Evaluation of Use Cases for Chatbots in CRM

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Abstract:

Chatbots are software that interacts in natural language. They gained alot of attention in recent years, mainly as virtual assistants and in text messenger platforms. Chatbots already take supportive roles for enterprises in customer relationship management (CRM), e.g. in customer service. As they improve and become more popular on different communication channels, they can take over more tasks. The aim of this research is to provide a better understanding of how chatbots can be used in the area of CRM.

The first and major part examines use cases for chatbots in CRM and their value proposition for the user. A systematic literature review, group discussions with potential users and expert interviews were performed to determine use cases. From these, a classification was derived. 20 use case classes were distinguished and discussed. This classification provides an overview over application and value of chatbots in CRM. It can be used in several ways, like a system of reference or a starting point for chatbot development.

The second and minor part demonstrates how chatbot technology and CRM systems can be integrated. Based on the use case classes a working prototype was developed, considering matters of chatbot design and technology. The prototype connects to a Oracle Siebel CRM system using a REST API to read user data. It uses that data to provide a more personalized user experience.

Confidentiality Notice:

Contents

1 Introduction

This chapter describes the incentive, goals and general approach of this research. It also gives definitions for the most important terms and a short overview over related work.

1.1 Motivation

Bots (short for 'chatbots') have gained attention during the last years in several areas. Examples are the virtual assistant Siri on iPhone, the opening of messenger apps for chatbots or the home assistant Alexa. Bots have been used for many years by enterprises to stay in contact with their customers. These systems were mostly used to answer simple questions or to route requests to appropriate service agents. With emerging possibilities in artificial intelligence (AI) and new channels like messenger apps and virtual assistants, chatbots become more interesting in customer contact. They can take over and support in more and more situations.

1.2 Problem

Chatbots offer a way for an enterprise to automate contact with customers. They offer interesting advantages. Like corporate websites they are available at any time of the day, highly scalable and extend self-service offers. The interaction through language and conversation is however closer to that with a human. They can be personalized and answer simple questions without the labor cost of a service agent. On the other hand the introduction of new technology is difficult and costly. Chatbots need to be programmed with acceptable behavior for all kinds of situations. It is also unclear if users really accept them as a communication partner. For an enterprise that applies a strategy of customer relationship management (CRM) the opportunities, risks and implications of bots need to be considered.

The emergence of bot technologies and application raises a decision problem that can be stated as the following question:

'Should an enterprise that applies CRM make use of chatbots?'

An exhaustive and concrete answer has to take into account many aspects of the topic, like costs, technology issues, benefits, target groups, user acceptance and necessary internal resources. The aim of this work is to provide a partial answer to this question, based on well-founded arguments. I want to target three aspects in this research.

Use Cases Chatbots are a cross-sectional technology, not strictly bound by medium, contact point, implementation technology or department. One can assume that bots are not suitable for all tasks in the same way. The concrete use case might play a very important

role on the way to decide if a chatbot makes sense or not. One therefore needs to find promising use cases to answer the underlying question in a more concrete way.

Value Proposition As this work is about CRM, one strategic goal to consider is customer satisfaction. To satisfy customers, the enterprise needs to provide services which render value for the customers. Every valid use case implies a value proposition to the customers that matches their needs – otherwise customers will reject it. Therefore, for every use case the value proposition needs to be considered to understand what impact the use case can have on the relationship to the customer.

Prototype Before introducing a new technology it is good practice to create a pilot or prototype first. Such an approach explores the practical, real-world challenges and takes into account aspects of technology stack, design and integration with CRM systems. It needs to be determined which efforts stand behind the introduction of chatbots. Bot technology is making rapid progress today which makes understanding current potential a constant endeavor. Target of this part is to explore how a promising use case can be transformed into an actual chatbot that is integrated with the CRM system.

1.2.1 Different Views

In the following two different viewpoints on the problem and approach of this research are presented. Both are based on well-known models. The first shows how the problem can be understood in terms of enterprise architecture, i.e. the business and IT landscape of an enterprise [Mat11, p. 13], using a model similar to that of 'Archimate 3' [The01, pp. 7–8]. For the second perspective I use the business model canvas of Osterwalder and Pigneur [OP10] to show how the problem can be described in terms of a business model. This should help people from different backgrounds to understand the approach and contribution of this research.

An Enterprise Architecture Point of View The problem and question of this research can be described from an enterprise architecture (EA) point of view. Several EA frameworks use layers to distinguish, relate and visualize EA elements (cf. [Mat11]). Layers describe certain abstraction levels of an enterprise and its IT-infrastructure. To describe the problem at hand I refer to a view on architecture with five layers, based on frameworks like Archimate 3 [The01, pp. 7–8], BMM [Obj19, p. 12] or FEAF [Fed01, p. 26]. The layers are: (1) Strategy, (2) Business, (3) Application, (4) Data and (5) Technology. The elements presented here do not give a full account of the (typically high) complexity of a real-world EA. The goal is to present a viewpoint on the approach of this work.

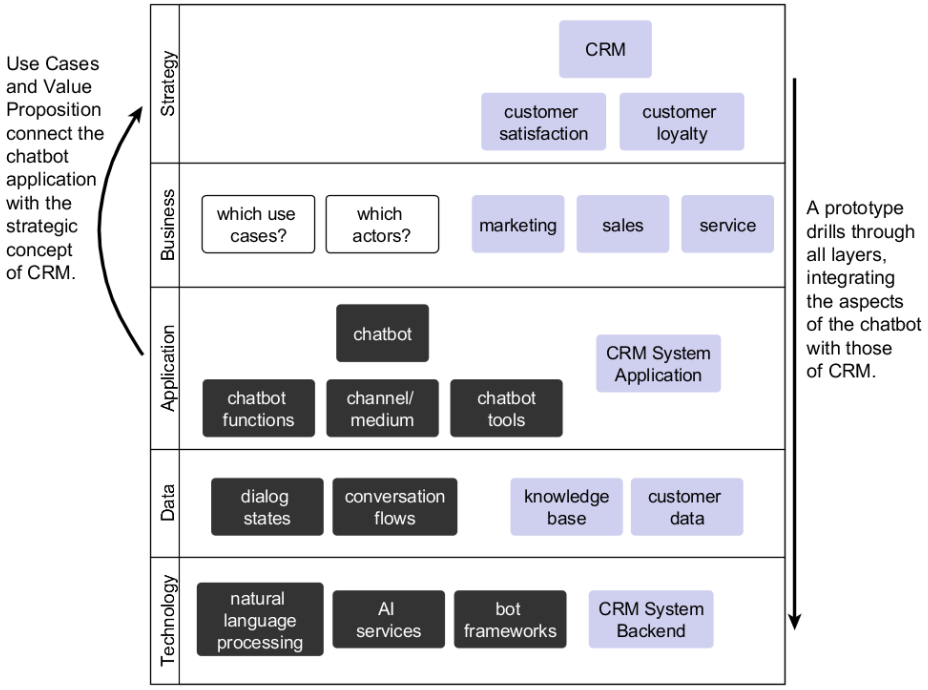

Fig. 1: The problem and approach described as layered view of an enterprise architecture model. Elements of CRM are in grey, elements of bots are in black. Elements in question are white. The arrows on the left and right represent the approaches of this work to connect ‘chatbots’ and ‘CRM’.

The problem at hand can be described as the relationship between the ‘grey elements’ (CRM) and the ‘black elements’ (chatbot): how the chatbot concepts integrate into an existing CRM architecture.

The first layer describes matters of strategy, overarching and influencing all other layers. It represents the goals, reasons and respective courses of action. Customer relationship management is a strategic concept that belongs in this layer. Related are goals like ‘customer loyalty’ and ‘customer satisfaction’, as sub-goals of a general goal ‘profitable enterprise’ or ‘successful organization’. All other concepts in this model can be considered as means to CRM and its’ goals.

The second layer is the part most in question during this research. I will examine business cases (use cases) and related actors, services and objects which connect the concept of CRM with the concept of chatbots, i.e. the relations to the first layer (strategy) and third layer (application). For a start, I say that there is a focus on the actor type ‘customer’ in various forms. This concept relates directly to concepts of the first layer: ‘customer satisfaction’ and

'customer loyalty'. The business cases uncovered will all be connected to some business function generally seen as part of CRM: marketing, sales, service.

The third layer represents the actual applications with which the business actors (e.g. customers) interact. These serve as interfaces that connect the business layer with the data and technology layers. In case of this research some of the application elements are fixed from the start. Chatbots are the application in question, and in our scope they connect primarily the business actor 'customer' on the second layer. Additional concepts might include certain chatbot tools, communication channels and mediums, specific functions of chatbot systems like voice user interface or rich interaction in a text chat. For an enterprise to make use of the chatbots they also should be somehow integrated into the existing CRM system applications.

Fourthly, the data layer contains data representations of other concepts and data structures. These are of lesser interest in this research, but it might still be necessary to name and explain them in sufficient detail. Examples are the data elements on which a chatbot draws, like conversation flows, the state of a conversation with a human or topic-related knowledge bases. These are all related to the chatbot on the third layer. Another noteworthy example is the data representation of the customer itself – the customer profile. This is obviously related to an actor 'customer' on the second layer.

The fifth and last layer, the technology layer makes the technical foundation. In our case this means software frameworks, hosting, data storage, among other things – all that is necessary to make the technical system actually work. The concepts of this layer are closely related to both the data and application layer. E.g. the chatbot tools have a strong application dimension as well as a strong technology dimension.

Prototyping in this research resembles a drill-down through all the layers of this model. In this way, I can focus on and discuss the relations between all necessary elements of this architecture model.

A Business Model Point of View A wholly different point of view on the problem can be given by looking on the topic as a business model. A popular, very visual way to express a business model is with a business model canvas, developed by Osterwalder and Pigneur [OP10]. It comprises of nine areas.

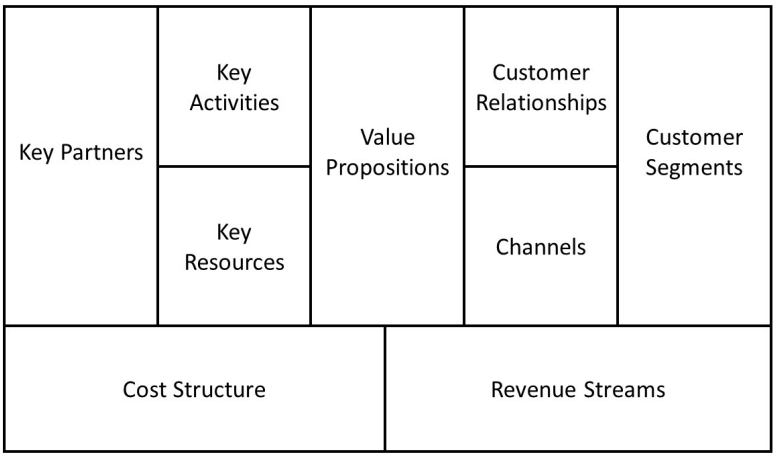

Fig. 2: Own diagram of a business model canvas as proposed by Osterwalder and Pigneur [OP10] and licensed by “Strategyzer.com” [Str].

The core of the business model canvas is the value proposition that the business offers to the customer. These are products, services, gains that the customer can purchase or otherwise achieve. On the left side is space to describe what is necessary to provide the value proposition: internal resources, activities, partners. The right side of the canvas addresses the customer: which customer segment is targeted, how relationships are built and maintained and through which channels. The bottom part of the business model is reserved for monetary aspects. Expected cost structure stands on the left, expected revenue streams on the right.

Osterwalder et al. suggest that a new business model might have a starting point either in a new technology coming up, or a high priority problem for a customer segment which should be addressed [OW15, p. 94–95]. Our case matches the first category.

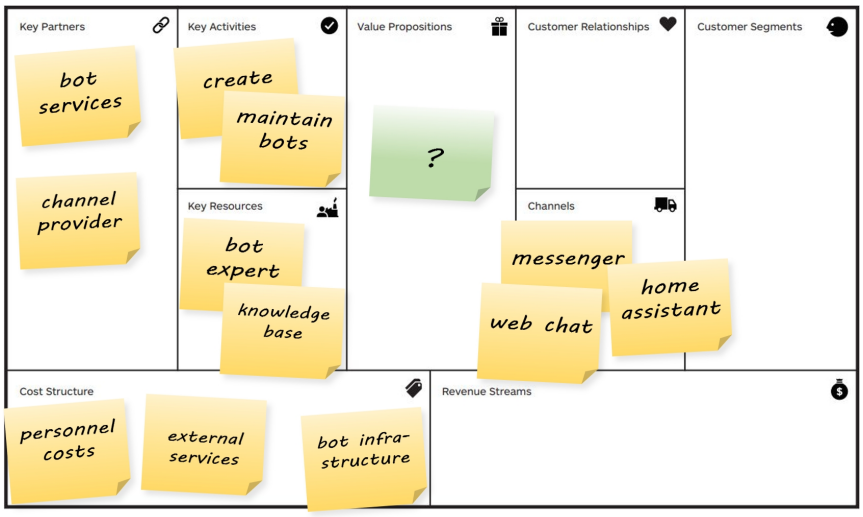

Fig. 3: A view on the problem and approach as a business model canvas. Some parts are predetermined by the technology. This work focuses on possible applications and their value for a user. These are represented in the central field, but also scratch the fields 'customer relationships' and 'customer segments'. Own diagram based on an image published by "Strategyzer.com" under Creative Commons license [Str].

To make use of this new technology in a 'bot driven business', one would need some resources, activities, partners and investments. Partners would be companies that provide services for bots (e.g. natural language processing) or infrastructure for bots (e.g. messenger channel). Main resources are people that can build and maintain bots as well as a base of structured knowledge on which a bot can draw (e.g. technical database to solve a technical problem or customer data to provide personalized services). Main activities would be to build and maintain the bots. Costs for bot specialists, external services and internal bot infrastructure would reoccur. A considerable investment in new knowledge and initial bots can also be expected. On the right side of the business model canvas, the 'channels' would contain items like 'Messenger App', 'web chat' or home assistant (e.g. Amazon Alexa) on which the bot could talk to customers.

What stays open in this view on a 'bot driven business' are the fields: 'value proposition', 'revenue', 'customer relationship' and 'customer segment'. The approach of this work is to focus on the 'value proposition' field, to find useful products, functions or services that a bot could provide to the user. In terms of the prototype, the approach is to make resources, activities, partners and investments more concrete for a single use case.

1.3 Research Questions

While some research was done about bots in CRM, there is no overview over different use cases, yet. To close this gap I collect use cases from research, practical applications, potential users and CRM experts. This shall clarify in which cases bots make sense today. Moreover, I will describe the value proposition the use cases imply. This is done in parallel, while collecting the use cases. The value proposition should help to validate single cases and understand their impact on the customer relationship. Some research was done to determine the service quality of single chatbots. But to the best of my knowledge, no research has focused on the value proposition of chatbots. The first two research questions can then be put as follows:

RQ1 Which use cases exist for customer-facing chatbots in CRM?

RQ2 Which value proposition does each of the use cases imply?

The results of this research should allow enhanced analysis of use cases, e.g. with prototypes. Use cases can be selected, compared and ranked according to their different characteristics. I will demonstrate this by creating a simple prototype based on selected use cases and integrating it with a commercial CRM system using bot technology.

RQ3 How can a bot for customers be integrated with a CRM system?

1.4 Scope

The terms ‘bot’ and ‘chatbot’ apply for a range of systems and need to be clearly defined. That is done in chapter 1.6.1. This section will refine the scope of this research on bots in terms of the CRM topic.

Obviously, only those bot use cases are taken into closer consideration which are applicable for CRM and in connection to CRM systems. This means primarily cases that find application in the areas of marketing, sales and customer service. It is quite difficult to clearly define which use cases stand outside of this area. E.g. simple ‘chatterbots’ that are designed for entertainment usually are out of scope, but they might be in scope if they serve a marketing purpose.

This research focuses on users in the role of end customer. In terms of CRM, many bots are workplace bots – created to make work with CRM systems easier. They are not used by the end customer, but by employees and users of the CRM. Any bots that are primarily intended to assist in a workplace scenario are not inside the scope of this work. I focus on consumers, customers and potential customers who are inside the scope of CRM.

In some parts of this research it was necessary to adjust the scope even further to achieve a more practical understanding of the problem at hand, e.g. in a brainstorming session. The telecommunications industry was chosen as a primary focus. This should be seen as an exemplary focus and not of an exclusive scoping.

1.5 Related Work

Ground work that is still referenced today are papers by Turing [Tur50] and Weizenbaum [Wei66]. Based on newer research like ALICE and AIML, Bayan Abu Shawar and Eric Atwell are some of the few researchers in the field of chatbots who published over several years and thereby laid important groundwork for the current state [AA07] [SA02].

As number and usage of bots are increasing, several publications have covered the topic. Most of them are blog posts, podcasts and research papers. Comprehensive books about chatbot usage, architecture, design and business are still rare. A majority of available research on bots was published since about 2016. So it can be expected that the body of public knowledge in the field of chatbots will further extend in the coming years.

Noteworthy is Amir Shevats guidline on bot design, published in May 2017. It covers a wide range of topics, including commercial aspects. It does not focus on single technical solutions but on general guidelines for designers [She17c]. A wide overview over the implications of conversation in technical systems offer McTear et al. in 'The Conversational Interface' [MCG16]. Other authors discuss deeper implications of modern chatbot interfaces, usage, quality and design, e.g. [FB17], [Klo+17], [Kul15], [FW17]. The publishing company 'O Reilly' produced a podcast series about bots, moderated by Jon Bruner. The 25 shows were published from mid-2016 to mid-2017. During most of the shows Bruner interviews some of the best known professionals in the bot area about their field of practice or research. The interviews give good insight into the state of the practice and became an important basis for this work [Bru16a] [Bru16f] [Bru16b] [Bru17a] [Bru16d] [Bru16g] [Bru16h] [Bru16i] [Bru17b] [Bru17c]. The economical use of chatbots is discussed and explored mostly in blogs and magazines. Statista published a dossier on 'Conversational Commerce' [Sta17a]. Bots are discussed as part of e-commerce [Gen18] [Tur+18] and customer service [Arc17] [Bro17]. The introduction of bots in enterprises is also discussed by several authors [Sar17b], [Ric01], [Kor17a].

1.6 Terminology

1.6.1 Chatbot, Bot

There exist a plethora of terms with very similar meaning. I decide to call the phenomenon 'chatbot' in this work. The term 'bot' is used as equivalent.

Ferrara et al. suggest that the etymology of bots is from ‘software robots’ [Fer+16, p. 96]. The word ‘robot’ as it is used commonly today became popular after a play by Karel Čapek. The Czech word ‘robot’ can be translated as ‘forced labor’.

The term ‘chatbot’ appeared around 2000 (cf. [SA02], an early paper that uses the term) and for a while has been used predominantly. Alongside other terms have been used like ‘avatar’, ‘virtual assistant’, ‘conversational agent’.

Shawar and Atwell simply define a chatbot as “a software program that interacts with users using natural language”. They see other terms as semantically equal, like ‘machine conversation system’, ‘virtual agent’, ‘dialogue system’ and ‘chatterbot’ [AA07, p. 29].

Dale follows this direction and calls the goal to “achieve some result by conversing with a machine in a dialogic fashion, using natural language” [Dal16, p. 811].

More technically, but similarly, Følstad and Brandtzaeg describe chatbots as “machine agents serving as natural language user interfaces to data and service providers”, and add their recent appearance “typically in the context of messaging applications” [FB17, p. 38].

Almost identically, Fichter and Wisniewski define a chatbot as a “computer program designed to provide some sort of information or service where the user interfaces with it conversationally via text or audio” [FW17, p. 56].

Semantically similar Tractica uses the term ‘virtual digital assistant’ for a bot and describes it as “an automated software application or platform that assists humans through understanding natural language in written or spoken form and leverages some form of artificial intelligence (AI) in doing so” [BW16, p. 1].

In this work I follow these definitions: A chatbot is a software program that provides some service to the user through conversation in natural language.

Recently, increased efforts are visible to distinguish ‘chatbots’ from a new breed of ‘bots’.

In the past, the term ‘bot’ has been used for many quite different kinds of programs like spam bots on Twitter, bots that crawl the Internet for search engines, bots on IRC [Bru16i, p. 28]. Recent interpretations are different in the way that they are all based on the ‘chatbot’ concept.

Klopfenstein et al. criticize the term ‘chatbot’ for this modern breed. They argue that (a) not all bots ‘chat’, are designed for natural language. Even those that are, will eventually disappoint expectations in a ongoing conversation. (b) The verb ‘chat’ might still be associated with the ‘chatterbots’ that simply try to entertain, while modern bots are rather efficient and goal-oriented tools [Klo+17, p. 557].

Oracle product manager Frank Nimphius distinctly calls ‘chatbot’ a communication interface. He distinguishes ‘bot’ which he sums up with the terms ‘virtual assistants’, ‘AI’ and

'machine learning'. In his view, bots know user profiles or context but care little about the interface or if the communication partner is human or a machine [Bro17].

El Moujahid from Facebook presents the recent progress in bots. While they started as simple text chat, they use more rich UI elements looking almost like apps. They start to blend elements of textchat, voice and visuals [El 17].

Each of the arguments certainly has a point. But they barely support each other. That makes it by no means clearer what exactly the new quality of 'bots' is compared to 'chatbots'. In conclusion, I hold on to my earlier definition which does not distinguish 'bots' from 'chatbots'.

It is noteworthy that there also exist other definitions of bots with slightly different focus which I will describe in the following.

Socialbots Bots are not only known as tools for individuals to help or entertain. They also have a history in social networks.

Boshmaf et al. define a socialbot as "an automation software that controls an account on a particular [online social network], and has the ability to perform basic activities [...]. What makes a socialbot different [...] is that it is designed to [...] pass itself off as a human being." [Bos+11, p. 93]

Ferrara et al. point out the goal of socialbots that interact with humans on the Internet, trying to "emulate and possibly alter their behavior" [Fer+16, p. 96].

Tsvetkova et al. describe the main characteristics of bots as "persistent, autonomous, and reactive". They talk on Twitter, they visit websites, they interact with humans and create a large portion of web activity [Tsv+17, p. 1].

Some of these bots are considered 'spambots' that pose a threat to cyber security and a problem to social network providers, as well as users and society as a whole. Social bots can acquire large amounts of private data that was otherwise protected [Bos+11, p. 101], others try to impact areas like political opinion and financial markets [Fer+16, p. 97]. Already, strategies are developed to detect bots in a text messenger environment. MacIntire et al. found both passive and active strategies but concluded that there is no sure way to certainty [MMH, pp. 463–472].

The threat that some of these programs provide might damage the reputation of bots in general. Apart from this, socialbots are of little concern for this research.

Chatterbots The term 'chatterbot' is sometimes used to describe the early bots like ELIZA, ALICE and other bots created to explore the possibilities of engaging (and enter-

taining) human users in conversation. This is primarily done to distinguish those systems from more task-oriented bots.

Virtual Personal Assistants Many big tech companies (e.g. Apple, Microsoft, Samsung, Google, Amazon) provide bots they call 'assistants'. Usually each company provides only a single type of such systems.

Apple calls Siri "an intelligent assistant that helps you get things done just by asking" [HB11]. Microsoft describes Cortana as "a personal helper who learns an individual's preferences to provide relevant recommendations, fast access to information and important reminders" [Mic21]. Google calls the assistant as "conversational—an ongoing two-way dialogue", it will"work seamlessly across devices and contexts". They added Google Home as additional hardware for home environments and Google Allo as messenger environment for the assistant [Pic16]. Samsung explains Bixby as "an intuitive and comprehensive interface that leverages contextual awareness to learn users' habits and respond accordingly". Bixby shall integrate the typical functions like answering questions and providing meaningful notifications, but also puts emphasis on home automation and image recognition [Sam17]. For the future Bixby shall be more of a platform, opening to third party developers and being available on other devices, including televisions and refrigerators [Par17].

In this research I will refer to these systems as 'virtual personal assistants' or short 'VPAs'.

Analyst company Tractica names bots generally as 'virtual digital assistants'. They further distinguish 'VDAs' for contact with a specific enterprise and those deployed for customers as 'multi purpose assistant' by platform providers [BW16, p. 1]. Shevat supports this difference but uses different terms [She17c, pp. 9–18]. This distinction provides a valuable insight. While most bots and the technology around them are created to serve specific use cases for specific users, the VPAs aim at a much wider usage and user base.

What each of the VPAs offers is surprisingly similar and can be summed up with (a) answering questions, (b) keeping a (personalized) context, (c) giving notifications and recommendations.

Adding to the bot program is the infrastructure of hardware, like 'Amazon Echo', 'Google Home', the strong integration in smartphones, or the possible integration in televisions and refrigerators. This aims on coverering different daily situations with the same assistant entity in the background [Bru17b].

Gentsch sums up VPAs as 'personal butlers'. He adopts Gartners 'Cognizant Computing'. According to this, a VPA stores the users data, follows the users activity, knows the users preferences and acts on the users behalf. Moreover, the VPA should be ubiquitously present, over different devices, in different situations [Gen18, pp. 92–96].

Another important aspect of VPAs is the integration of third party services that has started,

e.g. with the ‘Skills’ for Amazons Alexa. Opening the VPAs would allow for much wider usage and potentially make the VPAs to a kind of ‘single-entry-point’ to a wide set of services connected to it.

What Shevat calls the ‘super-bots’ and Mauro a ‘god bot’ means in both cases a top level bot or virtual assistant that connects to various lower layer services, even including other bots [She17c, pp. 9–18] [Bru16b, p. 70]. Skomoroch compares their possible future to a ’browser for bots’ [Bru16i, p. 15].

Several VPA providers have started opening their systems, allowing to extend their functionality. Some of the providers stay hesitant to fully open their APIs. The CEO from the bot-driven company ‘Service’ Michael Schneider suggested that they do not fully trust it to be robust enough, yet [Bru16g, p. 25]. However, companies like Amazon, Google or Samsung have dedicated themselves to opening their VPA as a platform and attract third party developers to it.

Embodied Conversational Agent (ECA) Some bots are not fully virtual, they also posses a physical representation thereby becoming more what is considered as robot. Luger and Sellen recognize the value of research in the area of ‘embodied conversational agents’. It was shown that those systems can reach a higher degree of sympathetic behavior than bots without embodiment. They use their bodies in the conversation and have to deal with the complexity of a real environment. This makes them only partly comparable to bots in phones or text chat. ECAs have successfully been piloted in many service areas [LS16, p. 5287].

Avatar The term ‘avatar’ is sometimes used referring to a chatbot that includes a graphic representation of the chatbot [EG15, p. 81]. In a study about chatbot quality Kuligowska even sees visual looks as a key criteria for business chatbots. The advantages of visual representations are seen in the more personal and engaging presentation. Using avatars offers the possibility of showing gestures and facial expression of the chatbot by using animations. Similar to ‘embodied conversational agents’ the expectation is for a more sympathetic behavior and better understanding [Kul15, pp. 5–6].

While many chatbots today provide at least an icon, animated avatars are uncommon. VPAs like Siri or Cortana come with rather abstract avatars, on messenger platforms like ‘Facebook Messenger’ dynamic avatars are not possible (yet).

Other Bot Classifications Apart from the mentioned terms there are several other terms or classification schema to describe special kinds of bots. These include...

- the distinction adopted in research between (a) chat-oriented systems for entertainment and (b) task oriented systems to help the user accomplish specific tasks [AG16, p. 2].
- distinguishing dialog oriented bots, that engage in conversation, from transactional bots, which just react to a single request and fulfills it – as was proposed by Cathy Pearl in the context of voice user interfaces [Bru16d, p. 4].
- a classification system based on mediums (text, speech, graphic), devices (e.g. phone-based, robot, etc.), purposes (informational, transactional, conversational) and domains (single, multi, generic) [Bap28, p. 8].
- the role of the human in bot systems. Mauro emphasizes the usefulness of having a human in the loop. This pattern can overcome certain limits of bot intelligence today. It is also necessary to improve bot ability and intelligence. Downsides are the latency (in a real-time response situation) and cost that come with a human employee [Bru16b, p. 8]. Chu observed that users on Twitter are not only humans and bots, but also bot-supported humans and human-supported bots (cyborgs) [Chu+10].
- good and bad bots. Ferrara et al. explain that some bots are intended to help, while others are 'malicious entities designed specifically with the purpose to harm'. Real impact of these bots have been reported since at least 2010 in areas like political opinion and financial markets [Fer+16, p. 97]. Also see the section on 'Socialbots'.

1.6.2 Customer Relationship Management

Customer Relationship Management (CRM) is a systematic approach of enterprises to manage individual relationships with customers. According to Homburg and Sieben enterprises increasingly focused on customer needs, customer satisfaction and customer loyalty. This lead to systematic approaches during the 1990s. The term acquired widespread adoption around the year 2000 [HS00, pp. 6–7].

Sivaraks et al. made the effort of collecting more than ten definitions about CRM. Comparing and concluding these, even the shortest definitions describe the aspect of 'business strategy'. Others highlight aspects of

(a) the integration of resources,
(b) the use of IT,
(c) the customer-centric point of view,
(d) towards long-term relationships [SKT11, p. 142].

Hippner et al. state that "CRM includes both to initialize and tighten longstanding customer relationships through coordinated and customized concepts of marketing, sales and service, with the help of modern IT technologies" [HHW11, p. 18].

Based on these definitions in this work I define CRM as a strategical and IT-supported approach of enterprises to focus on long term relationships with customers and integrate the areas of marketing, sales and services on this behalf.

2 Background

This chapter describes the background of bots and CRM, how they work together and certain implications of bots in CRM.

2.1 Chatbot Hype

For a few years now bots are trending. Apple introduced Siri in 2011 [HB11] as the first modern VPA. Bots have been introduced to the inceasingly popular messenger plattforms. 'Facebook Messenger' and 'WeChat' (the most dominant messenger in China) have overtaken the social networks in terms of user numbers [Sta17a]. In 2016 Facebook Messenger has opened for bots, and only a year later the official number of bots has reached 100,000 [Fac17, p. 2]. It is not only Apple, WeChat or Facebook: all major players have started or announced their VPAs, chatbot platforms or related technology services. Amazon Echo and Google Home are listening to people in their homes, Cortana is a core part of every new Windows system, Samsung has big plans for their own VPA. Many people call chatbots and the associated technologies (like natural language processing, voice recognition and machine learning) the next big step in user interfaces. In this context 2016 has been called the 'Year of the Chatbots' [Dal16, p. 811] [Gen18, p. 83].

Experts argue that the driving force behind the chatbots is the promise to converse with a computer in human terms, in natural language [AA07, p. 29].

The increased interest of big companies meant that large sums were invested into the new technology. Apple bought Siri, rather than develop it itself [US 10]. Amazon announced in 2015 the investment of $100 million in voice user interface technology [Ama15b]. Tractica expects the yearly revenue with voice recognition technologies alone to rise from 2015 to 2024 from 600 million to more than 7 billion [Tra15]. Furthermore, Tractica assumes the revenues connected with enterprise bots to rise by roughly 10% each year until 2021, reaching $3.9 billion. Revenues connected with consumer bots however are expected to rise sharply from less than $20 million in 2015 to more than $11.5 billion in 2021 [BW16, pp. 5–6].

However striking the numbers, the hype of chatbots is not without controversy. The next sections will shed some light on the development of recent years until the current state. After that, the implications of this development and the arising problems for companies applying CRM will be discussed.

2.2 Chatbot Emergence

Early Bots Arguably a starting point of chatbots as we think of them today is an article published by Alan Touring in 1950 in which he asks 'can computers think?'. He offers his

imitation game which is today also known as 'Turing Test' to test if a machine can convince a human of its intelligence. In the test setting one human tester would talk over a text interface with both a human and a machine, without knowing which is which. Eventually the tester has to decide which of the conversation partners is the machine and which is the human. A machine would pass the test if it could convince testers that it is the human [Tur50]. This test as well as the ideas connected with it are still widely discussed today.

The first chatbot (although it was not called 'chatbot' at that time) which acquired widespread attention was ELIZA, presented by Joseph Weizenbaum in 1966 [Wei66]. His research inspired other bot developers who created more sophisticated chatbots like 'Cleverbot', 'ALICE' and 'Mitsuku' (cf. [BF17, p. 3]). They all work on a text interface and provide answers that give many users the impression to talk to an intelligent being. ELIZA asked somewhat inquisitive questions about previously mentioned items. ALICE allowed developers to provide it with extensive and complex answering patterns. Mitsuku can learn, is witty in its answers and tries to repair broken dialog. A study published in 2016 showed that modern bots scored way better than ELIZA in users opinion [Sha+16, pp. 287–288].

Fact remains, ELIZA is simply mimicking human conversation by using rather few and rather simple methods to keep the conversation going. Even the much more sophisticated ALICE, programmed with a large knowledge base, can only provide relatively simple conversations. Humans find out quickly that these bots

(a) have no memory of the conversation so far,
(b) do not truly understand but give pre-fabricated answers (cf. [AA07, p. 35]).

None of these chatbots offer a conversation that can fool a human. But they provide reasonable answers for a number of usual topics, even if they do not really understand. This is a considerable advancement from ELIZA which really only evaded a meaningful conversation by asking over and over about what the user said last.

The chatbot technology made progress since ELIZA, but was mostly confined to the research space. Notable is the 'Loebner Price', which has rendered service to the development of better chatbots since 1991 [ERB09, p. 3]. The Loebner price actually is designed to make itself useless. It offers $100.000 for a bot that can respond to any image, voice or text input in a way that is not distinguishable from a human. If this goal ever were achieved the Loebner competition would end.

But until today, no chatbot system can convincingly imitate a natural human conversation.

Drivers and Forces of Bot Emergence What has made bots so popular today? It was probably a combination of factors.

(1) There are the technologies behind the bots. For many years the technical foundations of bot technology have been laid. Around 15 years ago technology for speech recognition and natural language processing (NLP) was already available, accurate enough for first applications. Since, prices have dropped, making speech recognition attainable for a wider range of applications [Bru16b]. Artificial intelligence (AI) is another core part of a new generation of bots. Using AI has become easier, through tools and cheaper learning computation [Bru16i, pp. 1–2] [BW16, p. 1].

(2) The consumer usage patterns have changed. When people started to adopt mobile apps, it took several years to become mainstream. Today most smartphone users barely install new apps and most app developers have trouble getting attention for their products and earning money. This trend is known as 'app fatigue' and seen as a major driver for the bots which are perceived as a 'new' environment [Bru16i, pp. 9–12] [Gen18, p. 85] [BW16, p. 2]. Perhaps even more important is the widespread adoption of text messengers by consumers. This has repercussions for enterprises as well. If they want to stay in close contact with their customers, both for e-commerce and to provide services, they adopt the messenger channel as well, thereby 'following the herd' [Bru16i, pp. 1–2] [Du 16, p. 10].

(3) Taking a wider view, the rise of the Internet as basic bot habitat and in conjunction the accumulation of vast amounts of data as 'fuel' for machine learning can be seen as major forces behind bots [KD17, p. 5].

(4) Another driver is the consumer expectation. On one hand, they expect service to be available, personalized and responsive 24/7 - companies see the chances here to cut costs with automated, yet personalized self-service systems. On the other hand consumers want to be relieved of boring tasks, find new and hopefully satisfying ways of getting these things done [BW16, p. 1].

Bot expert Andy Mauro cuts the development of bot technology until today into three phases. He describes the first phase characterized by bulky, expensive voice recognition technology primarily made for telephone. The second phase was about virtual assistants in mobile applications. The most famous culmination point here would be Siri. As the third phase he sees the bots entering messenger apps, which might lead to mass adoption as messaging has a huge user base [Bru16b, pp. 4–5].

Siri and Cortana One of the most famous bot systems today is 'Siri'. Apple Inc. acquired the manufacturer of the virtual personal assistant, in April 2010 [US 10]. Siri had been published as an app for iPhone a few months before, but it was removed from the app store after it was bought. Siri came back a year later as an integral part of the newly introduced iPhone 4S [HB11]. As in other cases before, Apple had been the commercial pioneer. It would take years for their competitors to catch up.

Microsoft followed with Cortana which was available on Windows Phone since April 2014 [Bel14]. It became a core component of a new Windows in 2015 [Mic21].

The bots had arrived in operating systems.

Chatbots on Messenger Platforms Around the same time Cortana was made available, Microsoft also introduced the experimental chatbot 'XiaoIce' to messenger platforms in China. XiaoIce became popular very quickly. It was downloaded 20,000 times during the first 24 hours. During the first three months an estimated 3 million users had each on average two conversations per day with XiaoIce [Wei14].

Instant messengers like Skype, AIM, ICQ or MSN had been around for many years. In fact the classic Internet Relay Chat (IRC) is one of the early social applications for Internet. But the new messenger platforms acquired much wider adoption. Examples are WeChat, WhatsApp or Facebook Messenger – the numbers show that each of them have doubled or tripled their user base since 2014, each connecting roughly a billion users in 2017 [Sta17a, pp. 29–32].

So, neither instant messengers nor chatbots are new. A new quality lies in the adoption of the platforms by users and the adoption of chatbots by the platforms. Following WeChat, most other messenger platforms have quickly opened up for bots. They provide APIs for companies to provide service through bots, NLP tools for developers, bot directories for users to find the bots they are interested in (cf. [Klo+17, p. 557]).

When Facebook opened their messenger for chatbots this seemed like a rather new phenomenon in Europe and the U.S.. But they have been common for some time within the Chinese messenger platform WeChat. The company 'Tencent' launched this messenger platform in November 2010 [Zhu18, p. 33]. Tencent was just one of several big players in the mobile, web and messenger environment in China. WeChat did not start as a success. It took several versions and new features like video chat and advanced social features until people adopted it [Zhu18, pp. 33–35]. Later it became the strategic core of Tencent. In 2014, it emerged from a messenger to a business platform, opening through APIs to external developers. Using official accounts, third parties could now gain access to the platform. The services provided by WeChat included authentication, speech-to-text, grouping of users and a customer service interface [Zhu18, pp. 38–40]. Contrary to WhatsApp, WeChat offers rather rich interaction and a variety of functions, including games and payment. Opening for chatbots might therefore be considered a comparatively small step for this platform.

Chatbots at Home With the introduction of their virtual assistant 'Alexa' and the home application 'Echo', Amazon had arrived on the stage of chatbots in July 2015 [Ama15a]. While most people would probably refrain from talking loudly with their device in public, this constraint does not exist in a private and rather calm environment. Beyond it's core functionality and connectivity to home automation, Alexa functions can be extended by third parties. Amazon even opened the Alexa API to developers so that other devices can connect to Alexa, if they allow voice input and have an internet connection [Ama15c].

Google announced its 'Assistant' in 2016 [Pic16], in the expectation of a shift from 'mobile first' towards 'AI first' (and conversational UI) as a primary interface [Bru17b]. The Google Assistant has similar features as Alexa (extensions, API). It is available through 'Google Home' in a private (smart) home environment, and also via smartphone and smart watch.

The assistants at home open up a new space for bots, in which they can interact with multiple persons in the household, control home automation devices and bring cloud-based services to peoples private environment.

Amazon invests in projects and companies that add to the general use case of an assistant at home. This includes a variety of services, e.g. for cooking, home security, garage door control, connectivity to IoT and car information. Amazon thereby focuses on the hardware that might use Alexa, new features as well as the underlying language processing technology [Ama15b].

Other Big Players The technology side of the chatbots, the challenge behind the seemingly simple interface is best demonstrated with IBM's Watson. Watson was created with the focus of providing meaningful answers to difficult questions stated in natural language. The core functions are (a) natural language processing, (b) hypothesis generation and evaluation, (c) dynamic learning. In combination they should allow Watson access to unstructured data and to go from deterministic to a rather probabilistic computing. High described Watson's 'deep' natural language processing as combining context with knowledge, creating a number of hypothesis before choosing the best possible answer [Hig12, pp. 3–6]. Watson become famous when in early 2011 it won against two ace players in a game of 'Jeopardy!' [Mar11, p. 1].

Samsung entered the stage relatively late, announcing their VPA 'Bixby' in March 2017 [Sam17] and introducing it two month later on their new phone 'Galaxy S8'. During their developer conference in 2017, Samsung announced their VPA Bixby 2.0 which shall be available for different devices, including televisions and refrigerators, for different languages and extendable by external developers [Par17].

2.3 Adoption and Prospects of Chatbots

So far, the big tech companies are in place with their solutions to provide the tools, platforms and examples for bots.

In the wake of these new possibilites many developers turned to bot development. Registered users of 'Wit.ai', Facebooks own bot framework, grew to 100,000 in less than four years [Wit16]. As described above, the number of new bots on Facebook Messenger has skyrocketed equally. Early developer meetups and events like 'Botness' or 'Bot Day' were conducted and many more about AI and chatbots [ORe16] [bot16] [Kis].

A young bot developer community conducted a survey on their members in 2016. The great majority were based in the San Francisco bay area, but participants also were from European and Latin American countries, India, Israel, and other places. 50% stated that they had created bots so far for rather small scale use or serious testing. A large majority said they created their own framework for bots. Many deployed bots on Facebook Messenger or on the collaboration tool 'Slack'. Some of the issues that ranked highest were bot discovery, consumer awareness, roadmap transparency and reliability of frameworks and platforms, bot experience rated poorly by consumers, quality of development tools. Other concerns were raised concerning design best-practices. [She16]

It is visible that more and more companies have applied bots in customer service and beyond. But what about the customers? There are good reasons behind the expectation that bots are what people want. But in spite of the big promise behind bots, the plenitude of new bots, the high investments and equally high expectations, there is no evidence for adoption by a majority, yet.

Welter, sales vice president from Genesys goes as far as to call the hype about chatbots a self-fulfilling prophecy, published by the investors like Facebook [Wel16]. Market analyst Tractica finds it at least necessary to mention that widespread adoption has started only recently, while tech companies have already invested for years [BW16, pp. 3–4].

Fortunately, recent surveys have focused on the customer point of view, mostly on how they perceived chatbots in e-commerce, e.g. on websites. In a survey among 18-34 years olds, which was conducted in the U.S. in December 2016, 58% percent said they had used chatbots at least once [Ret17, p. 2]. In a survey conducted in Germany in 2016 over 70% of respondents claimed that they have never communicated with a chatbot [Sta17b, p. 2]. Two years later, that number had sunk to 50%. The authors of that same survey come to the conclusion that a majority of Germans preferred personal contact to contact with a chatbot. Every second participant has never had any contact with chatbots, every third rejected using chatbots in general. However, most people deemed a chatbot useful for asking questions during an ordering process [ide18, p. 15]. Another survey conducted in Germany in 2016 supports the critical attitude of German consumers: only 3.5% preferred contact via a chatbot [Fit17b, p. 2]. This suggests at least for Germany that bots are slowly coming to peoples attention, but are far from being the preferred method of contact.

Asked about why they would not interact with a chatbot, participants stated that they had doubts concerning accuracy of text/ speech recognition (40%), that interaction with chatbots was not personal enough (60%) or that they did not want to communicate with a computer (60%) [Fit17a, p. 2] [Bit17, p. 2]. Beyond the unease of people talking to computers, there seem to be some issues in the quality of the chatbots that people have tried.

VPAs on smartphone or at home are seen slightly different. Surveys in Germany have shown that 50% of German Smartphone users were using voice commands occasionally [Bit16], and that a majority (92%) of users of voice controlled smart home devices were at

least somewhat satisfied [ide18]. People also stated they might use voice assistants like Siri, Cortana, Amazon Alexa or Google Home for small daily tasks (30-50% agreement), like making queries on a search engine, getting reminders for appointments or checking the weather forecast. 25% responded they would use them to control home automation [SN17].

Compared to task-specific chatbots on websites and in messengers, one would expect the VPAs to be of much better quality. However, even the much more sophisticated voice controlled assistants on smartphones are often far from perfect as Luger and Sellen found in a study with users of Siri and Cortana. They come to the devastating conclusion that " in the majority of instances, the operation of [these] systems failed to bridge the gap between user expectation and system operation", furthermore that "users had poor mental models of how their [VPA] worked and that these were reinforced through a lack of meaningful feedback regarding system capability and intelligence" [LS16, p. 5295].

Against all obstacles the expectations are high. Bots are expected to gain ground in many different areas, like customer service [Asp17], healthcare [Cru+11, p. 519] or in social networks [Bos+11].

Tractica casts these expectation in numbers, saying the user base of consumer bots will rise from 400 million in 2015 to around 1.8 billion in 2021. For the same time the user base of enterprise bots is expected to rise from less than 200 million to over 800 million. [BW16, p. 4]

2.4 Customer Relationship Management

Until the 1980s marketing mainly focused on acquiring new customers and maximizing profits of single transactions. Marketing research underwent a change from 'transactional' to 'relationship marketing'. The focus of marketing shifted towards longer term relationship, mutual value of the relationship, issues of the customer, stronger service orientation, intensified contact, mutual responsibility for quality [Neu14, pp. 25–26].

One driver behind this change was the globalization of markets. Many products have become more and more exchangeable. The same product can be available in similar quality from many producers. Therefore, many companies have to distinguish themselves from the competition through service and customer orientation [HD01, p. 5].

With customer orientation and relationship marketing came a strong focus on customer satisfaction and loyalty. This led to more systematic approaches of customer oriented business strategies. Since the late 1990s 'Customer Relationship Management' is a common term for those strategies in the enterprise world [HS00, pp. 6–7].

The rise of CRM is tightly connected to IT solutions that were able to support the ideas. Only with the corresponding IT it was possible to accumulate and store the vast customer data or to integrate large numbers of employees from different departments in a single

environment which contained all customer-oriented data and processes. This tight connection led sometimes to a view on CRM that solely saw it as a technical solution (cf. [HHW11, p. 18]). With the hype of CRM came up a pressure to introduce such a solution with little regard to the overarching business strategy [HS00, p. 5]. That said, CRM has become an established approach in the enterprise world. With CRM, a stronger integration of marketing, sales and service has taken place [HHW11, p. 17].

The market volume for CRM solutions has risen steadily to more than an annual 25 billion US Dollars in 2015. For some years, the market is lead by Salesforce, followed by SAP and Oracle [Gar15b] [Gar15a]. Expectations for the market see continuous growth for the coming years [Gra17].

Through means of a literature review, Zakaria and Mohammadhossein collected evidence that CRM indeed improves customer satisfaction. Reported advantages are

(a) better customer service,
(b) personalized service,
(c) responsive to customer needs,
(d) customer segmentation,
(e) customized marketing,
(f) multichannel integration,
(g) time saving,
(h) improved customer knowledge.

Many of these benefits are strongly interrelated, e.g. better responsiveness or a personalized service lead to a better customer service in general [ZM12, p. 1581]. Another study has shown a positive effect of CRM on service quality [SKT11, p. 153].

The area of CRM is not at a standstill. Modern approaches try to focus even stronger on the customer's perspective. While CRM looks mainly on the value of a customer for the company, the approach of 'Customer Experience Management' looks on the value for the customer. It has gained strong attention in the wake of widespread adoption of CRM [LV16, p. 69]. Quite similarly,'Customer Journey Management' (CJM) builds on CRM and focusses on customers themselves and their experience during the customer journey. The customer-oriented approach is taken further than before. It encompasses structure, organisation and documentation of 'buyer personas' (examples for a customer group), touchpoints, processes and related contents the lead to successful customer journey [PJ16]. Tightly connected with this focus on the customer's experience is also the 'Customer Journey Analysis'. The goal of this is to find out how a (potential) customer gets in contact with the enterprise over several channels and situations (touchpoints). In e-commerce it has become possible to track customers behavior in great detail. This allows in turn to contact the customer with a more personal, more timely message. It also allows to measure the impact of marketing campaigns more accurately [FH14, pp. 214–217].

2.5 CRM and Bots

Modern bots pose a tremendous potential for enterprises which exercise CRM, as more and more customer contact can be automated. They can reduce cost for the company by requiring less service operators, promote and sell products while also collecting data on users and their needs. They are always online, answer immediately and are much better scalable than human service personnel. While all of these advantages also apply for web and mobile apps, bots might offer the same in a more personal and frictionless way.

2.5.1 Chatbots as CRM Automation

Generally, bots are not distinguishable from other automation methods in CRM. They blend into common models. The following figure presents a model provided by Hippner et al.. It shows different layers in operational CRM. Processes of marketing, sales or services pierce through all these layers. Contact to customers happens through different channels like personal contact, e-mail or telephone. The customer experiences the enterprise at a touchpoint, e.g. the company website, a sales representative or a shop. The layer of 'Front Office' represents CRM as (technical/ IT) application that provides functionality for the touchpoint based on IT systems in the back (e.g. customer data, workflows, manuals). I will focus on operational CRM here, as it provides the most obvious area for application of bots: customer contact itself.

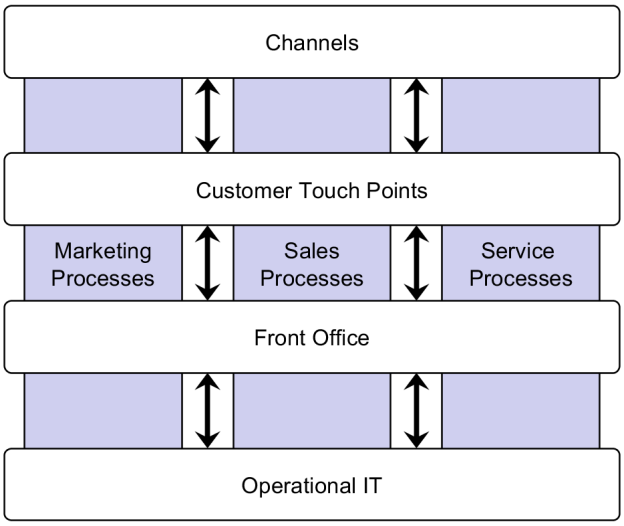

Fig. 4: Model of operational CRM. Own diagram based on Hippner et al. [HRW06].

Schöler describes along this model that CRM automation always happens in the 'Front Office' layer. He places automation on a 'border of customer interaction' between customer touch points (customer side) and other (peripheral) back end systems. In the area of customer service he distinguishes (a) self-service automation, (b) front-office service automation, (c) back-office service automation. As example for self-service he gives self-help through FAQs. As example for front-office automation he mentions interactive voice response (IVR) systems that route a customer calling by phone to the right service agent [Sch11, p. 690–694].

Bots are suited for all these areas. They can extend functionalities of FAQs (or other self service) through the interactive conversational interface. Identical to IVRs they can route a call to an agent. It is noteworthy that bots can not only take on and process incoming calls. The bot systems can serve both voice and text channels, for incoming and outgoing contact. Rather new channels that bots are very well suited for, are the messenger apps. Skomoroch points out their relevance especially for marketing, as peoples attention and awareness has shifted towards messenger [Bru16i, p. 13]. Bots are also suited for back-office automation. They cannot only serve the customer but also the personnel, e.g. to get some data from the CRM systems. A chatbot might in fact be used as an interface to all sorts of CRM-related function. An extensive survey in the U.S. in 2017 showed that customer service agents indeed saw potential in bots as supporting their work, e.g. in taking over supportive tasks or answering simple customer requests [Asp17]. However, bots in workplace scenarios are outside of the scope of this work and will not be considered any further.

Hauke and Wilde discuss automation in a 'Customer Interaction Center' (CIC). The CIC is a touchpoint that bundles the customer interactions over several channels (e.g. phone, e-mail, mail) and areas (marketing, sales, service). In addition to IVRs they mention other automation like workflow systems and scriptings that guide an agent through a service request, from greeting to offering a solution. Many of theses activities are supported by IT. Information about the case can be written directly to the CRM system, possible solutions drawn from a technical solution database [HW11, pp. 719–721].

Workflows, scriptings and system integration pose an important base to the use of bots in a CIC. If processes are already strongly defined, supported by workflow systems and integrated with peripheral systems a bot system can build on that. At least part of a scripted conversation might be further automated towards a fully automated interaction. Without human action the bot system can write information acquired from the customer to the CRM system and search a technical database for solutions. If a bot can not solve the request, it can still route the request on.

The amount and quality of structured knowledge is a key factor for automation of knowledge based systems, and therefore also for bots that try to answer customer requests. Schöler points out that automation in first-level support is largely based on the knowledge base of previous support cases. The larger, more accessible and structured this knowledge base is, the better the chances of a success in first-level support [Sch11, p. 694]. Kusber supports

the usefulness of bots for first level support, where bots can answer the simple questions or collect data about customers in need of support before transferring the case to an appropriate human agent. Similarly he suggests bots could generate leads by acquiring information about potential customers [Kus17, p. 240].

Leußer et al. discuss possibilities of marketing automation. They refer mainly to supportive tasks. But they also see opportunities in areas suited for bots, as: customer contact over multiple channels, automatically capture and qualify leads, contact customers in a personalized way based on scripts [LRW11, pp. 620–644]. Gündling sees automation in sales as supporting processes or as sales process management. In the latter case, most IT solutions start a sales process after a customer request. Gündling points out, that they should also focus on actively generating requests [Gün11, pp. 678–679].

Bots already support sales processes on some websites. But there are few bots yet, sophisticated enough to engage a potential customer in a meaningful sales talk. Guo suggests that a bot could automatically recognize a customer (e.g. because he has logged in his messenger app). Based on behavior a bot would qualify the customer and treat him accordingly (e.g. for a promising customer a sales representative immediately plugs in) [Bru16h]. Gentsch points out that conversation has always been typical in sales, but has become less prominent in e-commerce as it is too expensive to support each customer personally in online shopping. Bots offer a way out of this dilemma [Gen18, p. 86].

While for the moment bots in customer contact are limited to supporting, simple or very repetitive tasks they might in the near future capture more of incoming questions and even initialize conversations, like the more complex sales talks.

2.5.2 Interaction Concepts

There are two main ideas how bots interact with customers.

One is determined by the ‘human’ aspect of bots. This means that bots often appear more similar to humans in their behavior than other software. In conversation bots therefore might mirror real-world conversation better than apps or websites [Tur+18, pp. 256–259]. The typical methods of hotlines and (online) forms is often perceived as slow, onesided, inconvenient. Gentsch expects AI driven bots to provide an alternative by automating theses processes, while still providing a human feeling [Gen18, p. 85]. Klie sees a strong demand by customers to communicate in natural language. Customers want to express themselves in their own words and want an equally personalized answer. Failing to provide this might seriously harm the relationship to the customer [Kli17, p. 2]. In terms of personalization, Kusber suggests that bots initiate a conversation at a time that was usually convenient for the user. The bot could also ask if a problem that occurred during a past conversation was solved or remind during shopping what matching items the user has already bought [Kus17, p. 235]. This approach makes high demands on a bots capability. For a satisfactory, personalized

experience the bot must know the customer, handle a variety of different situations and engage in long and potentially complex conversations. This approach relies strongly on AI. Mauro pointed out some breakthroughs in this area [Bru16b, pp. 13–14], still he and other experts see AI systems which become human-like in their nature as far away [Bru16i, p. 18] [Bru16b, p. 7].

Contrary to the idea of bots that mirror a real-world conversation, Pombriant suggests thinking of bots as extended self-service. He gives ticket kiosks and ATMs as examples for self-service applications. The interaction in those systems is already blurringly close to that with bots. Already, those systems are moving to hand-held devices, getting closer to the user [Pom17, p. 8]. In many cases customers know what they want but are kept back by difficult systems. Bulky, long workflows and distributed information make it hard to use. Bots can shorten the navigation path by typing in the intent directly, making the interaction easier and likely faster [FW17, p. 57] [LJ13, p. 147] [Pom17, p. 8]. Abu Shawar and Atwell supported the idea that bots should rather be developed to help people do their work, not replace them fully or mimic them perfectly [AA07, pp. 45–46]. This approach can be described as more goal oriented. It is much simpler than the first, often reduced to a simple ‘question-answer’ or ‘intent-transaction’ pattern.

2.5.3 Cutting Costs

A most obvious advantage of bots are the lowered costs when they take over tasks earlier done by humans. As early as 2001 Rice reported about the introduction of bots for customer service at Logitech. He estimated the cost per support case going down from roughly 20$ per call in a human call center, to less than 1$ per call for chatbots [Ric01, p. 55]. Korzeniowski offers the case of the software provider Autodesk as an example. Their contact center operated with around 450 people. Automation took over product activation – more than 25,000 queries per month. A solution based on IBM Watson extended the automation to another 40 common cases. The cost reduction per case was estimated to have dropped from $50 for internal resolution or $13 for outsourced resolution, to a mere $1 for a resolution by a bot [Kor17a, pp. 30–31]. Those examples apply to companies with huge amounts of customer requests, where a high investment pays of. With a new generation of cheaper and more capable bots, they become available for a wider audience. Bots are expected to expand within smaller enterprises and extend the use cases [BW16, pp. 2–3].

2.5.4 Chatbot Introduction

Thinking of bot introduction, a gradual, stepwise approach is emphasized by most sources. According to Mauro many big companies already have first experience and are not overly ravished by the hype. He sees them taking a measured approach towards the newest bot technologies [Bru16b, p. 30]. Summing up experiences from the banking sector Sarvady

also recommends a cautions and risk-aware approach: to keep expectations low at the start, start small, try bots only as optional channel with fallbacks in the beginning and to rely on partners in all but the core services [Sar17b, p. 21]. Nimphius points out that building up the experience to create truely useful bots can take a long time. He emphasises therefore that companies should start early. He suggests to begin with a bot that strongly guides the user, before turning to NLP and use of AI [Bro17].

Rice suggests four stages for e-businesses on the way to automated online self-service.

1. In a first stage, there is some online FAQ and telephone support.
2. A knowledge base is exposed to the customer, an e-mail management system helps the support agents.
3. Bots answer customer questions, learn from new questions, draws on the knowledge base and dynamic content.
4. In the fourth stage, the automated self-service is managed. Depending on context and customers preferences, the best answers pop-up [Ric01, p. 64].

Smiers suggests in a blog post for Capgemini a maturity model for bots. He cuts it in the three dimensions 'Interaction', 'Intelligence' and 'Integration'. A simple bot would interact on only one channel and in one language. Interaction could be enhanced by including more channels or allowing group interactions. In terms of 'Intelligence' a basic function would be a Q&A pattern. More advanced functions would include mood detection or complex conversation paths. The 'Integration' dimension starts by simply linking to additional information and could enhance e.g. by performing transactions in the background or being part of a complex workflow [Smi17]. Interestingly, with almost 16 years between these two sources, they essentially suggest very similar approaches. Both offer features and functions for a low-level and rather easy introduction of the technology with successive extension towards a very complex and assumingly valuable (e.g. cost-saving, as seen above) system.

Korzeniowski reports challenges during the introduction of bots in service at Autodesk. The major issue was the integration of IBM Watson with all back end systems, including inContact, SAP, Salesforce and Tibco. As a result, the number of IT experts at Autodesk had increased from less than ten to more than twenty – representing a corresponding increase in cost [Kor17a, p. 32].

Another challenge is to create bots that can engage customers in meaningful conversations and offer additional value from the start. As worst case scenario, the bot knows actually less than the customer already knows [Ric01, p. 56].

As explained in chapter 2.3, customer acceptance of bots can not be taken for granted. Nowadays, many people have not even heard of chatbots. A study conducted in the Netherlands compared different service tactics in messenger apps to influence customer loyalty. One tactic applied a chatbot and it had in fact the lowest effect on customer loyalty. It was also found that only few participants had ever contacted a company via messenger [Wit23,

p. 55]. While this is only a single example, it shows that possible benefits of both chatbots and the messenger channel on customer satisfaction should not be taken for granted.

2.5.5 Implications

Beyond what bots are already accomplishing today and how they fit in the established models of CRM automation, there are issues with bots that can have a seriously negative impact on the customer relationship. I will touch upon a few of these aspects here and discuss implications.

Chatbot Breakdown and Abuse Bots are extremely prone to misuse. A study that evaluated a wide range of bot conversations showed that in about 2-5% of the conversations vulgar language and insults were used by the user. This was similar to reports from other studies which gave numbers from 3-7%. Sexual language appeared in less than 2% of conversations (with one bot reaching as much as 7%), but reports from other studies range from less than 1% to 18% [LJ13, pp. 153–154]. There is no indication that this kind of behavior has changed recently. Bots exposed to the public must therefore be able to deal with insults and abuse. Especially in those situations bots in CRM must be able both to fulfill company policy and strive for a good relation with the customer. Part of this is to distinguish if the intent of the user is malicious or if the customer is angry due to a reasonable cause.

The Case of Tay A well-known example for a bot breakdown is the case of 'Tay'. In March 2016, Microsoft launched the experimental, AI powered chatbot Tay on Twitter. After it's predecessor XiaoIce had been successful with Chinese users, Tay was aimed at the English speaking audience. It should play the role of a young, playful female friend. After only 16 hours Microsoft had to take Tay offline. After another brief online period, Tay was offline for good. What had happened? Tay became offensive, distributed strong opinions about racial, political, social matters, started to harress people openly. Microsoft blamed a small group of users who fed Tay with inapproriate input. Others said, that Twitter is simply a bad place for an AI to learn. There was also serious criticism on Microsoft, as Tay was designed in a way that could easily be abused to harm others [NN16].

Biased AI Another ethical question that bots raise is the bias in behavior of an AI system. Crawford and Calo discuss that in the same way as humans can be biased in their behavior, bias can become part of a bot. They argue that while AI applications can indeed help, they might also disadvantage people already disadvantaged by race, gender, social background. They mention three common modes to avoid biased AI: compliance, value in design and thought experiments. They criticize that none of these approaches is enough to consider the

broad implications of new technology. They suggest that a broader and interdisciplinary analysis of social implications of AI is necessary [CC16, pp. 311–313]. In terms of CRM this can have a seriously negative effect when customer feel marginalized, disregarded or affronted by the bots behavior. This is a difficulty for bot design and bot quality: are all possible user groups thought of?

Privacy Issues For companies that apply CRM it is interesting to store and analyze conversations with bots. While interactions of users on websites or in apps can be recorded, these are not easy to analyze. These records show how a mouse was moved or when a button was clicked. The records of bot interactions can show the intents, problems and interests of users more clearly, as they are stated in natural language. These records also pose serious ethical and privacy issues, though [FB17, p. 42]. While bots are expected to know and remember the user, to acquire trust of the user, they also should respect privacy. That includes that they do not save everything said in the conversation – i.e. that they can keep things secret (like a real friend) [Med+17, p. 455].

This dilemma generally applies to all cases where customer data is acquired. However, as bots offer the more 'human' characteristic, the role of trust might play a bigger role than in the interaction with other systems. This matter requires further research.

3 Methodology

This chapter will provide an overview over methodologies that served as basis and guideline for this research. The aim is to explain why and how these were applied in this case.

The methods used in this thesis stem from a variety of disciplines. One of the main challenges of this research was to combine the different methods to explore the new bot technology, its usage patterns and their value propositions.

The primary methodologies considered were marketing research, requirements engineering (with a focus on use cases and requirements elicitation) and value proposition.

From the beginning one re-occurring theme was the 'Voice of the Customer'. The term comes from the quality movement and essentially means, that all sections of product development must make the needs of the customer their primary concern. Consequently, they all rely on some kind of marketing research to learn and understand the customer needs in the first place. This viewpoint made marketing research a key methodology of this research [GH93].

As a means of documentation, use cases were chosen, which have successfully been used for a long time in requirements engineering. Closely related to use cases and the 'voice of the customer' theme is the requirements elicitation process, which therefore was also considered for this research.

As 'value proposition' is even mentioned in the research questions, a short explanation of this methodology is also deemed necessary.

For rather practical reasons, this research also draws on case study research, systematic literature review and qualitative data analysis.

Modern bot technology has for a good part found its way out of the research laboratories. Bot application and development can therefore be observed in a real-life context. This is the realm of case study methodology which therefore at least partially applies to this research.

To draw on results from other researchers and acquire possible use cases from a larger number of sources, the systematic literature review was a logical choice.

Finally, the explorative nature of this research made a qualitative approach an obvious choice. Qualitative research is widely used and appreciated in requirements engineering, marketing and case study research. However, the most detailed methodologies stem from social sciences. Especially with respects to modern technology-supported ways of qualitative data analysis, this research draws on the methodology of Kuckartz.

3.1 Systematic Literature Review

According to Kitchenham and Charters a systematic literature review (SLR) is :“a means of identifying, evaluating and interpreting all available research relevant to a particular research question, or topic area, or phenomenon of interest.”. A SLR is therefore a form of secondary research, drawing on previous results. It is tightly connected to both meta-analysis and systematic mapping studies (SMS). Meta-analysis builds on SLR and further evaluates the results with quantitative methods. The SMS is broader in scope and less detailed in focus than a SLR . It aims mainly on finding clusters of evidence to determine future research. The origins of SLR lead back to evidence-based medicine. It is useful to other areas of science as well, like software engineering [KC07, p. 2–3]. Webster and Watson also call literature review the “foundation of research in IS [information systems]” [WW02, p. 14]. Khan et al. point out that the core is the “use of explicit methodology” and added that a review should always be systematic [Kha+17, p. 118]. However, the methodologies differ depending on the field of research.

Webster and Watson offer two types of reviews. One is the synthesis of a topic in which a large body of resarch studies exists. The other is to find theoretical foundations to a rather undeveloped topic [WW02]. Kitchenham and Charters see many possible reasons to perform a SLR, e.g. to summarize existing evidence, to identify research void, to provide a foundation for future research, to check if empirical results support a certain theory or to develop new hypotheses [KC07, p. 3].

This research draws on a SLR for a rather small and narrow part of the project. The first goal is to identify if indeed a research void exists. For obvious reasons the SLR was therefore placed in the earliest phases of the project. The second goal is is to collect use cases and their characteristics. The scope is therefore much more limited than in a ‘full-scale’ SLR or meta-study that summarizes and synthesizes existing results. The purpose of the SLR is thereby to develop a structure on which future hypothesis or theory may stand.

Both Khan et al. and Kitchenham/Charters propose a stepwise approach. For Khan these are:

1. Framing questions for a review
2. Identifying relevant work
3. Assessing the quality of studies
4. Summarizing the evidence
5. Interpreting the findings [Kha+17, p. 118]

Kitchenham/Charters propose following (not necessarily sequential) mandatory steps:

1. Identification of the need for a review
2. Specifying the research questions

3. Developing a review protocol
4. Identification of research
5. Selection of primary studies
6. Study quality assessment
7. Data extraction and monitoring
8. Data synthesis
9. Specifying dissemination mechanisms
10. Formatting the main report
11. Evaluation the report [KC07, p. 6]

These phase models do not contradict each other and this research will follow them in general. In terms of data extraction and synthesis, this research sets itself apart from these guidelines. Firstly, it does not summarize evidence but use cases, secondly it also merges them with results from other sources.

3.2 Marketing Research

This research draws on methods of marketing research to listen to the 'voice of the customer'. Viewing a chatbot as a product, understanding what users demand from this kind of product and assessing market chances is a concern of marketing research.

It seems noteworthy that in English literature the term 'marketing research' is more widely used, but in German language the term 'Marktforschung' ('market research') is more common. Koch argues that the difference between 'market research' and 'marketing research' became obsolete over time. Marketing was considered as more confined in the past, excluding certain aspects of markets. The concept of 'integrated marketing' is today considered a much wider discipline, covering all relationships of an organization [KGR16, p. 2]. This point of view matches the more 'integrated' perspective taken in research of CRM, that rejects the idea of strictly separated areas of responsibility between marketing, sales and service.

The American Marketing Association (AMA) defines 'marketing research' in 2004 as follows: " Marketing research is the function that links the consumer, customer, and public to the marketer through information – information used to identify and define marketing opportunities and problems; generate, refine, and evaluate marketing actions; monitor marketing performance; and improve understanding of marketing as a process. Marketing research specifies the information required to address these issues, designs the method for collecting information, manages and implements the data collection process, analyzes the results, and communicates the findings and their implications. " [Ame17]

Especially the first part, to 'identify [...] marketing opportunities' matches the current research, as the technology in question should offer an opportunity for a more efficient, as automated, marketing process.

Marketing research is also relevant for decision makers. A primary goal is to reduce uncertainty about customer reactions or changes in markets, which requires information of high quality [KGR16, pp. 9–10] [KKW14, pp. 3–4]. In the area of chatbots this uncertainty still exists – if users will use them, if companies should apply them – this is the underlying problem of this whole work.

That marketing research can be seen as more than 'research for marketing' shows the approach of 'Quality Function Deployment' (QFD) which has been applied in Japanese industry since at least the 1960s. Griffin and Hauser describe it as a product development process for interfunctional teams. It uses a series of matrices ('houses') to deploy customer input throughout design, manufacturing and delivery. It thereby encourages all related functions to perform research about the customers needs, to support strategical as well as operational decisions [GH93, p. 2]. This research follows in these footsteps: that input about customer needs and perception is necessary for any kind of product development, especially in a customer-oriented (or customer-centric) like CRM. Same as Griffin, to determine customer needs and towards achieving customer satisfaction I draw on qualitative methods.

Other authors also emphasize that qualitative methods have their place marketing research. De Ruyter and Scholl list some of the areas for qualitative marketing research, to ...

(a) determine why customers buy something,
(b) find out how customers are satisfied,
(c) approximate how people understand a certain concept,
(d) find latent needs and motives,
(e) find themes and topics related to a certain product [RS98].

Kuß et al. add that in marketing research a 'pragmatic approach' is very common. The idea is to get an early understanding about a topic and its domain – for quantitative research the necessary insight is often still missing at this point. A 'relativistic approach' is less interested in objective data but in the paradigm of a certain topic. In focus is rather the point of view of individuals. An 'interpretative approach' is widely use in social sciences and consumer research. The advantage of qualitative research here is that it does not exclude the context of people, as is the case in most quantitative research [KKW14, p. 52].

This research indeed aims on the 'needs and motives' as well as the paradigm, mental model and understanding that people have about chatbots. These aspects are better explored with qualitative methods.

Different Aspects of Marketing Research To allow comparison of this work with other kinds of marketing research, one can characterize it. I therefore draw on differentiations made by Koch. According to him marketing research can be focused on

(a) certain regions or have an international scope,

(b) rather factual data or subjective data, like opinion of customers,
(c) monitoring of an object over time, repeated observation or ad-hoc analysis,
(d) market sectors or research methods,
(e) past, present, prospective matters. It can be designed as
(f) explorative, descriptive or causal research,
(g) primary or secondary research,
(h) qualitative or quantitative research,
(i) field investigation or rather a laboratory experiment. It can be
(j) used for operative marketing-mix or strategical planning,
(k) done internally or by an external service provider [KGR16, pp. 3–5] (also see [BEE09, p. 87] and [KKW14, p. 13–14]).

While this research is not limited to a certain region per se, it is limited in matters of validity. Participants of interviews and group discussions all work in a certain region of germany, the literature review is confined to German and English sources. Most noteworthy, pioneering of WeChat and the rapid adoption of bots in the Chinese market are hard to track without the necessary language skills. Some effort is made however to overcome these limitations by reaching out to sources which are available in English (e.g. [Zhu18]). But in any case, the results of this research are valid at best for a certain area of Germany.

This research covers both factual and subjective data, with an emphasis on the latter.

While this research considers the past developments, it does neither monitor any changes nor does it use 'pre-test/ post-test' methods. It is therefore considered an ad hoc analysis.

Markets and methods of marketing are in the focus. The markets referred to here are both that of the exemplary market of telecommunication companies and that of the chatbots themselves. The method in focus is that of an automated conversational interaction with customers. Research methods are under observation only in hindsight.

The focus of this research is mainly on the present situation. While certainly trying to draw a line from the past, into the future, the goal is an accurate picture of the present. The chatbot technology is very dynamic at the moment, so that it seems unrealistic to make an accurate guess about developments even for the near future.

The design of this research is explorative in the way that it tries to uncover entities and their relationships. To a lesser degree it tries to characterize entities.

This research draws both on primary and secondary sources. New data is created from the interviews and group discussions. Participants of discussions are exemplary 'early adopters' of the new technology. Participants of interviews are CRM experts. Secondary sources are (a) research literature, (b) publications drawing on experts related to CRM or bots, (c) bots that are applied in CRM.

The research can be described as qualitative. Qualitative methods are embedded in marketing research, but also have their own methodologies.

There is neither done any experiment, nor any field observation in a strict sense. The phenomenon is however observed in a 'real-life context'.

The results of this research serve strategical rather than operative needs, in the way that it should support general decisions about a bot strategy.

The research is done internally in the way that it is done mainly within the boundaries of one company. It includes external aspects in the way that it is executed by a temporary resource from an external source, i.e. a university student.

Phases Kuß et al. present a model of typical phases of a marketing research:

1. define the research problem,
2. specify the research goals,
3. specify the research design,
4. develop the measurements,
5. collect the data,
6. analyze the data,
7. report [KKW14, p. 11].

They point out, that to define the research problem in the first place it is necessary to know and understand the decision problem that needs to be solved [KKW14, pp. 11–12]. This research follows this approach through all its phases.

3.3 Requirements Engineering

Thinking about what people desire from a software system, the methods of requirements engineering (RE) should be considered. RE offers extensive, proven methods to elicit, analyze, document and manage requirements. Most important in our case are methods to elicit and document requirements, most notable in the form of 'use cases'.

Definition and Characteristics What exactly is a 'requirement'?

Fernandes and Machando provide a simple definition: "a requirement can be defined as anything that someone desires". They elaborate that "in the context of systems development, requirements are seen as properties that the systems (yet in project) shall possess when built". Finally they point to a definition by the IEEE [FM16, p. 45].

The IEEE, ISO and IEC define 'requirement' as:

1. “statement that translates or expresses a need and its associated constraints and conditions [...]
2. condition or capability that must be met or possessed by a system, system component, product, or service to satisfy an agreement, standard, specification, or other formally imposed documents [...]
3. provision that contains criteria to be fulfilled [...]
4. a condition or capability that must be present in a product, service, or result to satisfy a contract or other formally imposed specification [...]” [IEE17, p. 380].

Fernandes and Machando also classify requirements. They are either ‘primary’ if uttered by a stakeholder, or ‘derived’ from those. They are ‘candidates’ when identified by elicitation technique but still open for negotiation. They are ‘implicit’ if they concern functions inherently necessary for the domain, but not explicitly spoken about yet. Requirements are ‘functional’ if they describe a certain behavior the system in question should have, otherwise ‘non-functional’. The latter includes categories like ‘performance’, ‘usability’, ‘security’, ‘legal’, among others. There are ‘user requirements’ that affect users and ‘system requirements’ that concern the technical design [FM16, pp. 49–50].

I can characterize the requirements I mean in case of this research. Important for our case are rather basic ideas of a requirement – the expression of need or desire of a user, but also the capabilities to fulfill them. To capture the different needs and capabilities, I define a means to document them in a formalized way: the use cases. These describe functional requirements but might include non-functional aspects. I am looking at ‘primary’ requirements as they are related to the actual users. They are largely ‘implicit’ as I am looking at a rather new and unexplored domain. Also, I am looking at bot use cases in a broad (or horizontal) way and try to make the actual requirements more explicit in the process. They are user requirements as the technical domain is mostly fixed to chatbots.

Requirements Elicitation The process of ‘requirements elicitation’ aims at understanding what stakeholders need and expect from the system. It is not limited to a single technique or discipline and includes those from social sciences and organizational theory. Of great importance is the identification and engagement of stakeholders. Here the process relies heavily on communicational skills and cooperation. Different groups of stakeholders might have entirely different viewpoints. Users are the first to consider, also clients and (end-) customers. Among other potential stakeholders are experts [FM16, p. 87] [ZC05, pp. 19–20]. During elicitation the requirements engineer explores the domain, guides and assists participants of work sessions, mediates resolutions and finally documents the requirements. She might take the role of developers during the process and needs to validate all requirements against all stakeholders [ZC05, pp. 25–26].

The stakeholders in this case can be categorized in four groups. There are the users or end-customers, the owner of the bot system, the owners of integrated systems and finally third parties (optionally, in case of e.g. a platform service). Of biggest concern are the

first two groups. The focus in this research is on the user. The description of the process matches exactly that of this work, i.e. exploring the domain, guiding in work sessions, documentation, taking the role of a developer.

Elicitation Techniques According to Fernandes and Machado many techniques have been proposed, in categories such as marketing, psychology, participative design, human-machine-interaction or formal methods. Alternatively, they categorize by sources: (a) individuals, (b) groups, (c) artifacts. They present what they see as the most important techniques, e.g. interview, ethnography, group dynamics (in which they include techniques like brain storming or focus group), domain analysis, prototyping and scenarios [FM16, pp. 92–113].

Zowghi and Couling bring up a list of techniques to elicit requirements, comment on their advantages and compare them.

(a) Interviews can be applied in almost any phase. They are mentioned as an efficient way to gather large amounts of data. The quality highly depends on the interaction between interviewer and interviewee.
(b) Domain analysis is most useful in the beginning and adds well to interviews or groupwork.
(c) In group work, several additional techniques can be applied. E.g. with brainstorming groups can generate large amounts of ideas. Group work can be helpful in any stage and is also an alternative to interviews.
(d) Prototyping provides detailed and relevant feedback during the later phases. They add to interviews or group sessions. Prototypes carry the risk that users become attached to them, taking them for actual solutions.

Other techniques mentioned include ‘repertory grids’, ‘introspection’, ‘joint application development’, ‘apprenticing’, ‘ethnography’ and ‘viewpoints’. [ZC05, pp. 29–32]

This research follows the mentioned techniques. They align well with methods from marketing research. Domain analysis served as basic first step. Interviews and group work are two important methods applied in the first part. A prototype is the core and concern of the second part of this research. Mostly for added validity this research in fact used all the categories of sources mentioned by Machado and Fernandes: (a) individuals, (b) groups, (c) artifacts. The SLR would belong to the last category.

Elicitation Steps The process can be broken into fundamental steps like

1. Understanding the application domain,
2. identifying the sources for requirements ,

3. analyzing the stakeholders,
4. selecting the techniques, approaches and tools to use,
5. eliciting the requirements from the sources [ZC05, pp. 22–23] (also cf. [FM16, p. 87]).

This research followed these steps and their sequence in general. However, the elicitation process was a minor part embedded in a larger process more comprehensively described in the section about 'marketing research'.

3.3.1 Use Cases

Beyond eliciting requirements from the perspective of potential bot users I also need a method to document them. Use cases as a form of documentation have been used in requirements engineering for a long time. Cockburn defines use case as a "description of the possible sequences of interactions between the system under discussion and its external actors, related to a particular goal" [Coc00, p. 15]. For him, use cases are an appropriate medium for many occasions. He names (a) business process design, (b) documentation of software system behavior, (c) to specify requirements of software systems - both before or during design, (d) to specify requirements of combined hardware-software systems of a wide range, (e) documentation of behavior of internal subsystems [Coc00, p. 16]. What makes them useful for this research is that they are closely related to the users perspective. According to Gottesdiener "use cases are arguably the best requirements technique we have for describing 'the voice of the customer' in software products" [Got03, p. 4].

There are many ways to write use cases, both in terms of perspective and detail. According to Gottesdiener, requirements are discovered in a process through three perspectives: business level, user level, technical level [Got03, pp. 3–4]. Cockburn distinguishes different kinds of use cases. They can describe business processes or system processes. They can take a look from a wider corporate perspective, at the single system or into the systems innards. They can take a 'white-box' perspective where the internal processes of the system are visible, or a 'black-box' perspective where they are hidden. They can be written rather casual or in very strict and formal way ('dressed'). Finally, he distinguishes use case goals as either strategic, user-goals or subfunctions [Coc00, p. 14].

On these grounds, I can define the way use cases are used in this research. I am looking at the user level, at a black box and usually single systems. They will be written in a casual and rather abstract way. The goals of interest are both strategic and user goals. At this point use case documentation is complemented by the 'value proposition' methodology that will be explained in the next section.

Cockburn suggests a general 'breadth first' approach when collecting use cases. He would first brainstorm all possible actors, then all associated goals, followed by success steps, failure conditions and recovery steps. Vice versa, he rejects an approach focusing on details

from the beginning [Coc00, p. 121]. Gottesdiener proposes the following practices to apply use cases in a project:

- "Scope the domain
- Scope your use cases
- Validate use cases as they emerge
- Define the requirements models you'll need
- Determine the strategy you'll use to elicit requirements
- Settle on a standard format for your use cases
- Develop a project glossary" [Got03, pp. 4–10]

A 'breadth first' approach from a superficial to a more detailed description is used in this research. The exact step-wise approach of Cockburn however is hardly applicable in this research. I am not looking at one concrete system, but on a scattered multitude of use cases from different products all related to one subject. While Gottesdiener follows a similar approach, that one is more open to the adjustment needed for this research. The scope of the domain is clearly defined. A validation of use cases is not necessary at this stage, as they are 'valid by existence' – meaning that the use cases are rather collected from existing cases than uncovered for a system under development. Requirement model, elicitation strategy and format are defined to consider the aspect of value proposition. Finally, a glossary is deemed unnecessary, as the issue of a gap between business people and software people does not exist in the context of this research.

3.4 Qualitative Data Analysis

As this research acquires qualitative data, from both interviews and group discussions, a look on methods of qualitative data analysis is deemed necessary. The methodology is mainly that of Kuckartz and largely focused on a software based data analysis.

Qualitative research is well established in social science, e.g. in psychology, education research, sociology [Kuc07, pp. 15–16]. As stated above, qualitative research also has it's place in marketing research and requirements elicitation. In both these methodologies it can be used to understand the needs of people (users/ customers) concerning a system or product in question (e.g. in development).

Kaplan and Maxwell also discuss qualitative research in information systems. They suggest several reasons for a qualitative approach, e.g. to understanding how users perceive a system [KM05, pp. 32–34]. This is in line with the approach of this research. The need for a qualitative approach is connected to the unclear nature of the topic and how people perceive a rather new type of system.

Steps of Qualitative Evaluation While the focus in this section is on data analysis, a general sequence of qualitative research is described. Kuckartz proposes seven steps for a qualitative evaluation (e.g. interview).

1. Define subject and goal of the evaluation
2. Develop the interview guidelines
3. Conduct the interview
4. Explore the data
5. Create a system of categories and code the results
6. Evaluate based on categories, begin the report
7. Conclude the results, finalize and disseminate the report [Kuc08, pp. 15–59]

This research follows theses steps in general. Some steps differ slightly. Before concluding results (i.e. the use cases which were uncovered) they are merged with results from the systematic literature review.

Tasks of Software-Based Analysis For the software-based qualitative data analysis Kuckartz explains the following tasks.

1. Creating a project
2. Importing of source files
3. Exploration of source files
4. Segmenting and coding of source files
5. Cross-linking segments
6. Create memos for ideas/hypothesis/theories
7. Develop a system of categories
8. Summarize memos
9. Content retrieval
10. Define and classify case variables and source file characteristics
11. Complex analysis [Kuc07, pp. 20–27]

In this research, the more advanced methods mentioned here are not applied, i.e. cross-linking of segments, creating and summarizing memos, complex analysis. The focus is on deriving use cases and their attributes. This needs much less interpretation in case of the source itself.

Methods of Data Analysis Kuckartz describes in detail methods like transcription, coding and analysis. He describes the different document types, that are the basis of interview evaluation (e.g. record or transcription). He emphasizes that transcription is most useful for extensive analysis, but also needs a rigid process and is time-consuming [Kuc07, p. 39–40].

In terms of the style of transcription, Kuckartz explains different ways of transcribing interview records. This concerns aspects like speakers accent, emphasis of words, pauses, incomprehensible utterances and so forth. He presents guidelines for transcriptions and different systems. [Kuc07, pp. 41–45]. Kuckartz emphasizes the necessity of systematic categorizing or coding. He explains differences between the deductive and inductive approach. From a deductive perspective the text is searched for sequences that match defined categories. An inductive approach develops the categories over time. The process is usually more explorative. He distinguishes three kinds of codes: guideposts to topics, facts with high reliability and interpretation based on expert-knowledge. He warns to focus on a too strict or one-sided approach: inductive and deductive go often together and a system of codes that improves over time can have a strong effect on the whole analytical process [Kuc07, p. 60].

During this research for both transcription and categorization a rather measured approach has been taken. As the analysis is limited to finding use cases, characterizing them and defining limits which cases are still inside the scope of this work, no extensive analysis on the sources had to be done. Coding followed a deductive approach with codes defined around the subject of use cases.

Kuckartz gives an overview over four different approaches to qualitative analysis. (a) The 'Grounded Theory' is a methodology based on induction and a thorough coding process. New results are continuously compared with older ones and the underlying theory and analytical process adjusted accordingly. (b) The thematic coding process is based rather on existing theory and evaluates if the current case supports that theory. Therefore, categories are to some extent planned beforehand. (c) A summarizing coding process starts after the data has been acquired. The goal is to reduce the material to a defined abstraction level and keeping the gist intact. (d) Another approach aims on developing a typology of the objects in question. After the identification of the entities mentioned, they are characterized, and clustered in feature spaces until finally the newly developed types are applied to the original sources [Kuc07, pp. 71–106]. This research certainly takes the last approach, as it tries to identify, characterize and cluster the entities mentioned. As Kuckartz looks at the evaluation from the perspective of social science, in his description the participants themselves are clustered in categories. For this research I look on how the participants perceive the object in question. The goal is therefore rather to understand how the participants define and describe certain cases, merge the case descriptions with those of other sources, and finally to create the typology based on all case descriptions.

3.5 Value Proposition

As a means of describing the value of a bot use case for a user, this research draws on the methods of 'value proposition'.

Camlek explains value proposition as methodology "to demonstrate the value [e.g. utility, merit, return on invest] of a product, service or a solution" [Cam10, p. 120]. He draws a

link from product to value. The same product can thereby be described from five different viewpoints: the basic product itself, the features of that product, the customer needs, the customer benefits, the customer value [Cam10, p. 121]. This span of viewpoints, from rather concrete to rather abstract, provides a good guideline to conclude from one explicit aspect of product to another, yet implicit aspect. E.g. if one knows the features and the customer needs, at least the customer benefits can be determined.

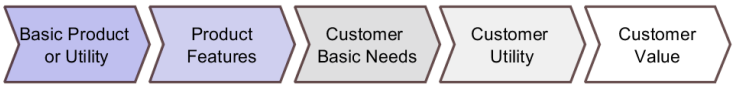

Fig. 5: Value proposition in context as proposed by Camlek (own diagram based on [Cam10]).

A similar, more visual model of value proposition provide Osterwalder et al. with the 'Value Proposition Canvas'. It can be used to visualize how far a product and its value proposition matches the customer profile it is intended for. The 'Value Proposition Canvas' has two sides. On the right side it represents aspects of the user or customer. On the left it represents aspects of a solution or product [OW15, pp. 8–9].

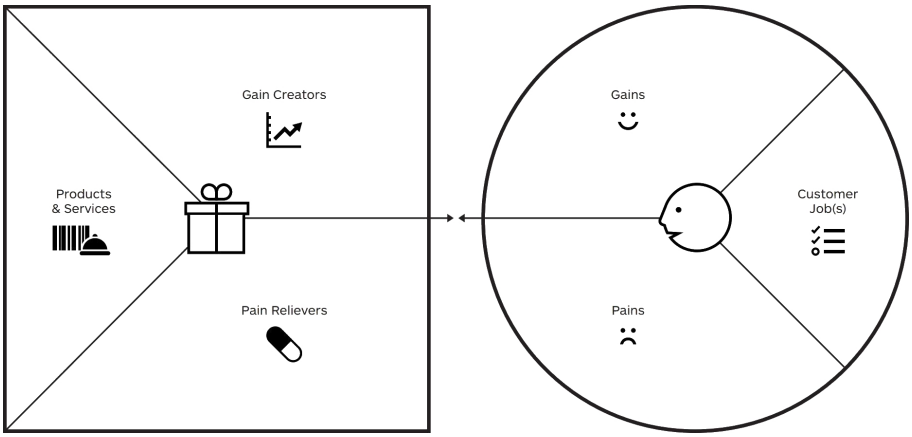

Fig. 6: The 'Value Proposition Canvas' as proposed by Osterwalder et al.. The left side, representing the actual value proposition should match the right side, representing the target customer. They define 'Value Proposition' as "the benefits customers can expect from your products and services" [OW15, pp. 8–9]. Copyright with "Strategyzer.com" [Str].

This canvas is a tool embedded in an extensive methodology to create successful value propositions and surrounding business models. This methodology is called the 'Value Proposition Design' [OW15] [OP10]. The core of both the 'Value Proposition Canvas'

and the whole ‘Value Proposition Design’ is to exactly determine what it is the customers needs. To elicit the customer profile Osterwalder et al. propose a process. It starts by (a) specifying the customer segment in question, followed by (b) identifying the customer jobs ..., (c) ... pains, (d) ... gains, and ends with (e) prioritizing the jobs, pains and gains [OW15, p. 22]. Understanding the customer comes first in this process. The starting point and first grave challenge is therefore to identify a target group and a task that is crucial for them. Both Osterwalder et al. and Camlek agree here that the value proposition is always seen from the customer point of view [Cam10, p. 122]. “Your customers are the judge, jury and executioner of your value proposition.” [OW15, p. 43].

In ‘Value Proposition Design’ after understanding the customer comes a process to define an actual value proposition. In terms of the ‘Value Proposition Canvas’ that means after filling out the right part, you fill out the left. You (a) list all products and services, (b) outline the pain relievers and (c) gain creators, finally (d) rank products, pain relievers, gain creators by importance [OW15, p. 37].

The final goal at this point is to create an optimal fit between the customer and the value proposition. Osterwalder et al. distinguish three levels of a value proposition fitting to the customer. A ‘problem-solution fit’ means that there is evidence for customers with certain pains, gains and jobs, and a value proposition was designed that addresses those. A ‘product-market fit’ is reached when there is evidence that the designed product actually creates value for customers and receives adoption in the market. The ‘business model fit’ is the level on which there is evidence that the value proposition can become a core part of valid, successful business model [OW15, p. 49]. Camlek looks at this problem from the perspective of an existing company. He points out that the new value proposition should fit the companies strategy and is best supported by a market-centric strategy [Cam10, p. 122].

This methodology has the customer-centric view in common with CRM. It is therefore considered useful for this context. This research is not aiming on creating a new value proposition from scratch, it examines existing value propositions for customers. For this analytical point of view, the terminology is the same and can be applied without adjustment. Contrary to the proposed process sequence - understanding the customer always first - in this case I look on the value proposition first. From there one can look on the customer segment, the business model or variations of the value proposition. Most importantly, I extend the view on use case towards the value proposition it provides and the pains and needs of the customer.

Similar to RE or marketing research, the value proposition draws on different methods to determine and explore the customer’s point of view and possible value propositions. Osterwalder et al. mention e.g. interviews and surveys, and give also emphasis to prototyping to quickly explore design alternatives. These are (a) napkin sketches, (b) short fill-out sentences that pinpoint the core idea (ad-lib), (c) value proposition canvases, (d) representations of a value proposition, (e) minimum viable products [OW15, pp. 76–77].

This research follows this approach in the second part, by selecting a promising use case and it's respective value proposition as a basis for a working, integrated prototype.

3.6 Case Study Research

For research on a real-life phenomenon, the case study research methodology offers appropriate tools and advice. The first reference in this area is Robert Yin [Yin14]. Building on that and focussing on software engineering is the book by Runeson, Höst, Rainer and Regnell [Run+12].

Runeson et al. define case study in software engineering as "an empirical inquiry that draws on multiple sources of evidence to investigate one instance (or a small number of instances) of a contemporary software engineering phenomenon within its real-life context, especially when the boundary between phenomenon and context cannot be clearly specified" [Run+12, p. 12].

The strategy of this research applies to the definition. It will draw on multiple sources to understand the usage patterns or use cases of contemporary bot technology especially in context with the users. Compared to the vast number of bots and use cases available I will look only on a small number of instances. That is still quite different from looking only at a single or very few instances. Also this research differs in that it not only looks at bots in real life context. It also looks at what research explores or what potential users imagine about a bot system. In this sense it is more closely related to marketing research.

Runeson et al. also characterize differences in research strategies by purpose, control and data, triangulation, replication, inductive or deductive approach [Run+12, pp. 11–21].

In it's purpose this research is exploratory and inductive as it is generating hypothesis and seeking to find some structure on which to build further research. This approach also emphasizes the viewpoint of the participants.

In terms of triangulation, this research puts methodological triangulation first. That means both the combination of interviews, group discussion and SLR, but also the different viewpoints on the subject, e.g. a marketing view and a view from requirements engineering. Data triangulation is attempted through the multitude of participants. In terms of observer triangulation this research is rather weak. While during the interpretation of use cases the opinion of experts was sought, the main decisions were made by one person only.

Parts of this research are easy to replicate, i.e. the SLR. The concrete methods of interview, group discussion and synthesis are developed and explained in great detail. While the results in qualitative research will differ, a replication is possible.

Yin distinguishes holistic and embedded use case study [Yin14] (cited by Runeson et al. [Run+12, S. 27]). A holistic approach, which looks on a broad range of aspects of the

subject, is feasible when the scope is limited and the cases are few. Runeson et al. add to that the distinction of single-case versus multi-case study [Run+12, S. 28]. This research can be considered an embedded multi-case study. Instead of a holistic view, it focuses on very few aspects (e.g. value proposition) of many cases.

The research process which Runeson et al. propose consists of following phases [Run+12, p. 21].:

- Case study design
- Preparation for data collection
- Collecting evidence
- Analysis of collected data
- Reporting

This process is comparable to that of marketing research as described in a previous section or to that end to for any kind of empirical study [Run+12, p. 21]. The general process is also followed by this research.

4 Ethical Considerations

There are certain ethical issues to be taken into account in this research project. Ethical considerations are a topic in every part of life. Science is no exception. It is imperative to take legal, ethical and professional issues into account with research. This stance is supported by several authors who describe research methods and practices, be it for case studies [Run+12, p. 40], or marketing research [KGR16, p. 14] [KKW14, pp. 285–291].

As this research is done inside a company, internal data and detail about the organization need to be protected. As a general precaution the research was defined as confidential, only available to the university and the company itself. Another major concern is that people who participate in interviews or group interviews give their consent to the way how their statements are used. That includes to inform them beforehand, what data of them will be used, how the interview will be recorded and what is the purpose of the research in general. There is no negative consequence expected for any individual participant. The research topic itself is largely technological and so far considered not controversial in the sense that any opinion toward it would trigger a strong response, e.g. by the employer. The data which was acquired during this research was kept on a company-owned notebook computer, for backup also on company servers and an external private disk. It is archived in encrypted form.

5 Evaluation of Use Cases

The aim of this chapter is to collect, characterize and discuss use cases for chatbots applicable in CRM. I will describe the goals, general approach, methods and execution, before finally presenting and discussing results.

5.1 Goals

The goal of this chapter is to answer the following questions.

RQ1 What use cases exist for chatbots in CRM?

RQ2 Which value proposition does each of the use cases imply?

Clearly, no answer to the first research question can be exhaustive. There will always be new use cases. To cover a wide range of use cases I will formulate them in a rather generic sense, that contains the essentials of many different cases. This means that a model of use case classification is created on the way, to cover similar individual cases within a single use case ‘class’.

5.2 Methods and Research Strategy

5.2.1 General Approach

Top Level Metaphor The top level approach can be described with a metaphor (proposed by Alfred Zimmerman): a funnel opening wide, then closing again towards a small end. The phases associated with this metaphor can be named: ’problem’ - ’analysis’ - ’conception’ - ’synthesis’ - ’solution’.

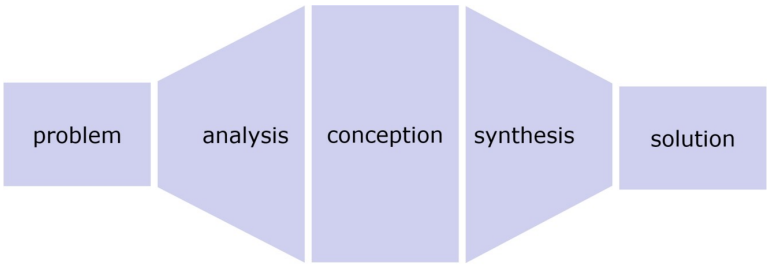

Fig. 7: A model that describes steps of solving a problem. It fits this works approach very well. Own diagram based on the work of Alfred Zimmerman.

The metaphor fits very well, because starting with the problem definition, the collection of sources is continuously extended, limited only by the time available and the amount of sources accessible. From the sources, single cases are extracted, forming an extensive list of attributed use cases. From this collection of small pieces should then derive some kind of classification or model applicable for all cases.

It is probably the hope of every researcher that at the peak of the process a model becomes strikingly obvious, crystallizing from the evidence found. However in reality it is mostly the interpretation of the researcher that 'makes' the model. From the peak point, I carefully strive to determine similarities between the single cases, define the boundaries of what is relevant, find a classification schema in which all (or at least most of) the cases fit.

The main process phases are now described in more detail.

First Step: Analysis The first step in this research was to collect cases from practice, research, CRM experts assessment, users opinion and reasonable imagination. This wide range of different sources was chosen to enhance both the validity as well as the total number of cases.

The cases from practice were taken into account as the bot technology is already in use for many years with some success. The obvious simplicity of this approach is contradicted by the huge amount of bots and bot use cases available today. Therefore only those cases from practice were taken, that are referenced by other sources for being of particular interest.

Cases from research were few but especially interesting as they were usually well-explained and evaluated in some fashion.

Some CRM experts who were connected to the topic of chatbots were asked for their assessment how chatbots could be used in the context of CRM. Expert opinions are probably one of the best sources one can get for an exploratory approach to a topic. While it would have been advantageous to ask bot experts as well, none of those were known in person. Their contribution to this work is therefore limited to their publications.

Asking also the users seemed to be of utmost importance to this research as it focuses on the users point of view. Groups of young adults were asked in discussions for their opinion about chatbots in customer contact. Again, this approach was taken due to the exploratory nature of this endeavor. It allowed to observe different customer viewpoints and experiences and how they influenced each other in group dynamics. The method of group discussion is also presented in detail.

Second Step: Bridging Analysis and Synthesis The bridge from collecting the use cases to deriving a classification schema was made of constraints and documentation style. The time constraint was to stay within the project plan. The amount of sources was also largely

constraint, e.g. to the research publications which were found using search engines, the CRM experts and potential users that were available. The set of use cases was also limited to those that have something to do with CRM. Together, these constraints lead to the eventual termination of the analysis phase and the beginning of a new phase. The stepwise extraction of attributes like actors and goals leads to a stage in which the use cases become enriched with meaningful information, comparable, and accessible for further processing.

Third Step: Synthesis The final set of use cases with all their attributes was the basis for the synthesis. While each of the use cases found were described separately, it was expected that many use cases were essentially similar or even identical. The patterns behind the list should were uncovered, similar use cases merged, common characteristics determined. This step relied largely on interpretation. This process lead to a classification. The number of cases decreased (from many single use cases to fewer use case classes) and the detail of description increased during this step.

5.2.2 Systematic Literature Review

The literature review followed the guidelines provided by Kitchenham and Charters as far as possible [KC07].

The goals were twofold. The first was to validate if there is indeed a research void. A SLR can help at this point to lay out the background of a topic, determine research voids and then position new research projects accordingly [KC07, p. 3]. After preliminary literature research it had become clear that available sources about the topic in question are very limited. Therefore a wide gap in current research is found. This was a necessary prerequisite to continue.

The second goal was to collect the use cases already explored or discussed in research. Previous to, and in close conjunction with the SLR a much wider and less structured literature search was conducted. This took into consideration various search engines and also references from other sources. This wide search served as a basis for the SLR, mainly by providing useful search terms. Later on, the results of both searches are merged before extracting the actual use cases.

Following Kitchenham and Charters, I split the SLR in three phases and additional stages. However, the concrete stages deviated slightly from their suggestions. Preparatory stages were added whenever necessary, mainly at the beginning. The goal of these steps was mainly to explore the differences of search engines, adjust the methods of SLR to this specific case and to develop a structure for the documentation. Moreover, the results from the wider literature search had to be merged before extracting data.

1. Phase: Planning

a) (preparatory steps)
b) identify the need for a review
c) specify the research questions
d) develop a review protocol

2. Phase: Conducting

a) (preparatory steps)
b) identify research sources
c) select primary studies
d) merge primary studies with those from a wider search
e) extract use case data

3. Phase: Reporting

a) specify dissemination mechanisms
b) format the main report [KC07, p. 6].

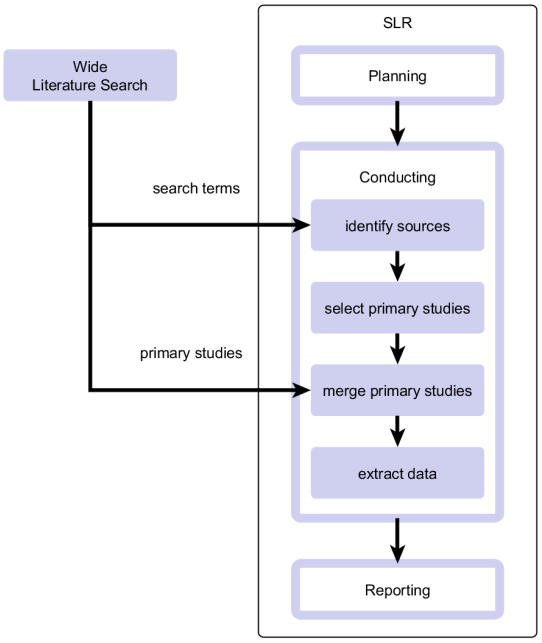

Fig. 8: Process steps of this literature search. Closely related to the steps laid out by Kitchenham and Charters [KC07, p. 6].

Following the structure laid out, this SLR started with the ‘Planning’ phase. To ensure that a SLR is necessary previous SLRs and ‘Systematic Mapping Studies’ (SMS) were reviewed

using a short checklist, to determine that either no SLR for the topic in question is available or that those available do not reach a certain level of quality or do not match the scope of the research in question as mentioned [KC07, pp. 8–9]. The checklist fundamentally consisted of only one question 'Does the SLR address both the topic of chatbots and CRM?'. As even this very broad scope did not provide any meaningful result it was pointless to focus any further.

In a second stage, the research questions for this SLR were specified. They were associated with the main research, as subquestions of the main research questions.

In a third stage a protocol was developed and set up. It was also defined where and how the results are stored and documented.

The second phase started again with preparatory steps, mainly preliminary or trial searches to assess the search terms and search engines to be used. This was done on the basis of previous searches on the topic. So, many important keywords could be extracted for the systematic search. Part of this stage was also to define the selection criteria. Based on the suggested approach by Kitchenham and Charters [KC07, pp. 19–20] these criteria were chosen in close relation to the questions defined in the first place, but also for practical reasons like language, research method, date or other characteristics. Criteria were refined over time.

Apart from the preparation, the phase 'Conduction' consisted of four stages. The first stage was an extensive search. It usually started with some trial searches to find well suited search terms for the search engine in question. After this, the actual search was conducted. During a second stage it was checked if the results matched the criteria for in/exclusion. All matching results were documented and compared to already acquired results. This procedure was repeated several times for different search approaches. In a third stage, the results from the SLR were merged with the literature list acquired during the wider search that preceded the SLR. Finally, data was extracted from the merged list of sources. That is, the sources were searched for concrete descriptions of uses cases.

Results can be documented in different ways. Webster and Watson advise to structure in a concept-centric way. Thereby, each resulting source is presented in relation to the concepts in question it covers. This could be in the form of a table where rows are sources and columns are concepts [WW02, p. 17]. In this documentation each row is related to a single source as well as a single use case. The columns were made of characteristics of the use cases. In a way the documentation followed a concept-centric approach. The columns cover in how far the source can make statements about certain concepts related to one use case. This illustrates the primary purpose of this SLR – and how it differs from many SLRs. It aims not on a meta-analysis over many sources, but to collect as many well-described single cases as possible from the sources.

Finally, methods, execution and results were captured and documented (see the corresponding chapter).

5.2.3 Group Discussions

Working with small groups is proposed in requirements engineering and marketing research. In both areas the preferences or needs of people, potential users or customers are scrutinized with the goal to to determine required, expected or proposed characteristics of a product in question.

Group discussions ('focus groups') are also suggested for case study research, to understand the context, factors or problems of a subject [Run+12, p. 50].

In requirements engineering it is the process of requirements elicitation where groups can apply methods like brainstorming. Group sessions can support or even replace interviews in the elicitation process. Also, they can be applied in any phase of the process [ZC05, pp. 29–32] [FM16, pp. 92–113].

Griffin and Hauser reported their experience with single interviews and group interviews in the context of discovering user needs. A number of 30 customers were interviewed. Different methods were used to let the customer describe his experiences in a certain usage scenario [GH93, p. 6]. During their research one focus group of eight people identified about as many customer needs as two interviews of one person each. They concluded that synergy effects when interviewing focus groups do not necessarily make them more efficient than interviews with single persons [GH93, p. 7]. They observed that above 12 customers asked, there is little gain in identifying new needs [GH93, pp. 10–12].

Kuß et al. present the technique of focus groups for marketing research. They suggest for 6-10 persons per group. The moderation is challenging as it should both encourage participation and guide through the topics. Possible advantages are the stimulating environment of a lively discussion, a natural discussion that lets people openly express their opinion, the relatively cheap price and the ease to transmit such a discussion by audio or video. Disadvantages are the relatively low data per participant and accordingly an incomplete account about each topic by each person. Important features of the group are (a) some connection to the topic and (b) adequate heterogeneity of the group. The discussion is usually recorded on video or audio; possible are also online discussions. Focus groups can be combined with other techniques, such as interviews (of single participants) or brainstorming [KKW14, p. 54].

Magerhans gives the most extensive description of group sessions. According to him, they can (a) help in pilot studies to explore unknown topics, (b) be used to derive product ideas, (c) help to evaluate group processes, e.g. if a new car should be bought or not. He distinguishes three forms of a group sessions. In a group survey, people fill out a questionnaire in a group setting. In a group interview the questions of the interviewer are answered by the group. In a group discussion, the participants interact freely with each other, guided by a moderator, and usually recorded on video [Mag16, pp. 174–176].

He also goes into detail on the success factors in group discussions. The atmosphere of the

discussion should be relaxed and cooperative in order to make the participants feel free to express themselves. All participants need to respect each other. A major role plays the moderator who needs to be unbiased, neutral, respectful, and refrain from judgment or too strict guidance. The participants should be neither extremely similar or different and necessarily need to be part of the target group of the research. For Magerhans the basic configuration is the relationship between participant, moderator and central topic. Adding to these are moderation methods and media [Mag16, pp. 176–178].

Magerhans explains ideal phases of a group discussion:

1. Preparation time (place and media are selected, food and drinks are prepared)
2. Greeting and Introduction
3. Warm-up, probably with a simple question
4. Agreement about a small set of rules for the discussion
5. Stimulus (e.g. short presentation about the topic)
6. Discussion (moderator asks questions and guides from one topic to the next, including all participants)
7. Conclusion (last questions or final comments)
8. Asking participants to assess the discussion, maybe give some incentive
9. Follow-up (researchers reflect upon the discussion, finding possible improvements)
10. Evaluation phase (use records and protocols to answer the research question) [Mag16, pp. 178–185]

He sees several benefits in group discussions. Among others,

- the participants look into the subject thoroughly, leading to insights about their imagination and experiences,
- researchers can follow the reasoning inside the group,
- they give insights into the language style used by potential customers,
- they are relatively simple to plan and perform,
- the evaluation can be done thoroughly and at a later time,
- in group discussions participants are less inhibited than in interviews.

As disadvantages of this method he mentions that

- the result evaluation needs to be interpreted, requiring domain knowledge and experience,
- results from the small numbers of participants can not be projected on the total population (cf. [Mag16, pp. 174–185]).

Based on this literature I decided that group discussions are indeed useful to determine certain uses cases and their respective value proposition for chatbots in CRM. Beyond

simply collecting use cases, asking the users offers other advantages. What makes a feasible use case and what disqualifies it, can best be decided based on users opinions. There is barely a common understanding of chatbots today. Therefore this can be described as an ‘unknown topic’ as mentioned by Magerhans. This makes a qualitative approach with discussions more applicable than a survey, thereby allowing ‘insights about the participants imagination and experiences’. Another advantage of a group setting plays a major role for this research. It was perceived during recruiting of participants, that some had doubts concerning their understanding of what a ‘chatbot’ might be. The group setting allowed participants to coin their experiences with less pressure than in a single-person interview. Those with little experience could see, that most others also had little knowledge about the topic, allowing them to express themselves more freely. The disadvantages mentioned by Magerhans were of little consequence. The effort of evaluating the results was limited as the number of cases was small. The researcher could therefore interpret the results by himself. A projection on a population is not necessary at this stage. Also, the group discussions only make a portion of the sources evaluated in this research.

In order to establish a rather open discussion and to integrate different methods, the format of group discussion was given preference to the stricter group interview.

In spite of the group sizes mentioned, it was decided to make smaller groups with three to five participants. This was due to the limited experience of the researcher with group moderation. The expectation was for smaller groups to be easier to guide.

This part of the research was conducted in three phases. It started with (a) developing and testing of the methods and guidelines. (b) During the second phase the discussions were executed, before finally (c) the acquired data was evaluated and the process documented.

The actual execution of the discussion can again be broken down into phases, resembling those mentioned by Magerhans. Several steps were left out, due to limited time.

1. Groups were composed from the participants (mixing backgrounds and gender), room and time determined.
2. Participants were greeted and they shortly introduced themselves.
3. In a short presentation it was explained how chatbots were defined and what they can do, two chatbot examples were presented.
4. Participants conducted a short brainstorming with subsequent discussion.
5. Participants pointed out and discussed tasks for which they could imagine using chatbots.
6. The audio record was processed and transcribed.

The target group was roughly defined as ‘young people with a technical interest’, as these are expected to be early adopters of chatbots.

During the first phase a total of three methods were evaluated for the group interviews of which two were finally applied. The goals were described as: (a) find a large number of use cases in which people would like to use chatbots, (b) find out which kind of application patterns are preferred most, (c) find out what quality criteria are most important.

The first method combined a classic brainstorming with a subsequent guided discussion. The participants would brainstorm situations in which they had contact with a company, and in which they might consider using a chatbot. However, this approach was deemed too complex for participants who had no experience whatsoever with chatbots. It was therefore changed to brainstorm any situation in which they had contact with a company. But this led to the disadvantage, that possibly answers would provide extremely different situations and for companies within very different sectors. The scope was therefore limited to companies in the sector of telecommunication and related areas, like smartphones and cloud services. Each situation would be recorded on a sticky note and put on the wall. After finishing the brainstorming part, similar situations would be grouped together. Finally, for each of the grouped situations the moderator would ask the group 'Can you imagine in this situation to reach your goal with a bot?', further questioning would include a simple 'why/ why not' or clarify what the goals and painpoints in the situation were and what gain could be expected from a chatbot.

For the second method a large sheet of paper was put on the wall on which different application patterns for bots were printed, each in its own distinguished area. These patterns were derived from initial literature search. Each described a way how a user could use a bot. In detail these were:

- ask FAQs
- get help with a product I bought
- buy a product
- get product information
- receive special offers
- be informed, get notifications
- share my opinion
- connect to a human
- use the bot as personal chat partner
- explore a topic in conversation
- navigate/ link to another place
- use the bot as search engine

The participants were each given three sticky dots. Then they were asked to put these dots on the patterns representing how they would like to use chatbots. They were allowed to put more than one dot on a single pattern to emphasize its value. It was also allowed to put some or all dots on no pattern, to indicate that no more patterns were found that reflected their interest.

A third method was proposed in which the participants would be asked what features or characteristics would make a bot particularly useful or useless. After preliminary tests, this method was dropped. It was considered to be too complex for participants with little first hand experience.

5.2.4 Expert Interviews

Expert interviews are proposed in case study research, marketing research and for requirements elicitation. The methodologies are however derived from social science.

For qualitative evaluation in general, Kuckartz proposes seven steps, of which the first three relate to the actual interview process: defining subject and goal, developing the interview guidelines, conducting the interview [Kuc08, pp. 15–59].

Fernandes and Machado present only four main steps for interviews in requirements elicitation: The interviewees need to be identified, the interview is first prepared, then conducted and finally concluded [FM16, p. 95].

Magerhans does not describe any process phases, but describes the process and techniques during the interview itself. He mentions greeting, initial question, inviting to answer, asking questions, active listening, endorsing answers to facilitate continuous participation, checking back to specify answers, picking up previous answers, fallback questions when the interview get stuck, finally additional questions at the end and to see the interviewee off [Mag16, pp. 171–174].

All three models of phases or steps put a slightly different focus. For this research all of these steps were considered.

The goal of the interviews was to find out how CRM experts perceived chatbots in context with their work and where they saw opportunities of companies and customers. In a more precise sense, the goal was to find and define use cases for chatbots in CRM. For this interview the interviewees were identified who were (a) experts in the area of CRM, (b) had some first hand experience with chatbot technology or application. They were contacted through an internal enterprise social network and personal connections. As suggested, guidelines for the interviews were prepared. They consisted of a set of general rules for the interviewer, a list of tasks, a list of utilities and a list of questions.

The general rules were meant as a constant reminder for the interviewer how to approach the interviews in general. They consisted of short statements like ‘ask why continuously’ or ‘follow errors, problems and pains to the root’ – things that are, while obvious, sometimes forgot during the actual interview. The task list comprised of task to perform before, during and after the interviews. These were e.g. to have two (working) recording devices ready before the interview. One utility was a simple chatbot that was created beforehand as a demonstration and a basis to facilitate further questions. Other utilities were a large sheet of

paper that showed a simple overview over a chatbot business model and a sheet with a set of possible applications for chatbots. Both these sheets were kept as backup if the situation occurs that interview gets stuck at some point.

The questions can be structured in several parts. The first part was about how the interviewee saw his work with CRM. The goal was to make the interviewee comfortable while talking about his or her main area of expertise. The second part asked about the attitude towards chatbots. The goal here was to learn how the interviewee wants to talk about the core topic of the interview, e.g. in a rather critical, enthusiast or abstract way, and also to provoke some emotional response to the topic. After that, a demonstration of a simple chatbot was planned with subsequent questions asking the opinion towards this system. The goal here was to lead the discussion to practical aspects. The main part were questions about the opportunities of chatbots. This aimed at finding and defining concrete use cases and the value proposition connected to them. Finally, a question was prepared asking who else would be an interesting candidate for another interview.

The full list of questions:

- About Customer Relationship Management (and Customer Journey Management)
  - How and since when do you have to do with CRM/CJM?
  - What is your role in the area of CRM/CJM?
  - What does CRM/CJM mean for you?
- About the attitude towards chatbots
  - How relevant are chatbots for your company and for CRM/CJM in general?
  - Do you use chatbots yourself?
- After short chatbot demonstration
  - How helpful was this chatbot in the given scenario?
  - What was missing during the interaction (why)?
  - What was too much during the interaction (why)?
  - How could the quality of this system be improved?
- About use cases and value propositions
  - In which area could chatbots be used in CRM/CJM?
    - Have you ever used a chatbot in this situation?
    - If not, what would need to be different so that you would use it?
  - Which problems could chatbots help solve in CRM/CJM?
  - What makes chatbots particularly interesting for the user?
  - What makes chatbots particularly interesting for enterprises that apply them?
  - What general quality requirements must chatbots meet for use in CRM/CJM?
- Final question
  - Whom would you suggest for another interview?

5.2.5 Qualitative Data Analysis

Analysis of the interviews and group discussions is a necessary step for this research. The analysis was supported by software. In accordance with the steps described by Kuckartz, the first steps were to create a new project and import the source files [Kuc07, pp. 20–27].

To perform an analysis, the results of interviews and discussions need to be documented in some way. Kuckartz differentiates four approaches of interview evaluation: based on memory, based on a protocol, based on a record, based on transcription [Kuc07, p. 39–40]. For our research all interviews and discussions were recorded as audio files. The audio files were edited to the purpose. The software “Atlas.ti” was used for qualitative data analysis. This software is very well suited for an evaluation based on audio record. For example, it is possible to apply codes and memos to certain sections of the audio record itself. For a qualitative evaluation as simple as chosen in this research, this was deemed as sufficient. However, in case of the group discussions, the difficulty of distinguishing the different speakers made a transcription indeed necessary.

In terms of the style of transcription, Kuckartz suggest for most cases to transcribe to formal written language and to use a short set of additional signs to include differences in voice and emphasis [Kuc07, pp. 41–45]. This research follows the approach to use formal written language, with few additional signs, mainly to mark statements that were not intelligible.

After the sources are prepared in that way and become accessible, they need to be explored and evaluated. In our case the primary concern is to derive use cases. To structure content and derive information from the sources, this research follows Kuckartz suggestion of systematic categorizing or coding [Kuc07, p. 60]. While the exact codes were not fixed from the beginning they were already roughly defined and no major changes were necessary.

The one code of primary importance was “ Bot use case”, to mark all mentions of a specific situation or way to apply a bot. Strongly connected to this code, other codes were applied to mark different topics related to bots.

- Bot acceptance (people express a need for, or an aversion against bots)
- CRM
- Bot development and design
- Bot infrastructure
- Bot limitations (in what situations bot application reaches it’s limit)
- Bot operations
- Bot rich interactions
- Bot security
- Bot usage context
- Bot user

A small set of codes was specific to understand the value proposition that people connected with the use case.

- Goal (concrete goals of a user the might be solved with the use case)
- Pains (problems that occur with a bot or can be solved by a bot)
- Gains (positive aspects about a use case or how a bot could improve it)

Another small set of codes was specific to the way participants talked about the case in question.

- Emotional (wording like ‘amazing’, ‘very good’, ‘boring’)
- Experience (participants referring to concrete experience they made with the use case)
- Reason (the participants explains the ‘why’ behind pure opinion)
- Vision (the case might not exist, but the participant imagines it vividly)

On the grounds of the coding from each mention of a bot use case, the related data was extracted, a new bot use case added to the list and characterized. This approach is similar to the first step of developing a typology as suggested by Kuckartz, to identify and characterize entities [Kuc07, pp. 71–106]. The latter steps, the clustering and developing of classifications is done in a further stage. Before doing so, the results of interviews, group discussions and literature review needed to be merged in a single list of standardized use cases.

5.2.6 Use Case Documentation

To document how bots can be used I needed a simple, yet adequate format that applies to all kinds of cases. ‘Use Cases’ as they are explained by Cockburn or Gottesdiener and used in the industry for many years provide that format.

Considering the differences in style presented by Cockburn [Coc00, p. 14] a short and concise form of documentation was chosen. For the problem at hand, the use cases had to be described in a way that they were both easily comparable and would capture the relevant aspects of the users perspective. To provide overview for hassle-free synthesis, the use cases were documented in a single list, with a row for each use case and a column for each attribute. For simplicity, all attributes were documented in point form rather than in complete sentences. The attributes to describe the use cases were:

1. Identifier
2. Name
3. Source

4. Actors
5. Goals
6. User needs/pains
7. Value proposition
8. Happy path
9. Context
10. Comment

Only ‘Identifier’,‘Name’ and ‘Source’ were mandatory. All other attributes were filled out as far as the source would permit.

A name for the use case should be self-explanatory, capturing the gist of it. In case that an existing bot system was described, the brand name was added.

The source of the use case should always be a single source, either from literature review, interviews or group discussions.

The relevant roles in a use case are the actors. An actor can be a person, organization or technical system. One actor that is always set is the ‘system under construction’ itself. In our case the goal was mainly to specify two types of actors. One is a ‘user’ actor who actively talks to the bot. Another is the ‘provider’ actor who is represented by the bot and who offers certain service(s) to the user.

The ‘goal’, ‘needs/pains’ and ‘value proposition’ were, for this research, always seen from the users point of view. This is due to the scope of this research. Potential goals for the providers of bots are of lesser interest.

The ‘happy-path’ was documented in a very simple style, as steps towards the goal. A simple example would be ‘user asks the current time -> bot states the current time’. Details, like in this case the time format, were excluded for this stage.

The ‘context’ allowed to document a special context in which the bot is applied. Examples are bots that are available only in messenger apps or on websites.

Finally, all additional relevant information concerning the use case, was put down in the ‘comment’ field.

5.2.7 Synthesis of Use Cases

From the sources a list of use cases derived, and of this list derived then a classification schema. This process was mainly one of interpretation. Beneath domain knowledge and time it required a rigorous process. The idea at this point was to refine the use cases in four steps. The base of the process were the sources, the final product a list of abstract use case classes.

(1) Identify Use Cases The first step was to identify use cases. The following (probably incomplete) list describes from what kind of statements in the sources use cases were derived:

1. Example, how someone would use, would like to use or would not like to use a bot
2. Mention of an existing bot with a statement of its exemplary character
3. Detailed descriptions of a bot system without stating the actual use case
4. Concrete description of a bot use case
5. ...

The main challenge here was to lay on criteria which made an actual use case. While the scope of this research is clear, many cases are in a grey area. Beyond being scope of the research, possible descriptions should provide as much information as possible. General policy at this point was rather to include a use case whenever in doubt.

(2) Describe Use Cases As a second step the identified use cases needed to become a lot more detailed. For this purpose a documentation style was defined as described in the section 'Use Case Documentation'. The challenge here was to find adequate information in the sources. As this was sometimes not available it had to be deduced or acquired from other sources. A good example are cases where concrete bots were mentioned. The obvious step here was to look into those systems directly and see how it works or how it is presented.

(3) Identify Use Case Classes The next and most demanding step during synthesis was to find similarities between the identified use cases. The goal was to find a classification schema that would cover all use cases. It was unclear if this could be accomplished. Alternatives were, e.g. simply to characterize similarities or patterns for the use cases. In any case, the long list of use cases must be condensed into a more concise, more comprehensive, less specific and ultimately shorter list.

(4) Describe Use Case Classes At best, the identified use case classes would lead to something like a generic model. Based on all use cases that belong to one class, an exemplary use case for this class would be described and discussed in greater detail. A more detailed description could contain some of the following items:

1. relevance for CRM
2. detailed value proposition
3. system-in-use-stories
4. usage examples
5. stakeholders

6. failure cases
7. chances and risks

Rank Use Cases With a complete list of characterized and classified use cases one could rank them according to any preferences. This is the use for which this list is intended. The goal is then to find use cases which are in a more narrowly defined scope like: a specific industry, commercial relevance, certain type of problem or customer, easy to create, etc. . We can therefore characterize all use cases according to attributes we define. For demonstration of practical application, we will do a ranking in the second part of the thesis. We will then further narrow down the scope to the telecommunications sector. This is however only one example and the use cases and classes can be sorted by any other preference.

5.3 Execution

Preparing and accessing the three main sources as well as finally acquiring information from them was a step-wise, dynamic and sometimes delicate process. In the following I will document these processes and the general results of the single sources briefly. A documentation of the processes of qualitative analysis or use case documentation is not deemed necessary as these were comparably straightforward in nature. The process of step-wise synthesis is reserved for the 'Results' section of this part.

5.3.1 Systematic Literature Review

The SLR was conducted in the three phases: planning, conducting, reporting. It was carried out during January and February 2018.

The planning started by creating a list of potential search engines. These were:

- Google Scholar
- Springer Link
- ACM DL
- BASE (provided by Bielefeld University)
- EDDI (provided by Reutlingen University)
- CiteSeerX
- Microsoft Academic
- IEEE Xplore
- ScienceDirect

One task during preparation was a preliminary search for SLRs and SMSs in the field of bots and CRM. It was a necessary step to acquire practical experience with the different search engines, to enhance the documentation structure and adjust search terms. Certain limits of the search engines were discovered. One great flaw is that some of the major search engines like "Google Scholar" do not support nested search statements. So it is not possible to nest "AND" or "OR" statements. This led to increased effort through manual search. Also it was found that some search engines do not support search for words in titles.

The first stage focused on the need for a SLR. A search for the titles with each of the following keywords was conducted:

- crm OR "customer relationship"
- bot OR chatbot
- "literature review" OR "mapping study"

The following databases were used:

- Google Scholar
- Springer Link
- ACM DL
- BASE
- EDDI
- CiteSeerX

During the first stage a total of 1 source was found, that matched the search term. It did not match the scope of this research. It was therefore inferred that there is no matching SLR or SMS available for this research.

The research questions for the review were based on RQ1. The primary goal was therefore to collect use cases for chatbots from the results in the first place. For each use case found, certain additional questions were posed, based on the use case schema that was described in section 5.2.6. Before acquiring any use cases, a goal of the SLR is also to validate the research gap in general.

- RQ1.1 What use cases for bots in CRM have been explored in research so far?
- RQ1.2 Has the topic of bots in CRM been covered? Is there a gap?

The protocol for the SLR was set up as a spreadsheet. It contained areas for documenting keywords, the strategy taken, search engines, searches, results and conclusions. Concrete resulting sources were documented in a Citavi instance, a software for literature management. Concrete resulting use cases were documented in a single list of use cases in which results from all approaches were collected and described. Starting the second phase, the preliminary searches had led to a set of search keys, search engines and selection criteria to be used.

The following search engines were applied:

- Google Scholar
- BASE
- EDDI
- ACM DL

The searches looked for certain keywords in the title of sources. Due to the limitations of most search engines, the keywords could not be applied in a single statement. The statement:

- bot OR chatbot OR “conversational agent” OR “virtual agent”

... was combined with each of the following keywords in a separate search:

- “use case”
- prototype
- building
- customer
- marketing
- business
- sales
- support
- service
- commerce
- kundendienst
- satisfaction

Some of the inclusion/exclusion criteria were defined before the searches started. Others had to be added later on, whenever cases appeared that for one reason or the other were more or less obviously not usable, but did not violate any criteria. A result was included if it (or the case it describes)...

- offers a concrete contribution to bot development or use,
- is applicable for CRM,
- is available as a full document,
- does not fall into the specialized (and therefore excluded) domains: healthcare, education, social system, gaming,
- does not solely focus on specialized scientific/technological aspects like: machine learning, system architecture, natural language processing,
- is in English or German
- and offers indeed some contribution and is more than a simple note on something.

While the first three criteria were somewhat clear from the start, the exclusion of very specialized areas extended whenever such cases came up. Excluding languages which were not understood by the researcher was also added as it happened. Finally, some results seemed simply too short as to be some real contribution and were therefore excluded.

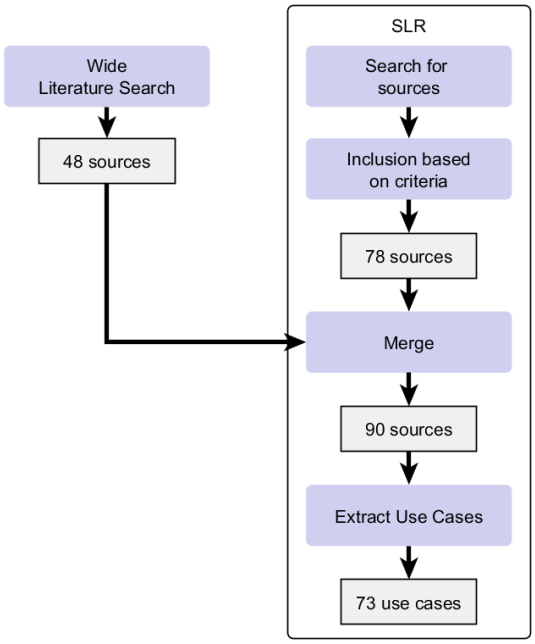

Fig. 9: Simplified process of this literature search and the number of results that each step created.

The total number of sources that were found during all searches summed up to 412.

The revised list of valid sources, without duplicates from single searches accounted for the number of 78.

The number of individual results without those which were already present from previous literature search was 42.

The total number of sources from which use cases were extracted was 90.

From all sources (both from the SLR and previous literature search) together a total of 73 use cases were extracted.

5.3.2 Group Discussions

In this case, the groups participants were recruited from the junior staff members of the company who supported this research. This group of about 45 people included working students, interns, apprentices, students writing thesis and others. A little less then half of the group were females. They were from different departments with a majority having an IT background. This group was selected for several reasons. First of all, they were easily

available. Secondly, they represented a possible segment of early adopters: young people with rather high technical interest. This also relates to a necessary feature according to Kuss, the 'connection to the topic'. Thirdly, the group provided 'adequate heterogeneity' – again related to Kuss (see chapter 5.2.3). This was expected to have a positive impact on an open discussion.

They were contacted at the beginning of the research and asked to participate in a brainstorming/ group discussion about the usage of chatbots. The circumstances were explained, e.g. that the data would be anonymized, that knowledge about chatbots was not required. Contact was made several times over a span of two weeks until a number necessary number of people had agreed to participate. Contact was made via an internal news board, email and in personal contact. Time, date and place for the actual group discussions were fixed using the internal groupware.

Group 1 In the first group discussion the four participants were aged 22 to 27, male and female. They worked in the areas: human resources, customer analytics and CRM consulting [The18a].

During brainstorming and discussion the participants mentioned several situations in which they were in contact with telephone (or related) companies and shared their opinion how chatbots could be applied here. The situations were grouped as follows:

(a) overview over own contracts, products and related services,
(b) advertisement, offers and comparing offers,
(c) contract changes, changes of terms and conditions, moving a DSL contract,
(d) notifications about data volume or account balance,
(e) suggestions for movies or music,
(f) terminate contract [The18a].

In the second phase participants applied sticky dots to proposed usage patterns and engaged in subsequent discussion. They came up with use cases, supported or rejected the proposed usage patterns. The provided and supported use cases were:

(a) getting technical help with a product – as alternative to using a website, FAQs or Google,
(b) using a bot as a search engine, which is more intentional and contextual than Google, or in situations when voice interface is practical,
(c) getting notifications about things of daily interest, like traffic, news or appointments,
(d) buying a product from home using voice,
(e) getting a recipe will cooking using voice,
(f) switching lights using voice at home,
(g) buying a product through a dialog,

(h) compare distinct products,
(i) bot as an objective, universal shopping adviser (especially for complex products).

Case (b) (bot as a search engine) was also rejected as Google was already perceived as good enough by some participants. Rejected were (a) voice controlled automated telephone service hotlines, as they rarely solved the problem but ended inevitably in talking to an agent anyways, (b) explore a topic in conversation, as it would either be very specific or too much effort to put in the conversation [The18a].

Group 2 In the second group discussion the four participants were aged 19 to 23, male and female. They worked in the areas: finance, data analytics and software consulting [The18b].

During brainstorming and discussion the participants mentioned several situations in which they were in contact with telco companies and shared their opinion how chatbots could be applied here. The situations were:

(a) usage of voice mail,
(b) transfer a current telephone number to a new contract,
(c) managing a pre-paid mobile contract,
(d) closing a contract,
(e) customer support,
(f) advertisement over mail, TV or post,
(g) using Siri,
(h) subscribing to Netflix,
(i) getting personalized advertisements based on other channels,
(j) recommendations for movies and series,
(k) saving data for shared access with colleagues and friends [The18b].

Certain ideas came up how chatbots could be applied. Chatbots could be used:

(a) as a personalized voice mail box,
(b) to change options of a pre-paid mobile phone contract,
(c) to get information about a parcel under way,
(d) as an advisor when looking for a new telephone contract,
(e) to find the right contact person when looking for support,
(f) get support on a website via a chat window,
(g) to make appointments for repairs on a device,
(h) for entertainment with some witty remarks to meaningless questions,
(i) as a single front end for various services (VPA),
(j) to provide recommendations for movies or series [The18b].

For some situations the possible use of chatbots was rejected or seen as limited.

(a) The process of taking a telephone number to a new contract was deemed too easy as to enhance it by another channel.
(b) The existing telephone chat to manage the mobile phone contract was sometimes perceived as not reliable, though in general it worked.
(c) Chatbot support on websites was perceived as being of some use, but only to a certain degree, due to its limits of knowledge; accordingly, calling a human agent was perceived as faster and more suitable.
(d) Bots cannot repair a broken device.
(e) No use was seen in chatbots to enhance advertisement via TV, mail, post or cross-website personalized banner ads.
(f) No use was seen in bots for shared file storage [The18b].

In the second phase participants applied sticky dots to proposed usage patterns and engaged in subsequent discussion. They came up with use cases, supported or rejected possible usage patterns. The provided and supported use cases were:

(a) comparing products and brands,
(b) getting additional answers about products on a website,
(c) being able to ask questions during the whole buying process,
(d) mirroring the conversational buying process with a real person,
(e) a more interactive version of Google search,
(f) an interactive navigation like a satnav, for pedestrians or in cars,
(g) a router or filter to find the right service agent.

Associated with case (c) using the bot to buy something was explicitely rejected as the participant did not trust the bot enough. This also starkly contrasts the case (d) provided by another participant. Rejected were (1) getting special offers - because the participant did not want to get random offers (2) getting technical help for a product - because the personal contact and physical visit (for a physical object) were deemed important, (3) personal chat partner - no participant used any VPA or had much preference for them; one participant saw it only as gadgetry [The18b].

Group 3 In the final group were again four participants, this time aged 24 to 26, male and female. They worked in the areas: human ressources, quality assurance and software consulting [The18c].

During brainstorming and discussion the participants mentioned several situations in which they were in contact with telco companies and shared their opinion how chatbots could be applied here. The situations were grouped as follows:

(a) request past bills,
(b) trial subscription ends,
(c) get new firmware,
(d) email notification about new series,
(e) spam mails,
(f) 'Hello Google',
(g) request for recommendations based on geo location,
(h) adverts for premium email service,
(i) calling support to clarify about allegedly sent SMS,
(j) advert for more online data storage,
(k) new phone contract,
(l) extend phone contract,
(m) consulting in case of hacker attack,
(n) notification that a mobile app cannot synchronize [The18c].

Associated to these cases, certain ideas came up how chatbots could be applied. Chatbots could be used:

(A) for efficient searching and filtering for documents on large web portals,
(B) for an easy transition from a trial subscription to a contract,
(C) for immediate inquiries about updates,
(D) for supportive tasks in complex customer support cases,
(E) as aide for finding interesting series or movies on a website,
(F) for immediate support in case a mobile app has a problem,
(G) as a satnav in a car.

For other of above situations the possible use of chatbots was rejected or seen as limited. (E) Chatbot aide for series and movies via email was seen as too complex and unnecessary. (f) The voice recognition of Google's VPA was seen as too limited to compete with manual input. (g) The timing and repeatedness of interaction based on geo location was perceived as very annoying. (e)(h) Participants did not feel incited to react on adverts via chatbot. In special (i) or complex (k)(l)(m) support cases the participants did not feel as if a chatbot could handle it [The18c].

In the second phase participants applied sticky dots to proposed usage patterns and engaged in subsequent discussion. They came up with use cases, supported or rejected the proposed usage patterns. The provided and supported use cases were (a) extensive, easy-to-access product information Q&A bot, (b) a smart, inquisitive, empathtic bot that mirrors the complete technical manual [The18c].

A total number of 42 use cases was extracted from all three discussion.

5.3.3 Expert Interviews

The experts for the interviews all worked as consultants for CRM and CRM systems. A total number of five expert interviews were conducted. Each of the interviewees had some experience with chatbot technology. Some interviews were conducted in a calm meeting room, others were conducted remotely using video-conference tool. In all cases the voices were recorded.

I will summarize briefly some of the statements from the interviews. Some of the interviewees had a very positive attitude towards bots and used them actively in both professional and private life. For others it was part of their job and they did not feel excited about the bot trend. Some interviewees expressed a clear expectation that bots and related technologies would be a long-term trend. All interviewees saw clear limitations in the way that bots could be applied today in a way that is useful both for companies applying CRM and their customers. Two interviewees had very concrete ideas how an effective bot infrastucture might look like. One of them suggested the concept of bots as intermediaries, essentially like the frontend of a two-sided marketplace on which vendors and customers meet. The other suggested powerful bots that could handle a wide range of human requests by accessing a large system of highly interconnected other bots in the backend, similar to a service-oriented architecture. For some interviewees the voice controlled assistants in home and car were the first really successful application of bots. One interviewee had recent experience with the integration of bots and CRM systems. He explained some of the issues at hand, e.g. that certain CRM processes were designed in a sequential way, but during a dialog with a bot this sequence was not necessarily maintained (cf. [The18d] [The18e] [The18f] [The18g] [The18h]).

From the interviews a total number of 29 use cases were extracted.

5.4 Results

The search for use cases in literature, interviews and group discussions lead to a list of 148 cases from about 56 different sources. Each was attributed with an ID, a self-explanatory name, the source from which it derived, actors (user, provider, third party), goals of the user, needs/pains of the user, value proposition, happy path, context and comments. While for some cases all the attributes could be defined, in most cases there were gaps. Often the source just did not provide sufficiently detailed information to make a sound assessment. This does not limit the lists usefulness. The number and range of use cases and the wide range of sources make it suitable for its purpose – to serve as a basis for the synthesis. The classifications based on this list is what makes actual results.

5.4.1 Preliminary Classification

At first a preliminary classification is presented. This one derived of interpretation during the early research process, after a first overview over literature and state of the practice. It was used during the second part of each group discussion. It was there presented to the participants as a guidance, so that they could express for what kind of application they could imagine bots. Each of these usage patterns were meant to conclude the sentence 'I want to use the bot to...'

- ask FAQs
- get help with a product I bought
- buy a product
- get product information
- receive special offers
- be informed, get notifications
- share my opinion
- connect to a human
- act as personal chat partner
- explore a topic in conversation
- navigate/ link to another place
- serve as search engine
- (finally, the participants could also decide they did not want to use bots in any of these ways)

While not strictly a result, the following diagram shows this classification as it was presented to the participants of the group discussion along with the numbers of sticky dots each item received during all the discussions.

Fig. 10: Diagram of the preliminary classification as it was used during group discussion along with the number of sticky dots each item received (the number in the middle represents sticky dots in favor of 'I do not want to use the bot in any of these ways').

5.4.2 Second Classification

Based on an early interpretation and the full list of use cases, a classification schema was derived. The goal was to develop an open set of features of which multiple could apply to a single use case. A set of 18 definitions was developed of features that could be clearly distinguished. These classes were based on actions the a bot would perform or support, sometimes related to entities or topics. These classes are overlapping, so a use case may belong to more than one class. They were developed in a way that each use case would belong to at least one class. If a use case would not fit to any class, a new class was created. There are no sub-classes defined. This classification is easily extendible. It can be extended by any clearly defined feature. As example, there were many bot use cases that applied to the area of banking. So a new class 'banking' could be defined without a problem, enhancing this classification.

The different classes are defined as follows:

Class	Definition
e-commerce	A bot that sells something, directly supports a concrete selling process, or offers changes in business contracts (close, change, cancel).
navigate	A bot which guides the user to certain places, based on geo/map services.

QA	A bot that answers typical, topic-related questions.
search	A bot that conducts wider search for answers than a QA bot, not necessarily topic-related or typical answers, usually accesses huge data bases or internet search engines like Google.
connect	A bot which routes and connects the user to another human.
advise	A bot that supports decisions in a certain field of expertise.
IoT	A bot that controls physical devices.
service	A bot that serves as a front end to a very special and usually rather complex service in the background.
manage	A bot which offers access and control of a set of personal data and services.
explore	A bot that offers to explore different aspects of a topic (in free conversation).
appointment	A bot which helps to fix appointments with humans in the physical world.
notify	A bot that actively sends notifications to the user.
support	A bot which is designed to solve concrete, complex (technical) problems in a certain field of expertise.
account	A bot that offers some function tightly connected to some account of the user, e.g. registration, onboarding, account management.
engage	A bot that tries to actively engage the user in some activity or conversation.
entertain	A bot with the purpose of entertaining, e.g. through conversation, games.
augment	A bot that augments local physical reality with information services.
discover	A bot which serves as a router to a bot that can fulfill the users request more appropriately.

In few cases, this classification already lead to a small set of use cases which are almost identical to each other and clearly distinguishable to others. A good example is the class ‘appointment’. Only three cases matched this class and all were essentially identical. This was considered a final use case class.

5.4.3 Final Classification

The third and final classification schema was bound much more closely to the use cases. The goal was to cluster use cases to form more generic use case classes. This could be done if they were almost identical or if one case was a special variant of the other. The difficulty here was to find the right abstraction. An example: one bot answers questions about a hotel, another answers questions about an insurance. Both do essentially the same, they listen to questions and provide answers. Nothing more. The topic differs and is therefore abstracted

to ‘any special topic’. Then both use cases are identical and can be clustered to a single class.

This schema allows no overlapping, i.e. every use case belongs to at most one use case class. Like the second classification this one is also extendible. Unlike in the second schema, no emphasis was put on relating each and every use case to a certain class. In the end, a number of 17 use cases that were deemed relevant for CRM could not be related to any class. Also contrary to the second schema, a link to CRM was mandatory. The items from the second classification and the third classification can be mapped on another. In fact a number of classes from the third classification are directly derived from a single class of the second classification. These include: ‘Satnav’ (from ‘navigation’), ‘make appointment’ (from ‘appointment’), ‘Service Discovery’ (from ‘discovery’), ‘Route to a Person’ (from ‘connect’), ‘Record Letters’ (also from ‘connect’), ‘Onboarding’ (from ‘account’).

The following list presents the relevant classes with their name and the sources from which they were derived. A list of the classes that includes the connected goals and value propositions is available in the appendix.

ID	**Class Name**	**Sources**
C6	onboarding to a service	[Bru16b], [The18f]
C9	make suggestions for entertainment	[The18a], [The18c]
C12	advise about products	[The18a], [The18a], [The18a], [The18b], [The18b], [Hei18], [Cha+01],
C15	search the web	[The18d], [The18a]
C20	route to a person	[The18a], [The18e], [The18b], [The18b]
C21	serve as sales assistant	[The18a], [The18b], [SNY17], [Wit23]
C34	answer questions	[Kus17], [The18b], [The18b], [The18b], [The18f], [The18c], [Tho], [Jen11]
C56	connect consumer and provider	[The18f], [The18f], [Car17], [BF17]
C78	serve as local guide	[DHa+15], [Hei18], [AA07]
C112	call people to action	[Sav+16], [Flo+16]
C132	make appointments	[The18b], [Mac18], [Bru17d]
C136	provide technical support	[The18a], [The18b], [The18e], [The18c], [Xu+17], [AS17], [Tho17]
C137	record letters	[Str16], [Bru16h]
C142	represent a person	[Bru16e], [Bru17c]
C117	gather feedback	[Hub17]

ID	Class Name	Sources
C111	serve as shopping agent	[The18e], [She17b], [Dal16], [Dal16]
C89	order instantly	[The18c], [Hei18], [Ols16b], [Pom17], [The18a], [Ols16b]
C13	manage account	[The18a], [The18f], [The18e], [VD16], [Ols16a]
C120	explore a topic	[Bru16c], [Bru16c], [BF17], [BF17], [Awa+14], [She17c]
C148	configure a product	[Lei17], [Lei17]

Other Classes All classes mentioned in this table were defined rather distinctly. Other potential classes could either not be defined clearly or they lacked a clear connection to CRM. These include following classes:

- Shop Bot ([Car17], [Car17], [Hei18], [Hei18], [The18g], [Kor17b], [Sar17a])
- Bank Bot ([Car17], [The18e], [The18e], [Eha17], [VD16], [VD16], [VD16])
- Newsletter ([The18d])
- Jokes ([The18b])
- Mobile Service Disruption ([The18a], [The18a])
- Group Shopping ([Bru16g])
- Service Discovery ([The18b], [The18e], [The18e])
- Satnav ([The18g], [The18b], [The18c], [The18b])
- Control Smart Home/ Car ([The18d], [The18a], [The18g])

5.4.4 Description and Discussion of Use Case Classes

I will now describe the use case classes of the final classification one by one and discuss how they relate to CRM.

Onboarding While mentioned only casually in three cases ([Bru16b], [The18f], [The18f]), onboarding makes an interesting use case class. Whenever a user accesses a software product (e.g. app, web portal) for the first time, there are some first steps to make. The goal of onboarding can be as simple as finishing the registration or go as far as to help the user understand all relevant functions. Many software products today offer some kind of onboarding. This can be a training, some introduction text, an interactive guide through the system, a registration process or a combination thereof.

One source mentions a registration process, where the user provides information, while also receiving information about the service. The source specifically points out privacy issues as the bot acquires sensitive personal data [Bru16b, p. 42]. The other source mentions onboarding first to register to a bot-driven service platform (refer to the use case class 'Two Sided Marketplace' below) and also learn about that platform, understand how it works and what it has to offer [The18f].

For another reason this use case class is interesting. Each bot itself is a software product and needs some onboarding process. This is especially important, as the functions of a bot can barely be seen at a glance, as is the case with many graphical user interfaces. So this use case class can be considered as mandatory for almost any bot.

The personal style of a chatbot might offer an advantage. Compared to an onboarding process on a website, which is usually sequential, the bot might provide a more dynamic process. This however will make the bot system much more complex than a website with forms. A user might input an address including information like country, city, street name in a single text string. The bot system must then be able to understand each of these information fragments and how they relate to each other.

In terms of CRM these use cases apply when a user activates a self-service portal or a software product for the first time. The goals of onboarding in general are in line with CRM. A quick introduction and a lowered learning curve help to avoid frustration with a new product and thereby facilitate customer satisfaction.

Manage Account Bots can be used to manage own accounts in self-service. Similar use cases were mentioned several times, in interviews, group discussions and literature ([The18a], [The18f], [The18e], [VD16], [Ols16a]). Most of these cases were not described as something very exciting for the customer but rather of a basic quality. As example, one participant mentioned a bot system which a user can call (on the phone) to manage basic features of its mobile service plan [The18a]. The bot of the airline 'KLM' provides the exception as this also offers a range of additional and innovative services [Ols16a].

This use case class is very closely connected to CRM, as self service is one part of the general service offer. Goals expressed for these cases are both to update personal data and to get an overview over options and services. Concrete actions the user could perform are to update the home address or the own telephone number, but also to get an overview over the current state of a service. However, neither text interfaces nor voice interfaces are very suitable for providing overview over a large amount of data. So the potential can be considered as limited in that way. Value for the customer is seen in the availability. The account can be accessed anytime and over different platforms (e.g. different messenger apps or VPAs). Sources also saw a value in having a single point of entry to a complex set of services and account data.

Question-Answer (QA) Getting high-quality aswers from a bot to a range of questions related to a specific topic is a typical interaction pattern with bots. Similar use cases were mentioned several times during group discussions ([The18b], [The18b], [The18b], [The18c]). They were accepted as useful application by most participants. Also in literature those use cases occured repeatedly and in one interview (cf. [Kus17], [The18f], [Tho], [Jen11], [LJ13]). It is probably the most typical use case class for bots today. A re-occurring theme was 'ask anything'. This describes the general expectation of users that they can simply ask the bot whatever they want and it will reply in a meaningful and helpful way. Especially in one group discussion this was seen as the primary advantage of a QA bot. Most cases were 'topic-related' in the way that they offered a wide range of answers for a specific topic. Some cases were 'event-related' in the way that they were offered to help users in case of a special event, e.g. a software update or in case of a service breakdown.

The potential in CRM is manifold. In marketing, sales or service there are always typical questions to be answered, about the company or products, or to solve simple problems. QA use cases not only help keep customers satisfied, they also provide a valuable source for information. During their study about QA bots, Lasek and Jessa found this to be very advantageous for the companies. By looking into conversation logs, they got insights into their customers needs and pains [LJ13, pp. 154–155].

Specific about QA use cases is the simplicity of the interaction. Usually the user states a single question, gets a single answer and the interaction is over. This pattern can be repeated several times, but the bot is essentially stateless.

Technical Support Using bots to provide technical support (troubleshooting) was another type of use case that was mentioned often. It appeared in group discussions, interviews and literature ([The18a], [The18b], [The18e], [The18c], [Xu+17], [AS17], [Tho17]). For simple problems, the line between QA and technical support can be blurry. Opposite to an interaction in a QA use case, the interaction in technical support is stateful and usually more complex. The bot must keep a lot of contextual information. Technical support is a longer process that involves analysis, making out a root cause for the problem and then offering solutions over several stages (e.g. soft reboot; hard reboot; re-install software; exchange hardware). The relevance of this use case class for CRM is obvious for all enterprises that have to provide technical support as part of their service offer. While QA bot can already provide help in a range of rather simple cases, bots that could diagnose and solve complex problems would enable a much higher degree of automation in customer service. There is however little evidence for practical application so far. Most sources either describe a vision or advances in research. The bot described by Xu et al. is the exception but does not focus strictly on technical support and is therefore not a good example.

Several sources mentioned the aspect of 'empathy' in context with bots that do support [Bru16g, p. 24] [The18c] [Xu+17]. The users expect the bot to make an empathic, helpful impression, to show that the users problem is taken seriously. This aspect is again strongly

related to CRM. While the way how the troubleshooting-bot treats the user does not actually solve the problem, it has a serious impact on the customer's satisfaction.

An excellent description of the difficulties to implement a useful bot for troubleshooting is given by Thorne. He describes the use case of (corporate) trouble shooting. Automated chat can be used to "help [...] employees or [...] clients to solve operational problems regarding the services and/or equipment [...] they use or provide". This can lead to "savings by replacing or complementing human operators". The troubleshooting dialog usually involves the end user and an agent who take turns in the conversation. It aims on the common goal to solve the technical problem. Firstly, the problem is introduced, the symptoms collected and discussed. The focus may change from one symptom to another, and refine further until the root problem has been found and a solution can be presented. [Tho17, pp. 1–14]

Search Engine Again slightly different from QA use cases are those where a bot is used as a search engine. It was mentioned two times ([The18d], [The18a]). In theory the QA bot uses a specific (large and probably private) knowledge base in which all questions and answers are stored, while the 'search engine' bot makes an ad-hoc search on (part of) the public internet. In reality the result might look identical. In contrast to search engines, the bot does not provide links but content. Participants of a group discussion also voiced hopes towards bots that improve the typical search engine, that understands context, is more interactive and builds upon today's powerful search engines. In practice bots can search the enterprise websites and thereby provide a shortcut to bulky menus (ref. [FW17, p. 57] [LJ13, p. 147]). Use cases like this are also a known fallback for QA bots that simply do not know the answer. So they can provide assistance in a CRM-related areas.

Shawar and Atwell actually compared how users perceived a QA bot that also drew on a search engine in comparison to a Google search over the FAQ page. They found that most users preferred the bot because (a) it gave direct answers, (b) if it did not know the answer it gave only few links. Some users preferred Google because (a) they were already familiar with the interface, (b) the bot gave less meaningful answers [AA07, p. 41]. These difference in opinion was also visible during the group discussion where this use case came up. One participant decisively rejected this use case for bots, stating that engines like Google were performing already well.

Suggestions for Entertainment Mentioned during group discussions was the idea that bots could be useful for providing personalized suggestions for entertainment, e.g. watching series or listening to music [The18a], [The18c]. The participants stated that already they got certain suggestions whenever a clip was finished. They found this to be useful. But it lacked the interaction that would be possible with chatbots. This way the user could actively decide the direction of suggestions, e.g. by topic, genre or artist. The CRM system plays a vital role for this use case class as it can store the customer profile and provide suggestions on this basis. While both cases explicitly referred to suggestions for media

clips, bots could provide suggestions in other context as well. Within a 'Sales Assistant' use case class for example users expect the bot to make product suggestions, again giving the user the opportunity to actively change or refine the direction of suggestions.

Explore a Topic This is a use case class with several practical examples from different sources ([Bru16c], [Bru16c], [BF17], [BF17], [Awa+14], [She17c]). This includes bots that let the user explore modern food, fashion, a famous location or new topics. The purpose in all cases is to inform and create interest at the same time. The focus of the user can be anywhere between those two aspects. In case of fashion the user might rather look for inspiration what to wear, in case of the news the user might rather focus on serious information, in case of a travel location a mixture of both. In all cases the value for the customer is based on an engaging interaction through dialog. In some cases this interaction resembles a game-like interaction. In terms of CRM these use cases would probably be most related to marketing. They offer an opportunity to actively shape a personal relationship apart from simply getting a job done. Users could explore e.g. product lines, services, features of lifestyle products, places or the enterprise itself.

Represent a Person Quite similarly to the previous use case class, a bot can be used to represent a person or entity, e.g. a company ([Bru16e], [Bru17c]). This is also called a 'brand bot' by Shevat [She17c, pp. 29–38]. As the bot not just 'talks about' a topic but also 'is' the subject of the topic, this kind of use cases reflect strongly on the bots's personality itself. The goal and purpose can be information but is even more focused on emotion.

In their appearance and effect, these use cases have a strong connection to the early chatbots like ELIZA or ALICE that were described in the introduction of this work. Shawar and Atwell consider the purpose of these early bots to be for amusement. They attracted both attention and adoption, as several bots were created (e.g. at 'Pandorabot') without apparent function other than to engage in conversation [AA07, pp. 35–37]. One of the most advanced systems of this kind is probably XiaoIce, which was created as a friend or so-called 'social assistant'. It showed empathy for the user, provided a sense of humor and a distinct personality [Wei14].

The purpose of these 'amusement bots' is one of the main differences to the use case class 'Represent a Person'. Contrary to the bots which represent mostly fictitious characters, bots in these use cases represent concrete individuals or entities. For the user it is in fact the problem to interact personally with the real, famous person (or entity representative), which provides the value in the interaction [Bru16e]. The purpose might also be to entertain. However, bots for this use case are not created for research or fun, but as marketing tools. This is what makes this use case class interesting for CRM. Similarly to the 'Onboarding' use case class, the relevance is twofold. On one hand, bots that focus on representing a person or entity can shape the relationship to customers and become actual faces of the

enterprise. On the other hand one must realize that all bots which an enterprise exposes to their customers are in fact also representing the enterprise in some way.

Local Guide The idea to enhance the user experience at a certain location with a bot is mentioned in some cases ([DHa+15], [Hei18], [AA07]). The way this is performed differs between the three cases. Important is that the user can get additional information to an area or event which is somewhat difficult to access or overview. Examples are a large museum, a department store and a conference. In the museum case, a bot was used to provide additional information about exhibits with an appropriate and appealing personality. In the department store case, the bot primarily help to get directons. The most detailed account is given bei D'Haro et al., who created and applied a bot for a conference. The system had access to information about schedule, events and speakers on this conference as well as some tourist information of the area. It thereby provided a rich set of features through a conversational interface, like connecting to people, adding events to the calendar or recommendations where to go next [DHa+15]. This is one of the few use case classes that distinctively crosses the boundary between online and real world. It augments the experience at a certain location through information services. All the mentioned cases are related to CRM. None of the systems provide a stand-alone service, they facilitate a better customer satisfaction at the location. Moreover, after leaving the location, the user is still connected to the information service. The user can still get information or notifications about the location or event. This offers opportunities in terms of CRM, e.g. notification about next events, or to learn how the user liked the visit.

Product Advisor A group of use cases that gained a lot of attention during group discussions and that also received attention in literature, were summarized to the use case class 'Product Advisor' ([The18a], [The18a], [The18a], [The18b], [The18b], [Hei18], [Cha+01]). Participants of the discussions expressed hope for an advisory system that would help them understand complex products. The goal is not to buy the product, but to understand important characteristics. These are the products advantages, differences in comparison to similar products and how it matches the usage which the user has in mind. To fulfill this, participants expected the bot to be neutral in its assessment and comparison of products, to have a vast product knowledge and to actively ask the user questions to guide the user to useful products. Cases in literature are described with similar characteristics. One source specifically mentions a 'gift bot' that would support decisions to buy a gift. It was described that after getting advice the user would also get the opportunity to purchase the selected product. Some participants of the discussions also welcomed such an opportunity if the advisor was neutral and not biased to sell a specific product. This class is therefore related to sales activities. Providing detailed information about products and making them accessible for a 'product advisor' can also be considered a responsibility of the marketing department.

Instant Order The goal in this case is simply to buy a usual product or service in a no-frills way immediately. Such use cases were described in group discussions and literature ([The18c], [Hei18], [Ols16b], [Pom17], [The18a], [Ols16b]). The concrete products and contexts differ strongly throughout the cases mentioned: ordering food in a bot-driven restaurant, calling a taxi, buying a movie ticket, transition from service trial to subscription, ordering a convenience product in the household and finally, a food delivery service. They all share two characteristics: (a) the concrete product is selected by stating a single intent, (b) payment is a background process. The bot thereby works like a simple self-serivice shop or a vending machine. The idea of bots serving in kiosk systems is explicitely mentioned by Pombriant [Pom17]. This already provides us with a clear link to CRM as bots in these cases take over sales tasks and generate income.

Sales Assistant A sales assistant focusses in every manner on helping the customer to buy the right thing. Use cases in which bots mirror the behavior of a human sales assistant were mentioned in group discussions and in literature ([The18a], [The18b], [SNY17], [Wit23]). Moreover Shawar et al. report that as early as 2005 bots were used as shopping assistants to find relevant products and services, and that they were deemed useful [AA07, p. 43]. This class combines aspects of the 'Product Advisor' class and the 'Instant Order' class. While in case of the 'Product Advisor' the user wants to understand the product alternatives in the first place, in case of the 'Instant Order' the user already has the clear intent to own a concrete item or to experience a concrete service – and to pay for it. The 'Sales Assistant' class fills the space inbetween. In these cases a bot will actively ask what a user wants, make suggestions and guide the user through all steps of the buying process. One participant of a group discussion specifically proposed that the bot should be exactly like a human sales assistant, a notion supported by one source from literature [The18b] [SNY17]. Some sources emphasized that a bot in this role is more interactive than a website [SNY17] [The18a]. Witte states that it helps the user to avoid FAQs and technical specifications by short questions and follow-up [Wit23].

In terms of CRM, this use case class covers a range of online sales activities. A bot that covers such a case might integrate many more use cases. It could manage a shopping cart, keep a shopping history, record suggestions made by the customer, actively notify the customer about special offers and additional products.

A similar potential use case class is the 'Shop Bot' class mentioned above in the list of 'Other Classes'. It focuses more on supporting shops or services in the real world. It extends the 'Sales Assistant' use case class by functions like finding the way to the next branch. However, the cases were too diverse to narrow them down to one distinct class.

Configure a Product Mentioned in two variants by a single source, bots can be used to configure products ([Lei17], [Lei17]). Product configurators are often rather graphical tools that provide a visual overview over alternatives and options. Leiser however argues

for bots. The mentioned cases are both about car configuration. The final goal is to buy the product, but also to learn about alternatives. The user in these cases is looking for a more informal way to explore the product and get concrete offers. At the same time the user is guided through various steps in a potentially long-lasting conversation. Due to the long conversation, the source proposes to save the state of it, so that the bot can stay a partner for an ongoing conversation about the product without losing the context.

This class is strongly related to the 'Sales Assistant' class and to a lesser degree to the 'Product Advisor'. It belongs clearly into the domain of sales and therefore has an equally clear relation to CRM.

Shopping Agent In a 'Shopping Agent' use case, a bot buys autonomously on behalf of the user. This use case class can be considered very close to the 'Instant Order' class. Cases were mentioned in literature and one interview ([The18e], [She17b], [Dal16], [Dal16]), but only Sheth focussed fully on the implications of this use case class [She17b]. Similar to the two previous use case classes, the goal of the user is to buy a product. In certain e-commerce environments offers and prices change rapidly. Good examples for relevant products might be air travel tickets and expensive consumer goods. Consumers have trouble to find the best or cheapest product as they are not always online to monitor these changes. So on its own a user will barely be able to select the best or cheapest product when it appears, before it disappears again. This use case class addresses this problem. The value bots offer in these cases is based on a high degree of personalization. The user needs to state clear preferences first (e.g. a product description and a maximum price the user is willing to pay for the product), before the bot autonomously starts searching for matching products. The bot will notify the user whenever a matching product was found or buy it immediately. In the latter case, the bot also serves the user by simplifying the ordering process.

Sheth suggest in an article for the 'American Marketing Association' that bots which support these kinds of use cases have the potential to make a serious impact on e-commerce. Dynamic pricing, brand advertising, subscriptions and customer loyalty might loose relevance when bots monitor prices constantly and buy without emotional attachment [She17b].

Two Sided Marketplace Bots can not only be used to buy things, they might also become a platform to offer and sell products and services. This notion was presented in literature, but most of all during one interview ([The18f], [The18f], [Car17], [BF17]). In one case a bot was used to find and offer appartments to rent. In another source the bot connected visitors to local economy and also included some system of local recommendations for shops. In the fourth case a bot simply offered a small set of payed third party services to the user. Depending on the size of the marketplace it will become difficult for the bot to present an overview over the offers and will become more like a search engine. In case of the appartment rental bot, the user has to answer a set of ten questions before the bot starts

searching for a matching apartment [Car17]. The value for the customer in this case is seen in getting a meaningful result more instantly instead of having to browse.

An enterprise can either provide a marketplace or simply use it. In CRM terms providing a two sided marketplace requires marketing efforts to activate and saturate the market. When using a marketplace it will provide a channel on which to contact customers and sell products.

Route to a Person A bot that routes a user to another person is one of the more proven use cases. Essentially the interactive voice response systems (IVR) that are used in telephone customer service for many years realize this use case. While this case does not receive much attention in recent research it was mentioned several times during group discussions ([The18a], [The18e], [The18b], [The18b]). It was one of the few applications of bots that was known, understood and accepted by most participants. As explained in the section about 'CRM Automation', this type of use case is also well-accepted and utilized in CRM.

Call People to Action A rather innovative use case is to use bots to call people to action, e.g. for volunteering in a project. This was mentioned by two related sources ([Sav+16], [Flo+16]). The system at hand was used to contact and notify users on Twitter and to provide them with small tasks. The goal for the user is to participate in an interesting project on the side. Volunteers who only wish to help occasionally sometimes loose track of a certain project and need regular reminders. For the organization applying bots for this use case they should help recruiting experts for volunteer work. The system should also help to keep volunteers connected to the project or organization for long-term participation. Moreover, the system also aimed at distributing micro-tasks between the volunteers. While this use case class is mainly aimed on volunteering and non-profit, it is strongly focused on 'relationship management' and was therefore included.

While the scope of this research is on bots for customer interaction, it should be noted that this use case class might have potential for enterprise-internal interaction. Some sources mentioned the potential of rather simple bots to manage people, places and tasks in daily life [Bru16f] [The18e].

Make Appointment Bots can be used to fix appointments for humans. Thereby they act on the users behalf, considering the users calendar and preferences. Cases were mentioned during a group discussion and in other sources ([The18b], [Mac18], [Bru17d]). While two sources referred to rather specific situations, like making an appointment with a medical doctor or a service station, the third source presented a concrete bot 'Amy' which makes appointments [Bru17d]. That source also provides insights into value for the user.

While all three cases share the common goal to make an appointment that is suitable for all participants, the number and character of participants vary. The calendars of the medical doctor or the service station might be publicly available and there are only two parties involved, but a bot might also deal with more difficult cases.

The user of 'Amy' would provide the bot with calendar access and preferences. When an appointment needs to be fixed, the user sends a message to 'Amy' stating the participants, possibly time and place. Later the user can change this data at any time with another message to 'Amy'. The bot actually appears as a separate named entity that actively sends and replies to emails striving towards an appointment that suits all participants at the given time (range) and place. It will send messages back and forth with all participants until an appointment will be fixed. For the user, this happens in the background. 'Amy' will only notify the user if serious problems occur [Bru17d].

People who work in an office and attend meetings at least occasionally know how hard and time consuming it can be to fix dates with several participants from different enterprises. This use case class addresses this problem and takes work from the user into an automated background process. Acknowledging how far systems like 'Amy' or similar functions of virtual assistants like Microsoft Cortana are already with standard cases, this might become common practice in business environments in the near future. In terms of CRM this probably applies rather to Business-to-Business relationships. The simpler cases as mentioned above however also apply to Business-to-Consumer relationships.

Record Letters Bots can be used to provide an automated channel for feedback messages. The use cases behind this class are technically very simple. As they barely rely on natural language interaction, they are on the very border of counting as bot systems at all. However, two very similar cases were mentioned by different sources ([Str16], [Bru16h]) in the context of bots – and the use cases have a clear connection to CRM. Therefore they were included in the list.

Basically, the sources present a channel to an organization or person in a messenger app. Through this channel users can send their messages, proposals or complaints. The bot functions on the channel simply by explaining what the channel is used for and to acknowledge that a message was received. The message itself however is not necessarily processed by the bot, but routed on to a human.

Although this use case class is technically unaspiring, it presents a concrete and very low level entry for using bot technology on messenger apps to foster a good relationship to customers (or other users).

Gather Feedback More aspiring than simply to record a letter is a bot that actively gathers feedback. Potential for cases like this has been expressed [Bru16h], but only a

single actual case was registered during this research. Hubert.ai is a bot that helps teachers get feedback for their courses. The bot contacts students, asks them about their opinion and offers answers and opinion ratings to the teacher. It uses sentiment analysis to extract tendency out of the full-text answers [Hub17]. In this case a bot is used in a domain traditionally filled by online surveys. The bot can provide some additional values: (a) it is more interactive than a form based survey, (b) it can ask several feedback questions, (c) it focuses rather on qualitative statements.

Similarly to the last use case class, this feedback can help enterprises to better understand their customers and foster a positive relationship.

Moreover, feedback can also be gathered about the bot experience itself. At the end of any bot conversation can stand the question if the bot was helpful and enjoyable. This class therefore also has the characteristic of being applicable for all sorts of bots, similarly to use case classes like ‘Onboarding’ or ‘Represent a Person’.

6 Prototype

The second part of this research focuses on practical application. The new technology provides a tool, but not a solution until a problem itself has been identified. During the first part of this research, use cases and use case classes were examined according to the problems they address and the value propositions behind them. The next step is to use the technology to make the value proposition concrete and create the real solution.

6.1 Goals

The goal of the second part is to demonstrate how bots can actually be applied in CRM in terms of design and implementation. The main question is stated as 'How can bots for customers be connected to a CRM system?'.

6.2 Approach and Strategy

Prototyping is proposed by Zowghi and Couling as a way to acquire feedback after gathering preliminary requirements. They mention usefulness of prototypes especially for user interfaces. Prototypes come in different flavor, some are executable programs, other rather paper prototypes that tell the story of how a system is used [ZC05, pp. 29–32]. Osterwalder et al. mention prototyping as a useful way to explore design alternatives. They emphasize low-cost, low-level prototypes like napkin sketches or representations of a value proposition. But they also see great value in prototypes that provide a small set of real features of the value proposition, the 'minimum viable product' [OW15, pp. 76–77].

In line with the goal of this part, the prototype should provide some basic features, so that a real connection with a CRM system is possible. It is of similar importance that the prototype builds on the results of the first part.

A first step is to select use cases with high relevance in terms of feasibility and value proposition as a basis for a design. It is not necessary that the selected use cases are later fully implemented, they will only serve as a starting point.

The next step is to consider design alternatives specific to bots. I will draw on sources from science and practice, to come up with relevant design questions for a bot prototype. These will be the basis for a concrete design.

Based on the design, it is necessary to explore and evaluate different bot technologies to find a suitable technical foundation for an implementation of the prototype. The technology decision has a strong impact on details concerning the concrete implementation. Therefore, implementation details depend on that decision.

Parallel to learning, evaluation and deciding about bot technology, similar decisions are necessary concerning a CRM system. An 'Oracle Siebel CRM' was available for this research. It is a widely adopted CRM system with a long history and can be accessed using it's REST API. It was therefore deemed suitable as exemplary CRM system.

Based on the design decisions, technology selection and an approach to integrate the CRM system, the prototype needs to be implemented. The approach here is to start from a small, running application and to improve it and add components over small steps. Also, a technical documentation is planned.

Finally, I will discuss to what degree the prototype is aligned with and supportive to CRM as well as its limitations.

6.3 Use Case and Scenario

This stage of development focused on identifying a problem users might have and what a potential solution to this problem would like. The steps to accomplish this were (a) drawing on the use cases and use case classes from the first part of this research to find interesting problems and value propositions, (b) writing a scenario that depicts in detail what happens to whom in what context, how the problem arises and how the solution would tackle that, (c) writing a 'system in use story' that gives an account of a potential, unique instance of that scenario in prose.

6.3.1 Selection of the Use Case(s)

The sets of use cases and use case classes describe goals, problems, gains and value propositions from the users point of view. This style makes them a suitable tool to develop a relevant value proposition.

Based on the scope of this work, it was decided that the primary use case should have something to do with telecommunications industry. With the help of two professionals from this area, the use case list was enhanced. At first, all use cases with some relevance for the telecommunications sector were flagged. This accounted to a number of 67 cases. This number was then successively decreased by removing cases which did meet some qualitative requirements. These were: (a) the use case should have a clear commercial relevance, i.e. it should provide potential for a sales opportunity, (b) the use case should address a clear pain, beyond 'convenience' and excluding cases with unclear need/pain, (c) the case should provide some innovation (e.g. excluding simple QA use cases).

Finally, the use cases with the IDs 7 and 9 were chosen. Both addressed a problem that can be described as 'mobile service disruption' – a topic closely related to telecommunications. In the first case, the mobile internet services are disrupted or limited due to a roaming

situation. This typically happens when the user is abroad or in a region that is not served by the users own service provider. Through service partners, that service provider might still offer mobile internet services, but will do this for a fee (which is usually high). While roaming fees have been eliminated throughout the European Union today, they are still a topic in most parts of the world.

In the second situation, the mobile internet services are disrupted or limited due to a used up data volume or pre-paid account. While many mobile service plans provide so-called 'flat rates', the use of high-speed connectivity is usually bounded by a certain data volume. If the data volume is used up, the connection speed is decreased – severely limiting the users ability to use internet services. For pre-paid mobile service plans it also can happen that the balance of the account is not enough to pay for further mobile internet services.

While the situations are different in detail, the use cases both deal with a common problem: the disruption of mobile internet services due to limitations in the business relationship between the consumer and the provider. Both cases were mentioned during one group discussions. The participants described their need in these situations primarily as 'answers and options'. They usually got aware of such problems when their provider sent them a short message, notifying them of service limitations. They wished at this point for a direct channel back, to ask questions, see their options to increase the service and make immediate changes.

A concrete scenario and solution approach was developed from there.

6.3.2 Scenario and Solution Approach

Basic Scenario The scenario for this prototype evolves around the arrival of a user at a foreign airport. The service plan is limited to roaming and no other mobile internet services (like free Wifi) are available. The user is a traveler who is not very familiar with the country and airport. The user has no specific service plan for this country. On arrival, it is therefore very expensive to access the internet. For the service provider this might be an interesting time to offer services and upgrades to its customer. The user is in a foreign environment and feels the pain of having limited data services. The user might be tired after a long flight and not eager to stroll around looking for information and services. Therefore, a user might be grateful for some free information and open to paid extra services and upgrades.

Basic Solution Based on these assumptions, the service provider offers the user a free bot service that answers questions, offers options and upgrades. As soon as the user registers in the mobile network of the local service provider, the users own service provider will notify the user of a roaming situation. This message will also contain a link to the free bot service. As the service provider has certain knowledge about the customer, the bot can offer a somewhat personalized service, e.g. greeting the user by name. As there is already a

business relationship, the current service plan and payment details are also available, so the bot can give accurate account about the current service plan, current service conditions and possible upgrades. It can also sell products without asking for sensitive data like the bank account number.

Enhancing the Solution by Drawing on Use Case Classes To enhance the service offer I drew on the use case classes. As the user is a traveler at an unfamiliar location, the bot might serve as a 'local guide' providing local services and directions. As the service provider is specialized in telecommunications, not airport services, it might open the bot to third party services to widen the range of services it can offer to customers. Thereby, the bot provides a small 'two sided marketplace'. As the bot will not only provide information about roaming conditions but will also sell upgrades or other offers, it also needs to cover the use case class of 'sales assistant', i.e. guide the user through the whole shopping process.

Final Solution Approach The bot will offer free services to users who arrive at a foreign airport and who receive mobile internet through roaming. In the prototype version the bot will offer three services. (1) It offers a map of the airport arrival area ('local guide'). (2) It offers information about the current mobile service plan and upgrades to the mobile service plan ('sales assistant'). (3) It offers to calculate a taxi fare and call a taxi – this is an example for other local services that might be integrated into this bot ('two sided marketplace').

6.3.3 System in Use Story

Mike is 32 years old and likes to travel to different locations all over the world. He just arrives in Japan Central Airport after a long flight. He plans to stay in Japan as a tourist for a one week trip. He has prepared accommodation for the first two days planning to be flexible in the places to visit. After the Japan trip he wants to move on to Korea and Taiwan, visiting each country for a week. He leaves the airplane, goes through visa procedure, picks up his luggage and exits the arrival area. He switches on his phone from flight mode and receives a short message from his service provider. It says he can use roaming services to access mobile internet in Japan – but it is quite expensive. The message also provides him with a link to airport services which are free of charge. Mike feels a little bit lost at the airport. He has only very basic skills in Japanese language and cannot read most of the signs around him. He thinks a little bit of help is indeed welcome and follows the link to the free airport services.

Fig. 11: Mike arrives at the airport.

Fig. 12: He switches his phone back on and gets a message by his service provider.

The 'Airport Arrival Bot' opens in a browser window, greets him by name and welcomes him to Japan Central Airport. Mike is happy about the personalized greeting. He follows the predefined dialog options to a menu that presents him with the main functions of the bot. He sees, that the bot offers some options for mobile internet. Mike is used to getting around in foreign countries, but here he cannot read and understand much. So he begins to think that having a fast internet service during his stay might be very helpful. He navigates through the dialog options and finds out that he can extend his usual service plan to surf in most countries for a flat monthly fee. He likes the idea. On the other hand, he does not travel the whole year, so most of the year he would pay for no extra gain. He decides for an upgrade to his service plan that is limited to the next 30 days. It is costly, but involves no subscription. He can also use the service in Taiwan and Korea, his next travel destinations. As his service provider already has all his payment details, all he has to do is to acknowledge the purchase and he is done. He gets immediately

another short message from his provider that notifies him, that he can use mobile internet now without having to pay the roaming fee.

Fig. 13: Apart from good manners, the bot offers service upgrades, maps and it can call a taxi.

Mike is content with the bot so far, he even does not realize it is a bot as he can navigate through useful pre-defined answers. He now wants to get to his hotel. The bot offers to calculate a taxi fare. Mike types in the address of the hotel. The taxi is not cheap. Mike would probably rather take a train into the city. He asks the bot if it knows something about train connections, but the bot declines. Mike shrugs and decides to take the taxi. He is tired from the flight and would enjoy to get to the hotel immediately to take a shower and a short nap. He orders the taxi. Finally, the 'Airport Arrival Bot' also provides him with a floor map, so he finds the way to the taxi stand easily. Mike types in 'Bye' and the bot replies 'Enjoy your stay!' as Mike leaves the airport.

6.4 Chatbot Design

This section starts with an overview over aspects of bot design as discussed by sources from research and practice. Based on this I will present a 'design template' that summarizes some of the most important design questions. Finally, I will present the concrete design decisions for this prototype.

6.4.1 Design Considerations

Bot Anatomy Like every non-trivial software, a bot is made from several components. Considerate of the 'human' character of bots, Amir Shevat also talks about 'bot anatomy'. He breaks down a bot to the core parts :

(a) AI
(b) purpose
(c) personality
(d) script
(e) help
(f) rich interactions
(g) data

As additional design considerations he mentions

(a) branding
(b) discovery
(c) engagement methods
(d) monetization [She17c, p. 40].

Kuligowska analyzes commercial bots on websites in terms of quality and breaks them down into the following aspects:

(a) visual looks
(b) implementation on the website
(c) speech synthesis unit
(d) knowledge base
(e) knowledge and additional functionalities
(f) conversational abilities and context sensitiveness
(g) personalization traits
(h) emergency responses
(i) rating of chatbot and website [Kul15, pp. 5–6].

Purpose The most basic aspect of chatbot design is probably defining a purpose for a bot. Shevat sees this as the first step of any bot design process [She17c, p. 44]. Fichter and Wisniewski expect any bot to be sure in purpose: either as horizontal, offering basic services in a wide range or vertical, to do one job really well [FW17, p. 58].

Personality To know and understand the target group that a bot should interact with is prerequisite for a next step: to create a distinct personality for a bot [Bro17]. Shevat

supports this notion. He highlights relevant features of personality: the bots name that should give some hint about core functions, a visual branding and a style of language [She17c, p. 48]. Kuligowska sees benefits in using animated representations of the bot with gestures and facial expressions. She also sees benefits in unique, human-like voices for the bots and in customization of the bots attributes (e.g. appearance, gender) by the user [Kul15, pp. 5–6]. Etema-Sajadi and Ghachem support the notion that chatbots with animated image are beneficial [EG15, p. 81]. Some sources suggested a friendly, humorous, approachable personality [FW17, p. 58] [AH16].

Bots Pretending to be Humans It is a controversial topic of bot personality, if bots should identify themselves as non-humans. In practice the border between bot and human is often blurring (e.g. bot-supported human in customer service) and this combination has advantages (ref. [She17c, p. 64]). However, several sources see it as a good practice that a bot should not pretend to be human [Bro17] [FW17, p. 58].

Channels A bot is exposed to the user on one or more channels. Like the bots personality, the channel of choice is largely depending on the target user group of the bot.

Shevat roughly categorizes some of the major platforms. He sees 'Slack' as a platform for business bots, 'Facebook Messenger' as for consumer bots, voice-driven bots rather on 'Amazon Alexa', 'Kik' as a platform mostly for teenagers [She17c, p. 22]. Schneider sees Twitter as particularly relavant for companies today, as it is a popular channel for customer service [Bru16g, p. 14]. For Kusber, companies must try to engage their customers in those channels where the customer already resides, i.e. to follow changing customer behavior [Kus17, p. 242]. In terms of bots, companies see opportunity in the messenger platforms for several reasons. The reachable audience is huge, the platforms offer services and an established infrastructure. This not only refers to bot tools and AI, but also the user interface elements and user authentication [Bru16h]. Bapat compares the text-based platforms 'Telegram', 'Facebook Messenger', 'WhatsApp' and 'Twitter' for bot-related features. The only platform that is yet to offer official support for bots is 'WhatsApp'. While technical details differ, for the most part the features are similar. Some platforms also support bots in group chats, others provide own AI services or other special features [Bap28, p. 10].

Rich Interaction Bots that appear on several channel, look slightly different on each. This is different from apps. A good user experience depends on the channel. Conventions that worked for mobile apps will not work for bots [Bru17c]. However, bot platforms like instant messenger are providing more and more rich interaction (e.g. images, buttons, UI elements), becoming more similar to apps. Mauro assumes that users will probably not miss the slight difference to apps. Interaction modes like webviews in WeChat are probably not the solutions for all markets, but rich UI elements might become normal. In the future chat

and other UI elements might blend together, extending the classical 'browse and search' interaction paradigm by allowing to type anywhere [Bru16b, pp. 47–48]. Klopfenstein et al. argue that an interaction which makes more use of buttons and pre-defined answers is less focused on open input by the user. It offers the user more guidance to perform certain tasks and is therefore also less relying on AI [Klo+17, pp. 559–560]. Shevat supports this idea; he describes the interaction for functional tasks as shaped like a funnel towards achieving the goal [Bru17a, pp. 34–35]. Law and Baldwin from 'Kip' report that rich interaction to shorten and speed up conversation indeed enhanced user engagement [Bru16g, p. 53].

Voice User Interface Beneath bots in text interfaces, voice user interfaces (VUI) are comparably new and have different characteristics. A big benefit is the 'hands free' interaction. Another is, that the user is not visually distracted. These benefits are especially interesting whenever a user is driving a car or is otherwise concentrated on hand-eye coordination.

The potential of VUI also has many limitation. For one, fully voice controlled systems are applicable only in private environments, like home or car [Bru16b, pp. 6–7]. They are e.g. not very well suited for security sensitive content, that could be overheard easily, like passwords [Bru16d, p. 17]. As VUI has only very limited space for answers, queries that give more than one answer are a serious problem. People simple could not follow. There are different models to solve this, like: give the best match, give a short list of two or three or change to a visual channel [Bru17b]. It makes therefore a big difference if the conversion is multi-modal, mixing VUI and a visual channel [Bru16d]. Even with their limitations, VUI can be expected to become more and more common. A representative survey for Germans over 18 showed that 36% of the participants used VUI on smartphone. In another survey in Germany up to 50% of the participants said they might use voice driven assistants for making queries on a search engine, getting reminders for appointments or checking the weather [SN17]. Over 90% who used such assistants at home were at least somewhat satisfied [ide18].

Conversational Interface While in text interfaces rich interaction can blur into app-like interaction, in many cases interaction in a conversational model will stay different from typical GUI. As Cheng points out, conversational interface is less strict about input and always a joint experience of more than one participants [Bru16f]. Følstad and Brandtzaeg see bots shifting the primary object of design from visual elements to conversations. Interactions are less tied to visual buttons and menus but more to adequate responses to users requests. Usability will in turn be judged differently. Design changes from an explanatory task (explain the user which features are available) to an interpretational task (understanding what the user needs). User interface itself will not differ much, but the convenience of accessing the underlying services will [FB17, p. 41].

AI This 'interpretational' model makes high demands on the bots understanding – one area where AI comes in.

Shevat points out that AI is not a single technology, and also not necessary in all cases. For a bot, AI can help e.g. with language understanding, conversation management or sentiment analysis [She17c, p. 70–76]. Mauro emphasizes that bot interfaces offer adaption to the context which the user is interested in. While this was theoretically possible in the past, most internet applications still resemble 'catalogs'. He sees great potential in AI for bots and mentions deep learning. But he also states that is not useful in all situations that bots run into. Some information can be recognized and saved without any deep learning. Learning also requires labeled data, which is often not available. In practical terms, a simple knowledge base might often be enough [Bru16b, pp. 18–24, 39]. Bruner and Scomoroc discuss the limitations of training deep learning models. For development of large VPAs extensive bot training might be an option, but it is too costly for small bots [Bru16i, p. 19–20, 34].

AI offers many new opportunities for bots and drives the development of advanced conversational interactions. For some people AI is even the core of modern bots [Bro17]. But a bot that offers open input also awakens strong expectations. As was mentioned in the description of the 'QA' use case class, users expect that they can 'ask anything'. Luger and Sellen showed with their study that even modern VPAs often fail to fulfill this expectation [LS16, pp. 5293–5295].

Conversation Script In his book about bot design, Amir Shevat spends a large part on conversation. In his view every bot should cover some typical situations, like onboarding, error handling or providing help [She17c, p. 79–136].

Onboarding is not only a valid use case for bots in CRM (as presented in the last chapter), it is also a necessary first step for most bot conversations. The purpose and usage of a bot has to be presented to the user. Contrary to graphical user interfaces, conversational interfaces have little graphical representation of the services they offer. As explained above and supported by Bruner and Scomoroc, conversational interfaces invite expectations, as they do not firmly define what the bot can or cannot do and what its' limits are [Bru16i, p. 19–20, 34]. A bot should make its purpose clear from the start, have a clear scope and should be easy to understand. Bots that require to learn how to use them first or that are too generic might create a bad experience [Kus17, p. 242].

Similar to onboarding, a bot needs a mode to engage a user and initialize a conversation [Bru16f]. Part of this is to make a good first impression, to learn when to re-approach the user, to improve the experience and finally to become habitual for the user [She17c, p. 202–203]. Mauro explains that a bot on an open platform needs to engage, entertain and service the user first – before it can be expected to create value for the operator, like an ecommerce event [Bru16b, pp. 65–67]. Kusber supports this notion, that a bot must offer

a distinct value for the user – not only initially, but essentially in each feature [Kus17, p. 242].

Apart from rather generic parts of a conversation, that every should be able to handle, there is that part of the conversation that makes the core functional parts of the bots. Shevat calls this 'functionality scripting', as the conversation usually develops over several steps and conditions. In a task-led conversation he suggests the funnel-shaped conversation that evolves over a limited set of states to an end. In a topic-led conversation, he suggests that it freely switches between related topics. Finally, he emphasizes to make the style of the bot during each step be in line with its personality and to invest time in a good and appropriate language generation [She17c, p. 202–203], a notion supported by Dennis Mortensen the founder of 'x.ai' (cited in [She17c, p. 63]).

Tool Support for Bot Creation While the design of bots should be independent of the tools to create them, there actually exists a strong dependency.

Andy Mauro is a founder of 'automat.ai', a company that creates bots and bot tools. He describes the relationship between bot strategy and technology. As soon as one applies a bot strategy that goes beyond creating simple bots, technical decisions become part of design. It needs to select the right platform, make data available, use data input from users, use the right interaction mode, use a technology stack that provides AI features, get or buy experience in bot development. It is unreasonable to assume that any single technology creates a great user experience with bots on its own [Bru16b, pp. 24–27]. He also criticizes most bot tools today. Many tools use a wording derived from machine learning practices – like 'intent' and 'entity'. In his view, they represent a failure of the industry to talk in terms of the customer, not of the developer. Bots should become as easily to create as it is today to create a website – not requiring any technology knowledge tools [Bru16b, pp. 14–15].

6.4.2 Chatbot Design Template

For a structured approach on bot design, I created a short list of design questions. This 'bot design template' should help a bot designer to cover all relevant aspects. It is based on the design considerations and in major part on Amir Shevats book about bot design.

The design template covers the following items:

Core	
Purpose	What is the bot there for, what goal should it achieve?
Core functionality	What are the bots particular functions to reach this goal?
Brand	
Personality	How can the behavioral style be described. Is it polite, formal, casual, helpful, witty, enthusiast?
Logo/ Appearance	How does the bot look like (or sound like), does it have a face or logo, a color schema?
Name	How will people call the bot? Does it have a specific name?
Context	
Location/ Habitat	Where does the bot live, where can people access it? Messenger, Phone?
Integrated systems	Which special external systems does the bot need to work (apart from basic bot architecture)?
Value/ Business model	How does the bot contribute to the enterprise of its owner? Does it make customers happy, does it earn money, is it measurable?
Others	
Special features	What is special about this bot, which does not fit in anywhere else?
Type/ Keywords	Is this a certain type of bot? What keywords describe it best?
Behavior	
Onboarding	What does the bot on introduction to make a good first impression?
Feedback/ Error handling	How does the bot catch difficulties and breakdown to go back on track?
Initialize conversation/ Notifications	How and when does a conversation actually start? Is the bot actively approaching users?
Help	What does the bot do when the user is lost?
Functionalities	What are all the functions the bot offers? How does a conversation run for these functions?

6.4.3 Design Decisions

For the bot prototype, the purpose is to help travelers arriving on a foreign airport when their mobile data services is reduced to (expensive) roaming services. Specifically, this applies to own customers of the service providers.

The core functionality is two-fold. At first, the bot can sell mobile service plans. Secondly, it can connect to third-party services.

The personality of the prototype can be described as helpful, caring and polite in approaching the user. It is task-oriented and to the point in making its offerings. It stays short-spoken and demure towards the customer, especially when it makes a mistake.

In its appearance, the bot is rather plain. It has no particular logo, sticks to a simple black and white color schema. The main space of the chat area is reserved for the chat bubbles. Depending on the location of the airport, a particular background image or color might be shown. The bot uses a simple ‘sans serif’ type. It makes use of unicode symbols to mark topics and make them easily recognizable.

The prototype has no own name. It is called ‘Arrival Bot’ or ‘Airport Arrival Bot’. A specific own name might depend on the location of the airport where it is used.

As a habitat, a website might be sufficient. It should be optimized for mobile view. It might also make sense to offer the bot in messenger apps.

The prototype integrates mainly the CRM system of the telecommunications company itself to provide customer data like name and service plan information. It also will integrate third-party services. For the start, it should integrate a taxi service. It might also integrate some map or geolocation service.

The business model behind the bot is directly related to its core functionalities. The bot can sell service plans for mobile internet in a situation where the user is threatened by service limitations or incalculable costs. As it also offers 3rd-party services, the provider of the bot might also demand a share of paid services, e.g. when the bot orders a taxi or books a hotel room.

A special feature of this bot is the way how it is connected. Usually a user would become aware of the bot when entering a roaming situation. The provider sends a short message and offers this bot as a free service.

Keywords related to this bot could be ‘airport’, ‘mobile service plan’, ‘local services’.

The behavior of the bot is rather straight-forward. It makes use of a central ‘menu’ that provides an overview over core functions.

Onboarding is a short self-presentation, a greeting by name and the question ‘do you need

help?', with predefined answers. This reduces the users reaction to a simple 'yes or no' decision, without having to think much or type in anything.

Errors are handled in two ways. At first, the bot will rarely offer any open answers, but always provide a narrow conversation path with pre-defined answers. This reduces the chance of any error happening. Secondly, if the bot does not understand, it will excuse itself and direct the user to the main menu. Similarly, the bot does not provide any special help or explanation. Whenever the conversation comes to a halt, the bot will direct to the main menu, which presents the tasks the user can perform with the bot.

Every conversation with the bot is initialized when a user, arriving at an airport, follows the link provided by the mobile internet service provider.

The prototype will offer three functions. It serves as a sales assistant for certain mobile service plans. It also offers some kind of local information, e.g. map of the airport. Finally, it routes the user to third party services, e.g. a taxi service.

6.5 Chatbot Tools and Technology Selection

To create a bot there are a wide range of solutions available today. A large part of the time to develop the prototype was invested in learning different pieces of technology, understand how they work and how the are different from each other.

Most bots are composed of a set of different components. At the front end, a bot needs a platform on which it is exposed to the user. Many messenger platform (e.g. Kik, WeChat) and assistant systems (e.g. Alexa, Google Assistant) are open to third-party bots. Bots can also be located in mobile or desktop applications or on web pages. The bot logic that manages the dialog is a separate part. This is usually considered the core of the bot, as it contains the behavior. There are several frameworks (e.g. Microsoft Bot Framework, Botkit) and libraries available that provide useful functions to create a bot from code. A number of integrated, cloud-base tools is available that allow the creation of bots without coding (e.g. Flow.ai, Chatfuel, Botsify). They use graphical tools instead, to create dialogs and connect the bot to channels and back end systems. Most of these integrated tools also provide some AI services and host the created bot systems. Many bots rely on AI from external services, e.g. for language understanding. Other external services that many bots rely upon are for example knowledge bases and search engines.

6.5.1 Technology Evaluation

In the following, a few bot frameworks and tools will be presented. It has to be noted, that all the tools presented here are subject to rapid change and extend their functionalities continuously.

Microsoft Bot Framework Microsoft offers a wide range of services related to bots. Most of them are part of the 'Azure' cloud services. The range of services includes bot hosting, AI ('cognitive') services, connection to different channels as well as analytics of usage. Part of the bot framework are also libraries and SDKs to code bots in 'Node.js' or 'C#'. The services which Microsoft offers via their 'Azure' platform come at a price. Very basic free service plans and a 30-day trial phase are available. According to the terms and conditions for using the bot services, Microsoft uses all data from conversations to improve their services. This might be a problem in terms of privacy, when sensitive data is transmitted using the bot. The documentation is rich and provides examples for a quick start.

Flow.ai and similar Cloud Applications 'Flow.ai' offers cloud-based services to build and host bots. The bots can then also be connected to different channels and systems in the back end. While 'Flow.ai' allows bot creators to add code-snippets, the tool to create dialogs is almost free of code. Users arrange 'events' and 'actions' in dialog sequences, called 'flows'. 'Flow.ai' is extremely easy to learn. Simple QA bots can be created and deployed within few hours. Flow.ai is provided by a start-up based in the Netherlands. Update-cycles are short and improve the platform with new or enhanced functionalities. However, in some areas 'Flow.ai' falls short behind larger competitors like 'Dialogflow' or 'Flowxo', which have similar offers. Most notably, the documentation is not sufficient to allow bot creators to utilize the potential. 'Dialogflow' and 'Flowxo' both take a similar approach: building bots and dialogs without coding. Due to their higher complexity they are both more difficult to use, but at the same time offer more advanced conversations.

Botkit Created by 'Howdy.ai' , Botkit is a framework to build bots with 'Node.js'. It is aimed at developers and makes no promises to create bots without coding. It has attracted a wider community of developers who want to share their work and knowledge. The framework itself is open source. Around it, 'Howdy.ai' and partner companies offer a wide range of services, including hosting and tool support. Beyond basic service plans, paid subscriptions and services are available. Compared to other bot frameworks and services, botkit is more difficult to use. Botkit supports a wide range of channels and functions. A complete technical documentation is available. Mentionable is that Botkit not only provides channel support for the 'Microsoft Bot Framework', but also received considerable code contributions from Microsoft and IBM [Bru16c, p. 29].

6.5.2 Technology Decisions

During the evaluation phase I built several simple bots with all of the mentioned technologies.

The lack of documentation made more complex bots impossible with ‘Flow.ai’. Services like ‘Dialogflow’ or ‘Flowxo’ showed more promise. However, all these solutions were deemed not flexible enough in the end. The bots created with these tools are for the most part limited to that particular cloud-platform. This makes it very difficult to share the bot with others.

Although Microsoft makes the most ‘complete’ offer, in the end I decided in most parts against using Microsoft Bot Framework. The prototype should not be depending on a paid platform. Furthermore, it is obvious that for the most part the Microsoft Bot Framework intends to keep developers inside their service environment – a typical ‘vendor lock-in’.

I decided to use ‘Microsoft LUIS’ service for language understanding. This service is available outside the paid ‘Azure’ cloud services. A free service plan was available that provided all necessary functions.

Botkit certainly showed the most promise of all technologies for being open, scalable and flexible. It has however a steep learning curve. This makes it useful for more complex bots and evolving projects.

For the rather limited prototype I decided to go without relying on a specific framework.

For bot developers, the environment ‘Node.js’ for server-side JavaScript has gained a prominent role in the bot world. Both Botkit and the Microsoft Bot Framework rely on ‘Node.js’. As this technology was already used during the evaluation of these frameworks, I stuck to ‘Node.js’ as the environment for the bot prototype.

6.6 Integrating Siebel CRM

6.6.1 Background of Siebel CRM

‘Oracle Siebel CRM’ is a solution for CRM. Oracle is one of the leading software producers in the world. It was founded by Larry Ellison in 1977. Oracle offers mainly business software, e.g. for enterprise ressource planning (ERP) [CRM]. Oracle acquired Siebel in 2006 as a new centerpiece of their portfolio in the CRM area [Kaw06]. With an estimated annual turnover of more than 2bn USD, Siebel is one of the big players in the market for CRM solutions [Gar15b].

6.6.2 Integration via REST API

Recent versions of Siebel CRM brought a REST API through which external application can gain access to the Siebel data structure. Due to the cloud-based and distributed character of modern chatbots a connection through a REST API is a good solution.

To expose the REST API to the outside world, Siebel CRM needs to be configured specifically. The connection via REST is a relatively simple procedure, as it is stateless. That means that each operation is only one single request-response pair. Each call can be used to perform one of the different data operations in the Siebel CRM: query, insert, upsert and delete. These correspond to the HTTP methods: GET, POST, PUT, DELETE. The HTTP header for each call contains information for authorization and content type of the message. For insert and upsert operations, the data is contained in the HTTP body. Parameters like search parameters for queries are part of the URL. The REST API allows access on different kinds of resources of the Siebel CRM, e.g. 'Business Services' or 'Business Objects'. 'Business Objects' relate directly to the data structure of the Siebel CRM. However, only a short list of 'Business Objects' are accessible via the REST API (about 30 out of several hundred) [Ora18].

For the project at hand, a test server with a recent version of Oracle CRMS was setup and configured accordingly. The access through 'Business Objects' allowed sufficient access to customer data, like names and contract information. However, the limitations were severe. As example, it was not possible to acquire 'product recommendations' for a specific product. As a substitute I used data from 'product component' to represent a product upgrade.

6.7 Bot Implementation

The bot was created in several phases. Each phase added certain functionality.

6.7.1 First Phase: Websockets

In a first phase, a client and server were set up, that exchanged text messages over websockets. A chatroom system which was published on Github served as boilerplate code. It was originally created by the user 'martinsik' and later modified by the user 'jonathan-annett' [mar13]. During this phase, I simplified the system to serve only a single client. It essentially echoed whatever the user wrote on the front end.

6.7.2 Second Phase: Chatbot Front End

In a second phase, the client was enhanced visually by integrating the chatbot frontend 'chat-bubble'. This was provided on Github by the user 'dmitrizzle' [dmi17]. It completely exchanged the previous 'chatroom' front end. Originally created as a framework for simple chatbot interactions only on client-side, I had to make several changes so that it would exchange data with the server, using websockets. 'chat-bubble' brought its own data format for bot dialogs. The server replies were adjusted to this format, so that the front end could easily interpret the payload of any server reply.

6.7.3 Third Phase: Dialog System and Language Understanding

In a third phase, a dialog system for the bot back end was created and integrated with LUIS. The dialog system was created as a finite state machine. The bot would always be in a certain dialog state. Based on the input of the user, the bot would change its dialog state to a next state. On entering the next state, the bot could perform some action before sending a reply to the user. Each dialog state consisted of three elements: an ID, the action it would perform on entering the state (this included a reply message) and the possible transitions to next dialog states. This type of dialog system is adequate for a 'task-led conversation' according to Shevat (cf. with the 'Design Considerations' section).

Microsoft LUIS was integrated in this phase to provide the bot with some language understanding. Any input from the user is first sent to LUIS to determine the 'intent' of the input and possible 'entities' in it. The 'intent' is essentially the next step or goal the user wishes to achieve. This can be something like an explicitly stated action ('I need a taxi'), a question ('who are you'), a piece of conversation protocol ('Hi, how are you') or a reaction to something the bot said ('No'). The 'entities' are certain data elements that the user mentions. Example: 'I want to go to Tokyo at 12:00h'. 'Tokyo' and '12:00h' would be entities marking place and time. While the intent is important for the transition to the next dialog state, the entities are important for actions the bot has to perform when entering the next dialog state.

6.7.4 Fourth Phase: Dialogs

In a fourth phase, the dialogs themselves were created. Based on the scenario and use cases, the bot dialog states were created in the dialog system. This was a time consuming and error prone, rather than complex task. At first, the complete possible conversation was laid out as a graphical representation of a finite state machine, including names for the states and transitions. For all dialog states, the replies of the bot were written. As the bot is task-oriented and limited to a few, tailored functions, it was decided to provide as much guidance in each step as possible. To accomplish this, for most messages from the bot several pre-defined answers are offered to the user. This shortens the paths for the user to reach a certain goal. Instead of having to input an answer, the user can simply click on one button to continue. Also for a better guidance, a few emoji-like Unicode characters were included. 'Airport' related messages were marked with an airplane symbol, messages related to the 'taxi' service with a taxi symbol and messages related to mobile internet with a symbol of a parabolic antenna. Parallel to creating the dialog states, the LUIS service had to be trained with possible utterances of the user for each step, what they mean (intents) and what data they might contain (entities).

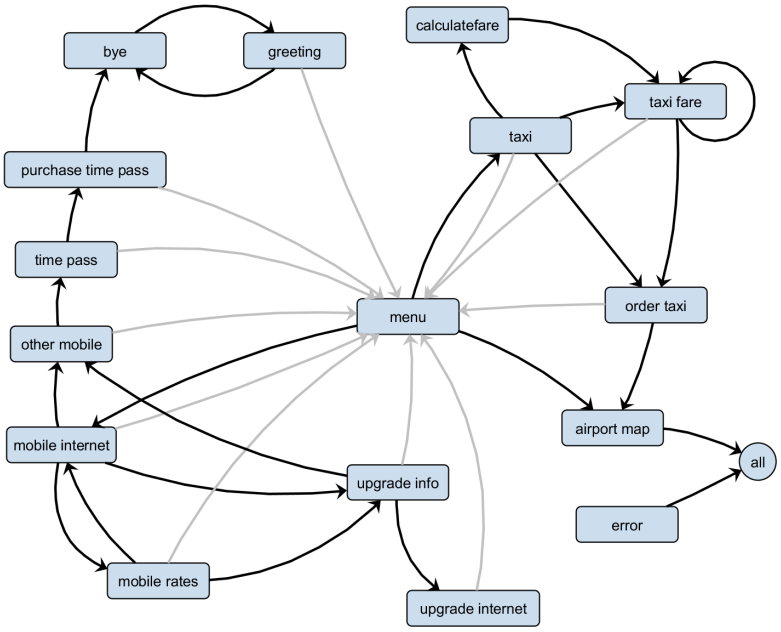

Fig. 14: A view on all dialog states and transitions (grey and black arrows). The state ‘all’ is not a real state but represents possible transitions to all states.

6.7.5 Fifth Phase: CRM Integration

In a fifth phase, Siebel CRM was integrated. Drawing on the CRM system served several purposes. Firstly, the user should be greeted by title and name. Secondly, the bot should name the currently active service plan. Thirdly, the bot should provide a recommendation based on this, for an advanced service plan.

Each REST call to the CRM can take several seconds to complete. If the bot would request user information from the CRM at the time it needs them, this could delay the bots answer for many seconds and provide a bad user experience. Therefore, the information must be acquired from the CRM as soon as possible. As the bot already needs information for the initial greeting, the bot should start acquiring the user data as soon as a user can be identified, i.e. as soon as the user connects to the bot server.

The user information is requested in several steps using asynchronous REST calls. For each step the bot calls the CRM to acquire more user data based on the data it already had. It starts with a ‘contact ID’ which can be used to acquire the ‘contact’ data from the Siebel CRM. This can in turn be used to acquire ‘account’ data, which then leads to ‘product’

data, i.e. the current service plan of the user. This can then be used to find a recommended product for a upgrade of the service plan.

Although these REST calls can take several seconds to complete, this approach gives the bot a head start and thereby a chance to collect the user data before it actually becomes part of the conversation.

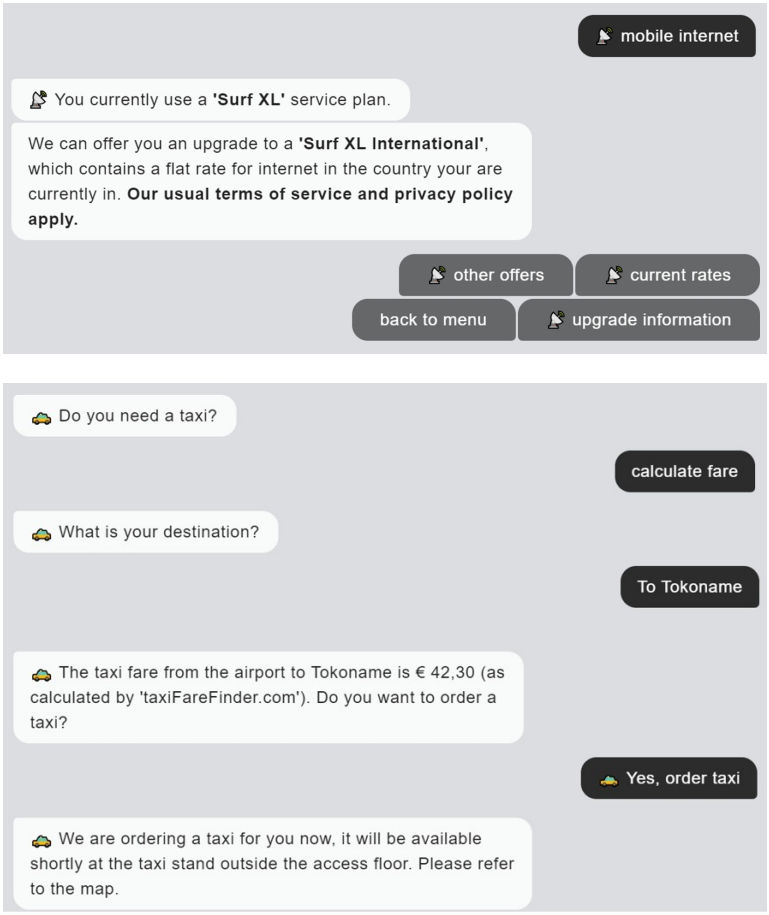

Fig. 15: Some visual examples of an interaction with the prototype.

6.7.6 Sixth Phase: Documentation

Finally, a documentation of the prototype was created. The first part is about the structure of the system. It describes the role and tasks of all the single components of the chatbots as well as the external systems which the bot relies upon. The second part is a set of instructions how to make use of the bot. This includes the general setup, a detailed explanation how the dialog system can be used and how the CRM system is integrated. Part of the documentation is also a short video recording of an extensive interaction with the bot.

6.8 Results

In this chapter I demonstrated how a simple chatbot can be built and connected to a CRM system. The process comprised of use case selection, design, technology evaluation and implementation.

The whole process was aligned to the CRM topic: the concrete use cases of the prototype were selected out of a set of CRM-related use case classes, a 'system in use story' described possible usage and value from the point of view of the customer, user data was provided from a real CRM system.

In conclusion this prototype provides a comprehensive example for different aspects of how a bot becomes part of CRM. The bot ...

(a) serves as touch point for customers who need service in a certain situation,
(b) offers the user a conversational user interface on a website,
(c) contains the logic to provide automated services, independently from a human,
(d) offers sales opportunities,
(e) uses 'good practices' like pre-defined answers to guide users through the conversation to perform tasks or finish transactions,
(f) actively draws on the CRM system to ...
    (i) call the user by name,
    (ii) give the user information about his current product,
    (iii) finally make an upgrade recommendation based on the current product.

6.8.1 Limitations of the Prototype

This prototype is limited in many ways. It is horizontally limited in the way, that it presents only very few examples of possible local third-party services (i.e. taxi, airport map). It is vertically limited in the way, that it does not provide full functionality in any part, i.e. it is neither possible to really call a taxi nor to buy a product. The integration with the CRM is limited to examples that show how the bot can read data. A very useful way of integration would be, if the bot would also document its conversations inside the CRM. This could be either as a full log of the conversation or as a summary (e.g. 'customer started conversation, customer bought upgrade'). From a technology perspective, the bot is limited due to the rather simple self-created bot framework. It does not scale and has no tool support, which not only makes creating new dialogs tedious work. The prototype is also untested. No account can be given about how useful this bot would really be for users.

7 Conclusion

This research aimed at improving understanding of how bots can be applied in the field of CRM. Bots have recently drawn a lot of attention. They are becoming more capable and offer interesting advantages for CRM. It is therefore vital for enterprises that apply CRM to understand if and how they can make use of bots.

The main goal was to determine use cases for customer-facing bots and their respective value propositions. A secondary goal was to integrate such a bot with a CRM system.

A first necessary step in pursuit of these goals was to provide an understanding about the state of bots and CRM today. The better part of chapter 2 summarizes the backgrounds of bots and CRM. Part of this was to explain the current hype around bots and how bots fit into CRM. The second step was to determine and describe methodologies that provided basis and guidelines to perform the research (chapter 3). Chapter 4 briefly discusses ethical considerations of this work. Chapter 5 and 6 describe how the actual research was conducted.

The first and major part examined use cases for bots in CRM and their respective value proposition (chapter 5). It combined methods of systematic literature review, group discussions and expert interviews to collect 148 use cases. In a stepwise synthesis, these use cases were analyzed, compared and classified. The final classification provides an overview over many use cases for chatbots in CRM and their value proposition for the user (chapter 5.4.3 and 5.4.4). It thereby answers the initial questions about use cases for CRM and their value. It covers rather simple, well-known use case classes like 'Question-Answer' and those with obvious relevance for CRM like 'Sales Assistant'. It also contains unexplored but interesting use case classes like 'Onboarding' or 'Call People to Action'. A second classification provides an overview over features and actions bots can perform in certain use cases (chapter 5.4.2). Both classifications are open for extension.

During the second and minor part of the research, a bot prototype was developed (chapter 6). The concept of that prototype was based on some of the use case classes provided by the first part. This demonstrates how the use case classes can be put to use. The development process also considered matters of bot design and technology. Most importantly, the prototype integrated a Siebel CRM system in the back end using a REST API. The bot reads customer data from the CRM system to provide a personalized experience, e.g. when it greets the user by name or makes recommendations based on currently active contracts. This work thereby answers the third research questions about how a bot can be integrated into a CRM system.

7.1 Different Views

During the introduction to this thesis, chapter 1.2.1 added two different viewpoints to describe the problem and approach of this research. From the same viewpoints I will now describe the results of the research.

An Enterprise Architecture Point of View Identical as in the introduction, I refer to a model of EA with five layers: (1) Strategy, (2) Business, (3) Application, (4) Data and (5) Technology. During the introduction elements inside the presented model were rather abstract and exemplary. Now, the view will become more concrete, depicting how the prototype might fit into an EA model.

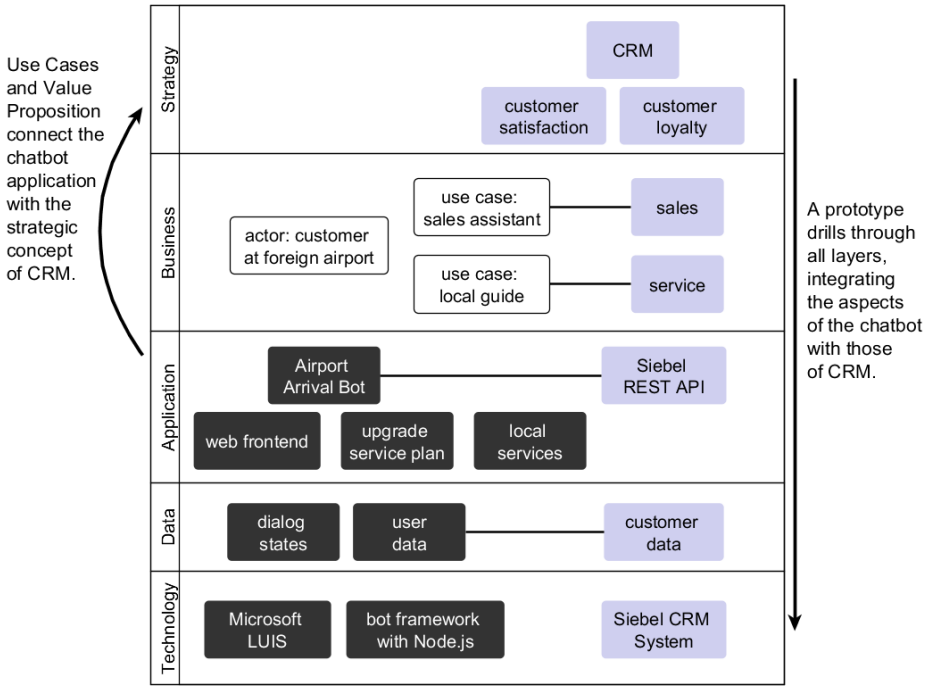

Fig. 16: A view of an enterprise architecture model and how the bot prototype fits in. Elements of CRM are in grey, elements of the bot are in black. Elements that were examined during the research are white. The arrows on the left and right represent the approaches of this work to connect 'chatbots' and 'CRM'.

The strategy layer contains the same elements as in the initial view. The strategical concept of CRM served as a guideline throughout the research. This applies to all use case classes that were determined. This also applies for the prototype.

On the business layer, elements for the areas 'sales' and 'service' are present. The 'sales' element can now clearly be connected with the bot use case 'sales assistant' from the prototype (selling upgrades for service plans). The 'service' element is closely connected with the use case 'local guide' – the bot offers the user some free local services and

information. The primary actor can now also be identified more closely: it is a customer of the company who is in the special situation of arriving at a foreign airport.

On the application layer, the prototype 'Airport Arrival Bot' offers several services, e.g. a web front end to the user. It also connects to the 'Siebel REST API' elements, thereby integrating with CRM.

On the data layer, the bot accesses the 'customer data' from the CRM. At the same time the bot also acquires 'user data' during a conversation. The user might select a certain product or state certain preferences, that could then be returned to the CRM system as 'customer data'.

Finally, the fifth layer has only changed slightly. The services, frameworks and systems have become concrete.

Compared with the view on EA from the introduction, this view showed strong connections between the elements of the bot and the elements of CRM. The prototype fulfilled its goal: drilling through the layers, integrating both sides.

A Business Model Point of View As in the introduction, I draw on the business model canvas developed by Osterwalder and Pigneur [OP10]. Based on the model presented in the introduction, I can now give a more detailed and comprehensive account on what a business model for bots might look like. With the bot technology as a starting point, the view shown in the introduction already made some statements about many elements on the left side of the model, as well as the 'channels'.

Each of the use case classes described in chapter 5 contains the information necessary to fill the central area, i.e. describes the value proposition this class offers. In some cases statements about other areas, like customer segment or revenue streams might also be possible (e.g. the 'instant order' gives a clear indication of revenue streams).

Moreover, I will present a full view of a business model canvas for the prototype. Like the prototype itself, this business model is also rather 'prototypical'. It is therefore closer to a 'problem-solution fit' than to a 'product-market fit' as defined by Osterwalder and described in chapter 3.5 [OW15, p. 49].

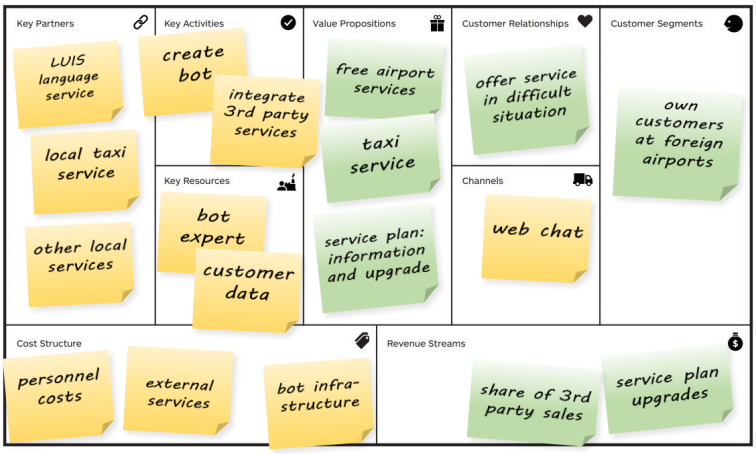

Fig. 17: A view on the prototype as a business model canvas. Some of the predetermined parts (yellow notes) have become more concrete. Parts that were determined during the work on the prototype are presented as green notes. While the research mainly focussed on the central part – the value proposition – in this case we can make statements about all areas. Own diagram based on an image published by "Strategyzer.com" under Creative Commons license [Str].

The sticky notes on this canvas come in two colors, yellow for areas that were determined in the initial view, green for areas that were open. In case of the yellow areas, some of the notes on this final view are now more concrete. For example the channels are limited to a web chat and in terms of partners the business model relies on 'Microsoft LUIS' for language understanding. The green areas are all filled out for the prototype. The customer segment is clearly defined and some statements about the type of relationship or revenue streams can be made. A specific characteristic of the prototype is its reliance on third party services. This reflects in terms of key partners (taxi and other local services), activities, possible revenue streams (by demanding a share of third-party revenues) and also the value propositions. The value proposition is the core of the business model canvas. In case of the prototype it is not a single one. Beyond some basic airport services and service plan upgrades, other value propositions would be provided by those third parties.

In conclusion, the prototype fulfilled its goal: it is concrete and covers all areas to fill a complete business model canvas.

7.2 Discussion

A wide view on possible applications This design of this work was explorative. It aimed on gaining new insights, uncovering entities and their relationships. The entities in this case were mainly the use cases; the relationships that to bots and users. This work thereby took a

new view on those use cases, first collecting and finally abstracting them. It identifies classes of use cases that give an adequate abstraction of specific and similar use case. The resulting classification allows more easily and precisely to compare how bots can be applied. This view is wide in the sense that it includes all use cases that could be found. It is narrowed down by the scope on CRM. It is limited by the amount of sources that was drawn on and the number of identified use cases. It provides a close-up view for each class on the value proposition for the customer.

In some previous works, authors gave a rough overview over some typical use cases for chatbots. Other works concentrated either on proposing innovative new use cases or they fleshed out solutions for common ones. This work contributes with its wider and more comprehensive overview on use cases, that is at the same time open for extension.

Opportunity for focused examination The classification places side by side use case classes that have received very different degrees of attention. Describing the motivation in chapter 1.1 I stated that bots become more interesting as they can take over in more situations. The classification now assembles the old and some new situations. It thereby offers a good starting point for examination of use case classes that are outside of awareness so far, yet offer opportunities for innovation. Classes like ‘onboarding’, ‘call to action’, ‘local guide’ and several more are such candidates. They are outside of of the most typical domains for bots, like answering questions, serving as search engines or sales assistants. While largely unproven, sources have given good reasons, why those are interesting cases for bots and should undergo further investigation. That the classification can be used in this way was demonstrated during the creations of the prototype. Like Shawar and Atwell did in their paper in 2007, one can ask then again (with an even wider view): ‘Chatbots – are they really useful?’ [AA07].

Abstract view on use cases The more abstract view on use case classes, rather than on single exemplary use cases gives certain advantages. By providing each class with its own name, this work offers a terminology that can be used to discuss use cases without having to refer to a concrete example. People who are familiar with the classification will then understand some of the implications immediately without knowing the concrete case. The abstract view can also be considered less prone to changes in technology and markets. In the hype about bots today or other technology-driven topics, research results can become obsolete very quickly. Applying such observation on this research, I would argue that such a statement is true for a single use case but to a much lesser degree to the use case classes. By abstracting from the single cases to more general classes the results become robust towards rapid changes in technology or adoption of specific systems.

Open classification This openness of the classification might indicate a limitation of this work. However, the goal was not to give an exhaustive account on all possible use

case classes. This might not even be possible, due to the huge number of bots that are already created. Like in other explorative research, the results of this work provide a starting point rather than some final explanation. The openness should therefore be considered an opportunity for future work on this topic. Examining further use cases can help to improve this classification and its schema, by extending them or making them more precise (e.g. by more formal definitions for each class).

Limitations in use case class descriptions Concerning the extent to which the use case classes are described and characterized there are limitations. As described in chapter 5.2.7 a detailed description of the use case classes could contain items like failure cases, system-in-use-stories or a list of stakeholders. However, only few of them were given for the classes. This is also an open space for improvement of the classification schema: by adding aspects that have fallen short during this research.

7.3 Should an Enterprise Use Chatbots?

Finally, I want to come back to the initial problem. What is the contribution of this work towards a solution for the initial decision problem:

'Should an enterprise that applies CRM make use of chatbots?'

In reflection I have to admit that the results of this work rather answered 'how' to make use of chatbots than 'if' one should do that at all. How did this work then contribute to an answer to the 'if' question? It lies not so much in the actual results but in the research as a whole:

(1) A large part of this thesis was dedicated to providing a basic understanding of bots, how and why they became so popular, what actors and forces are driving this development. Enterprise leaders should be aware that most of the large technology companies are investing heavily in this area.

(2) This work explored some of the relationships between bot and CRM. Some parts of bot technology already blends in perfectly and some companies report massive cost savings by using bots. Approaches for the introduction of bots in CRM were presented and expert opinions who state that it makes sense to start very low but aim high. Enterprise leaders should be aware that bots are already becoming a normal part of CRM automation and that their introduction is a long-term process.

(3) There is little indication for large scale adoption of bots by users. Many users have never even used bots. So it was deemed necessary to focus largely on the customers point of view on this topic to understand what makes users accept or abandon bots. One approach in this work was therefore to listen to the 'voice of the customer'. These methods were described in detail. The focus on value proposition for the customer stems from the same reasoning.

Enterprise leaders should be aware that providing a good user experience with bots is still largely terra incognita. The voice of the customer and value for the customer should be considered all the more.

(4) Finally, the actual results of this work give insight into the concrete application of bots in CRM. A wide range of possible use cases was presented. The prototype highlights the development process. Enterprise leaders should be aware that bot technologies and first good practices for design are available. Creating simple bots, integrated with the CRM system is a solved problem. Finally, there are a lot of innovative use case classes for bots available that each provide an opportunity for CRM.

A Full List of Use Cases by Name

ID	Name	Source
1	search website	[The18d]
2	newsletter via messenger	[The18d]
3	home automation, light switch	[The18d]
4	todo-list	[The18e]
5	Amazon price notification	[The18e]
6	onboarding	[Bru16b]
7	terminate contract (telco)	[The18a]
8	roaming notification and services	[The18a]
9	suggestions for movies or music	[The18a]
10	notifications about data volume or account balance	[The18a]
11	contract changes, changes of terms and conditions, moving a DSL contract	[The18a]
12	advertisement, offers and comparing offers	[The18a]
13	overview over own contracts, products and related services	[The18a]
14	getting technical help with a product	[The18a]
15	using a bot as a search engine	[The18a]
16	getting notifications about things of daily interest, like traffic, news or appointments	[The18a]
17	buying a product from home using voice	[The18a]
18	getting a recipe while cooking using voice	[The18a]
19	switching lights using voice at home	[The18a]
20	connecting directly to an appropriate service agent	[The18a]
21	buying a product through a dialog	[The18a]
22	compare distinct products	[The18a]
23	bot as objective, universal shopping adviser (especially for complex products)	[The18a]
24	informs about fluctuations of depot values	[The18e]
25	gives hints how to optimize financial products	[The18e]
26	informs about each movement on the bank account	[The18e]
27	connect to a service agent or provide telephone number	[The18e]
28	personalized voice mail box	[The18b]

ID	Name	Source
29	manage pre-paid mobile phone contract	[The18b]
30	get info about parcel under way	[The18b]
31	advisor for telephone contracts	[The18b]
32	connect to a service agent	[The18b]
33	Technical troubleshooting (phone)	[The18b]
34	QA for contracts	[The18b]
35	make appointment for repair	[The18b]
36	find service	[The18b]
37	witty easter egg answers	[The18b]
38	compare distinct products	[The18b]
39	additional answers about products on website	[The18b]
40	seamless information during whole buying process	[The18b]
41	mirror the conversational buying process with a real person	[The18b]
42	interactive search engine (e.g. for products)	[The18b]
43	interactive local navigation (e.g. for shops)	[The18b]
44	voice controlled satnav	[The18b]
45	topic filter before getting connected to a service agent	[The18b]
46	support bot	[The18e]
47	get WLAN Key	[The18e]
48	bot registry	[The18e]
49	super bot	[The18e]
50	StackOverflow bot	[The18e]
51	scientific search bot	[The18e]
52	internal services bot	[The18e]
53	local services	[The18e]
54	service bot in case of service breakdown	[The18f]
55	FAQ bot	[The18f]
56	local recommendations	[The18f]
57	local orders	[The18f]
58	register to platform services	[The18f]
59	self-service data quality	[The18f]

ID	Name	Source
60	portal onboarding	[The18f]
61	home automation	[The18g]
62	voice controlled satnav	[The18g]
63	car automation	[The18g]
64	travel bot	[The18g]
65	efficient search/filter for documents on a web portal	[The18c]
66	easy transition from trial to subscription	[The18c]
67	immediate inquiries about (firmware) updates	[The18c]
68	aide for finding interesting series/movies	[The18c]
69	immediate support when mobile app has problems	[The18c]
70	VPA as sat nav	[The18c]
71	time recording system	[The18d]
72	product QA bot	[The18c]
73	technical manual bot	[The18c]
74	social media brand, customer support	[Xu+17]
75	full web site mirror	[PS17]
76	live chat supporting FAQ bot	[Tho]
77	local tourist guide	[Awa+14]
78	conference information	[DHa+15]
79	human-like (multi-language) shopping assistant for e-commerce	[SNY17]
80	management (game) advisor	[APG09]
81	insurance customer service agent	[Jen11]
82	newspaper community relations	[Str16]
83	technical support for car	[AS17]
84	apartment match making	[Car17]
85	banking bot	[Car17]
86	premium hotel bot	[Car17]
87	restaurant bot	[Car17]
88	flower bot	[Kor17b]
89	buying movie ticket	[Pom17]

ID	Name	Source
90	ATM	[Pom17]
91	service for water companies	[She17a]
92	email service router	[Seo00]
93	money transaction (‘ChatPay Bot’)	[VD16]
94	credit card manager (‘American Express Bot’)	[VD16]
95	currency converter and alert	[VD16]
96	creditcard loyalty manager (‘Wally’)	[VD16]
97	bank bot	[VD16]
98	airtravel (‘BB Bot, KLM’)	[Ols16a]
99	bot driven restaurant	[Ols16b]
100	call a taxi/Uber	[Ols16b]
101	London public transport bot	[Sar17a]
102	Lily - customer service bot	[Ric01]
103	trial phase bank bot	[Eha17]
104	Summarize Bot	[Mac18]
105	appointment with medical doctor	[Mac18]
106	restaurant bot (‘Subway Bot’)	[Hei18]
107	food delivery (‘Allyouneedfresh.de’)	[Hei18]
108	shopping mall (‘Macy’s On Call’)	[Hei18]
109	gift finder/ advertisement (‘L’Oreal Gift Bot’)	[Hei18]
110	generic shop helper (‘Alibaba Dian Xiaomi’)	[Hei18]
111	autonomeous shopping bot	[She17b]
112	call to action	[Sav+16]
113	expert volunteer recruiting	[Flo+16]
114	guided micro-participation	[Flo+16]
115	crowd sourced service bot	[Cui+]
116	hotel bot	[LJ13]
117	gather student feedback (‘Hubert’)	[Hub17]
118	get money back (‘Do Not Pay’)	[BF17]
119	snacks and cabs (‘Niki’)	[BF17]
120	explore food (‘Heston Bot’)	[BF17]

ID	Name	Source
121	explore fashion (‘H&M’)	[BF17]
122	health care advice	[BF17]
123	weather service (‘Poncho’)	[FB17]
124	bank bot in app	[Kus17]
125	contact center	[Kus17]
126	search engine	[AA07]
127	yellow pages search	[AA07]
128	virtual museum guide	[AA07]
129	sales assistant bot	[Wit23]
130	ticket bot (‘StubHub’)	[Dal16]
131	flight bot (‘Skyscanner’)	[Dal16]
132	make appointments	[Bru17d]
133	product advisor	[Cha+01]
134	forms bot	[Bru16f]
135	scan business cards (‘cardIQ’)	[Bru16d]
136	troubleshooting	[Tho17]
137	letters to the president	[Bru16h]
138	news notifications (‘Harvard Business Review’)	[Bru16c]
139	news exploration (‘Purple Bot’)	[Bru16c]
140	IoT bot (‘Thington’)	[Bru16c]
141	personal bot	[Bru17c]
142	celebrity bot	[Bru16e]
143	service resolution (service)	[Bru16g]
144	group shopping	[Bru16g]
145	messenger routing bot	[Bru16a]
146	vacation bot	[She17c]
147	configure car to explore	[Lei17]
148	configure car to buy	[Lei17]

B Use Case Classification Schema 3 with Value Proposition

ID	Name	Goals	Users Needs/ Pains	Value Proposition
C6	onboarding to a service	onboarding	easy access to a new service, learn what the portal offers, complex portal with many offers	acquire necessary data to setup a new account; provide assistance to the user to make use of the service immediately, low learning curve
C9	make suggestions for entertainment	next entertaining media	explore and get new content when last media ends	suggestions right on time, large knowledge base, personal advice based on last preferences
C12	advise about products	find best matching product, understand complex products	too many offers, independent advice, knowledge gap about complex products, easy-to-use, understand alternatives, advice for gifts	filter large number of offers, independent service, huge product knowledge, actively ask relevant questions to provide suggestions, compare products, link to ecommerce
C15	search the web	find specific web content	navigation overload on some web sites, quick, reliable, Google offers links - not content, enhance search engine	immediate, efficient, content by intent, site search, contextual, personal, interactive, based on effective web search, channel-depended
C20	route to a person	find the right contact person immediately	get additional help beyond the bot, meaningful categories who can help, do not explain the case more than once	escalate bot conversation to human, keep/pass context
C21	serve as sales assistant	discuss products, buy the right thing	full-service in natural conversation, quick, hassle-free, avoid long product-specs	single interface, interactive guide through the whole buying process, simply choose and buy
C34	answer questions	immediate answer to 'unusual questions', understand topic	ask anything, anytime, quick, informative, avoid long FAQs	knowledgable, slim interface
C56	connect consumer and provider	find matching offers, find matching customers	explore wide market with small or niche vendors, immediate service, instant answer, direct connection to vendor/customer, single interface, easy-to-use	high-quality leads for vendors, route interested customers to vendors, services for vendors/customers, full search on marketplace, payment services
C78	serve as local guide	access and additional information to area or event	easy to get lost, dense environment with many options, immediate answer, no information service in sight, additional/ in-depth information, no time to explore everything by oneself	maps, guide/recommendations, search for people/places/events, schedule, knowledge base, related services
C112	call people to action	support a project as volunteer, long term participation	loosing track of interesting projects, want to participate occasionally - but not constantly,	contact and inform experts/potential volunteers, match message contents to recipient
C132	make appointments	fix appointment	hassle-free, difficult to agree upon free date/time especially with many participants	fix appointment for all participants based on calendars and preferences
C136	provide technical support	solve (technical) problem	understand my problem (diagnoses), quick reply, empathic, helpful response, help from expert,	stepwise refine the problem and suggest solution, understand underlying logic, empathic and guiding helper, access to full technical data/manual

ID	Name	Goals	Users Needs/ Pains	Value Proposition
C137	record letters	give feedback	reach person/organisation easily, anytime	automated channel but actual message read by human, channel operated by either bot or human, multiple channels possible
C142	represent a person	interact with famous/interesting person	personal style of interaction, difficult to reach 'in person', information about person distributed over several channels	conversation about the person in a very personal style, available on popular channels,
C117	gather feedback	get feedback	quick, comfortable	more interactive than form, ask feedback questions
C111	serve as shopping agent	acquire product w/o action	find best/cheapest product, not always online to check oneself and follow best prices	highly personalized to preferences, simplify ordering process, notify about interesting offers, buy autonomously
C89	order instantly	buy usual product	convenience, immediate, no-frills, no channel switch	self-service, (shopping cart), payment, product selection, (product access)
C13	manage account	manage account, see options and services	too complex services, different services in one account	single point of entry, self-service, single interface, available over different platforms, 24/7
C120	explore a topic	create interest for a topic, learn about a topic	missing inspiration - looking for something new, entertainment, not read too much	game-like interaction, short stories/snippets, journey through topic, provide suggestions for things to do
C148	configure a product	configure a product to buy	rather informal than on a website, price information, hassle-free, pause and continue	guided process, make offers based on current state when pausing, keep in messenger,

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Heidelberg, 12.07.2018, Jens Thenent