Chatbots – An Interactive Technology for Personalized Communication, Transactions and Services

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CHATBOTS – AN INTERACTIVE TECHNOLOGY FOR PERSONALIZED COMMUNICATION, TRANSACTIONS AND SERVICES

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ABSTRACT

Chatbots as a new information, communication and transaction channel enable businesses to reach their target audience through messenger apps like Facebook, WhatsApp or WeChat. Compared to traditional chats, chatbots are not handled by human persons, but software is leading through conversations. Latest chatbots developments in customer services and sales are remarkable. However, in the field of public transport, little research has been published on chatbots so far. With chatbots, passengers find out timetables, buy tickets and have a personal, digital travel advisor providing real-time and context-relevant information about trips. Chatbots collect and provide different data about users and their journey in public transportation systems. They include travel, product, service and content preferences, usage patterns, demographic and location-based data. Chatbots have many advantages for both companies and mobile users. They enable new user touch points, improve convenience, reduce service, sales and support costs, one-to-one marketing, new data collections and deep learning. Using chatbots, smartphone users can reach a company anytime and anywhere. The questioned users of an investigated prototype are remarkably open to new mobile services and they quickly adapt to this technology.

1. INTRODUCTION

1.1 The Rise of Chatbots

The number and variety of chatbots strongly increased in the last couple of years. In April 2017, more than 100'000 chatbots are available in the Facebook messenger only (see Figure 1a), and the potential global annual revenue generated by chatbot transactions is estimated up to 32 billion US Dollars (in Figure 1b).
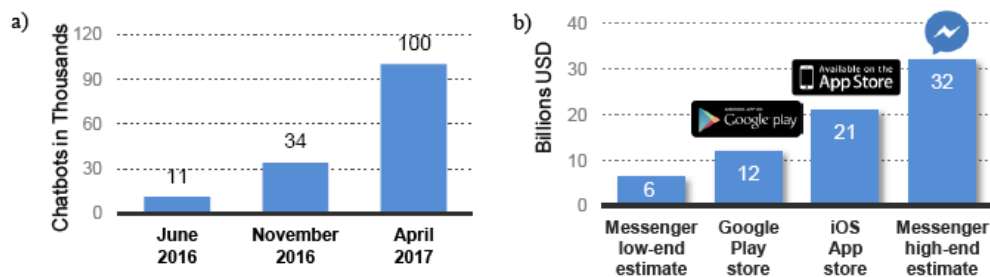

Figure 1. a) Number of chatbots in Facebook messenger and b) Potential global annual revenue of chatbots transactions
(Source Data: a) Facebook 2017 b) Business Insider 2017)

However, chatbots as a personal, interactive and disruptive information, communication and transaction channel not only generate high revenues, they also reduce costs: The potential annual salary savings created by chatbots is estimated to 12 billion US Dollars in insurance sale, 15 billion for financial services and sales representatives and 23 billion for common customer service personnel in the US (Business Insider 2017b).

1.2 Outline and Research Method

To better understand the use, importance and the challenges of chatbots in public transport, this research paper is divided into four sections: After a motivating introduction, the term chatbot is defined and its technical functioning explained in **section 2**. **Section 3** outlines the benefits and challenges of chatbots. In the main **section 4**, the research results of chatbots in the public transport sector are presented. The empirical study was separated in two surveys: The first one focused on 134 customers in the public transport sector and asked about their general preferences and habits of querying timetable and buying tickets. Moreover, questions about the values of a digital travel advisor including personalized information and offers were asked. In the second survey, 84 test users of a prototype were asked about their experiences with the new chatbot. Furthermore, the potential for a travel advisor of a public train company was evaluated. Finally, **section 5** shows new opportunities for cross- and up-selling-activities, gives a conclusion and an outlook.

2. THE USE OF CHATBOTS

2.1 Definition

The word "chatbot" consists of the terms "chat" and "robot". Originally, the term chatbot was used for a computer program, which *simulates human language with the aid of a text-based dialogue system.* Chatbots contain a text input and output mask, which allows mobile users to communicate with the software behind them, giving them the feeling of chatting with a real person (Wang & Petrina 2013).

Since the introduction of smartphones and mobile applications, shortly apps, the term chatbot is mostly used for *messenger apps* rather than for pure computer programs (Atwell & Bayan 2015).

2.2 Operating Mode of Chatbots

Generally, chatbots have quite similar technologies and architectures. Figure 2 shows the technical process of a chatbot, when a mobile user makes a request until the appropriate answer is sent by the chatbot.
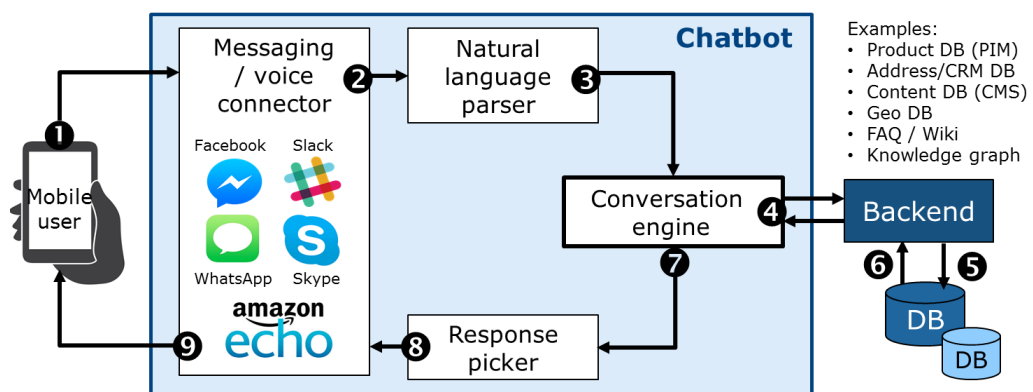

Figure 2. Operating mode of chatbots (Source: Following Weidnauer 2016)

The process starts with a *user's request* (see step 1 in figure 2) using a messenger app like Facebook, Slack, WhatsApp, WeChat or Skype, or an app using text or speech input (e.g. Amazon Echo in step 2). The user request is recorded by a so-called *Natural Language Parser* (NLP; 3) and is translated into the programming language of the conversation engine. Following, the *conservation engine* analyses the question and redirects it to the backend (4). The *backend* is connected to one or several databases (DB) or information systems (IS), which give the request to the corresponding query. The answers are may retrieved from following DBs or IS:
- Product information management system (PIM)
- Content management system (CMS), blogs, intranets or wikis
- Customer relationship management system (CRM) or address DB
- Enterprise resource planning system (ERP)

- Core banking or (health) insurance system
- Geographical data, public data or statistics and (local, national or international) open data
- Knowledge graphs from search engines a social media
- Data warehouse (DWH), business intelligence (BI), big data or another information system.

In the BLS case study discussed later on, the chatbot app is connected to destination information and ticket booking systems of the railway company.

The chatbot matches the given question with the database(s) in the backend (step 5 in figure 2). Once the appropriate result is retrieved from the backend (6), the conversion engine forwards it to the *response picker* (7). In the last step, the answer, which is still in the programming language of the chatbot, is translated into the natural language of the user and is sent to the user interface (see step 8; Dempt 2016, Weidnauer 2016).

Chatbots and language parsers use semantic patterns and keywords to analyze the requests of users and to edit them as accurately as possible. By matching databases stored in the backend, chatbots recognize patterns or regularities and combine them. This process is also called *machine learning*. In addition, some chatbots use the technique of *deep learning*, a subcategory of machine learning.

The chatbot starts with the analysis of the main core themes and then goes into the depth of the topic. If the user starts the conversation with a question, the chatbot first tries to analyze the main topic and then uses the funnel principle to narrow down the topic more closely (Dempt 2016). Software tries to understand the text of the user by regular and data-driven semantic procedures. *Rule-based methods* attempt to recognize data expressions automatically. *Data-oriented methods* work similarly to content analysis of qualitative social research. Deductive categories are built in advance and then the texts of the users are coded using these categories to assign them quickly to the related topics (Trendone 2016).

2.3 Language of a Chatbots

For communication, chatbots are used since the 1960ies, when Weizenbaum (1966) developed the very first chatbot system for psychiatric reasons. Following, social, psychological and behavioural impact factors and findings on communication between users and chatbots are summarized.

1. **The chatbot as a team member**: Human people trust the chatbot more when they perceive it as *a team member*, rather than a technical device. If bots use partnership-oriented presentations and communicate in a *similar manner* as their users, information is considered as more credible (Reeves & Nass 1996).

2. **Scope of the messages**: People expect certain *courtesy* of the computer or software like a chatbot. That means, users do not expect their answers to be listed in bullet points and they do not want to be burdened with too much information. Ideally, the chatbot should accurately reflect the required information in a *polite manner*. For this, it is important that the chatbot identifies and knows the returning user over time and learns from previous conversations and search queries (Reeves & Nass 1996).

3. **Personality traits**: Studies have shown that the way a person expresses himself and the wording a person uses depends on the level of *extroversion* (Braun 2003). Dominant, extroverted personalities need much more adverbs and adjectives and they speak in the first-person plural more often than introverted persons (see Gill & Oberlander 2002). Furthermore, most people prefer communication partners with *similar personality traits*. This is often the case, if people assess their own personality traits as disruptive, unique or special. Using similar personality traits, users can better assess their counterparts, and information has usually been rated as better and more trustworthy (Braun 2003). If these research results are applied to the design of computer programs like chatbots, a chatbot should adapt its wording to the personality type of a user. Therefore, the chatbot has to find out the user's personality during the conversation using special language codes and then *adapt his personality to the user using a specified wording*.

Another option to solve the personality problem is that a user can *choose the personality of the chatbot*. Starting or using a chatbot, the chatbot may introduce different personalities and then the user can choose his preferred chatbot personality (Laurel 1997).

4. **Specialists vs. generalists**: As research shows, users perceive an answer of a specialist as more credible than a generalist's ones. Thus, it is generally recommended that chatbots offer different characters for different topics and *chatbots should communicate like experts* (Braun 2003). Therefore, natural language output of chatbots should be formulated in a professional and expertise manner with human traits.

5. **Gender stereotypes**: Different gender stereotypes are described in psychology and sociology literature. These sex stereotypes can also be considered in computer software or avatars like chatbots. For example, in rather technical inquiries, users show much *more confidence in a male chatbot* than in a female chatbot (Reeves & Nass, 1996). In contrast, for service requests in customer support centres or hotlines, customers except rather female supporters. Therefore, chatbots in the service, tourism, transport, fashion and beauty industry may appear and interact like a woman. However, to develop gender correct chatbots in future, more research should focus on the influence and user expectations of gender characteristics in Human Computer Interactions (HCI) like chatbots.

6. **Credibility**: If chatbots provide *wrong or inadequate answers* to users or if they repeatedly ask the same questions, they lose credibility. Users will soon break off the communication and they not use the chatbot anymore, if chatbots cannot answer the asked question or solve the user's problem. In addition, users *expect the chatbot to learn from previous conversations* and chatbot should not ask redundant questions every time (Braun 2003).

7. **Emotions**: Finally, chatbots are seen as more credible, if they express adequate emotions. Especially, bots should show *positive emotions* like joy, gentleness and happiness to strengthen the engagement and relationship between the user and the chatbot. In addition, a chatbot should show a *minimal level of empathy*, behave situational and caring. Ideally, chatbots can do small talk and entertainment. The same applies for the reaction time: It is more credible if a chatbot does *not always respond immediately*, but also integrates certain pauses as it is natural with human beings (Reeves & Nass 1996).

2.4 Application Fields of Chatbots

The fields of applications of chatbots are manifold (compare figure 3): Very popular are *calendar assistants* (chatbots like X.ai, Rhonda) and *chatbots for reserving or purchasing event tickets* (e.g. Morph.ai).

Searching and buying products online using chatbots are popular too (e.g. H&M, chatShopper, eBay). Moreover, 58% of the asked users are using chatbots for *booking hotels, trips and flights* (e.g. KLM, Swiss, Austrian Airline chatbot). This paper focuses on this kind of chatbots used for **searching and booking train trips** in the public sector.

Other fields are chatbots for *news* (e.g. CNN, NBC & BBC News chatbot in the Facebook messenger), weather (e.g. Hi Puncho), traffic (e.g. Traffic News & Traffic Jam) and financial chatbots (e.g. Trading Bot). Last but not least, many chatbots are used for *customer and delivery services*.
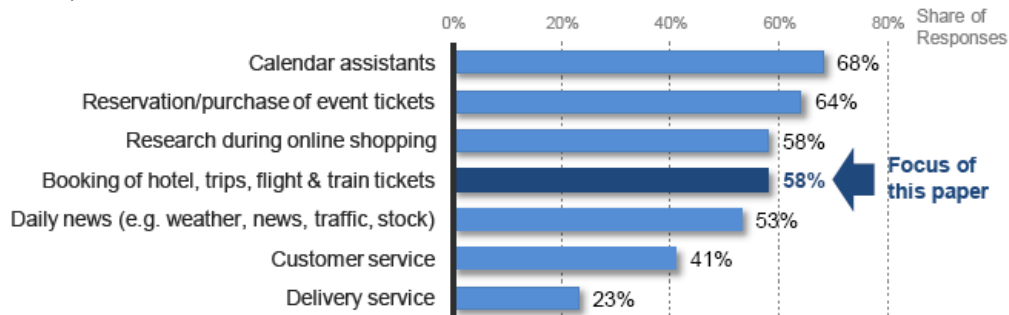

Figure 3. Fields of applications of chatbots (Source: Statista 2017b)

3. BENEFITS AND CHALLENGES OF CHATBOTS

3.1 Strengths and Benefits of Chatbots

Chatbots have two different type of consequences for companies: On the one hand, chatbots change the way of informing, communicating and transacting between the company and its customers or other external stakeholders. On the other hand, internal chatbots may strongly influence and change the future organization, communication and collaboration within the company.

Thanks to messenger apps and chatbots, most businesses have new ways to interact with their customers through *one-to-one communication*. Users usually use the messenger apps for private purposes among friends and colleagues. Companies have now the chance to enter this private communication channel for businesses. Using chatbots, consumers and businesses can communicate *24 hours day, 7 days the week*, independent of working or opening hours. Companies can save on personnel costs in customer services and do not take the risk that they cannot be reached outside their business hours, and they do not miss customers' requests.

Looking at the collection of user and usage data, the use of chatbots leads to new potentials for providers. Companies get to know their customers and their preferences in a new way. In many cases, users link their social media profiles with their messenger profiles, therefore

companies have direct access to *user interests, responses and profiles*. If this is not the case, a chatbot can collect necessary information or questions during the dialog with users. In addition, the chatbot stores individual user preferences based on the users' requests, purchase history and other activities. These new data collections give companies the opportunity to address their customers in a relevant manner and *customized offers can be targeted directly and personally to users*.

Chatbots allow customers to get in contact with companies whenever they want so, without paying attention to *time zones, opening times and waiting loops of call and service centres*. Chatbots are very promising for international and digital companies like online retailers or web shops. Customers sometimes buy products in different countries and they do not want to be dependent to local time zone or foreign languages. A further advantage is one-to-one communication. So far, users often *must search and browse a website for a long time* to find the right information like product, price, service or contact information. In the case of complaints or other customer service inquiries, chatbots are helpful, straight-forward and efficient.

In a best-case scenario, the chatbot knows its users like a good friend and offers them appropriate offers, solutions and services at the right time. Depending on the permissions the user gives to the chatbot, he will be informed automatically and proactively on specific inquiries and demands. In public transport, the chatbot as a travel companion is a promising service compared to other ones. In future, customers can automatically be informed by *push notifications* about delays and other relevant information directly on users' mobile phone.

Apart from communication and transactions with clients, chatbots offer new potentials within the firm. For example, chatbots are used for *supporting and training purposes for employees*. Another example is the digital onboarding of new staff members. Instead of long onboarding processes of colleagues, chatbots take over the introduction of new team members, internal communication, standard processes and tasks.

3.2 Weaknesses and Threats of Chatbots

In contrast to the many benefits of chatbots, researchers, developers and providers of chatbots may be aware of the disadvantages and risks of the new technologies and applications. Today, customers are very *familiar* to receive or formal information from companies using *(mobile) phones, newsletters, e-mails, apps or websites*. Messengers are mainly used for private communication among family, friends and colleagues.

However, companies should be aware that customers are used to other communication channels and that it will therefore *take some time to adapt* before getting used to new communication and buying methods. In a transition phase, most classical (offline and online) channels still must be provided and the customers should be motivated and incentivized to use new technologies and tools. It is important that companies can be found in messenger apps like Facebook or, in the case of standalone apps, in the app store of Apple and Google.

Another important topic for both providers and users is *data protection*. If companies offer a stand-alone chatbot app, they are responsible for protecting and handling customer data adequately.

However, if companies offer their chatbot on a third-party platform, data are also sent to operators and platforms like Facebook, WhatsApp, Slack or WeChat. Chatbot developers and operators should ensure both data privacy and data protection. When it comes to registration

and payment processes, where personal, sensitive or financial data are insert, data protection is crucial. Communicating with customers, companies try to collect as much data as possible, to store and use them for further business and marketing reasons. Users need to be aware that providers of chatbots and messenger platforms will *collect personal data*.

Furthermore, consumers may fear that they will miss other relevant offers because of personalized offers are preselected only. Table 1 summarizes important strengths, opportunities and risks of chatbots.

Table 1. Advantages and risks of chatbots for providers and users

	Strengths & Opportunities	Weaknesses & Risks
For providers/ companies	- 24/7 customer service (anytime/anywhere) - New & direct customer contact points - New method & types of data collection - High amount of personal user/usage data - Personalization & automation of communication - Reduction of service & support costs	- Malfunctioning chatbots & unanswered questions - Investments in IT infrastructure & chatbot tools - Extension of IT & analytics architectures - Lack of awareness & acceptance by users - Information security & data protection - Image & reputation risks
For users/ customers	- 24/7 customer services & support - One-to-one communication on personal device - High convenience & ease of use - Time- & cost-savings - Reduction on relevant information & services - Relevant offers based on user preferences	- Privacy - Data protection of personal & sensitive data - Lack of experience & understanding - Biased personalized information - Artificial/non-human conversation - Social isolation & ethical concerns

4. RESEARCH RESULTS ON CHATBOTS IN PUBLIC TRANSPORT

4.1 The New Chatbot of the Swiss Railway Company BLS

Since the begin of April 2017, the chatbot of the Swiss Railway Company BLS is publicly available in the Apple app store. An Android version in Google play is available too. Previously, the chatbot discussed in this research paper was treated as a prototype and was available for internal developing and testing only.

The first chatbot version of BLS allows its users to *buy individual railway tickets*, day tickets in Switzerland and additional tickets in the BLS tariff area. Furthermore, it offers the possibility to simple *query the timetable of all trains.* The user can request both core functions by chatting with the chatbot within the native app.

Unfortunately, the conversation with the chatbot is quite static now. The customers cannot enter free text, but choose from given response options only. Furthermore, the chatbot is not yet functioning as a permanent travel advisor. In future, the chatbot will be able to process free, imitated conversations by the user and provide regular information on travel histories or other travel-related offers like a travel companion.

4.2 Methods of Ticket Purchases and Experience with Chatbots

In the first survey, following question asked was asked to 134 participants: "Which method do you currently use most frequently to buy your tickets?". The responses showed that almost every second customer still is using the ticket machine to purchase tickets and *43% are using an app to buy tickets* (compare Figure 4a).
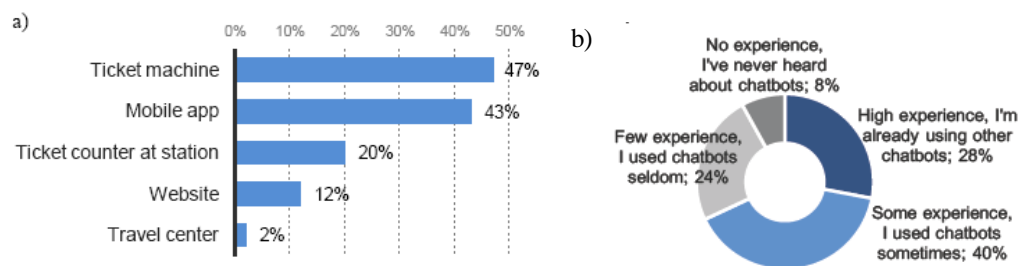

Figure 4. a) Methods of ticket purchase in public transport and b) experience with chatbots (n=134)

However, every fifth passenger still uses the ticket counter at the train station, where they have personal contact with a sales and service staff member.

To purchase train tickets, the *website is used by 12%* of the customers only. Obviously, today passengers are used to use apps before, during or after their journey. In the last years, websites as point of sales lost in importance in public transports. Finally, travel centres are also very seldom visited to purchase tickets (2%).

The results show that ticket machines, which are available at every train stations, and apps are the both most widely used methods to buy tickets. Digital channels as the (mobile) website, which are mostly used at home or at the office, are less and less used for buying tickets.

Secondly, in the participants of survey were asked, if they are familiar with chatbots or if these applications are (completely) new to them. Surprisingly, figure 4b shows that most *participants already know chatbots:* 28% of the "high experienced" respondents are using chatbots in other application fields. 40% have at least some experience and used chatbots sometimes. 24% have few experience with chatbots and did not used them often. 8% of the users had never heard about the term "chatbot". These responses show that chatbots are not completely new to customers, but this type of applications is already popular.

The answers of this study confirm the results of the literature: Chatbots are not new to most of people, but just a minority is using them regularly and intensively. Furthermore, literature research shows that chatbots *generally get great acceptance from most users*. Regarding the survey, it is certainly helpful for many mobile users that they are already familiar with chatbots.

However, many mobile users still must learn and adapt to this information and communication system. Public transport customer – and mobile user in general – must adapt their habits, their searching and buying behaviour to chatbots, which takes some time, learning, practical and communication efforts.

4.3 Digital Services and real-time Information in Public Transport

Considering the registration and starting process of the BLS chatbot, the test users were happy: 80% were (very) satisfied (in figure 5a). The timetable and ticket access provided by the bot also have seen as positive and there was no problem with the payment process. However, the payment process and especially the ticket offering was or will be improved in a further version of the chatbot. In future, a chatbot in public transport will serve as a travel advisor, as a *digital personal consultant*. To find out whether the users would like travel support, the participants were asked whether they want real-time information during the trip, such as delays or transfers. Figure 5b shows that customers answered very united to this question: *84% of mobile users always want real-time information and updates* about their trips. 12% of the respondents would like to receive information only if they explicitly ask for it, and 4% have indicated that they do not want to receive real-time information at all. One reason for this high consensus: Many customers are used to receive order or delivery status information, for instance e-mail or SMS notifications about a customers' mail, parcel or product.

After completing the payment process, BLS customers are asked whether they wish to be informed by e-mail, SMS or by a push notification in mobile apps, for instance in the case of *train delays, next connections or changes of the rail track*. The chatbot will provide real-time and relevant information to its user in the form of chat messages. This means that the customer does not have to enter his e-mail address or phone number, but gets the information directly from the chatbot as a *push notification* to the mobile.

The comparison with other providers and the detailed analysis of the prototype showed that the chatbot should not provide timetables and tickets only, but also serves as a personal travel companion, as a *robotic adviser providing context- and location-based information during a customer journey in public transport*.
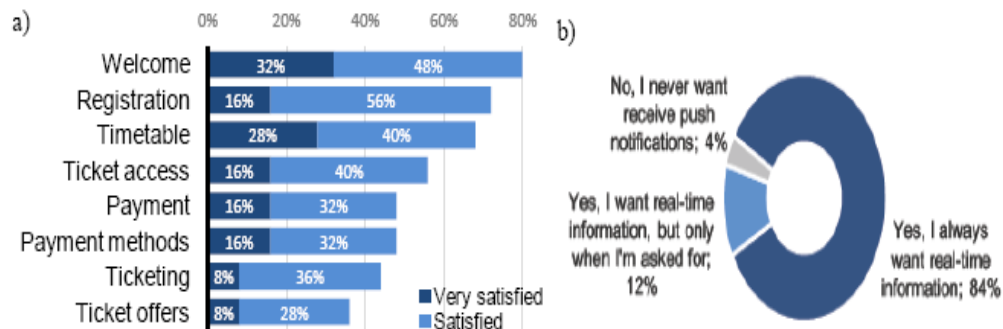

Figure 5. a) User satisfaction with the BLS chatbot and b) demand for real-time travel information (n=84)

4.4 Future Usage of Chatbots in Transportation

Users will continue to use a chatbot prototype only, if she/he is satisfied after an initial test phase and if the new solution provides high customer (added) value. Therefore, the

participants were asked at the end of the online survey, whether they will continue to use the chatbot for buying tickets or for timetable information.

The answers in Figure 6a show that the chatbot prototype has convinced many, but not all users: *40% of respondents would continue to use it*. In contrast, 48% are not quite sure and probably prefer other methods. 12% will switch back to the previous method of searching trains and buying tickets (using an app or the ticket machines at the station). Considering the answers of the previous questions, this result was not surprising. On the one hand, the users miss the entry of different ticket preferences and on the other hand, the chatbot do not offer all kind of tickets available. Since chatbots like the BLS prototype still have functional or technical burdens and they still are in their infancy, many users will not (yet) use the chatbot regularly. At the same time, the chatbot hast to be improved and extended so that customers can use it for all inquiries and receive value.
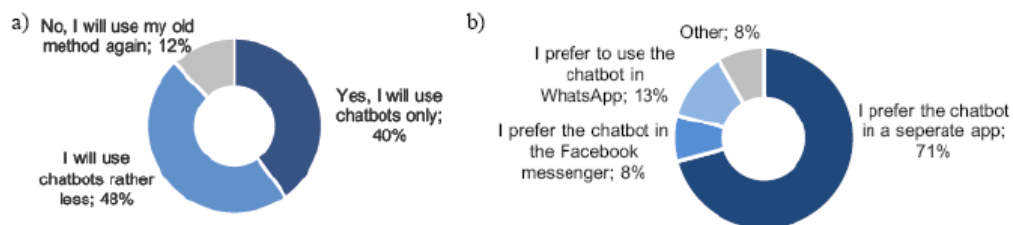

Figure 6. a) Future usage of chatbots in transportation and b) chatbots in apps or in messengers (n=84)

A chatbot can be provided as a standalone app or as an integration into a messenger app like the Facebook messenger, WhatsApp or Slack. Therefore, respondents were asked if they prefer to use the chatbot as a separate app or as a chatbot in a common messenger. Figure 6b shows that users have a clear opinion to the this question: *71% prefer the chatbot as a stand-alone app*. 13% of the participants wish to integrate it into WhatsApp and 8% prefer an integration in the Facebook messenger, probably for privacy reasons.

This results differ from literature research. This states that the trend goes to messenger apps like Facebook messenger or WhatsApp, and away from apps. In most European (national or local) public and private transport systems, customers are used to use a *mobile app to looking for time tables and to buying the next flight, train, metro or bus ticket*, often displayed in the wallet of the iPhone or Android mobile phone.

5. CONCLUSIONS AND OUTLOOK

5.1 New Opportunities for Cross-selling Activities in Public Transport

In chapter three and four, a chatbot concept and prototype as personal travel assistant was introduced as well as first feedback of its users. This section shows further possibilities and concludes with an outlook.

In future, the chatbot as travel advisor will exceed standard services and these concepts will be adapted from other industries and organisations, and developed further.

Since a chatbot system (might) knows the journeys, preferences regarding food and beverages and other consumer goods or activities of its users, it might offer additional vouchers or special offers from existing or future partners of the public transport company. Supplemental value added services may, which are promoted by chatbots, may cover following four areas of public transport.

1. **Restaurant, cafes, takeaways at railway stations**: Using chatbots, food and drinks should be offered and served before, during or immediately after the trip of a passenger.

2. **Shopping in or near the railway stations**: Station near stores could digitally and automatically provide product and service offers for travel necessities or food.

3. **Permanent events and touristic information about cities and areas**: Chatbots could provide cultural and touristic information about museums, opera houses, theatres, permanent exhibitions, cinemas, concert or opera halls, sightseeing services, etc.

4. **Temporary events in the cities and area**: Chatbots may inform interested customers location-based on trade fairs, markets (e.g. Christmas market December), sport events, cultural or music events, temporary art or other exhibitions, folk festivals, restaurants and cafes in the cities, etc.

Today, conventional communication and transaction channels do not offer this kind of additional services, but chatbot and smart apps could integrate these possibilities and benefits. For special offers provided by chatbots, it is may recommended to limit the vouchers to time-periods, to certain places and to relevant target groups or responding individuals.

In many countries, cooperations between public (or private) transport companies and other industries do not exist yet. Organisations of public transport may use this cross-industry offers potential to get valuable new partners, to motivate customers to use chatbots (apps) and incentive passengers to take the public train or bus.

Public transport organisations may benefit from its cooperation with other partners from the consumer and service industry. Probably, transport companies will negotiate for provision based compensation of their products and services provided by chatbots and apps. Other industries, such as coffee shops, restaurants, shops, supermarkets, leisure activities and others, will win an additional sales channel which will be mostly supervised by a transport company. In this case, third party industries and companies do not need additional sales teams, but win another attractive and profitable sales channel in order to reach the target audience.

Additionally, chatbots of public transport may avoid the usage of apps and websites from other industries, if it integrates many further products and services. In this case, chatbot systems can benefit from their data and knowledge about the user. Chatbot and artificial intelligence systems should learn the preferences of its users as much detailed as possible to provide the right information to the right user at the right time.

5.2 Chatbots as Replacement for other Communication Methods

Today, thousands of organizations – like the Swiss Railways companies BLS and SBB – are developing, testing and providing chatbots for mobile smartphones. In future, chatbots can complement or even replace traditional information, communication and sales channels like newsletters, websites, sales desks or hotlines.

With chatbots, both companies and users can initially, directly and personally contact at anytime and anywhere, what is not possible in this way with traditional channels like websites, newsletter or hotlines.

In addition, chatbots can communicate context- and location-based to prospects and existing customers and allow personalization as well as one-to-one marketing (for a summary, see table 2).

Table 2. Chatbots versus traditional communication channels

	Chatbot	**Website**	**Social Media**	**App**	**Hotline**	**Newsletter**
Contacting by companies	+	− −	++	+	+	++
Contacting by users or customers	++	+	+	+	++	− −
Customer service outside the service hour:	++	++	−	−	− −	− −
Communication to new customers (acquisition)	−	++	+	−	+	− −
Communication to customers (retention)	++	+	++	+	+	++
Communication among users	+	−	++	+	− −	− −
Machine/deep learning (Artificial Intelligence)	++	−	+	+	− −	− −
Personalization / 1-to-1 marketing	++	+	+	+	++	+
Context-/location-based services	++	−	+	++	− −	− −

Legend: ++ strength + possible − difficult − − weakness (not possible)

However, it must be ensured in digital marketing and digital business that chatbots can understand and edit most of user requests without human help. If this is not possible, a customer consultant should be available in the background to service the customer. In future, native apps and (mobile) websites will continue to exists, despite the rise of chatbots. Some of the app features and functionalities probably will be replaced by chatbots and other intelligent assistants like Siri or Amazon Echo.

However, a replacement of apps, websites and web shops cannot be observed so far. Most users are still used and bound to conventional communication and transactional channels like mobile apps and websites. This setting will probably continue for a couple of years. Since current chatbots still are not able to adequately cover all features, chatbot technologies and their applications should be developed and improved by researchers, by the software industry and by digital businesses. The same applies to social media channels: They offer many functions that chatbots currently do not cover yet and it is questionable whether they will provide them in near future. Thus, corporate social media and chatbots will co-exist and used by digital users.

Nevertheless, chatbots and their markets are rising, new fields of applications and usages are growing fast. Companies and researchers must invest, test and develop chatbots further. Chatbots are next generation intelligent information and communication systems which (will) make our lives easier and more convenient.

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