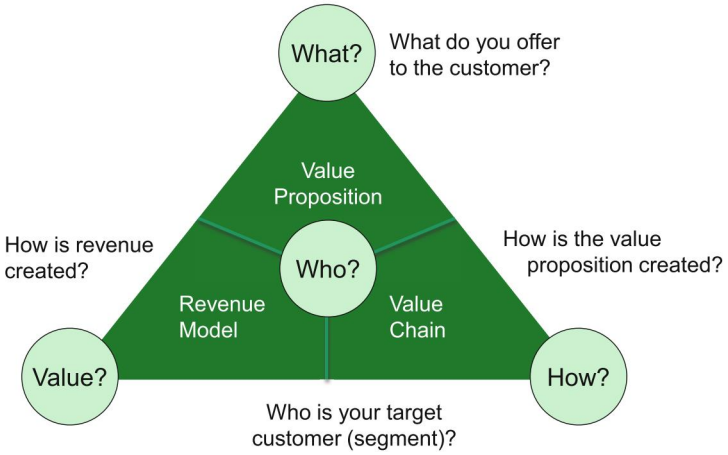

Figure 7.2.: St.Gallen Business model definition – the magic triangle, according to Gassmann, Frankenberger, and Csik (2016)

regards to one or multiple references to the following criteria:

- They are best practices and therefore a prominent example for successful API use for value creations.
- The associated industry is experiencing / will experience a considerable business impact, that resolves to a change in business higher or equal to 25%, as presented in Figure 2.3 (see subsection 2.2.3)
- They match to one or several goals listed in chapter 6
- They incorporate a special feature, prominent for APIs
- They represent an industry, which is not obviously linked to digital business or IT related topics at first sight

Further e3 value models, that will not match these criteria, but have been discovered during literature research and experts interviews will be shortly mentioned but not added in this work with regards to the added value.
Additionally, for the sake of simplicity, details on actors will not be mentioned explicitly or will be abstracted, when already having introduced it in a preceding use case value model.
No company or brand names will be used or mentioned for the upcoming explanations and value models, unless, the information were publicly available.

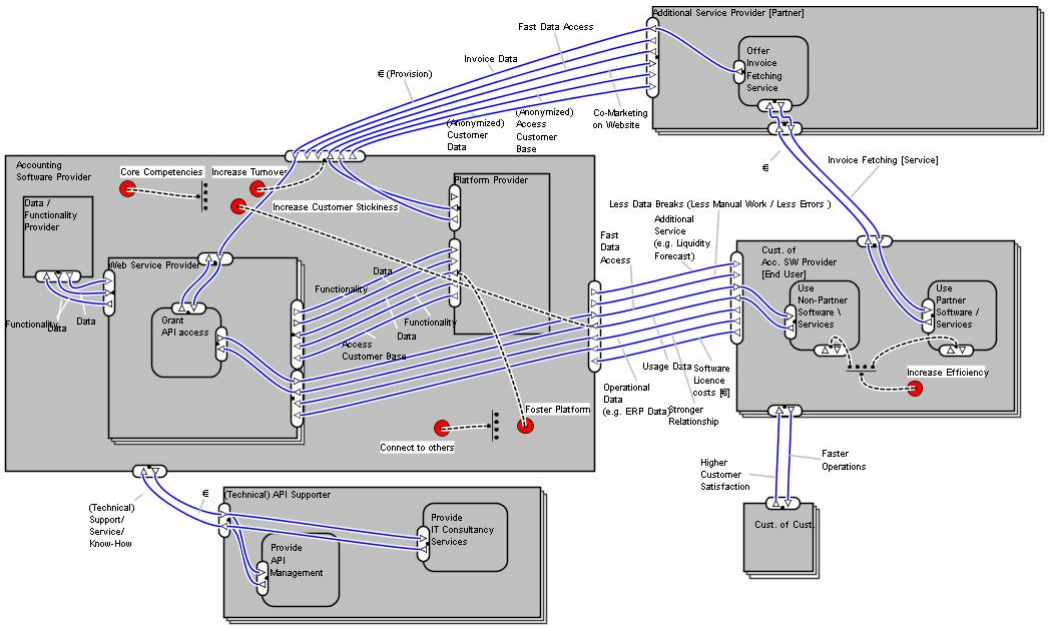

Figure 7.3.: Invoice fetching in Operations

7.2.1. Operations

Invoice Fetching Service

The invoice fetching service provided by ...

Factoring

7.2.2. Banking

Especially the banking sector has been influenced by API related topics during the last years (see section 2.4). Due to the enforced opening of banking to competition, a large number of fintechs and new use cases came up.

According to Pamidighantam and P. Agarwal (2018) the rise of additional players in the banking sector led to a democratization of "process, products and experience" and disrupted the oligopoly within the financial services industry. Bank customers are therefore no longer linked to financial institutes only, but have the freedom of selecting customized solutions. However, the aim for banks as well is to occupy the front-end to the customer. (Dohms 2017)

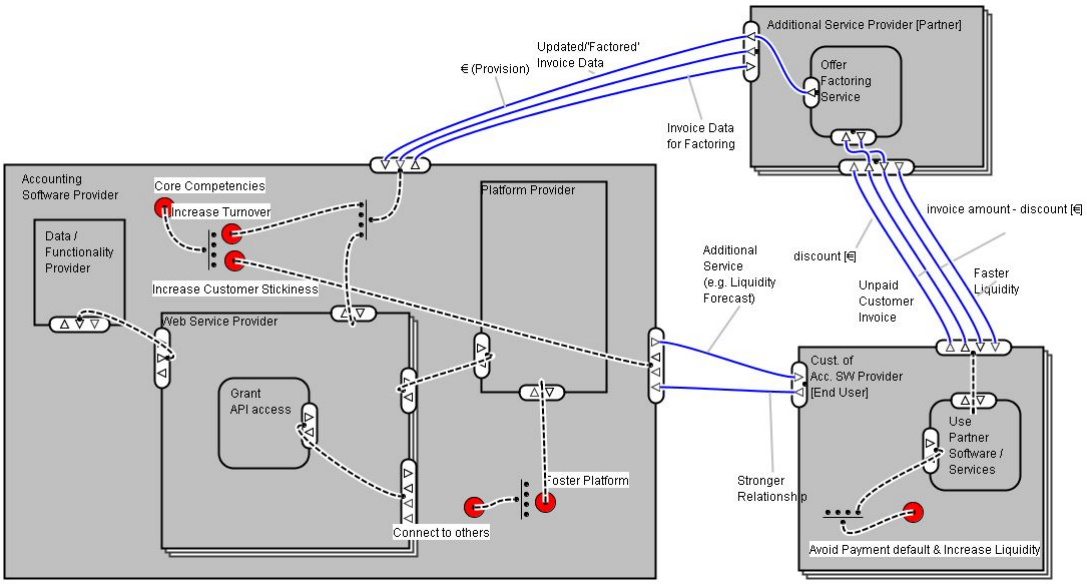

Figure 7.4.: Factoring in Operations

> **"Banking is necessary, banks are not."** - Bill Gates (Daske, Engelschall, Gutzeit, et al. 2015, p. 45)

The aim of the banks is to foster the ecosystem see (McIntyre, S. Agarwal, Olijve, et al. 2018)

Account Aggregation

.headless here as well?

Account aggregation is one of the most prominent example of open banking and the power of APIs within the financial sector. However, is not seen as a long-term growth driving feature, but rather a basic need. (McIntyre, S. Agarwal, Olijve, et al. 2018, p. 10)

Age Verifier

Financial service provider can not only deal with financial solutions but are also able to link to other areas. This allows banks to create new solutions out of bank data, beyond the financial sector. (Schmiechen 2018; Coeckelsbergs 2019)

A prominent example of this "beyond banking" mindset is the example of an API

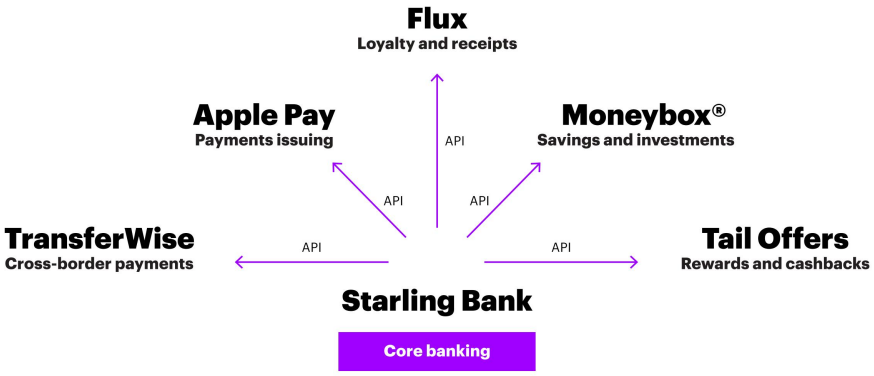

Figure 7.5.: Illustrative example of an API-enabled open banking ecosystem, according to McIntyre, S. Agarwal, Olijve, et al. (2018)

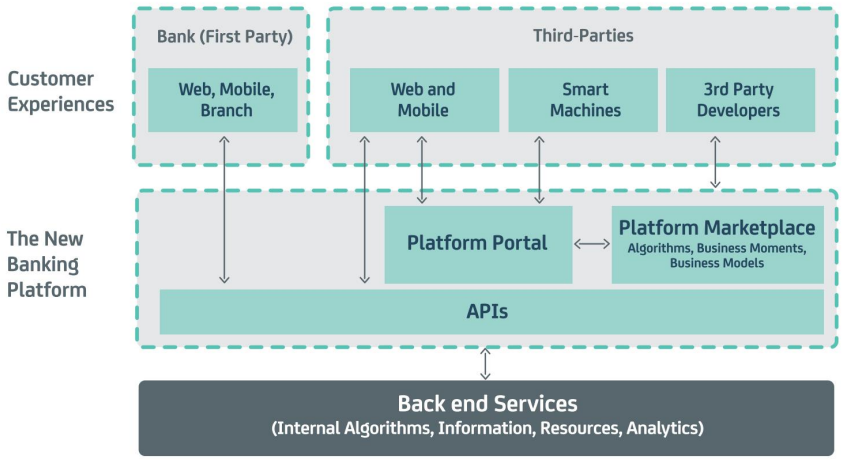

Figure 7.6.: Abstraction of a banking platform within the API economy, according to C. A. Technologies (2016)

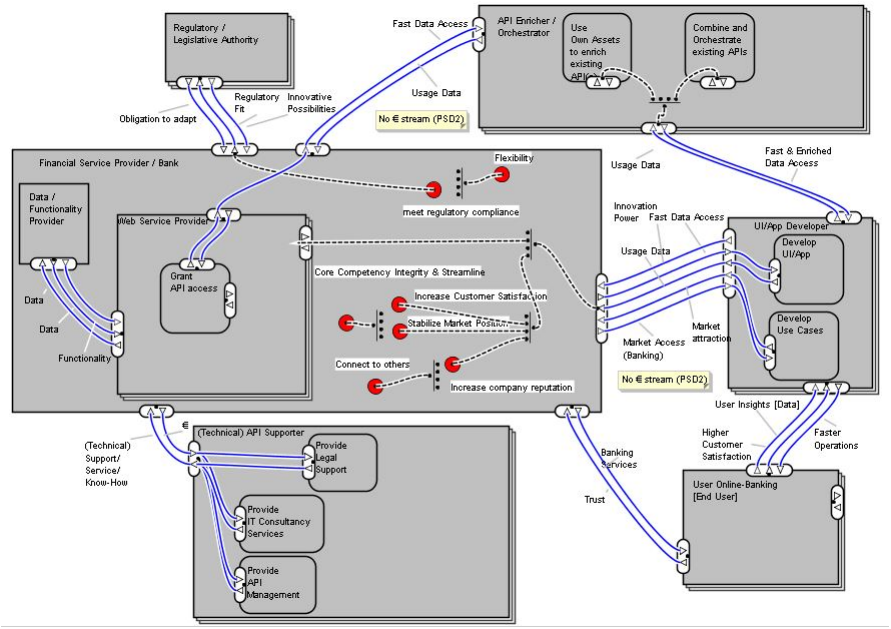

Figure 7.7.: headlessbanking

solution to verify the identity or the age of a banking customer[2].It "can be found in a plug-in for e-commerce shops so that customers don't have to provide all their ID details to buy fireworks for example. Neither the date of birth nor the specific age of our customer will be shared. The only information shared — on behalf of the customer — is a true or false value if the person is above a specific age. Nevertheless, the vendor fulfils the legal requirements to sell the fireworks. (Coeckelsbergs 2019) This API is a premium API, which is getting monetized, like all other non-relevant PSD2 APIs. Hill 2019

Banking and Insurance Sales

7.2.3. Transport/Logistics

.well known example: waze

> "The traffic app Waze, for instance, uses APIs to create a two-way exchange between municipalities and other partners to share data on road closures, accidents, construction delays, and potholes." (Iyengar, Khanna, Ramadath, and Stephens 2017, p. 5)

[2]for more information see https://developer.db.com/products/agecertificate

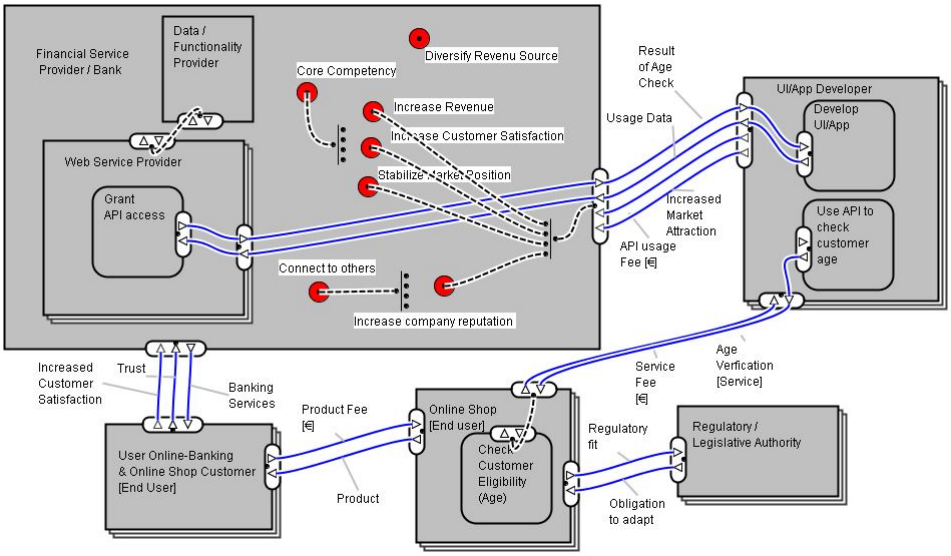

Figure 7.8.: Age Verifier in Banking

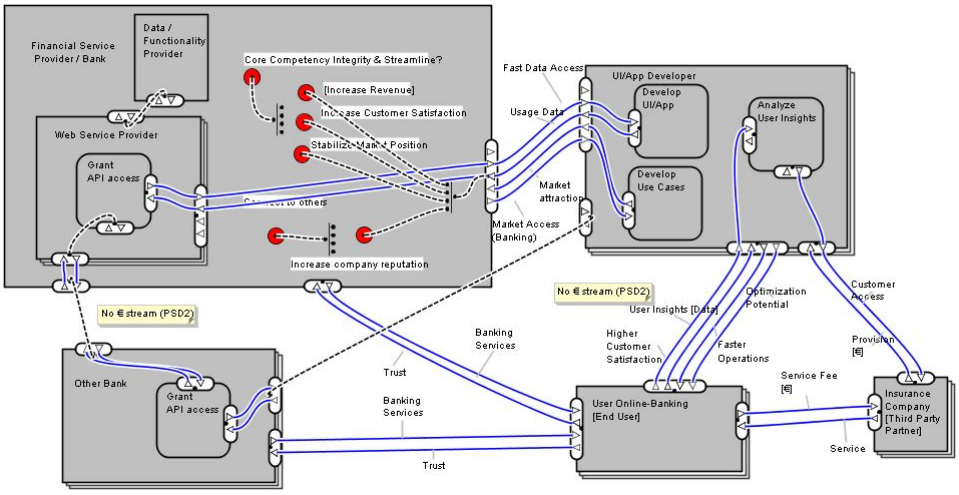

Figure 7.9.: Banking and Insurance - Account Aggregator

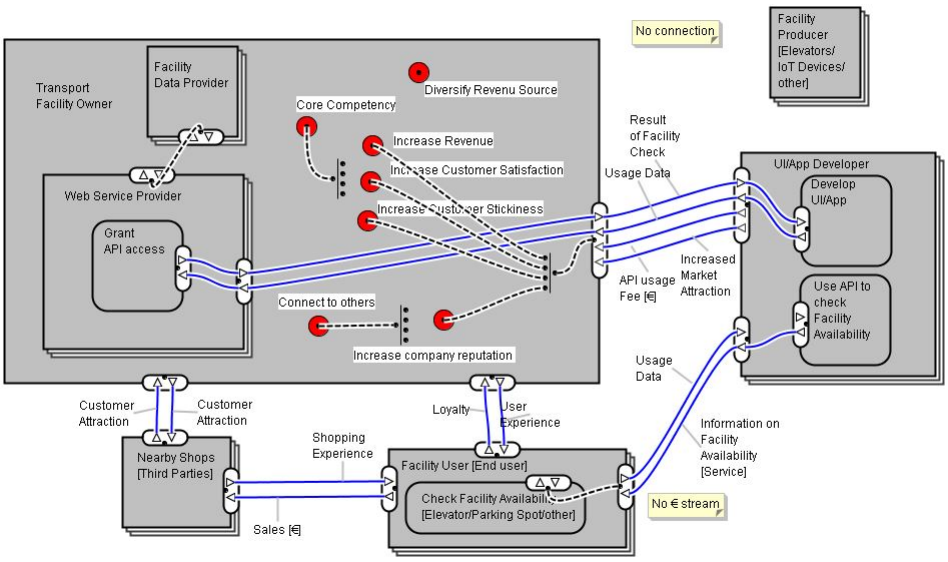

Figure 7.10.: Use facility data for better facilities

Transport Hub facilities-1

When being exposed to public places as a mobility facility provider (parking slots, public transport, regional transport), there are a lot of unused assets, both physically as well as in terms of data [I9]. For them "making the connection between the physical world and the new digital world" is still a challenge. can also be for buses, parkingslots, train, etc .for simplicity reasons, actors are not put in the same organization, even if in interview this was the case . bahn service, normally technology provider gets paid, The facility owner respective the WSP provider does not know about a connection th the owner itself [I9]

Ride Hailing-2

.mytaxi .see (Schäfer 2019)

Connected Car-2

.example of HONDA INTERNAVI: FUTURE OF DRIVING (Vart and Rialan 2013, p. 29)? "The Ford Motor Company and General Motors have established API programs that allow third-party software developers to build apps that will enable vehicles to include a wide range of “connected car” features ranging from voice recognition to advanced

vehicle diagnostics" (Evans and Basole 2016, p. 27) "One of the huge benefits of a connected car is not only the immediate information available to the customer but also building a detailed understanding of how people use their cars." (Daske, Engelschall, Gutzeit, et al. 2015, p. 41)

Public Transport-2

.see european technical specification (Bundesministerium für Verkehr and Innovation und Technologie 2018)
.Google Example in the US as standard and headless approach by public transport companies

Airline alliances - tbd

see Iyer.2015b - corporate alliances matter less thanks to apis .flugzeuge und datenkraken see (Hegmann 2019)

7.2.4. Manufacturing-1

Machine Data

"In addition to cars, APIs can be found in a paper mill production machine, bus , or elevator. An API is useful for device or vehicle status, its location, for assessing its maintenance needs and to connect the devices to an interoperable set of technologies from different manufacturers". (Moilanen, Niinioja, Seppänen, and Honkanen 2019, p. 58) "New applications can be built and different types of equipment and services can be connected - creating a smoother, safer, and more personalized people flow experience for building users. By utilizing the programming interfaces, different types of information can be collected from the devices and anticipate, for example, the need for maintenance. That information can be utilized in the design of new devices to make them more durable, safer, and more efficient. Other maintenance costs can also be better optimized". (Moilanen, Niinioja, Seppänen, and Honkanen 2019, p. 91)

7.2.5. Retail-1

"Amazon has been especially effective at opening APIs to its modular services. Figure 3.1 compares the range of APIs made available by Amazon and by the leading traditional retailer, Walmart, which is making a strong effort to become a significant platform

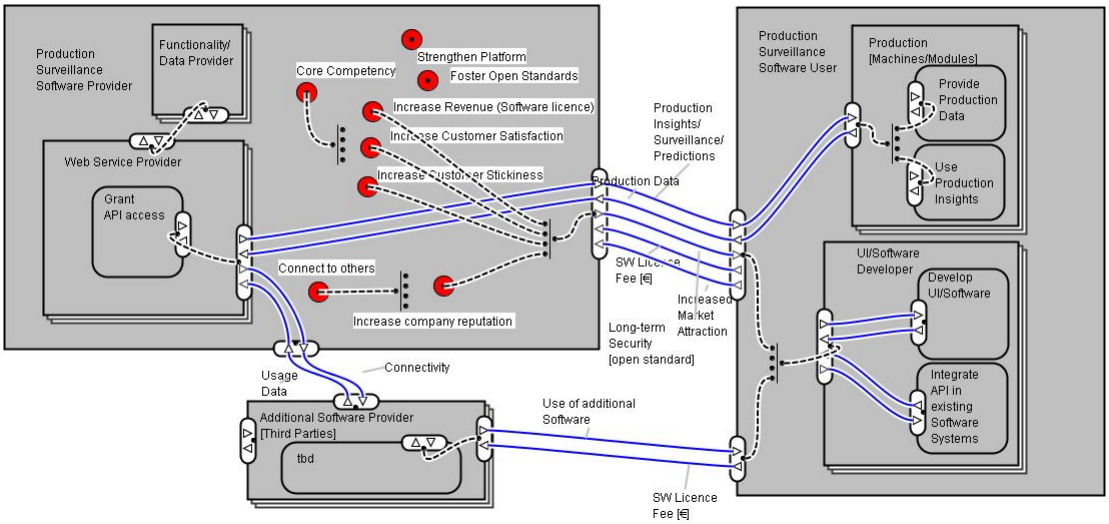

Figure 7.11.: Machinedata analyzing

competitor. As you can see, Amazon has by far outstripped Walmart in the number and variety of APIs provided." (Parker, van Alstyne, and Choudary 2016) "The power of APIs to attract extension developers and the value they can create is enormous. Compare the financial results experienced by two major retailers: traditional giant Walmart and online platform Amazon. Amazon has some thirty-three open APIs as well as over 300 API “mashups” (i.e., combination tools that span two or more APIs), enabling e-commerce, cloud computing, messaging, search engine optimization, and payments. By contrast, Walmart has just one API, an ecommerce tool. Partly as a result of this difference, Amazon’s stock market capitalization exceeded that of Walmart for the first time in June 2015, reflecting Wall Street’s bullish view of Amazon’s future growth prospects." (Parker, van Alstyne, and Choudary 2016) "In the early days of Amazon, Jeff Bezos reportedly issued a company-wide mandate requiring all technical staff, without exception, to embrace APIs. The mandate served as the foundation for the EC2 cloud computing platform, S3 storage cloud, warehouse management and fulfillment services, Mechanical Turk, and other initiatives." Collins and Sisk 2015, p. 29

Search Engine Development

-MMS Riepl - sell data and sell own search engine as an API product

The shift from a traditional (retail) company to a tech company is evolving, but

still very hard to realize. The shift first has be completed in the mindset before really deploying it in the company.

IT and business are not yet synchronized in their way of seeing issues or business related topics. Business seems to miss the old days, IT has the abilities to perform the shift. They are still working and thinking too much in silos instead of seeing the situation as a whole for the entire company.

- guter Absatz für Conclusion in 'mindset is key'

7.2.6. Content-2

International Expansion

- guardian example To work toward the "open out" goal, the *Guardian* created a set of APIs that made its content easily available to external parties. These interfaces include three different levels of access. The lowest access tier, which the paper calls Keyless, allows anyone to use *Guardian* headlines, metadata, and information architecture (that is, the software and design elements that structure *Guardian* data and make it easier to access, analyze, and use) without requesting permission and without any requirement to share revenues that might be generated. The second access tier, Approved, allows registered developers to reprint entire *Guardian* articles, with certain time and usage restrictions. Advertising revenues are shared between the newspaper and the developers. The third and highest access tier, Bespoke, is a customized support package that provides unlimited use of *Guardian* content—for a fee. Some of the first products released under the *Guardian's* new open platform model include a Content API, which provides access to over a million articles a Politics API, which provides election results and candidate information a Data Store, which provides access to data sets and visualizations, ranging from a table of country-by-country laws and practices regarding the death penalty to a colorful graph depicting all of the time-travel journeys of TV sci-fi hero Doctor Who and an App Framework, which facilitates app development, aimed at making the system easy to experiment with and build applications for. In response, over 2,000 extension developers signed up in the first twelve months. Parker, van Alstyne, and Choudary 2016

7.2.7. Agriculture-1

Soil composition

.interview siebke
"FUJITSU: AUTOMATING ALL FARMS: Futjitsu has launched a new service called AKISAI that aggregates nationwide data from a network of sensors and cameras installed in fields and farms. The records include various data like soil temperature, moisture, rainfall, or humidity. Futjitsu wants to address the new farmer market: young ex-urbans with no farming experience." (Vart and Rialan 2013, p. 37)

7.2.8. Healthcare-1

should be considered as a subsection as in schallmo we talk about it.

tbd - carepass or allianz startup, and 4 other interesting knowledge items

7.2.9. Transport Insurance-1

.be aware of automotive ecosystem by (Riasanow, Galic, and Böhm 2017), which will not deeper evaluated, but referred as part of this example
"In addition to cars, APIs can be found in a paper mill production machine, bus , or elevator. An API is useful for device or vehicle status, its location, for assessing its maintenance needs and to connect the devices to an interoperable set of technologies from differen manufacturers". (Moilanen, Niinioja, Seppänen, and Honkanen 2019, p. 58)

Data Partnership

.automotive insurance example schmitz

7.2.10. Retail Insurance-2

Fast Claims Processing

7.2.11. Banking Retail-2

"Similarly, American Express uses its Pay with Points APIs to create mutually beneficial partnerships with merchants, arrangements that have increased retail sales, card spend, and brand loyalty." (Iyengar, Khanna, Ramadath, and Stephens 2017, p. 5)

8. Discussion

As stated in chapter 1, the goal of this work is to explore and create a comprehensive business focused overview on the corresponding API ecosystem with actors, goals and value streams and – based on this – define API-enabled value creation archetypes.

Within this chapter, a comprehensive overview on results from the preceding seven chapters will be given: starting from a section about confirmed assumptions from existing literature, to a dedicated section on the most common goals from literature and interviews, to interesting insights for organizations, further observations, and - to finalize this chapter - a dedicated section for implications for organizations willing to (re-) start a goal-oriented and business-driven API strategy to create value.

Please note, that a mapping of the results of this thesis to the associated research questions can be found in section 9.1.

8.1. Confirmed Assumptions

In chapter 2 and chapter 3 existing findings from other research have been presented. During the course of the analysis of the interviews, some topics recurrently appeared and could be confirmed by this work.

8.1.1. Organizations' Identification stage

Iyengar, Khanna, Ramadath, and Stephens (2017) stated, that "most [organization] do not have a formal API strategy, are unclear about the true value at stake, and are uncertain about how to implement a program that quickly maximizes consumer and business impact." In a later work, this uncertainty was confirmed by (organizations "are still in an identification stage regarding potential business models"), who had his focus on the automotive industry. Throughout the literature reviews, other writers also had similar statements and promote the missed out potential. (Nordic APIs 2015; Iyengar, Khanna, Ramadath, and Stephens 2017; Palmieri 2018)

The analysis of the interview led into the same direction. For one interviewee, their

internal business units still do not see the real value in APIs, and regret the old business models disappearing [I6], or still do not have the experience to offer the right value and request for the right amount of money [I9].

However, financial service provider do not join this group. Since PSD2 put pressure on banks, activities concerning API offerings and strategies considerably gained momentum: "The majority of financial services organizations today are focused on building an API strategy and/or platform and view the marketplace as a potential project for the future." (C. A. Technologies 2016, p. 8) Apart from the regulatory necessities, more financial institutions also count on premium APIs. One forerunner to mention is Deutsche Bank with its leading developer portal[1]. Eventually, there is no clear picture, as some say, that PSD2 is pushing banks, but only to their necessities, not further [I15].

8.1.2. Monetization

As stated in Koch (2019, p. 46), organizations often have no clear monetization strategy for data, which is one important goal within revenue related API goals (see chapter 6 and section 8.2).

APIs are seen as a technical tool or an (internal) API solution, rather than a real product, that can be used to "earn money". Bouza.2018 As APIs are still considered an internal topic, companies rather associate them with cost savings than relating them to monetization or revenue generation, at first sight (compare to Horkoff, Lindman, Hammouda, and Knauss (2018, p. 9)).
This assumption is confirmed by several interviewees of this qualitative work. [...insert quotes here from industries .....] .
However, some companies do voluntarily not directly monetize their APIs as they fear a decrease in spread and are in the same time aware of other value streams, that will indirectly foster the own organization. [I3.1].

8.2. Most common goals

During the vivid discussions with the different API experts, some goals were mentioned more often than others. A selection of the most frequently named goals respectively goal categories, will be summarized here.

[1] https://developer.db.com/

Please note, that this research is of qualitative nature. Therefore, no detailed statistics on the number of references in literature or mentions throughout the interview can be provided. For deeper insights, a quantitative research has to be conducted (see also section 9.3)

Increase Revenue

Next to the potential of internal cost savings and streamlining, all interview candidates mentioned the aim of increasing (or at least stabilizing) their revenue stream. This can be done directly (selling API-generated data [I6], selling API product [I6]) or indirectly (increase customer stickiness/satisfaction/experience [I3], expand market reach/increase customer touchpoints [I7])
Similar to the interview outcome, this is by far the most prominent goal mentioned by literature. (Iyengar, Khanna, Ramadath, and Stephens 2017, and more)

Foster innovation

Even if some interview partner mentioned the increased ability of (external) innovations, the interviewed experts have a far less innovation-centric view on APIs than the existing literature (new business capabilities, richer customer experience, among others; (Iyengar, Khanna, Ramadath, and Stephens 2017, p. 2) This can be achieved internally by a closer customer relationship due to usage data analyses [I3, I6], or externally, by integrating external development ideas from the open source community, giving feedback on the published API for instance [I2, I11] This can be seen as an additional market access to knowledge, than access to customers. [I1]

Foster Ecosystem & Expand Reach

The goal of fostering an ecosystem (own ecosystem or ecosystem the organization is part of) is another frequently mentioned category. This includes promoting ecosystem standards and a deeper partner integration. By strengthening the ecosystem, additional awareness respectively reach for the own company can be risen, supported by mechanisms like the already presented network effect. The term "reach" does not not necessarily refer to market reach from a sales perspective, in this case. It rather invokes

e.g. the reach for partners, customers, supplier and more (see chapter 5) to increase integration and collaboration. This also intensifies possible network effects.

Increase Business Agility

An increase business agility, internally as well as externally, allows organization to quickly react to changing market decisions, as the acting organizations all have their API capabilities internally ready and can got to market quickly. (Hellbe and Leung 2015, pp. 83–85) (De 2017, p. 14) (Iyer and Subramaniam 2015b) In numbers, this can reduce the time and cost to market for new business capabilities by up to 90%, according to Pamidighantam and P. Agarwal (2018, p. 4).

Interestingly, the term agility has rarely been mentioned throughout the interviews. However, contextwise, there were several goals('break up silos' [I6, I16], 'Enable external interoperability (via Increase Standardization modularity)'[I2], 'headless approach'[I2, I12]) fitting in the two agility categories ('Internal Compactness' and 'External Business Fluidity').

8.3. Further Interesting Results

....central success elements... use this term like this! .intern/partner/open definition not always clear
..if you want to transfomm and win the digital transformation you should stick to apis (see top objectives of digital business strategy » covers al lot of point of interview results in goals c.a technolgoies 2018 whitepaper

.implications: roadmap dig trans bild by schallmo
.kostensenkung » nicht klar bei open apis, aber intern klar (nicht unser fokuss)
.ziel: plattform schaffen » evtl. auch ökosystem stärken, begrifflichkeit war nicht klar - ökosystem stärken könnte also auch ein ziel sein, auch wenn es nicht konkret genannt wurde
.

other sections or sections originally proposed by myself

8.3.1. API is most relevant important building block for transformation

.(Hellbe and Leung 2015)

> The recent drive towards customer and user centricity demands that applications be built rapidly with frequent iterations. Moreover, to support different segments of users, enterprises need focused applications that bring the business functionality to the specific customer context. In this pursuit of user centricity, the key enablers of the "digital shift" are the mobile shift – for reaching out to the users wherever they are, the cloud shift – to enable rapid adjustment to fluctuation in demand and a faster, cheaper innovation cycle, and the multi-channel shift– to allow users to access enterprise assets at their convenience. Finally, all these changes are supported by improving the user experience through modern UI techniques and usage patterns such as social elements. Rudrakshi, Varshney, Yadia, et al. 2014, p. 4

A Company Without APIs Is Like A Computer Without Internet" Jürschick 2016

8.3.2. Mindset is key

When it comes to mindset in terms of the API environment, there are large differences between companies. On one extreme, there are organizations, mainly tech companies, that push forward the use of APIs (e.g. Netflix, Expedia, Salesforce) or even force their employees to make this mindset mandatory[2]. On the other side, there are large companies that are still struggling internally between departments ("business still regrets the old business models disappearing" [I6]), do not want to pay a little more for flexible solutions [I9] or are unsure about the value they offer externally as there are no benchmarks [I9]. The prominent example of Amazon's success in diversifying and improve their offering through a change in mindset. They mandate Jeff Bezos forced into the heads of development staff proved him right, when considering the evolving products. (Collins and Sisk 2015, p. 29). Additionally,

"If I am a real product owner and I'm responsible, then I have to think in this direction permanently. Not only associating it with a specific internal use case, but as it were a real product." [I6] .!one of the most important chapters of my work

8.3.3. Development Approach

community:
In the most successful developer communities, the most active members don't work for the company that provides the API—rather, they help because the API is critical to

[2]"In the early days of Amazon, Jeff Bezos reportedly issued a company-wide mandate requiring all technical staff, without exception, to embrace APIs. (Collins and Sisk 2015, p. 29)"

what they do and they love helping others see its value. (Jacobson et al. 2011, p. 8)

.intern nach extern (maturity-ansatz) oder komplett außen entwickeln?

———-

During several interviews (reference to interview partners Ixx and Ixx) the defintion of types of APIs and actual development of APIs came up. Whereas the author used existing definitions for the classification of APIs (see De (2017), or **...**), this approach not always fitted the organization's reality.

IP MMS e.g. promoted a different approach of seeing APIs. Instead of categorizing APIs by their orientation (...3 parts...), it is better to see their orientation by maturity ... . (make ref to site or book by footnote or lit) The focus is on the development from inside to outside instead of originally classify the interfaces... .This also underlines the approach of Amazon found and CEO Jeff Bezos. In a former memo to his employees he stated to ... and made this directive a company strategy. This can be observed when having a closer look at the company's development of the last years. Growing from a bookstore to ... by utilizing internal expertise and asset to externally commercialize it. [bring picture here from mgt class]

On the other hand, there is the more open approach to let the open (development) community let design your API. » from outside to inside But not only from a technical point of view, but also the ideas on step earlier can be fostered having an API mindset. Considering the invoice fetching model, interview partner I3.1. stated, that they would have never thought about that. The idea come directly from a partner and then started to outperform financially. For their customers this represent a huge relief in daily work. According to Parker, van Alstyne, and Choudary (2016) "widely useful functions [...] have often been invented by extension developers."

8.3.4. Influence of Regulatory Initiatives

» auch vergleich banking vs automotive (vda)
:
google existiert schon, headless
eu
not revenue driven but user experience and lilberalization of market

8.3.5. Standards - Nutzen für alle Teilnehmer

As seen in various value models [....give concrete examples here...] in section 7.2, value does not necessaricly come from direct monetization of API, but principally via indirect sources like customer satisfaction (which leads to increased customer loyalty, which leads to decreased contract terminations, which leads to sustainable licence costs payments). A

8.3.6. Automation might reach its peak - connectivity does not

Interview partner I3.1 mentioned, that automatisiation with the operations sector might reach its peak already in some years. Perspectively, they are therefore aiming at shifting more into the consultancy part and acting as a central aggregator of data to provide more future oriented services like forecasts (e.g. liquidity) - instead of automation.

8.4. Further Observations

Disagreement in strategic approach Iyer and Subramaniam (2015b) supports the hypothesis, that companies should not have too specific goals, due to the broader range of possibilities available through an API - the so called fluidity in business goals. McIntyre and McFarlane (2018) also support the more open approach. However, a lot see this as a possible waste of resources, as states Pettey (2017).

Ambiguity on API Orientation Throughout content
.definitions mostly unclear what is internal, partner, open
.»> also refere to different development approaches: dev vs maturity
.depends on mindset rather than on size of an organization
.graphic dig trans » some industries have more pressure than others, but also depends on size and concrete goal what they want to achieve (innovation vs touchpoints/-turnover)
.mostly rest, some try graphql see section 2.1
.!!!.Wie sichtbar für Endverbraucher

.
.opex vs. capex
.evtl teilweise auch zur interesting insight??
As e.g. already mentioned in chapter ...psd... so called openAPIs in the banking sector are in reality not open APIs according to their definition.

8.5. Implications for Organizations

good quote: API management is emerging as a crucial capability to navigate the digital age. But only those that master its implementation will be able to sustain the value. (Iyengar et al. 2017, p. 8)

also refer to difficulty in monetization, but give hint when to monetize it directly and when offering for free:

Second, if particular functionality is reinvented by a number of extension developers and gains widespread acceptance by platform users, the manager of the platform should acquire the functionality and make it available through an open API. Widely useful functions such as video and audio playback, photo editing, text cutting-and-pasting, and voice commands have often been invented by extension developers. Recognizing their broad applicability, platform managers have moved to standardize these functions and incorporate them into APIs that all developers can use. This accelerates innovation and enables improvements in service for everyone who uses the platform. (Parker et al. 2016)

content
.mindset important
.know assets first
.no silos but cooperation
.moving fast, brave yourself
.from orga to tech company
.if you want to transfrom and win the digital transofrmation you should stick to apis (see top objectives of digital business stratgy » covers al lot of point of interview results in goals c.a technolgoies 2018 whitepaper
.
.
.
This work can therefore serve as an insightful support for organizations that consider implementing APIs as a part of their business (model) and want to be aware of the relevant implications for them.
why need strategy? (red hat summit 11:42)
.you built an api but no one is using it
.you loose too many developers in the onbarding process
.asked by senior mgt, what is the value of your api- and you have no answer
.you api users are complaining and consuming too much support resources

13:29» api program or strategy should adress all elements to

.desribe
.deliver
.capitalize
the value of an api (((value)delivery)capitalization)

» api model canvas (not going to handle that, as not the scope of this work, just mention it)

.
.
.
try to get people from different teams and different roles together to think about the API strategy
» also for implications
.break up silos between business and IT
.see API as a product. .
.

9. Conclusion

This chapter presents an overview on the research results of this work. Initially, the author summarizes and maps the key findings to the associated research questions. Additionally, limitations of this scientific work are explained. Finally, the writer provides stimuli for enhancements and potential starting points for future work.

9.1. Summary

RQ1 - *Who are relevant actors (stakeholders) within the API environment?*

....

RQ2 - *What are potential (value creation) goals through APIs for API providers?*

.....

RQ3 - *What are typical API-enabled value creation archetypes used to achieve those goals?*

....

9.2. Limitations

This research work is based on an extensive literature research as well as 17 semi-structured interviews with API-related topic/industry experts. Even if the research was conducted at the utmost possible accuracy, there are some limitations to mention.

First, all the experts were able to give particularly interesting insights to their experience with private and partner APIs. However, only few had practical insights from within organizations strategically offering public APIs. Therefore, there might be a lack of completeness concerning goals and implications regarding public APIs.

Second, due to a timely limited research and writing period for this master's thesis, a limited amount of industries could be treated in more detail. Referring to Figure 2.3 by Harting, Kolev, Redweik, et al. (2015), more expert interviews with partners from impacted industries could have been conducted, to avoid bias from literature research and compensate missing confirmation.

Third, for the same time frame issue, only one time restricted interview in an isolated environment has taken place during the interview period. Not only grounded theory methodology (GTM) could not be conducted to its full extent, namely the theoretical sampling process. Additionally an enhancement to this limitation could be provided by following the workshop approach, as proposed and processed by Horkoff, Lindman, Hammouda, and Knauss (2018), where participants from different departments and different roles will be brought together.

9.3. Future Work

There are some topics that were intentionally not treated in this thesis and therefore leaves room for further investigation.

First and foremost, this qualitative research can be a predecessor for a quantitative work, focusing on operational and strategic value exchange questions within the area of APIs. Therefore, more respondents from more industries can serve as a basis to confirm findings from this thesis.

Furthermore, a scientific guideline for organizations and consultancies to better help understand and find suitable assets for an API-fication would be highly beneficial. Even if this was partially treated in section 8.5, a more detailed and elaborated version with concrete recommended actions and an API-strategical methodology could be promising for relevant stakeholders. This could be then carried out with the help of inter-/intra-company workshops. The aim is to bring together different departments and brake up silos within an organization to foster cooperation and exchange of best practices, similar to what Horkoff, Lindman, Hammouda, and Knauss (2018) proposed in her paper.

Finally, there might be more API-enabled value creation use cases, to visualize and develop in more detail. Especially the internal value flows due to the offering of APIs, could be further investigated, as partially done by Horkoff, Lindman, Hammouda, and Knauss (2018). In particular, the impact of a change in mindset (from silos to

API-fication mindset) would be of high interest.

In conclusion, the author could eventually provide valuable insights into API-enabled value creation models for organizations and research. Especially organizations can utilize given references and prepare arrangements when considering participating or expanding their API activities outside the own company.

A. Interview Guideline *(German/English)*

Interviewleitfaden

"Identification of API-Enabled Value Creation Archetypes and their Implications for Organizations"

Einführung / Introduction

Die Bereitstellung von (Partner/Public) APIs hat in den letzten Jahren zur Entstehung von leistungsfähigen Ökosystemen und neuen Geschäftsmodellen geführt, die es Unternehmen ermöglichen direkt oder indirekt Wert zu generieren. Dieser Trend, auch als API Economy bezeichnet, stellt allerdings für manche Unternehmen eine Herausforderung dar.

Eine Herauforderung für Unternehmen ist die Identifikation möglcher Geschäftsmodelle im Rahmen der API Economy. Geschäftsmodelle definieren wir in dieser Studie als die Logik, wie eine Organisation Werte schafft, d.h. u.a. (1) was eine Organisation anbietet, (2) wie die geschaffenen Werte dem Kunden übertragen werden, und (3) wie der Gegenwert (Ertrag) vom Unternehmen eingefangen und verteilt wird. *[1]*

Wir möchten daher typische Modelle (Archetypen) der Wertgenerierung von nicht-privaten APIs sammeln und analysieren. Ziel ist die Identifikation von direkt oder indirekt involvierten Stakeholder und den Wertflüssen zwischen diesen Wertflüssen. Dies können materielle Werte (z.B. Geldaustausch/Bezahlung) oder auch nicht-materielle Werte (z.B. verbessertes Kunden-Image, Einhalten von Compliance-Richtlinien) sein.

Das Ergebnis dieser Studie soll Unternehmen dabei unterstützen, eine Übersicht über mögliche Geschäftsmodelle im Rahmen der API Economy zu erhalten.

Zweck des Interviews / Interview Purpose

In diesem Interview möchten wir mit Ihnen über Erfahrungen, Status Quo und zukünftige Entwicklungen in Bezug auf die Wertgenerierung durch nicht-private APIs innerhalb Ihres Partnernetzwerkes sprechen.

Vertraulichkeit & Mitschnitt / Terms of Confidentiality & Tape Recording

Dieses Interview wird anonym durchgeführt. Einzig eine Klassifizierung Ihres Unternehmens und Ihre Rolle wollen wir mit Ihren Antworten in Beziehung setzen.

Um im Rahmen der Forschungsarbeit den größten Wert aus Ihrer Expertise zu schöpfen, möchten wir dieses Interview gerne aufnehmen.

> Erlauben Sie uns, dieses Interview aufzunehmen? ☐ YES / ☐ NO [inkl. Löschung der Audio-Aufnahme nach der Transkription]
>
> If YES: Gestatten Sie uns, den Inhalt dieses Interviews direkt zu zitieren, möglicherweise in Verbindung mit der zuvor genannten Unternehmensklassifizierung? ☐ YES / ☐ NO [nach nochmaliger Absprache?]

Interviewformat / Format of the Interview

Das folgende Interview besteht aus fünf offenen Fragen. Dies bedeutet, dass Sie uns Ihre Sichtweise zum dem Thema mitteilen können. Das Interview dauert in der Regel 45 (+/-10) Minuten, abhängig von Gesprächsfluss und Tiefe der Antworten.

Kontaktmöglichkeiten & Anmerkungen / Contact & Last Remarks

Sollten Sie im Anschluss an dieses Interview weitere Fragen oder Anmerkungen haben, können Sie sich jederzeit an Gloria Bondel (gloria.bondel@tum.de) oder Benjamin Strobel (ben.strobel@tum.de) wenden.

Haben Sie noch weitere Fragen, bevor wir mit dem Interview beginnen?

Informationen Interviewpartner*in / Information about Interviewee

1. Welcher Industrie gehört Ihr Unternehmen an?
2. Wie viele Mitarbeiter sind in Ihrem Unternehmen beschäftigt?
3. Welche Rolle haben Sie in Ihrem aktuellen Unternehmen?
4. Seit wie vielen Jahren arbeiten Sie im / beschäftigen Sie sich mit dem Themenbereich API / API Economy / API Strategie / API Geschäftsmodelle?

Inhaltliche Fragen / Content related Questions

Start

1. Welche Erfahrung haben Sie mit dem Angebot von nicht-privaten Schnittstellen (APIs)?

Modell

2. Was waren/sind Ihre Ziele, die sie mit dem Angebot von nicht-privaten APIs erreichen wollen?
3. Können Sie die genannten Geschäftsmodelle näher erläutern?
    a. Was genau bieten Sie über Ihre Schnittstelle an?
    b. Aktoren
        i. Welche Aktoren nehmen an ihrem API-Geschäftsmodell teil?
        ii. Wer sind die Nutzer der APIs (einzelne Partner, komplett offen)?
    c. Wertflüsse
    d. Weitere Einflussfaktoren / Elemente
4. Was sind die Gründe, warum Sie sich genau für die genannten Geschäftsmodelle entschieden haben, auch in Abhängigkeit von der eigenen Industrie?

Weitere Informationsressourcen / Further Resources for Information

5. Können Sie uns weitere Ansprechpartner im Bereich der API Geschäftsmodelle nennen, mit denen wir uns zu diesem Themenbereich unterhalten könnten?

Nachbereitung / Post-Information

Nachdem wir alle Interviews durchgeführt haben, werden wir die Ergebnisse zusammenfassen und Ihnen einen visuellen Vorschlag Ihres Geschäftsmodells in Form eines E3 Value Models zukommen lassen.

Definitionen wichtiger Begriffe / Working Definitions

API Economy

Wertschöpfung durch die Bereitstellung von digitalen Diensten über Partner- oder Public-APIs

Geschäftsmodell / Business Modell

Die Logik, wie eine Organisation Werte schafft, d.h. u.a. (1) was eine Organisation anbietet, (2) wie die geschaffenen Werte dem Kunden übertragen werden, und (3) wie der Gegenwert (Ertrag) vom Unternehmen eingefangen und verteilt wird. *[1]*

Private / Partner- / Public API

Private APIs: Integration verschiedener Anwendungen und Systeme innerhalb eines Unternehmens

Partner-APIs: bessere Kommunikation und Integration von Software zwischen einem Unternehmen und seinen Geschäftspartnern

Offene (Public) APIs: Informationen und Funktionalitäten eines oder mehrerer Systeme und Anwendungen öffentlich Dritten zugänglich zu machen, die nicht unbedingt eine Geschäftsbeziehung zum veröffentlichenden Unternehmen haben *[2]*

Wert (-fluss) / Value (stream)

Austausch von (nicht-) monetären Werten zwischen einzelnen Aktoren innerhalb eines Geschäftsmodells. Dies können materielle Werte (z.B. Geldaustausch/Bezahlung) oder auch nicht-materielle Werte (z.B. verbessertes Kunden-Image, Einhalten von Compliance-Richtlinien) sein.

Aktoren / Stakeholder

„[…] alle internen und externen Personengruppen, die von den unternehmerischen Tätigkeiten gegenwärtig oder in Zukunft direkt oder indirekt betroffen sind." *[3]*

Quellenangaben / Sources

[1] Bieger, Thomas und Reinhold, Stephan. „Innovative Geschäftsmodelle: Konzeptionelle Grundlagen, Gestaltungsfelder und unternehmerische Praxis", 2011

[2] FABERNOVEL, „Why Should I Care About APIs", Dezember 2013

[3] Thommen, Prof. Dr. Jean-Paul Thommen. „Gabler Wirtschaftslexikon: Definition Anspruchsgruppen", letztmaliger Zugriff am 27.05.2019

Interview guideline

"Identification of API-Enabled Value Creation Archetypes and their Implications for Organizations"

introduction

The provision of (partner/public) APIs has led in recent years to the emergence of powerful ecosystems and new business models that enable companies to generate value directly or indirectly. However, this trend, also known as API Economy, is challenging for some companies.

A challenge for companies is the identification of possible business models within the framework of the API Economy. In this study, we define business models as the logic of how an organization creates value, i.e. (1) what an organization offers, (2) how the value created is transferred to the customer, and (3) how the countervalue (revenue) is captured and distributed by the company. *[1]*

Therefore we would like to collect and analyze typical models (archetypes) of the value generation of non-private APIs. The aim is to identify stakeholders directly or indirectly involved and the value flows between these value flows. These can be material values (e.g. money exchange/payment) or non-material values (e.g. improved customer image, adherence to compliance guidelines).

The results of this study are intended to help companies gain an overview of possible business models within the framework of the API Economy.

Interview Purpose

In this interview, we would like to talk to you about experiences, status quo and future developments regarding value creation through non-private APIs within your partner network.

Terms of Confidentiality & Tape Recording

This interview is conducted anonymously. Only a classification of your company and your role is what we want to relate to your answers.

We would like to record this interview so that we can derive the greatest value from your expertise within the framework of our research work.

> Will you allow us to record this interview? ☐ YES / NO☐ [incl. deletion of the audio recording after transcription]
>
> If YES: Do you allow us to quote the content of this interview directly, possibly in connection with the aforementioned company classification? ☐ YES / NO☐ [after further arrangement?]

Format of the Interview

The following interview consists of five open questions. This means that you can tell us your point of view on the topic. The interview usually lasts 45 (+/-10) minutes, depending on the flow of conversation and depth of answers.

Contact & Last Remarks

If you have any further questions or comments following this interview, please feel free to contact Gloria Bondel (gloria.bondel@tum.de) or Benjamin Strobel (ben.strobel@tum.de).

Do you have any more questions before we start the interview?

Information about Interviewee

1. Which industry does your company belong to?
2. How many employees are there in your company?
3. What is your role in your current company?
4. For how many years have you been working in / dealing with API / API Economy / API Strategy / API Business Models?

Content related Questions

launch

1. What experience do you have with offering non-private interfaces (APIs)?

model

2. What were/are your goals to achieve by offering non-private APIs?
3. Can you explain the business models mentioned in more detail?
    a. What exactly do you offer via your interface?
    b. actuators
        i. Which actuators are participating in your API business model?
        ii. Who are the users of the APIs (individual partners, completely open)?
    c. value flows
    d. Further influencing factors / elements
4. What are the reasons why you chose the business models mentioned above, also depending on your own industry?

Further Resources for Information

5. Can you name any other API business model contacts we could talk to about this topic?

postal information

After we have conducted all interviews, we will summarize the results and send you a visual proposal of your business model in the form of an E3 Value Model.

Working Definitions

API Economy

Value creation through the provision of digital services via partner or public APIs

Business Model

The logic of how an organization creates value, i.e. among other things (1) what an organization offers, (2) how the created values are transferred to the customer, and (3) how the countervalue (yield) is captured and distributed by the company. *[1]*

Private / Partner / Public API

Private APIs: Integration of different applications and systems within a company

Partner APIs: better communication and integration of software between a company and its business partners

Open (Public) APIs: make the information and functionalities of one or more systems and applications publicly available to third parties who do not necessarily have a business relationship with the publishing company *[2]*

Value (stream)

Exchange of (non-) monetary values between individual actuators within a business model. These can be material values (e.g. money exchange/payment) or non-material values (e.g. improved customer image, adherence to compliance guidelines).

stakeholders

"all internal and external groups of persons who are directly or indirectly affected by the entrepreneurial activities at present or in the future. "“ *[3]*

sources

Bieger, Thomas and Reinhold, Stephan. "Innovative Business Models: Conceptual Foundations, Design Fields and Entrepreneurial Practice", 2011

[2] FABERNOVEL, "Why Should I Care About APIs", December 2013

[3] Thommen, Prof. Dr. Jean-Paul Thommen. "Gabler Wirtschaftslexikon: Definition of stakeholder groups", last accessed 27.05.2019

List of Abbreviations

The following list describes all abbreviations that are used within the body of this work

API ..... Application Programming Interface

B2B ..... Business-to-Business

B2D ..... Business-to-Developer

ERP ..... Enterprise Resource Planning

EU ..... European Union

GTFS ..... General Transit Feed Specification

GTM ..... Grounded Theory Methodology

ICT ..... Information and communication technologies

IoT ..... Internet of Things

JSON ..... JavaScript Serial Object Notation

MECE ..... Mutually exclusive, collectively exhaustive; approach to separate a set of items into non-overlapping subsets, mainly used in management consultancies

PSD2 ..... Payment Services Directive 2, an EU initiated attempt to foster innovation within the banking sector

REST ..... Representational State Transfer (RESTful)

RQ ..... Research question

SLA ..... service level agreement

SOA ..... Service-oriented architecture

SOAP ..... Simple Object Access Protocol (originally; full name was dropped with version 1.2., today only 'SOAP' is used

TPP ..... Third-Party Providers

UI ..... User Interface

WSP ..... Web Service Provider

XML ..... Extensible Markup Language

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