Online Vehicle Sales: Use Cases for Intelligent Virtual Agents along the Customer Journey in the Automotive Industry

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Dissertation submitted in partial fulfilment of requirements for the MSc in Management with specialisation in Strategic Marketing, at the Universidade Católica Portuguesa, 4th of January 2022

Abstract

Title: Online Vehicle Sales: Use Cases for Intelligent Virtual Agents along the Customer Journey in the Automotive Industry

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Artificial intelligence (AI) comes in multiple forms and is rapidly disrupting various businesses and industries. While OEMs are demonstrating their ability to innovate and use artificial intelligence in areas such as smart mobility, production improvements, and logistics, there is still a lack of innovative technology use in the automotive customer journey. Consequently, the traditional vehicle purchase is frequently perceived as outdated and inferior, especially among younger customers. In this context, the strategic use of intelligent virtual agents (IVA) at different customer touchpoints represents a promising opportunity to strive for a superior customer experience.

The aim of this paper is to present use cases for IVAs along the customer journey in the automotive industry and to prioritise them according to their usage potential. To obtain a holistic view, the assessment is made from two perspectives: that of the customer by the online survey and that of the company by expert interviews. Based on this analysis, key enablers and bottlenecks for a successful deployment of intelligent virtual agents are obtained.

The findings revealed that IVA use cases functioning as recommendation systems in the vehicle configuration phase achieve the greatest priority among the use cases presented. Moreover, there are strong synergies between three cases that together represent a tremendous pool of value: product recommendation, scheduling appointments, and transfer to human agent. To leverage the full potential of IVAs, OEMs and dealers are encouraged to create a heterogeneous data ecosystem with a particular emphasis on data security to enable a seamless customer journey.

Keywords: Digital Transformation, Intelligent Virtual Agents, Artificial Intelligence, Customer Journey, Customer Experience, Online Vehicle Sales, Automotive Industry.

Resumo

Título: Vendas Online de Veículos: Casos de Utilização para Agentes Virtuais Inteligentes ao longo da Jornada do Consumidor na Indústria Automóvel

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A Inteligência Artificial está rapidamente a infiltrar-se em vários negócios e indústrias. Embora os fabricantes de equipamento original demonstrem a sua capacidade em inovar e utilizar inteligência artificial em áreas como a mobilidade inteligente e melhorias de produção, existe ainda falta de tecnologia inovadora na jornada automóvel do cliente. Como resultado, a compra de um veículo é frequentemente interpretada como algo desatualizado. Neste contexto, dos agentes virtuais inteligentes representa uma oportunidade promissora para proporcionar uma melhor experiência ao cliente.

O objetivo deste documento consiste em apresentar casos de utilização para agentes virtuais inteligentes ao longo da jornada do consumidor na indústria automóvel e priorizá-los de acordo com o seu potencial uso. A avaliação é realizada a partir de duas perspetivas: a do cliente, através de um inquérito online, e a da empresa, através das entrevistas com especialistas. Com base nesta análise, derivam os principais fatores de capacitação e de fundação para uma implementação bem-sucedida de agentes virtuais inteligentes.

Os resultados revelaram que os casos de utilização de agentes virtuais inteligentes que funcionam como sistemas de recomendação na fase de configuração do veículo alcançam a prioridade mais elevada. Além disso, existem sinergias fortes entre três casos que, em conjunto, representam um conjunto de enorme valor: recomendação de produto, agendamentos de marcações e transferência para agente humano. Os fabricantes de equipamento original e os revendedores são encorajados a criar um ecossistema de dados com uma ênfase particular na segurança de dados, de modo a permitir uma jornada do cliente sem costura.

Palavras-chave: Transformação Digital, Agentes Virtuais Inteligentes, Inteligência Artificial, Jornada do Consumidor, Experiência do Consumidor, Vendas Online de Veículos, Indústria Automóvel.

Acknowledgements

With this thesis, my academic journey is about to come to an end and it is time to thank the people who have been involved in the final step of this chapter.

First of all, I want to express my gratitude to my supervisor André Pinho for his guidance throughout the process of this dissertation. You have always been there for me and I highly appreciate your dedication and support along the journey. Muito obrigado pelo apoio e motivação!

I would also like to thank all the participants in my survey for their cooperation. Their answers are largely responsible for the results of this thesis. In addition, I would like to thank my interview partners who agreed to participate in these interviews and willingly drive to contribute valuable insights to this work.

Moreover, I would like to congratulate all my friends for their achievements and thank them for making these 1.5 years of studying in beautiful Lisbon one of the best times in my life.

Zu guter Letzt, vielen Dank an meine Familie & an meinen Freund. Ich bin sehr dankbar, dass ihr mich bedingungslos bei allem unterstützt und immer hinter mir steht. Danke für alles!

Thank you. Obrigada. Danke.

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1. Introduction

The digital age makes identifying the right way for companies to engage and retain customers extremely complex. Customers expect brands to connect with them through their channel of choice, at the time of their choosing, and to resolve their issues or respond as soon as possible. The demand to deliver content-rich and personalised content, products and services is therefore greater than ever. Furthermore, today's emerging technologies are fundamentally reshaping the way customers interact and engage, creating an entirely new set of expectations that are forcing companies to change how they provide their services and product offering as they strive for superior customer experience.

In comparison, the traditional vehicle purchase is still considered as an intimidating, non-transparent and complicated process rather than an exciting experience (Deloitte, 2019). While digitalisation in retail has already arrived in other industries and online sales have become the new norm, the digital transformation in vehicle purchase has only been slowly adapting to new digital standards. Most vehicles are still sold offline in brick-and-mortar retail via dealerships. In 2018, only about nine per cent of all vehicles were purchased online (Deloitte, 2019). As a consequence, the automotive customer experience is frequently perceived to be outdated and inferior, particularly among younger consumers (McKinsey, 2019). Given that millennials will account for more than 45 per cent of all potential vehicle consumers by 2025, it is critical that manufacturers understand and accommodate to their needs (McKinsey, 2019). If they want to stay competitive and satisfy consumer expectations, automotive manufacturers must look beyond the automotive industry in order to anticipate the demands of this first generation of integrated-mobility customers; and thereby are forced to adapt to these changes by optimising the customer's buying process toward a more digital-customer oriented approach. In this context, as artificial intelligence (AI) progresses, there is a possibility to enhance customer experience by expanding companies' understanding of their consumers' factors that influence consumer behaviour (Evans, 2019). The strategic use of AI technologies at various key customer touchpoints can therefore bring significant benefits to companies and may improve customer experience.

Therefore, the question aptly arises as to how the automotive customer journey can be accompanied and optimised in the best possible way, at each of the digital touchpoints, with the help of AI-powered intelligent virtual agents.

This dissertation analyses the applications of one of the most quickly rising technological advances: artificial intelligence. The AI application considered in this document are Intelligent Virtual Agents (IVAs), which mainly use natural language processing (NLP) and artificial intelligence (AI) techniques to match user text or voice input to executable commands. This research paper examines the role of IVAs in transforming customer experience through the customer journey in the automotive industry. This study has been conducted to answer the following research questions:

RQ1: What use cases are there for IVAs along the customer journey in the automotive industry?
RQ2: What are the use cases of IVAs with the most potential in each stage of the customer journey in the automotive industry?
RQ3: What are the key enablers and bottlenecks for the deployment of IVAs within the automotive industry?

This dissertation is structured as follows: after an initial introduction, the main constructs and concepts related to the topic are defined. The method of research is then outlined, followed by the analysis and findings. This dissertation concludes with a discussion of the results, which include a managerial recommendation for manufacturers and dealers in the future. This is subsequently followed by implications for research and practice, limitations, and recommendations for future research.

Academic and Managerial Relevance

Despite the increasing interest in artificial intelligence (Watson, 2017), there is a noticeable absence of theory-based research on how businesses should design their digital business strategies and sales processes utilising AI to deliver commercial value (Mikalef et al, 2019). There has been very little research on artificial intelligence (AI) on the subject of business and marketing. Most of the artificial intelligence research is focused on the technical aspects of AI and the installation of AI systems, rather than the use of AI to assist customers. It is widely acknowledged that artificial intelligence is a valuable tool for businesses to employ in an attempt to optimise consumer experience. Nonetheless, there is no research yet that provides an overview of IVA use cases in the customer journey nor a prioritisation of these use cases. Therefore, understanding the benefits but also identifying key enablers and bottlenecks in the implementation of IVAs can separate today's leaders from laggards. This dissertation brings

together existing literature on artificial intelligence and the customer journey in order to paint a clear picture of the effect of selected AI techniques on customer experience in the customer journey, thereby filling the current research gap.

2. Literature Review

This section provides an overview of the existing literature on the topics underlying this thesis, aiming to build a theoretical framework that supports the research, as well as to provide a basis for the subsequent findings.

2.1 Artificial-powered Intelligent Virtual Agents

Artificial intelligence (AI) comes in multiple forms and is rapidly disrupting various businesses and industries. AI has the ability to disrupt business concepts (Duan et al., 2019), alter work prospects (Schwartz et al., 2019), perform improvements (Wilson & Daugherty, 2018), and even improve human talents (Dwivedi, et al., 2021). Despite its multiple definitions, the widely understood definition of AI by Russell and Norvig (2010) involves the ability of machines or computers to emulate human thinking, reasoning and decision-making. Russell and Norvig (2010) classify AI concepts into four categories: thinking humanly, thinking rationally, acting humanly, and acting rationally. AI thus refers to the ability of a machine to perform cognitive functions associated with the human mind such as thinking, learning, perception and interaction with the environment, problem solving and even creativity (McKinsey, 2019).

Robotics and autonomous vehicles, computer vision, speech, virtual agents, and machine and deep learning are some examples of technologies that use AI to help companies solve business challenges (McKinsey, 2019). The utmost level of interest in AI as a driver of economic transformation is being mirrored in the size of global AI investment, which is expected to reach almost $98 billion in 2023—more than double the $37.5 billion invested in 2019 (International Data Corporation, 2021). When considering AI from the standpoint of its business capabilities, AI can be tailored to meet three specific business needs: (i) Process Automation; automating business processes, (ii) Cognitive Insight; gaining insight through data analysis, and (iii) Cognitive Engagement; engaging with customers and employees (Davenport & Ronanki, 2018).

This dissertation focuses on enhancing the customer experience in the customer journey within the automotive industry, with the help of intelligent virtual agents and therefore aims to serve the (iii) Cognitive Engagement mentioned as one of the three business needs above.
Over the last fifteen years, the domain of intelligent virtual agents has grown tremendously in providing new opportunities to industries such as retail, training, healthcare and customer support (McKinsey, 2021). Suitably, experts predicted that 85 per cent of customer interactions would be handled without human agents in 2021, with the vast majority of those being handled by chatbots and intelligent virtual agents (Gartner, 2020). An intelligent virtual agent is an autonomous entity that performs tasks for its owner. The agent is given a set of goals and then acts on its own to carry out these goals. As it performs its tasks, it learns about its environment, its owner and other agents, and uses this knowledge to improve how it carries out its tasks (Elmahalawy, 2012). Adopting virtual agents to deliver enhanced customer experience requires digital fluency of the evolving technology. However, thanks to scientific breakthroughs in artificial intelligence, intelligent virtual agents can fulfil tasks such as answer customer queries and complaints, recommend products, and help customers to find information. They can take up large volumes of customer calls and ease the load off human customer care executives.

With the advancement of recent developments, the various terminologies around virtual agents are becoming increasingly blurred in terms of their technologies and functionalities, which is why it is important to delineate the terms and capabilities beforehand. Table 1 illustrates the three different types of IVA technologies.

	Virtual Agents		**Virtual Personal Assistant**
	Conversational AI	***Chatbots***	
Technology	• Machine learning • Natural language processing • Natural language understanding • Artificial emotional intelligence	• Rule-based programs • Machine learning • Natural language processing	• Machine learning • Natural language processing • Natural language understanding

Core-functionality	• Use artificial neural networks or ANNs to learn from the surrounding environment • An extended version of a chatbot that interacts with users in a more intuitive way and carry out a wider range of functions • Understands intent and responds politely and human-like, two–way conversations; understands basic human emotions due to artificial emotional intelligence	• Automated rule-based programs that simulate conversation with users and usually respond with a single-line response (no conversation interpretation) • Designed to respond to questions and statements within their learned set of knowledge; chatbots are non-adaptive • Only understand the site-specific terminology and lack the basic understanding of human emotions	• Exhibits its own personality and is uniquely associated with an individual user • Retains information associated with the user to provide contextualised answers • Enables various functions (climate control, lights, media) and settings
Interface	• Chat-like interface • Voice-commands	• Chat-like interface	• primarily voice-commands
Examples	• Siri deployed by Apple • Alex deployed by Google	• ELIZA deployed by ZF group	• "Hey BMW" deployed as in car assistant by BMW group

Table 1: Types of Intelligent Virtual Agents

Both Virtual Agents and Virtual Personal Assistants are software programs powered by AI with the ability to interact with humans in their role as an end-user. However, the distinction between a virtual agent and personal assistant lies primarily in the core functionality and the service provided.

AI-powered intelligent virtual personal assistants serve as an intermediary between an individual end-user and the systems and service technology. For example, in-car virtual personal assistants, or VPAs, allow drivers to access information and perform tasks while continually learning driving behaviour, such as preferred heated seat settings and common destinations, and regulating vehicle systems as required. The system may give recommendations for fuel-efficient driving, warn drivers when required, notify them of maintenance issues, remind them of upcoming service procedures, or even schedule them automatically (Alphabet, 2021).
In comparison, the main use of a virtual agent is to simulate a human support agent. Depending on their functionalities, intelligent virtual agents can be further subdivided into chatbots and conversational AI. The former, chatbots, are automated simple rule-based systems that replicate human-to-human dialogue and usually provide a single-line response, mainly in a chat-like interface. They are not adaptable and are programmed to reply to questions and comments based within their learned set of knowledge. In contrast, conversational AI agents, as the word already implies, are AI-driven and equipped with Natural Language Processing (NLP) and/or Natural Language Understanding (NLU) enabling them to process, understand, and generate responses in a natural two-way conversation while continuously learning from its environment and adapting to it. Therefore, this type of conversational AI can be defined as an enhanced version of a chatbot that interacts with users in a more intuitive way, performs a broader variety of functions, and even understands fundamental emotional responses. While chatbots are to be primarily used in a chat-like interface, conversational AI use either text or voice as their forms of communication (Gartner, 2020).

2.2 Developments in the automotive industry and the use of AI-powered technology

The automotive industry has been experiencing a tremendous shift over the last years. At the centre of all smart innovative technologies is the question of where mobility is heading towards. Intelligent transportation systems, such as autonomous vehicles and sharing mobility platforms

are among the most disruptive technical advancements of the twenty-first century (Bansal and Kockelman, 2018). Simultaneously, continued investments across the automotive industry signals that the overriding CASE megatrend—connected, autonomous, shared and electric—have the strength to revolutionise the automotive industry and people's lives. The steady rise of alternative modes of transport, such as car-sharing and mobility on demand, coupled with the increased consciousness on health and sustainability, raises the prospect that private vehicle ownership may become less important, if not replaced, in the future (Herrmann et al., 2018; Lyons et al.,2019; Martin et al., 2010; Menon et al., 2019; Sperling, 2018). However, this trend is particularly pronounced in metropolitan areas, where individuals have a broader variety of transportation options. In comparison, the total number of vehicles currently in use in Europe is forecasted to grow by 1.4 per cent at 273 million by 2025, from 269 million vehicles in 2020 (PWC, 2020). If Germany is considered, it quickly transpires that the decentralised infrastructure and bans on sharing services such as Uber and Lyft do not yet allow people to shift their mobility concept away from owning their own personal vehicle. During the current Covid-19 pandemic, this question of mobility has gained yet another perspective. The risk of infection and extended spread of the virus resulted in many passengers avoiding personal contacts and favoured private transport modes as it was perceived as safer and more hygienic. Consequently, using public transportation has declined by 70 to 90 per cent in urban cities throughout the globe (McKinsey, 2021). To what extent this will further affect the mobility concept probably depends on the further course of the pandemic, and as such it is difficult to determine at present.

One change that started before the pandemic, but whose process has certainly been accelerated by this, is the digital and remote shopping of products and services—something that has been largely disregarded with regard to the automotive customer journey and vehicle buying process. To date, most vehicles are still sold in brick-and-mortar retail via dealerships (Deloitte, 2019). However, the existing approach does not fit the needs and demands of today's modern customer. In order to remain competitive and meet customers' expectations, established manufacturers are forced to adapt to these changes by redesigning their existing sales structures to online platforms and optimising the customer buying process with the help of emerging technology in order to improve customer experience.

2.3 Intelligent virtual agents in the automotive industry

Besides a lack in digital transformation and usage of innovative technologies in the automotive customer journey, manufacturers are demonstrating their ability to innovate and use AI in other business fields. The use cases range from I.T. problems and production improvements, lean management, to logistics (Gartner, 2020). Much of the R&D in artificial intelligence has been invested in progressing transportation and optimisation of the product manufacturing and its life cycle. The biggest trend and concurrently technological challenge that requires AI is autonomous driving. Autonomous vehicles use sensors, actuators, complex algorithms and artificial intelligence systems, which employ machine-learning techniques to collect, analyse and transfer data, in order to make decisions that in conventional vehicles are taken by humans (ZF Group, 2021). These developments are primarily intended to support existing technologies and primarily increase security. In comparison with this, manufacturer started developing and integrating sophisticated voice-enabled Virtual Personal Assistants (VPA) aiming to improve the experience and convenience of the end-consumer while driving. Mercedes-Benz, Hyundai, Honda, PSA, and BMW were among the first companies to create a voice-activated assistant to handle the infotainment system in their vehicles (Deloitte, 2021).
Apart from its indispensable presence in the automotive industry, AI is still very little integrated into the automotive customer journey in order to advise or assist potential customers in their vehicle purchase decision-making or in their interaction with the company and the service. One reason for this is the current sales channel, which primarily takes place offline (Deloitte, 2019).

2.4 Consumer and the automotive customer journey

The growth of e-commerce and social media coupled with new technologies, digital services and mobile devices has fundamentally changed customer buying behaviour and demands. The modern customer, also defined as ‘Instant Consumer,’ is more empowered, informed, diverse and demanding than ever and can be distinctively described with the keywords ‘I, everything, immediately, everywhere’ (Peppers & Rogers, 2017). In today’s digital society, customers make heavy use of social networks, they are strongly mobile-first oriented and are perceived as ‘always on,’ because of the omnipresent access to the internet. This trend in shopping behaviour is often abbreviated as SoLoMo (social, local and mobile) (Heinemann & Gaiser, 2016). There are two concurrent major trends to be observed.

First, looking at the sales approach over time, there has essentially been a major shift towards omnichannel retail in recent years. This approach comprises of an extended channel scope, seamless cross-channel coordination, and complete interconnectivity of channels in order to optimise the customer experience. With the disappearance of boundaries between the virtual and physical worlds, customers can switch between numerous online and offline channels in all process steps of customer interaction, in a barrier-free and auto-selective manner. They may gather information from one channel and buy from another. It follows the approach of "being available at anytime, anywhere, making it convenient for the customer" (Deloitte, 2019).

Second, with rising customer expectations and product parity, personalisation has become an integral part of shaping the customer experience and perception at every touchpoint (McKinsey, 2020). Personalisation can take a variety of forms. The best personalised experiences can be achieved when companies engage customers in dialogue and use data to create one-to-one personalisation. AI-driven personalisation technology is particularly suited to this, enabling products, offers and communications to be individually targeted at the customer rather than at the customer segment level, making the customer experience more personalised.

In this context, customer journeys have gained significant importance in recent years. Customer journey describes the interaction of an end-customer with a company or product across different phases and touchpoints (Zinkann & Mahadevan, 2018). Each touchpoint varies from customer to customer, and their number can vary from a few to many, depending on the industry and product. In the automotive industry, the traditional vehicle buying process is divided into five phases: I.) Awareness, II.) Consideration, III.) Configuration/Selection Consultation, IV.) Purchase and V.) Retention, and is often perceived as a time-consuming, intimidating, non-transparent and complicated task, instead of an exciting experience (Deloitte, 2019). In fact, less than one per cent of the customers perceived the well-established vehicle buying process as an ideal experience (Autotrader, 2015). Considering that the customer's research in the vehicle buyer's path is supposed to include up to 900 digital interactions, it becomes apparent how complex this process might be (Google, 2017).

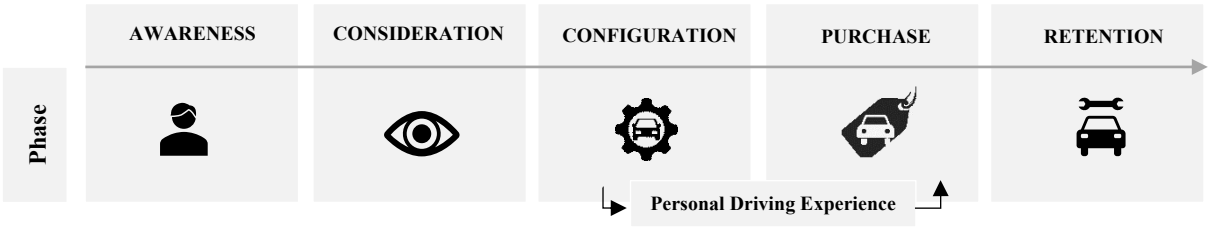

Figure 1: Automotive Customer Journey (Majorel, 2020)

At each stage, there are different touchpoints with the OEM or the dealer, in order to satisfy specific customer needs. Naturally, the aim at each stage is to increase customer satisfaction, loyalty and advocacy but also to truly differentiate the brand. A vehicle is a significant, emotional purchase with high financial commitment and the decision-making process to buy a vehicle therefore typically takes between 5 and 12 weeks. Therefore, customers are channel-sensitive and expect meaningful, personalised support at each phase of the customer journey once they get in touch with the OEM or the dealer (Majorel, 2020).

Most vehicle purchases begin at the **awareness stage,** with buyers driven by the need to find a vehicle or a strong desire to buy. An increased number of OEMs and dealers use social media to drive awareness and differentiate their brand, through their own channels, any third party automotive platforms or influencer cooperation, which often use video as the primary media, reaching millions of potential customers (Majorel, 2020).

In the second stage, **consideration stage,** the customer researches online and offline to compile a list of vehicles of interest. Up to 95 per cent of potential vehicle purchases begin with an internet search that is entirely self-motivated and does not involve any support of a dealer. Next, customers narrow down their options to a limited list (McKinsey, 2020).

Once the potential customer has gathered information and made a (pre-)selection of models, the **online vehicle configurator/selection consultation** becomes an integral and important stage of the customer journey. With realistic simulations of parts and features, the customer gets a comprehensive overview of the design and the associated cost of the vehicle. The important connection between the customer and the dealer is often lost during this step. These processes are more commonly available on brand websites than on dealers' own online channels. Similarly, customers can often only book a test drive on the dealer site but not on the OEM webpage (Majorel, 2020).

While a growing number of people can imagine buying a vehicle online, for most people the personal test drive, considered as detached stage in the automotive customer journey, is still essential in the decision to make a purchase. Customers used to visit an average of five dealers before buying a vehicle. This has changed as they are now well informed through intensive online research that they only need one visit to the dealer's showroom (McKinsey, 2019). About 50 per cent of customers say they would even consider completing the actual purchase process online if it were possible (Boston Consulting Group, 2020).

In the **purchase stage,** a seemingly simple click on a purchase button often has a direct impact on the customer's emotions, especially for such a significant financial commitment. In addition, the customer has previously spent a lot of time thinking about financing options and deciding on the right vehicle. With the click of a button, the customer is confronted with a significant amount of paperwork and bureaucracy.

After the vehicle has been purchased and handed over to the consumer, it is crucial to remain in contact by offering additional offers and maintenance services, defined as the **retention stage.** In the automotive industry, the estimated value of a customer is €41,000 and does not only consist of the purchase of the vehicle itself. It is also widely acknowledged that after-sales servicing produces more profits for the OEMs and dealers than new vehicles sold. Taking this into consideration is the first step in trying to maintain driver loyalty at the point of sale. Within this stage, it is important to be present for the customer through their preferred communication channels or to proactively monitor customer satisfaction (Majorel, 2021).

2.5 Unified Theory of Acceptance and Use of Technology Model (UTAUT)

Although an intelligent virtual agent is "the next big thing", along with its prospects for market growth, current theoretical understanding of individuals' acceptance of an intelligent virtual assistant is deficient (Zhang, 2021). However, there are models helping to measure the user acceptances of technologies that can be applied to the use case of intelligent virtual agents. The technology acceptance model (TAM) is a theory of information systems that measure how consumers accept and use a particular technology (Davis, 1989). It has been continuously examined and developed, with the most recent significant revisions being the TAM 2

(Venkatesh & Davis, 2000) and the unified theory of acceptance and application of technology (Venkatesh, 2000). Within the UTAUT model, four constructs are identified as determining factors for behavioural intention and user behaviour: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. While the first three are direct determinants of intention to use and user behaviour, the fourth is a direct determinant of user behaviour. Gender, age, experience and voluntariness of use are assumed to moderate the effects of the four central constructs on intention to use and user behaviour (Venkatesh & Davis, 2000).

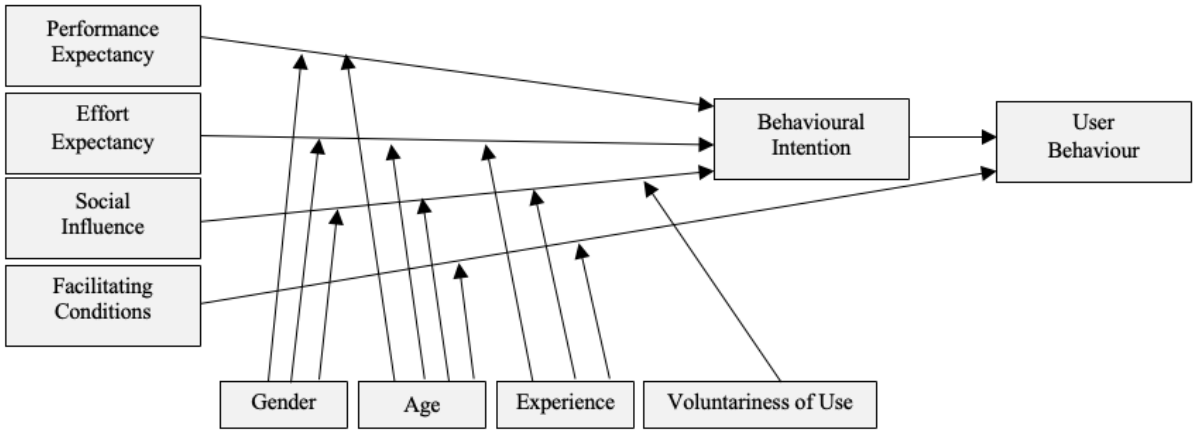

Figure 2: Unified Theory of Acceptance and Use of Technology

(Venkatesh et al., 2003)

2.6 RICE Prioritisation Model

The prioritisation of IVA use cases is a main component of this work. The RICE prioritisation model is a prioritisation framework to help decide which products, features and other initiatives should be prioritised by assessing these elements against four factors. These factors—which form the acronym, RICE—are reach, impact, trust and effort. Reach, the first factor in determining the RICE score, reflects the number of people who use or can use the application within a given time period. Impact shows the contribution of the feature to overall product promotion, in this case vehicle sales. The confidence component measures how confident an assessment is made of the reach and impact values for the application. Effort indicates the time component. In this case, effort is the part of the RICE evaluation model that best reflects the cost of deploying the application (Medium, 2019).

3. Methodology

3.1 Research design

This dissertation includes a qualitative and a quantitative approach, as a mixed method approach enables a more integrated comprehension of the intricate research subjects (Molina-Azorin, Bergh, Corley & Ketchen, 2017).

Before beginning the collection of primary data, various use cases for the application of IVA in the customer jounrey were described and analysed, aiming to answer research question one. These use cases were the basis for further qualitative research, carried out in the form of expert interviews, with the aim of gaining industry-specific insights, as well as knowledge about the integration, use and opportunities of AI-powered technologies. The brief analysis of use cases can therefore be complemented by these expert insights. In this context, a semi-structured interview method was chosen, as it allows the interviewer to prepare a preset of open-ended questions while providing the possibility to switch spontaneously to topics, or add additional insights to discussed topics, which seem important to any interviewee (Jamshed, 2014). By using indirect forms of questioning the respondents were encouraged to project their underlying motivations, beliefs, attitudes, or feelings regarding the issues.

In parallel to the expert interviews, an online survey was conducted. Online survey was chosen as a quantitative research method to obtain a greater level of understanding of respondents' attitudes towards user acceptance of IVA technologies and the common interaction in the customer journey. In order to evaluate whether IVA is accepted and used as a technology in the automotive customer journey, a modified version of the UTAUT model was used. Based on the four direct determinants of the UTAUT model that significantly influence the acceptance and use behaviour of technology, the following hypotheses were formulated:

The first determinant of the UTAUT model is the ‘performance expectancy’ (Venkatesh et al., 2003). Relative advantage theory refers specifically to the influence of the perception of the utility of an innovation compared to its antecedent (Moore & Benbasat, 1991), resulting in hypothesis H1.

H1: There is a positive relationship between the user‘s relationship expectancy and the user’s usage intention in the specific case of IVAs applied to the automotive industry.

The second predictor of the UTAUT model is ‘social use’ (Venkatesh et al., 2003). This will be stated as ‘relationship expectancy’ from hereon. In the current literature on subjective norm theory, it is argued that an individual's behaviour is affected by the preferences of their important personal relation on a specific issue (Ajzen, 1991; Davis, Bagozzi & Warshaw, 1989; Mathieson, 1991; Taylor & Todd, 1995). This resulted in the hypothesis H2.

H2: There is a positive relationship between the user’s performance expectancy and the user‘s usage intention in the specific case of IVAs applied to the automotive industry.

‘Effort Expectancy’ is the third predictor of the UTAUT model (Venkatesh et al., 2003). The perceived level of use of a system is determined by the correlation with perceived ease of use (Davis, 1989). This leads to the hypothesis H3.

H3: There is a positive relationship between the user‘s effort expectancy and the user‘s usage intention in the specific case of IVAs applied to the automotive industry.

A fourth direct determinant of the UTAUT model is "facilitating conditions" (Venkatesh et al. 2003), renamed to ‘Privacy Expectancy’. The construct of compatibility describes a person's perceived congruence with existing beliefs and experiences (Moore et al., 1991), which leads to hypothesis H4.

H4: There is a positive relationship between the user‘s privacy expectancy and the user‘s usage intention in the specific case of IVAs applied to the automotive industry.

This resulted in the conceptual framework summarised in Figure 3:

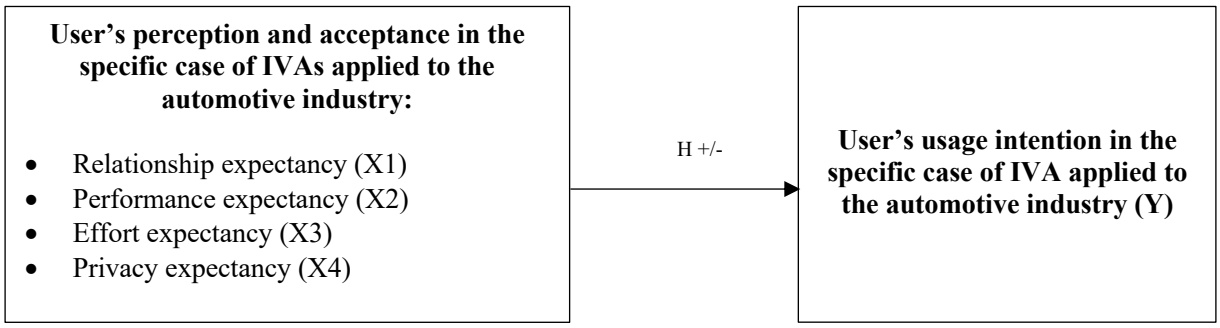

Figure 3: Conceptual Framework of Quantitative Research

The combination of online surveys and expert interviews also has the benefit of bringing in two different perspectives to this topic. The expert interviews cover the business perspective, while the online survey is intended to outline customer's intention and willingness to use IVA technologies. In both, there was an ask to prioritise the use cases presented.
By benchmarking the prioritisations of both in a joint matrix, it will then be possible to derive which use cases with the most potential should be implemented. Consequently, the answer to the second research question is derived from this analysis. Furthermore, the survey will also ask about possible barriers and concerns that users may have about such technologies, which will then help to identify what the key enablers but also bottlenecks for a successful deployment of IVAs are. Together with the insights on the expert interviewees, this answered the third research question.

3.2 Data collection

3.2.1 Primary data collection

Quantitative data was collected from a sample through a set of structured questions by means of an online survey. Before the questions of the survey were developed, the following objectives were defined: identifying the consumer's attitude towards vehicle purchase and its most important attributes within it and attitude towards the usage of IVAs. The data was collected online through the survey program 'Qualtrics.' For the sampling process, a non-probability sampling was selected. The online survey was shared with fellow students, friends and family via social media and Linkedin as well as in international Facebook groups with the purpose of

sharing online surveys. After the collection, the data was analysed in SPSS. The total questionnaire consisted of three different sections, the first is the experience about the customer's vehicle purchase, then about the customer's perception and attitude towards IVA and the third is demographics. In order to evaluate the reliability of this research, a first draft of the questionnaire and pre-test was conducted. Participants involved in the pre-testing were fellow students and members who were not involved in the creation of the survey.

In total, 132 respondents participated in the survey. Specific variables that caused participants to be excluded from the survey resulted in a total number of 118 respondents who could be used for the analysis. The sample size of 118 respondents consisted with 62.7 per cent of female and 37.3 per cent of male respondents. About 74.6 per cent of the respondents own a vehicle, while the vast majority of 61.8 per cent were also part of a vehicle purchase and process itself.

	Demographics	**Total Sample**
Gender	Male / Female	37.3% / 62.7%
Age	18-25 years	32.5 %
	26-40 years	59.6 %
	41-65 years	7.0 %
	> 66 years	0.9 %
Vehicle Ownership	Yes / No	74.6 % /24.6 %
Vehicle Purchase Experience	Yes / No	61.8 % / 38.1 %
IVA Experience	Yes / No	76.2 % / 23.7 %
Country of Origin	Germany	46.5 %
	Portugal	32.6 %
	Italy	2.6 %
	France	2.6 %
	Other	15.7 %

Table 2: Sample Characterisation

To collect the qualitative data, eight experts were interviewed. Interviews took place online via Microsoft Teams or Zoom. The session started with individual introductions and an explanation of the topic and purposes of this study. Interviews lasted between 45 and 60 minutes. The

interview guideline was subdivided into two broad themes: first, general trends in the automotive industry and consumer behaviour and second assessment and prioritisation of use cases concerning artificial intelligence in general and on IVAs in the customer journey specifically. Experts were then asked to rank the discussed IVAs cases based on their most potential. Additionally, it aimed to identify key enablers and bottlenecks for the deployment of IVAs within the automotive industry. An overview of the interviews held as well as their objective for contribution to this work can be viewed in the appendices.

3.2.1 Secondary data collection

The literature review in the previous chapter was enhanced by further, in-depth literature research. This paper is primarily based on Grade A papers, white papers, and studies by renowned management consulting firms, as well as industry-specific reports and company figures.

4. Analysis and Discussion

Before evaluating the use cases of IVAs in each of the of the stages and subsequently prioritise them based on certain attributes, one needs to investigate each stage separately. This research focuses on the purchase of new vehicles by private customers within the context of the B2C market, in which both the distribution channel via manufacturer and franchised dealer will be considered. Figure 4 illustrates the scope of this paper.

Product Type	Passenger Vehicles	Truck		Van	
Customer Group	Private Customer (B2C)		Business Customer (B2B)		
Distribution Level	Manufacturer		Franchised Dealership		
Business Division	New Vehicles	Used Vehicles	Financial & Mobility Services	Service	Parts & Accessories
Customer Journey	Pre-Purchase		Purchase		Post-Purchase

Figure 4: Scope of Investigation

4.1 Use cases for IVAs along the customer journey in the automotive industry

Based on the customer journey described in the literature review, several use cases for IVAs per stage in the marketing funnel will be presented and analysed individually in the following section. The awareness and consideration phases often overlap, which is why a clear separation of the use cases per stage can often prove challenging. Therefore, some use cases are also applicable to both stages.

Uses cases in the awareness stage

The first phase within the marketing funnel has the task of either awakening a need, creating a need or drawing attention to one's product through various channels (Lemon & Verhoef, 2016). Social media has earned its place as an integral part of people's daily lives, with people spending on average 2.25 hours per day on social media channels (Statistica, 2020). The automotive industry has the potential to benefit from social media strategies (Deloitte, 2014), as a growing influence of social media in vehicle purchasing decision-making is highly evident (Nayeem, 2013). In fact, studies proved that a majority of the respondents significantly utilised social media resources for making the decision of purchasing a particular vehicle of a particular brand (Darshan, 2018).

The spectrum of types of social bots ranges from simple bots that automate single and repetitive elements of the communication process (e.g. liking, sharing or retweeting), over partially human-steered accounts with automated elements (so-called hybrid bots or "cyborgs,") (Chu et al., 2010; Grimme et al., 2017), to autonomously acting agents equipped with artificial intelligence and learning skills. Social bots are designed for one- or many-sided communication and the imitation of human online-behaviour (Grimme et al., 2017; Woolley, 2016). These are contrasted with other automated agents, such as web-crawlers and spam bots, which either function fully undetected, operate beyond these standards, and/or pretend to be human agents. This analysis therefore solely refers to social bots that are clearly recognisable as technology serving as an agent. Social bots can be integrated into social messengers such as Facebook Messenger, Instagram Direct or Twitter to facilitate private communication with customers on a text-based interface (e.g. chatbots). While they can provide answers to simple and mostly repetitive information such as opening hours, contact details or relevant links, they can additionally be used as newsletter replacements. Followers can register with the bot and then receive direct messages to their mobile phones (e.g. via Facebook Messenger, WhatsApp) at

regular intervals. They can either send customers product details or even encourage them to register for a test drive if they are well programmed. Some providers, like WhatsApp, have decided to stop offering a messenger newsletter function.

The same functions can also be performed by a chatbot on the company's own website. Furthermore, these chatbots can also act proactively, which is only permitted on the company's website and not on any third-party platform (Gartner, 2021). This way, chatbots can start conversations at the earliest point in the marketing funnel, instead of simply reacting when a customer has a query.

Uses cases in the consideration stage

The aim is to obtain an overview of the market in order to make a shortlist and potentially prepare for dealer talks and negotiations and prepare for dealer meetings and negotiations (Majorel, 2017). Once the lead shows interest and starts looking for additional information, IVAs can provide answers to their requests and FAQs immediately. Accordingly, the functionalities can be programmed serving the same requests as presented in the awareness stage. If a customer has been inactive on a web page for a couple of minutes, a virtual agent can pop up to ask if they need any assistance. This repetitive, proactive engagement is one way to generate leads and guide customers to the next stage of the sales funnel by providing information about promotion, special product features or brand campaigns.

Use cases in the configuration/selection stage

The process of buying a vehicle is described as intimidating and stressful, particularly given the complexity and the many features offered within the configuration process. Consequently, people feel most confident in their decision-making process when they are provided with an easy-to-navigate and easy-to-digest overview of the options that are relevant to them rather than overwhelming them with a plethora of complex choices (Deloitte, 2017).

Intelligent virtual agents, also called virtual product recommendation agents (PRVA) in this context, can help customers find products and even recommend products to them by understanding their needs. For this purpose, they rely on artificial intelligence paired with machine learning and processing technologies. Porsche provides a concrete example of product recommendations in the context of vehicle configuration. In early 2021, the company introduced an AI-based recommendation system with more than 270 market- and derivative-

specific neural networks and a complex AI-based algorithm to find specific patterns in the data and recommend the most relevant items for a particular customer (Interview E & Porsche, 2021). Throughout the process, customers are directed to a lighting configurator that allows them to modify their vehicle and add specific additional features based on simple needs, inspirations and comparisons. The system makes it possible to highlight the products that other customers prefer most and to introduce these to new customers. This creates an opportunity for cross-selling and upselling which is beneficial for higher margins. The aim is to offer a limited number of alternatives that can be fully combined without hindering consideration of the full range of options. Accompanied by supporting options, customers should not be discouraged if they still need further explanation. Every customer should still have the possibility to configure every detail themselves and request a direct personal consultation if they wish to do so.

There is usually a break in the customer journey when booking a test drive or a personal consultation at one of the partner dealers. Although many websites offer a dealer search function, a new and disconnected journey often begins when the customer visits the dealer. The possibility of making an appointment via the IVA, and during this already transmitting relevant information or specific questions about the desired vehicle to the dealer, is another potential use case.

Use cases in the purchase stage

The purchase phase includes the purchase decision, the evaluation of possible financing options, the signing of the contract and the exchange of documents (Majorel, 2017). There are several use cases that can potentially be applied to the purchase phase.

First, the purchase itself seems to be through a single click, but in most cases it involves high financial pressure and emotional attachment. Money transfers can be facilitated with the help of IVAs. Such use cases are already increasingly found in the banking sector, where bank providers use IVAs primarily in their own apps. For example, customers can converse with a chatbot or use voice technologies to complete transactions without the help of a live agent, ensuring that personal data remains private and transactions are secure. Voice technologies that incorporate natural language processing as part of artificial intelligence are becoming more common in banking transactions in this context, as voice recognition is one of the most secure biometric features available and has several advantages over other biometric methods such as fingerprints or facial recognition (Singh et al., 2018).

Referring to the purchase within the customer journey, IVAs can be used to complete the vehicle purchase in collaboration with any financial service provider. Such collaboration between OEMs and banking providers is already partially planned. As Interviewee H announced, Mercedes is expected to launch in-vehicle payments via Mercedes Pay in cooperation with VISA in spring 2022, allowing customers to order goods and services directly inside and through the vehicle. Although this use case takes place in the context of a virtual personal assistance function and the completion of the customer journey, it shows that such an option is also possible if the cooperation with one of the existing banking providers is extended to use cases along the customer journey.

Second, IVAs can also be used in the processing of documents that the customer is usually asked to sign or provide after the completion of the purchase. With the help of an IVA, unstructured documents such as invoices and receipts, copies of ID cards or similar can be converted into structured data. For this purpose, the customer is asked to take a picture of the documents they would like to deliver, while the IVA receives the documents, processes it and enters the data automatically into the system. Accordingly, Expert D presented two tools that already offer this service as a standard solution for this use case. The tool DocAI from Google Cloud Service Procurement as part of the Google platform and Power Virtual Agents from Microsoft as part of the Power BI platform use AI and machine learning to process data on a large scale and return cleanly structured data to increase operational efficiency on both the company and customer side.

Another use case where AI comes into play are smart contracts. This use case was decided to be excluded from the further evaluation, as the complexity of this use case is primarily based on the blockchain technology, which would require a clear definition and delimitation regarding terms and functionalities before it can be compared to the previously mentioned use cases.

Use cases in the retention stage

The retention phase, also called the after-sales phase, describes all activities after the vehicle has been handed over to the customer. The customer experience within this process has a significant influence on a renewed purchase decision and on upselling activities and thus forms the basis for long-term customer loyalty (McKinsey, 2009). The importance of this stage in the process is also demonstrated by the fact that customers spend around 15 hours on the decision-

making process to purchase a vehicle, but up to 50 hours to have it serviced during ownership (Service Industry Study, 2019). As a result, customers rank the service experience as even more influential than the final purchase experience when buying their next vehicle (Future of Automotive Retail Survey, 2018). Nevertheless, many touchpoints that occur at this stage are isolated points of interaction rather than a continuous and ongoing relationship with their previous process, which therefore leads to a further break in the customer journey. IVAs can be used in the retention phase in various cases.

First, IVAs can be used for answering customer complaints, handling refunds or order cancellations. Companies such as Amazon show how AI-based chatbots can be used to analyse and process such requests in a solution-oriented manner or to bridge waiting times until a human service employee is available if the request cannot be resolved independently, thereby cutting labour costs.

Another area is the use of IVA assistance in the context of repair services or spare parts recognition. AI-based IVAs can assist by offering spare part recognition via a photo. The customer makes a request and takes an image of the removed part with his smartphone or tablet and sends the photo to a service. This service accesses a cloud-based neural trained network created based on all relevant spare parts information from the manufacturer of the defective machine. The service retrieves relevant results for the spare part with information on the matching probability. The results are displayed directly in the digital spare parts catalogue or in the service information system. Additionally, offering on-site repair services with seamless appointment scheduling helps to increase customer satisfaction, even in situations where the vehicle is damaged (Interviewee B).
The IVA use cases presented are summarised in the following table, which specifies the intended stage and the required type of IVA:

Stage	Use Case	Type of IVA	Channel
Awareness	Push-up notifications, newsletter, customer engagement	Chatbot	Social media
Awareness	Push-up notifications, newsletter, customer engagement (proactively)	Chatbot	Website
Consideration	Push-up notifications, newsletter, customer engagement	Chatbot	Website

Configuration & Selection	Product recommendation, upselling, check availability	Conversational AI	Website
Configuration & Selection	Schedule appointment, transfer to human live agent	Chatbot	Website
Purchase	Make transactions, smart contracts	Conversational AI	Website
Purchase	Documentation exchange, order requests	Chatbot	Website
Retention	Order request and update, drop-off, handle customer complaints, handle spare parts, collect customer feedback	Chatbot	Website
All stages	Transfer to human live agent, FAQs	Chatbot	Website

Table 3: Overview of IVA use cases

4.2 Use case acceptance & potential

Hypothesis testing to assess user intention for IVA

Before prioritising the use cases, it should be investigated whether an IVA technology along the customer journey in the automotive industry would be accepted by potential customers. If the benefit of the use of IVAs is not sufficiently present, the respective technology will not find market acceptance and is bound to suffer scepticism and rejection. Therefore, it can be assumed that the virtual agent growth curve is fuelled by customer acceptance.

To accurately assess the relevant factors influencing the user's intention to use IVAs applied to the automotive industry; the hypotheses based on a modelled version of the Unified Technology Acceptance Model presented beforehand were tested. The hypothesis H1-H4 focused on the relationship of the perception and acceptance of IVAs (X) and the user's intention to use IVAs applied to the automotive industry (Y). A 5-point Likert scale was used to measure all attributes. The (multiple) linear regression was being used for the hypothesis testing, as all variables were metric. Prior to regression, the items of the dependent variable 'behavioural intention to use IVA' (Y) had to be computed into one variable.

Hypothesis 1

H1: There is a positive relationship between the user's relationship expectancy (X1) user's usage intention (Y) in the case of IVAs applied to the automotive industry.

The entered independent variables of the relationship expectancy (X1) model were the items 'I would trust IVAs consistency' (mean = 3.63,), 'My family would have a positive perception of me using IVAs' (mean = 3.18), 'My friends would have a positive perception of me using IVAs' (mean = 3.14), and 'I believe that I would be able to correctly describe my interests' (mean = 3.64) which were all computed in the first step. The overall R-square of the relationship expectancy amounted to 0.57, which indicates a moderate value of 57 per cent of the variance for a dependent variable that is explained by the independent variables in the regression model. The strongest variable is 'I think that I would be able correctly describe my interests' explaining 40.9 per cent of the usage. The significance level was 0.001, therefore below the significance level of 0.05, confirming the hypothesis H1. The model indicates a moderate relationship concerning the user's relationship expectancy (X1) and the intention to use IVAs (Y). In this regard, this refers to the user's trust in the consistency of the technology and reliability of the IVAs. Even though users consider themselves as able to describe their symptoms correctly, the usability of the technology to specify it according to their interests seems to have the greatest impact on user intention.

Hypothesis 2

H2: There is a positive relationship between the user's performance expectancy (X2) user's usage intention (Y) in the case of IVAs applied to the automotive industry.

The two entered predictors of the model were 'IVA would make it more convenient to find a right vehicle' (mean = 3.47), 'IVA would make it faster to find the right vehicle' (mean = 3.63) and 'IVA would be helpful for improving my search' (mean = 3.65). The R-square of the performance expectancy amounted to 0.565, which indicates a moderate value of 56.5 per cent of the variance for a dependent variable that is explained by an independent variable in the regression model. The significance level was 0.001, therefore below the significance level of 0.05, confirming the hypothesis H2. The strongest variable with regard to the performance expectancy is 'I think that IVA would make it faster to find the right vehicle explaining 21.3 per cent of the user's intention. Users would therefore have a higher likelihood of using IVAs, if they see benefit in reducing the time on finding a vehicle. This also goes hand in hand with the fact that the overall vehicle purchase process is described as complex and time-consuming.

Hypothesis 3

H3: There is a positive relationship between the user‘s effort expectancy (X3) user’s usage intention (Y) in the case of IVAs applied to the automotive industry.

The entered predictor of the effort expectancy (X3) was the item ‘I think that it would be easy to use IVA’ (mean = 3.96). The R-square value presented an explained variance of 46.4 per cent of the usage intention (Y). The model was significant, and the unstandardised coefficients indicated a positive relationship between the predictor and the dependent variable (Y). As a result, H3 can be confirmed. The ease of using IVAs is a positive contributing factor for the usage intention (Y) of users. A complex and long-lasting usage interface and evaluation process would consequently decrease the user’s willingness to use IVAs. This is consistent with the previously mentioned strongest variable in performance expectancy, which shows that users primarily aim for a reduction in time and complexity, as they are only likely to be offered with results that match their inputs.

Hypothesis 4

H4: There is a positive relationship between the user‘s privacy expectancy (X4) user’s usage intention (Y) in the case of IVAs applied to the automotive industry.

The relevant predictors for the privacy expectancy (X4) model were ‘I would feel comfortable with sharing my data with IVAs’ (mean = 2.69) and ‘I would trust IVAs to only use my data for the search’ (mean = 2.14). The model explained for 61.7 per cent of the variance in usage intention (Y). Both predictor’s B-values were positive and significant, hence confirming the hypothesis H4. The low mean (2.14) of the second predictors combined with an R-square value of 0.617 suggests that users are uncomfortable with sharing their preferences with IVAs. This might be explained by the fact that there is a stronger public awareness for data security and privacy in recent years. The medium mean (2.69) of the first predictor indicates certain reservations of users concerning the application of their data by IVAs. Consequently, a better transparency of IVA’s data privacy would increase the willingness to use IVAs.

Use case potential

The benefit of an IVA project should be assessed from two viewpoints: that of the customer and that of the company. The latter measurably achieves higher customer satisfaction, increased sales success, and reduced service costs through the deployment of intelligent virtual agents. Customers profit from a service that they can access at any time and from anywhere in moments of high intent (BM Institute for Business Value, 2020). Nevertheless, the introduction of IVAs is initially associated with high costs, which should be weighed against the potential benefits for each of the use cases. For this reason, the presented use cases were evaluated and prioritised by experts reflecting the company view, and by the survey participants representing the customer view. The prioritisations of the individual use cases were first ranked on a prioritisation scale from 1 being the lowest to 10 being the highest value of prioritisation and then summarised in a matrix. The left axis shows the prioritisation in high and low from the company perspective, the right axis is that from the customer perspective. The recommendation is then derived based on the matrix. Use cases that are in the upper right field of the matrix can therefore be classified as use cases with the most potential impact from both perspectives. These should be considered first when implementing IVAs along the customer journey.

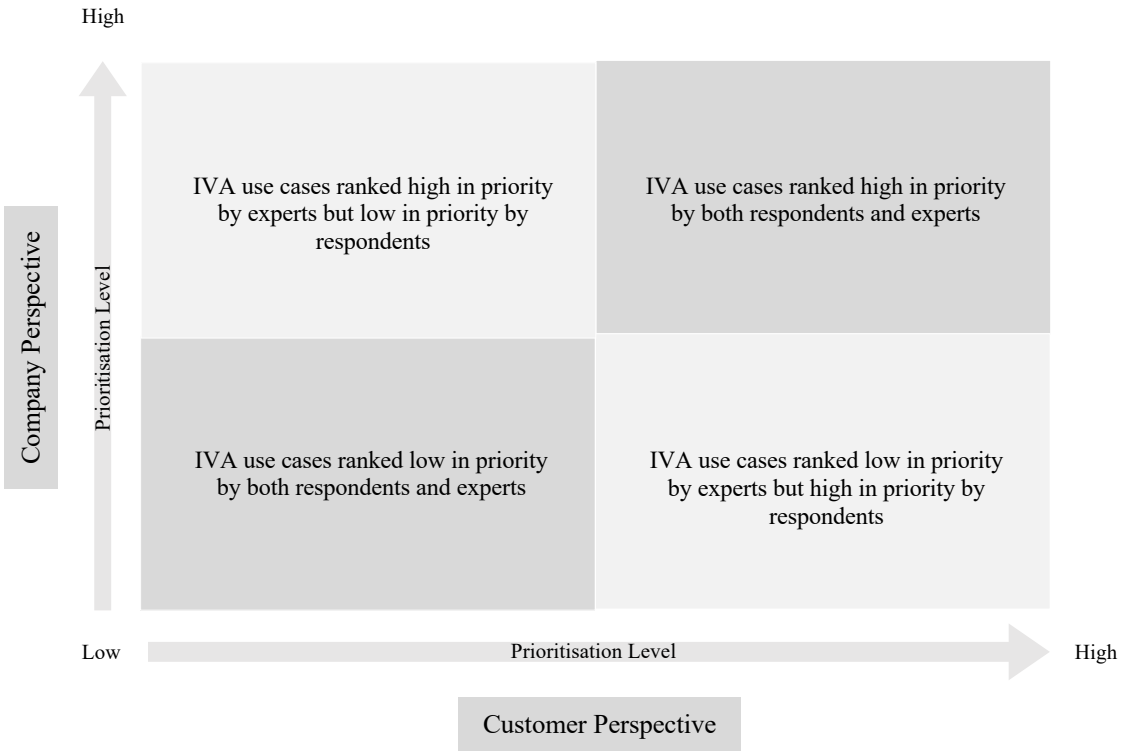

Figure 5: Explanation of Prioritisation Matrix

In the following, the results of the survey from the customers' point of view are presented: 75.4 per cent of the participants have already used an IVA. Considering the use of IVAs, customers value availability outside customer service hours (frequency = 33.7%), fast and efficient response times (frequency = 30.39%) and objectivity (frequency = 18.78%) as the main advantages of using intelligent virtual agents. On the question regarding the main characteristics of the customer journey in the automotive industry, the respondents named complexity, time intensity and the uncertainty of making the right decision as the main attributes. Although users trust IVAs' expertise (58.58%) and objectivity (60%), they would rather intend to use IVAs for less expensive products (57.17%).

In addition, respondents were asked to rank the use cases in which they could imagine the use of IVAs along the customer journey. The top three priorities included 'IVA helps me with basic questions and queries (product availability, opening hours, FAQ),' 'IVA helps me with vehicle recommendations based on my needs and interests' and 'IVA helps me with transfer to a human agent/live chat'. Considering that the main attributes describing the vehicle purchase process are complexity and time intensity, this can explain the high prioritisation of the IVA use case in terms of product recommendations, which are designed to filter options, make suggestions and help customers make their final choice. Accordingly, about 64 per cent of respondents believe that using IVAs would help them better understand their preferences and improve their search, while as many as 72.45 per cent believe that IVAs would help dealers better understand their needs and search criteria. In fact, almost three quarters of the respondents said that IVAs can make it easier for dealers to provide advice, which may point to the fact that there often seems to be a mismatch between what the customer wants and what the dealer recommends. This could be due to a variety of reasons, including an influential personal preference of dealers in terms of model or features, but also an economic motive to sell a vehicle with a higher profit margin. However, it also shows that personal consultation from the dealer is still an important step in the vehicle purchase process for many participants. Accordingly, only half intend to use IVAs instead of a visit to a dealer. Accordingly, IVAs can be a supplementary support in the decision-making process in this step but are not seen as a substitute for personal advice. Still, the survey shows that the need for personal consultation is decreasing among younger participants.

The use case with the least importance from the customer's point of view are 'IVA helps me make transactions/money transfers when buying a vehicle' and 'IVA helps with digital

contracting and a secure document exchange.' In both cases, there is a need to share personal and sensitive data, which could be a reason for the low user intention.

	Use Case
1	FAQ (basic request & inquiries)
2	Product recommendation
3	Transfer to human Agent
4	Schedule appointment
5	Push notifications, newsletter
6	Customer complaints
7	Handle spare parts
8	Order request and drop-off
9	Collect customer feedback
10	Money transfer
11	Document exchange

Table 4: Customer's Prioritisation Table

In parallel, after presenting several use cases, which were additionally complemented by experts, they were also asked to prioritise these use cases. For this purpose, the RICE prioritisation model including the dimension Reach, Impact, Confidence and Effort was used. The definition of the individual dimensions was presented in the methodology section. Experts were asked to rate the dimensions Reach, Impact and Effort on a scale of 1 to 10. While for the dimensions Reach and Impact, 1 was the lowest and 10 the highest score to be given, the scale was reversed for the dimension Effort, as less effort means a better score and result. The points were awarded for each use case individually while the confidence level was already determined beforehand. The confidence component of the RICE score defines an individual assessment in terms of weighting the expert's prioritisation. This was decided based on the two variables 'Working Experience' and 'Level of Expertise'. Both variables were divided into a five points system and applied to all use cases awarded by the same expert. The following table shows the allocation of points:

	Level of Working Experience	Level of Expertise
1	0-5 years	Novice
2	6-10 years	Advanced beginner
3	11-15 years	Competent
4	15-20 years	Proficient
5	Above 20 years	Expert

Table 5: Point System

After the experts allocated had allocated themselves points according to their experiences, the following confidence levels for each expert emerged:

Expert	Working Experience	Level of Expertise	Confidence Level
Expert A	3	4	**7**
Expert B	3	5	**8**
Expert C	2	1	**3**
Expert D	3	4	**7**
Expert E	5	5	**10**
Expert F	3	3	**6**
Expert G	3	5	**8**
Expert H	2	5	**7**

Table 6: Expert's Confidence Level

Contrary to the actual formula of RICE model, which is (R + I + C)/ E, all four dimensions have the same weighting and were summed up after each assessment. The individual assessment of use cases of each expert can be found in the appendix. Table 7 shows the overall prioritisation ranking. The ranking is done in descending order of points.

Phase	Use Cases	A	B	C	D	E	F	G	H	Sum
Con-figuration	Product recommendation	30	33	25	29	33	29	27	30	**236**
Retention	Customer complaints	24	32	27	28	29	24	27	27	**218**
Retention	Handle spare parts	24	26	22	24	34	22	29	26	**207**
Con-sideration	Schedule appointment	26	30	20	25	27	25	27	26	**206**
All	Transfer to human agent	26	29	23	24	29	25	24	23	**203**
Purchase	Document exchange	26	30	25	14	26	25	22	26	**194**
Retention	Order requests & drop-off	23	25	19	23	16	22	24	23	**175**
All	FAQs	26	25	18	24	27	23	26	24	**199**
Retention	Customer feedback	25	27	23	23	26	23	24	22	**193**
Awareness	Push notification, newsletter	22	20	13	19	22	18	21	13	**148**
Purchase	Money transfer	14	14	9	12	15	13	13	12	**102**

Table 7: Expert's Prioritisation Ranking

According to experts interviewed, creating and delivering a superior customer experience is one of the biggest keys to differentiation, competitiveness, and growth (Interview B and E). When considering the digital vehicle purchase, the majority can imagine that the vehicle sales will take place entirely online in the near future and thereby little to no personal interaction is required (Interview B, D, F, G,H). Experts see the advantages of IVAs in the marketing funnel primarily in the personalisation of the process for each individual customer's need (Interview D, E, F), a profound data collection (Interview A, B,D, E, F) as well as the reduced labour cost. The main goal of companies should be to reduce the complexity of the automotive customer journey in order to make the vehicle buying experience more pleasant (Interview A, D, E, F). Two options were proposed, the first being a reduction in the number of choices. Looking at Tesla, which is currently disrupting the market, there is only a minimal choice. Tesla benefits from the fact that individuality can already be created through the brand positioning itself, as owning a Tesla is currently a unique selling point in the market itself (Interviewee A). The second way to reduce complexity is to provide sufficient decision support. Therefore, five out of eight experts have awarded the IVA use cases for product recommendation within the configuration process as the use case and stage with the most potential. Clearly, it is also the

phase in which the conversion takes place, which emphasises the importance of this phase once again. If you look at millennials, who are predicted to represent 45 per cent of vehicle buyers in 2025, another factor comes into play, this one being convenience (Interview H). Today, 47 per cent of people younger than 30 prefer online as the favoured next vehicle purchase channel. Potentially, it would therefore be possible to capitalise on the convenience opportunity by offering them tailored recommendations and potentially, a free vehicle delivery to the customer and a one-week testing period before buying the vehicle.
The second and third use cases with the most potential is the handling of any spare parts and customer complaints. OEMs and dealers face many service requests and complaints daily. Considering that customer service accounts for up to 50 per cent of the profit margin and has a major impact on customer satisfaction and loyalty, this explains why such a high prioritisation is envisaged. Automation is about taking the user out of the loop, yet user experience is critical to adoption. Experts therefore stated it as important to strike the right balance between cost pressure and revenue pressure and hyper-automation and hyper-personalisation (Interview H). Therefore, it is important to offer a fallback whenever people are not willing to talk to a IVAs.

Even though the added value of IVA, chatbots in particular, answering FAQs, whether via social media or on the website itself, was rated only middling, it was also emphasised that while this did not offer any differentiation potential, it is nowadays state of the art on many websites providing products and services. Solutions such as that of Microsoft, one of the largest integration partners, as well as many universal solutions, often allow such a development to be programmed on a low-code approach without a high level of technical background needed. Chatbots are easy to train to solve queries related to providing information about current campaigns or opening hours.

At the very least, experts perceived the potential in the support of a IVAs for money transactions. In various use cases based on examples in the banking sector, it was highlighted that added value is rarely recognised (Interview A). In addition, the use of one-click ordering as offered by Amazon is seen as an added value, which in turn is not suitable for a large sum such as the purchase of a vehicle. Here, the cost/benefit factor has shown that the added value is not recognisable that people are still very sceptical about sharing personal data and at this stage the customer has already become a qualitative lead.

By combining both views in a matrix, the following figure displaying the positioning of the use cases results:

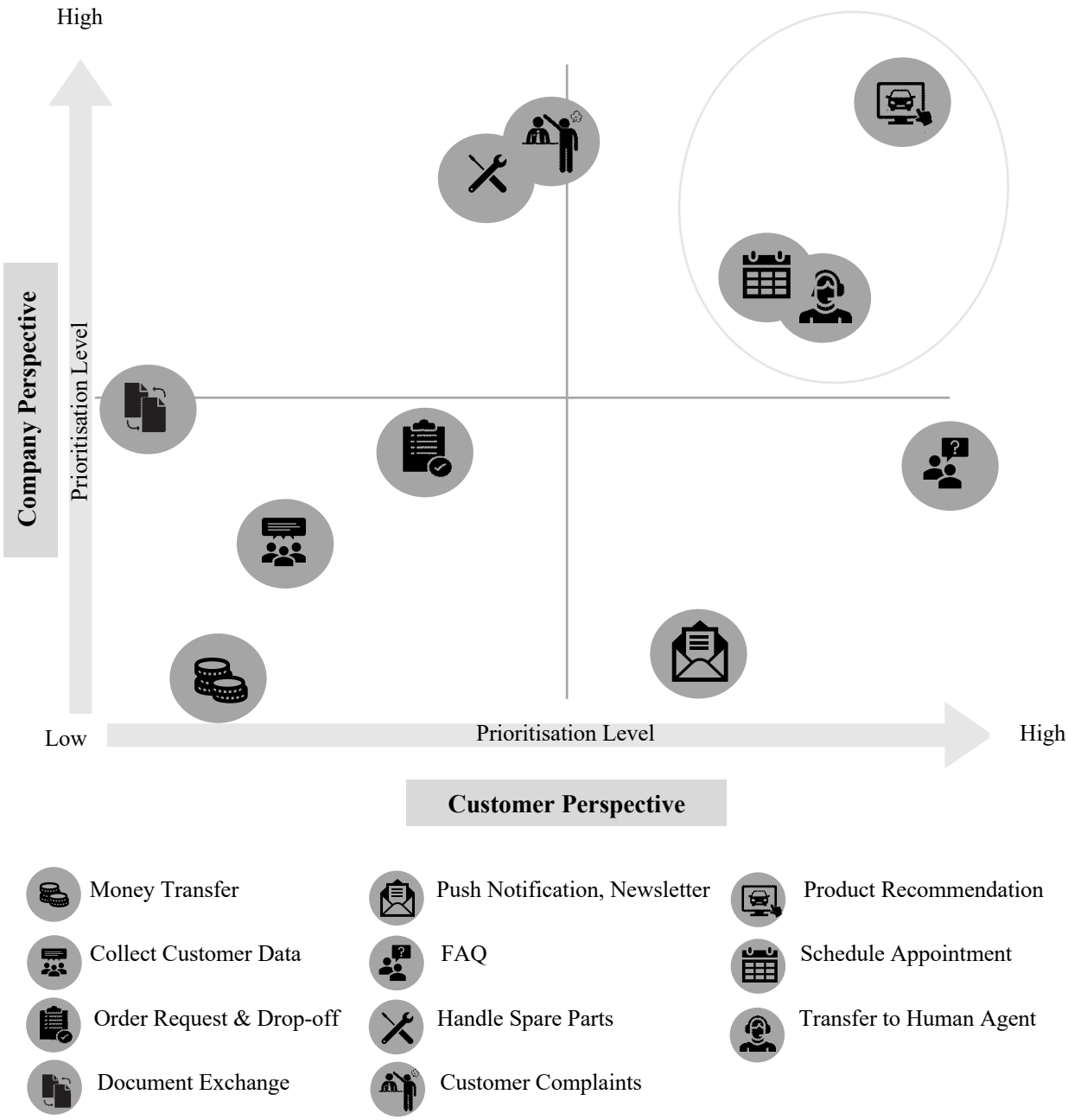

Figure 6: Matrix of combined use case prioritisation

The comparison of the two views shows that especially for the highest prioritisation as well as for the lowest prioritisation of the IVAs use cases, a correspondence of the two perspectives can be observed. This is shown by the fact that many use cases are placed either in the upper

field on the right (high:high) or in the lower field on the left (low:low). The customer perspective shows that they can imagine using IVAs for simple activities such as FAQs and sending push-up notifications or newsletters about current brand campaigns, etc. The reason for this may be that the technology is still in its infancy and hence this is the most common use case for IVA and those that only require a response and not much effort/will on their part. On the other hand, nearly 40.48 per cent indicated that they have already had an experience in which an IVA was unable to resolve their request, which may be indicative of a limited user expectation of IVA capabilities. Hypothesis testing showed that users have confidence in using an IVA but have concerns about disclosing personal information, resulting in the use cases with the most personal information being ranked in the bottom two.

In the expert rankings, the main factor is the resulting profit. Product recommendation and after-sales parts services are precisely areas where leads occur and profit is generated through cross-selling and upselling. Surprisingly, the IVA use cases related to 'spare parts handling' and 'customer complaints' are the two cases that diverge the most between the two perspectives. While experts consider these two cases to be in the top three places, consumers rank them only in the middle of the priority range. This can be explained by the fact that experts are aware of repetitive requests and these can be automated, while consumers may prefer to speak directly to a human agent rather than an IVA who may not directly understand the problem. Because consumers are often stressed or frustrated whenever a complaint or defect arises, it is even more important to respond to them with empathy and understanding. 32 per cent indicated that IVAs often lack empathy.

Regarding the use cases 'schedule an appointment' and 'transfer to a human agent,' both have been placed among the top five IVA use cases. In this context, the experts mainly pointed out that these two cases probably do not add tremendous value individually, but in a synergy of multiple use cases they can provide tremendous benefits. Synergy exists when the use cases share the same or similar data sets, technologies, or purposes, or when the output of one use case can be used as an input to another. The analysis found that there are strong synergies between three use cases that together represent a tremendous pool of value: product recommendation, scheduling, and transfer to a human agent that use the same data and share the same basic goals (Interview D & E). Value can be added while costs can be shared between these three use cases.

4.3 Enablers and bottlenecks for the deployment of IVAs in the automotive industry

The analysis of IVA use cases shows that there are still gaps in the customer journey that remain unfilled by OEMs and dealerships to make the customer journey more seamless. As of yet, there is no seamless integration between the individual stages—from the first click on the OEM's website, to the test drive in the dealership, to repair services. Manufacturers and dealers hardly exchange any information or customer data, resulting in silos of customer data that are difficult to combine and create accurate profiles. These fragmented systems among dealers and OEMs are also a major cause of poor personalisation along the customer journey. However, as stated by five out of eight experts, personalisation should no longer be just a matter of tailored communication and content that is relevant for a particular customer. The needed transformation from a product-oriented to a customer-centric business includes a stronger understanding of who the customers are and what they need. As a reference, although most costumers are undecided about the type and model when looking for a new vehicle, nearly all online vehicle search services allow customers to choose a type or model as a first step, thereby defining them through technical parameters. However, rather than being presented with a multitude of options of what is available, customers seek the answer to 'what is best solution for me, given my unique circumstances?' which highlights the need to focus on their personality, lifestyle and needs. Considering that the literature review did not reveal a clear trend in mobility, which is primarily caused by many external factors such as lack of infrastructure network and political bans, all experts were in agreement that it will no longer be sufficient for OEMs to focus solely on the production and sale of vehicles in order to meet customer needs. Experts face the need to transform systems and business models affecting all the major sources of profitable growth: new vehicle sales, used vehicle sales, after sales, service and mobility services and vehicle sharing, vehicle leasing. Furthermore, the dealer's data strategy needs to be aligned and linked to the manufacturer's omnichannel sales strategy.

Besides the need for more personalisation and interconnected data collection, it has also been shown that customers are still very reluctant to share data with IVAs, as many do not trust that the data will only be used for this purpose and have also already had bad experiences with data sharing online. This is also reinforced that the 'privacy expectancy' dimension was the strongest of the four dimensions within the UTAUT Model describing user intention for IVAs. This highlights the importance of data protection and transparency about what data is collected.

Lastly, the survey showed that the experience of using IVAs was mixed and there are still situations where IVAs are unable to solve customer requests, leading to high frustration on the customer's end. The experts see one factor for failure in the fact that IVAs are deployed at too early a stage. Furthermore, companies often present the IVAs as too 'human' and their limitations are not clearly stated, leading to unrealistic expectations about the IVA's ability for assistance. Furthermore, the fact that 25.4 per cent of respondents stated that personal advice or personal test drive is still important to them shows that people still see a need for face-to-face advice from human agents despite increasing technological possibilities. In fact, studies proved that 71 per cent of people would be less likely to use a brand if it didn't have human customer service representatives available (Forbes, 2019).

Based on these analyses and findings, the following key enablers and bottlenecks for a successful implementation of IVAs are recommended:

First, OEMs and dealers are encouraged to create a heterogeneous data ecosystem or CRM system that enables seamless data exchange between OEMs and dealers. Each part of the digital ecosystem should function to work together to guide the customer through the process aiming to refill existing gaps in the customer journey. For instance, this means that a person who has already configured the vehicle online and then makes an appointment for a face-to-face consultation, or a test drive, will be advised based on this configuration that was already transmitted to the dealer when the appointment was made. OEMs must ensure that their data processing systems are in place and accessible to all parties. A number of the use cases described are based on such a transfer of data and can only provide added value and thus a competitive advantage if this enabler is fulfilled. Even though this is associated with immense costs in the first place, personalisation and a great customer experience can only be achieved if OEMs and dealers together have a holistic view and share ownership of their customers based on a unified customer profile that combines all sources of information. Furthermore, the key to differentiation in customer service and experience lies in the successful integration of all mobility concepts.

Second, OEMs are advised to create a consent management process for each data set, in which customers agree to share their data. This also includes that the cookie consent notice is adapted according to the new GDPR regulations and that the customers are always informed which data is collected from them and outlines the benefit. In fact, more than 50 per cent of consumers are

willing to share their data if it means a more personalised and easier experience (Accenture, 2018). Beyond data security and access, cybersecurity is increasingly important. Greater protections could thus actively enhance customer experience, therefore companies need to set out guidelines in this area.

Third, even though recent studies show that IVAs can answer up to 80 per cent of customer queries without any human intervention, a more seamless customer service and a better customer experience is only possible when technology and people work hand in hand. Through such collaborative intelligence, humans and IVA technology amplify their complementary strengths: leadership, teamwork, creativity, and people skills of the former and speed, scalability, and quantitative capabilities of the latter.
Companies are encouraged to test IVAs first in a test environment before being deployed in practice. Moreover, in situation where an IVA fails a human intervention, a well-defined fallback should be considered in any case as a permanent option for customers to transfer to live chat. While the future of IVAs promises to eliminate mundane mechanical tasks from the workstreams of marketing departments, human interaction and oversight is still crucial to mitigate for algorithmic bias and enhance customer experiences from a creative curatorial and empathetic standpoint.

5. Conclusion & Managerial Contribution

In this paper, various use cases for IVAs along the customer journey in the automotive industry were presented and prioritised according to their usage potential. The evaluation was done from two perspectives to acquire a comprehensive view: the customer's perspective via an online survey and the company's perspective via expert interviews. The use cases with the highest priority for utilisation were identified by combining the two views in a matrix. To evaluate whether IVAs will be used, the influence on user intention was analysed by applying the four dimensions of a modelled UTAUT model. Lastly, based on the analysis coupled with findings from secondary research, key enablers and bottlenecks for a successful deployment of IVAs were obtained.

The findings revealed that IVA use cases functioning as recommendation systems in the vehicle configuration phase achieve the greatest priority among the use cases presented. Moreover,

there was a strong synergy between three cases that represented a massive pool of value, as these cases employ the same data, and the output of one can be used as an input to another. The three cases mentioned are product recommendation, schedule appointments, and transfer to a human agent.
The IVA use case with the least prioritisation among the use case presented was money transfer with the help of voice payment technology and document exchange. In both cases, there was a need to share personal and sensitive data, which could be a reason for the low user intention. In fact, customers tend to be highly reluctant to share data with IVAs, as many do not trust that the data will only be used for this purpose. This was further highlighted by the fact that the 'privacy expectancy' dimension was the strongest of the four constructs within the UTAUT model describing user intention for IVAs.

To leverage the full potential of IVAs, OEMs and dealers are encouraged to create a heterogeneous data ecosystem with particular emphasis on data security to enable a seamless customer journey among different customer touchpoints. Furthermore, they are advised to establish a consent management process for each data set, in which customers agree to share their data—ensuring that customers are aware of how and why their data is being used and adhering to this openness in procedures may lead to increased trust and engagement. In this context, personalisation should be enhanced within the customer journey. Besides tailored communication and content, providing the customer with a valuable experience implies understanding their purposes and needs concerning the vehicle in the first place.

Lastly, a better customer experience is only possible when technology and people work together. Through such collaborative intelligence, humans and IVA technology amplify their complementary strengths: leadership, teamwork, creativity, and people skills of the former and speed, scalability, and quantitative capabilities of the latter.

By considering intelligent virtual agents equipped with artificial intelligence along the customer journey, OEMs and their franchised dealers can create added value in three main aspects: improved and consistent customer experience, resulting in higher sales from more relevant offers to customers and an increase in customer satisfaction; and reduced human labour costs in customer services. The implementation of IVAs along the customer journey is a competitive advantage and helps the entire automotive industry. The benefits of this technology transformation will be, on the one hand, valuable to the whole of industry, in that the efficiency

of media budgets, tactical sales budgets, and margin improvements from more customer-centric packages. On the other hand, applying AI-powered IVAs to automotive vehicle configuration is expected to be a crucial differentiating factor among automotive OEMs and between incumbents and new, digital competitors. The benefit of those effects is estimated to reach up to 2 to 5 percent of the total operating margin.

6. Limitations & Future Research

Despite that the research conducted has led to additional knowledge in a still limited field of research, the following limitations must be taken into account.
First, a distinction between the IVA types was solely made in terms of their core functionality. The influence of the agent's physical appearance and embodiment on the user's perception was not considered in this work. Furthermore, it was not analysed which conversational interface (e.g., chat, voice or text) and conversational style (e.g., rational or emotional) is preferred by respondents for each IVA use case.

Second, the studies conducted only examined the perceptions and behavioural intentions of representatives aged 18-40 years. There were only 7 per cent of respondents aged 41-65 years and only 0.7 per cent over 65 years, which means that they are not representative. Even though this already covers a large age group, it cannot be concluded that these results apply unrestrictedly to the age groups over 40 years.

Third, the UTAUT model identifies four relevant constructs for assessing intention to use technology. To adapt to this specific case of technology use, the construct ‘social influence’ was renamed to the construct ‘relational expectation’ and ‘facilitating conditions’ to ‘private expectation’. In addition, the four moderating variables (gender, experience, age and voluntariness of use) that explain the effects of the independent variables on the dependent variable were not included in the study. Accordingly, the UTAUT model was not considered in its entirety, which may lead to slight deviations in the results due to the missing factors.

Lastly, to comprehensively understand the customer journey in the automotive industry, future research should also include the used vehicles. Another interesting field of research could be how the four trends of digital transformation in the automotive industry, autonomous driving,

shared mobility, connectivity and electrification, will impact new vehicle sales and the after-sales. In addition to these constraints, the impact of the current Covid-19 pandemic should certainly be examined once reliable data is made available. In this context, it will be interesting to analyse whether the contact restrictions associated with the crisis have led to a greater digitalisation of the customer journey in the automotive industry.

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8. Appendices

Appendix I: Online Survey

Q#	Question	Possible Selection
The first part of the survey includes questions about your previous experience of buying a vehicle.		
Q1	Do you own a vehicle?	- Yes - No - I don't want to answer
Q2	Have you ever bought a vehicle yourself?	- Yes (also applicable in the case of support from family or friends) - No - I don't want to answer
Q3	Where do you get information before buying a new vehicle? (multi-selection possible)	- Physical visits to dealer - Manufacturer's website - Experiences and opinions of family and friends - Brochures or information material from OEMs - Dealer's websites - Articles in trade press (e.g., Auto Bild, ADAC) - Customer rating reports - Social media channels
Q4	What attributes are important for you when buying a vehicle? (multi-selection possible)	- I do not want to buy a vehicle without personal advice. - Before I decide on a vehicle, I usually visit a dealership or a showroom several times. - I would also buy a new vehicle without having seen it in person beforehand. - I would also buy a new vehicle without taking a test drive beforehand. - It is very important for me to be able to configure my vehicle personally on a device with all possible equipment features.
Q5	How important is a personal consultancy in the process of buying a vehicle?	- Extremely important - Very important - Moderately important - Slightly important - Not at all important
Q6	The vehicle buying process is often described as complex, intimidating and an unexciting experience? What is the main reason for this perception from your point of view?	Free text field

The second part of the survey includes questions about your perception of Artificial Intelligence (AI), in particular the field of Intelligent Virtual Agents (IVA) that works with AI technology. **Intelligent virtual agents are a conversational entity that uses artificial intelligence and natural language processing to understand user intent, analyze patterns in a conversation and finally use all this to address customer queries.** **Examples of virtual agents are chatbots, Alexa, Siri, etc.**		
Q8	Have you ever used an IVA (e.g. chatbot or any similar) on a platform?	- Yes - No - I don't want to answer
Q9	What was your experience? If you don't want to answer this questions, please enter "X" in the text box.	Free Text field
Q10	What are the most positive aspects for you using an IVA? (Please choose up to two)	- IVA is able to react faster than human agent. - IVA is friendlier than human agent. - IVA reacts outside of customer service hours. - IVA enables easier transfer to a human agent who can better assist. - IVA works more accurate than human agent.
Q11	What are the most negative aspects for you using an IVA? (Please choose up to two)	- IVA is unable to solve issue. - IVA can not understand request. - IVA is unfriendly. - IVA collects personal data. - IVA uses data for retargeting purposes.
Q12	Please rank the following use cases where you personally consider an IVA to be most useful for you:	- IVA helps me with basic questions and inquiries (product availability, opening times, FAQ) - IVA sends push notifications via social media messenger about brand campaigns, news, and product innovations. - IVA helps me make transactions/money transfers when buying a vehicle. - IVA helps with digital contracting and a secure document exchange. - IVA helps me with vehicles recommendations based on my needs and interests. - IVA helps me with requests as part of the after-sales services (customer feedback, handle customer complaints). - IVA helps me to schedule an appointment for personal consulting (by phone or in person). - IVA helps me with the transfer to a human agent/ live chat.
Q13	Please indicate how much you agree with the following statements about your **attitudes** towards intelligent virtual agents in the vehicle buying process:	Rating Scale 'Disagree – Agree': - I would trust the IVA's expertise - I would trust the IVA's consistency - I would trust the IVA's objectivity - I would feel comfortable with sharing my data with the IVA

		- I would trust the IVA to only use my data for the vehicle buying process - I had bad experiences with sharing my data online - I would recommend using the IVA to a friend
Q14	Please indicate how much you agree with the following statements regarding your **perceived performance** of IVA's:	Rating Scale 'Disagree – Agree': - I believe that using IVA would help me understand my preference better - I believe that using IVA would help dealers to diagnose my search better - I believe that using IVA would make it easier to find a right vehicle - I believe that using IVA would make it faster to find a right vehicle - I believe that using IVA would make it more convenient to find a right vehicle - I believe that using IVA would be helpful for improving my search
Q15	Please indicate how much you agree with the following statements about IVA's:	Rating Scale 'Disagree – Agree': - I think that I would understand how to use IVA - I think that it would be easy to use IVA - I think that IVA would react flexible to my input - I think that I would be able to correctly describe my interests - My family would have a positive perception of me using IVA - My friends would have a positive perception of me using IVA - People who use IVA are smart - People who use IVA are naive
Q16	Please indicate how much you agree with the following statements regarding your **intention** of using IVA's:	Rating Scale 'Disagree – Agree': - I intend to use IVAs the next time I am looking for a vehicle - I intend to use IVAs for less expensive products - I intend to use IVAs to understand the options better - I intend to use IVAs instead of researching about my interest online - I intend to use IVAs instead of visiting a dealership
Demographics		
Q17	What is your gender?	- Male - Female - Prefer not to say
Q18	How old are you?	- 18-25 years - 26-40 years - 41-65 years - > 66 years
Q19	Where are you from?	- Portugal - Germany

		- Italy - France - Other: (free text field)

Appendix 2: Expert Interviews

Appendix I: Overview of Expert Interviews

Interview ID	Role of Interviewee	Company Type	Reason for Interview
Interview A	UX/UI Designer	Freelancer, Self-Employed	Obtain an assessment of the traditional versus digital automotive customer journey with regard to user experience and user interface, potential usage of IVAs from business and consumer perspective; record expertise in consumer behaviour and attitude towards IVAs
Interview B	I.T. Consultant (Chat- & Voice-Bots)	German automotive supplier and tech company	Obtain an assessment of use cases of IVAs in the customer journey; record expertise in IVAs with regards to feasibility, scope of implementation, bottlenecks and key enablers, obtain an assessment about changes in mobility and the influence of technology.
Interview C	Senior Developer	German digital agency (website launch, relaunches)	Obtain an assessment of use cases of IVAs in the customer journey; record expertise in IVAs with regard to feasibility, scope of implementation, bottlenecks and key enablers; obtain an assessment about changes in mobility and the influence of technology.

Interview D	I.T. Consultant	Biggest Microsoft Dynamics Integration partner in Europe	Obtain an assessment of use cases of IVAs in the customer journey; record expertise in IVAs with regard to feasibility, scope of implementation, bottlenecks and key enablers.
Interview E	Head of Sales (new vehicles)	German automotive manufacturer	Obtain an assessment of use cases of IVAs in the customer journey; record expertise in IVAs with regard to feasibility, scope of implementation, bottlenecks and key enablers, obtain an assessment about changes in mobility and the influence of technology, gaining insight about current sales models and digital maturity.
Interview F	Dealer	Dealership	Obtain an assessment about changes in mobility and the influence of technology, obtain an assessment about changes in consumer behaviour, gaining insight about current sales models and digital maturity.
Interview G	Lecturer of Smart Mobility Management	Faculty for mobility and customer insight in Switzerland	Obtain an assessment about changes in mobility and the influence of technology; obtain an assessment about changes in consumer behaviour; obtain an assessment and record expertise of use cases of IVAs with regard to consumer acceptance and attitudes towards it.
Interview H	Head of HR and Marketing	Mobility start-up (corporate	Obtain an assessment about changes in mobility and the influence of

		start-up of Germany automotive manufacturer)	technology, obtain an assessment about changes in consumer behaviour.

Appendix II: Expert Interview A

Questionnaire

1. Please describe your perspective of the recent developments in the automotive industry in Europe?

- **How has the market developed in recent years?**
- **What were the main trends/developments in the last 5 years?**
- **Where is mobility heading towards?**

- The topic of mobility needs to be considered in a very multidimensional way, as there are so many different macroeconomic trends and influences that need to be taken into account (e.g., political regulations, infrastructure). This is especially applicable to Germany, where the automotive industry is considered one of the major industries and is therefore also very politically controlled.
- There is no clear paradigm shift or mobility trend recognisable in recent years. Germany is a very decentralised country where the decision is often not up to the customers to choose which mobility concept he or she prefers, as living without a vehicle is not possible in some areas due to a lack of infrastructure and vehicle sharing options. This is applicable to many countries in Europe.
- While vehicle ownership may decline in the urban cities due to regulations or increased maintenance costs, people will continue to buy and use own vehicles in the rural areas.
- OEMs therefore need to consider a variety of mobility concepts in order to remain competitive in the market.
- Especially when considering new players such as Tesla entering the market with a data driven, customer-oriented and direct-sale approach.

2. The traditional vehicle buying process is perceived as a time-consuming, intimidating, untransparent and complicated task, instead of an exciting experience.

- **What do you think are the main reasons for this perception?**
- **How can the digitalisation of this process change this attitude towards it?**

- The purchase of a vehicle is the second most expensive purchase a person makes in a lifetime.
- The vehicle purchase involves highly technical and complex decisions. It serves for many different purposes; many trade-offs have to be made. In addition, it is a high financial commitment that requires a high level of involvement from the prospective buyer.
- Buyers with less experience often feel overwhelmed by unlimited and fragmented information and technical terms that are only used within the (re)purchase process.
- However, newer player like Tesla have managed to reduce the complexity in the process by lower the multiple configuration options and offer direct and 100% online sale. They have managed to create individuality through the brand itself. You define yourself by buying a Tesla.
- There is still a lack of personalisation in the customer journey. Personalisation should no longer be just about tailored communication and messages, it should start with the question of "Was brings the most value to the customer?"; "What are his/her needs?
- Meanwhile, people already come to the dealer highly informed and already know about their preferences. There are many gaps in the customer journey - when they enter the dealership, they usually start an individual new journey because they start again from scratch explaining their needs and requirements. These are gaps in the customer journey that harm the customer journey.

3. A study assumes that 45% of new vehicles will be bought my millennials (born between 1981 and 1996). This target group is described as mobile-first oriented and "always on". How can companies adapt to these new customer expectations?

- Millennial generation is heavily mobile-first and can therefore access information anywhere, anytime. This also affects the media budget, which is no longer just TV, but a mix of Google ads, social media, video content on YouTube and on TV. It's very complex and highly competitive.
- There is an increasing trend for personalisation and customisation. Personalisation has been a trend for over a decade and has evolved greatly from template-like marketing communications to dynamic, predictive and even proactive experiences.
- Millennials are used to offers being tailored to them and companies being always proactive and accessible.
- Millennials have less brand loyalty than previous generation, therefore an exciting and joyful customer experience is key for enhancing customer loyalty.
- Millenials value convenience - they want to start a subscription today and cancel it tomorrow. While this would argue in favour of a car subscription, this model is still not working well enough and is currently depriving millennials of their most important asset - flexibility and time.
- Given the multitude of choices and offers, it should be the goal to reduce complexity. This can be done either by offering limited options or by using technology to guide them perfectly through this journey

4. Please rank the following use cases according to its most usage potential.

- **Please state use cases you are familiar with?**
- **What are potential bottlenecks & key enabler for a successful deployment of IVAs.**

- I consider the use of IVAs to be particularly helpful in two phases of the customer journey. The first phase is the configuration/selection phase, in which the customer already shows great interest and IVAs can serve as a decision-making aid by making tailored suggestions. This also offers the possibility of cross-selling and upselling. The second phase is the after-sales phase, where one can automate a lot in the repetitive requests. Both are stages where the actual lead will be occur and profit will be generated.

- Furthermore, there is still a gap in the customer journey, as there are often search functions for dealers, but an appointment cannot be made directly after the configuration process. Both sides, OEMs and dealers, have very valuable data sets that are yet difficult to connect. However, it would ensure a seamless journey and allow for more personalisation based on precise customer profiles.

Interview A	Reach	Impact	Confidence	Effort	TOTAL
Pushup Notification, Newsletter, Customer Engagement, FAQ	8	1	7	6	22
FAQ	7	4	7	8	26
Product Recommendation, Upselling/ Crosselling	10	10	7	3	30
Schedule Appointment	6	8	7	5	26
Transfer to Human Agent	6	8	7	5	26
Money Transfer	3	2	7	2	14
Customer Complaints	6	7	7	4	24
Order Requests & Drop Off	5	7	7	4	23
Handle Spare Parts	5	8	7	3	23
Collect Customer Feedback	5	4	7	8	25
Document Exchange	7	6	7	4	24

Appendix III: Expert Interview B

Questionnaire

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1. Please describe your perspective of the recent developments in the automotive industry in Europe?

- **How has the market developed in recent years?**
- **What is the future of vehicle ownership?**

- The future of mobility is driven by three major technology-driven disruptive trends: Electrification of vehicles, connected and autonomous vehicles and Mobility-as-a-Service.
- The most important trend to pursue at the moment is autonomous driving.

- As autonomous vehicles and shared vehicles become more common, autonomous mobility providers could offer rides cheaper than today's ride-hailing services. This could transform the automotive market from a product to a service model, as consumers increasingly choose to use on-demand services rather than owning a vehicle.
- Even if a reduction in car ownership is expected, this will still take a very long time and will never be completely replaced as it is not possible due to several external factors.

2. The traditional vehicle buying process is perceived as a time-consuming, intimidating, untransparent and complicated task, instead of an exciting experience.

- **What do you think are the main reasons for this perception?**
- **How can the digitalisation of this process changes this attitude towards it?**

- There will be two major changes in vehicle buying over the next ten years.
- The first involves many more ways of where and how people buy vehicles in Europe. In some cases a dealer will be involved, in others not. That is a big change in the way one think about vehicle retailing in Europe. And some changes are already visible. In new vehicle sales, Tesla is going direct to the consumer, and in used and leasing cars we see start-ups like Finn or Vehiculum entering the market aggressively.
- The second big change is that this process will increasingly move towards online and this is already in progress. By 2030, the entire vehicle trading process is expected to become digital. This includes everything from finding the right vehicle to the actual transaction. People will be able to buy a vehicle online without having the need to go in a dealership if they don't want to.

3. A study assumes that 45% of new vehicles will be bought my millennials (born between 1981 and 1996). This target group is described as mobile-first oriented and "always on".

- **What needs to happen along the automotive customer journey to meet the demands?**

- Personalisation will not only define the vehicle trade in the future, but the trade as a whole. The cornerstone will be the use of big data or the compilation of data on individual customers, which can be used to build up precise customer profiles.
- The ability to collect and integrate large amounts of information about a customer will significantly automate and make vehicle buying more fluid in the coming years.

- Rather than clicking through all technical parameters and models, algorithms will do the searching for them. They will integrate data that they themselves provide and that other players already have.
- This also means that customers spend less time going through the vehicle purchase funnel. It will no longer be necessary to evaluate all the complex parameters of a car yourself. Instead, algorithms will do the searching for them. They will integrate data that they themselves provide and that other players already have.

4. Please discuss the following use cases and prioritise them. What are potential bottlenecks? What are the main advantages of using IVAs?

- Customer segmentation has been applied across industries for years to reduce wastage in marketing campaigns and to support other tasks such as product recommendations, pricing and upselling strategies. It is now a building block for companies to optimise their customer experience as it helps to tailor it precisely to different customer segments and their specific needs, and enables brands to target individuals more accurately with unique messages and offers across all touchpoints in the consumer journey and purchase occasions.
- People are still very data sensitive even though they are willing to share their personal preferences if it brings them benefit.
- The main benefit of IVAs lies in permanent accessibility, automatization of processes and data collection which all serve to strive for superior customer experience.

Interview B	**Reach**	**Impact**	**Confidence**	**Effort**	**TOTAL**
Pushup Notification, Newsletter, Customer Engagement, FAQ	1	1	10	8	20
FAQ	3	4	10	8	25
Product Recommendation, Upselling/ Crosselling	10	10	10	3	33
Schedule Appointment	8	8	10	4	30
Transfer to Human Agent	7	8	10	4	29
Money Transfer	1	1	10	2	14
Customer Complaints	8	7	10	7	32

Order Requests & Drop Off	5	6	10	4	25
Handle Spare Parts	5	8	10	3	26
Collect Customer Feedback	5	4	10	8	27
Handle Spare Parts	5	7	10	3	25
Document Exchange	8	8	10	4	30

Appendix IV: Expert Interview C

Questionnaire

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1. How would you describe the development of IVAs? What are the main bottlenecks in the deployment of IVAs?

- Interviewee C considers virtual assistants / chatbots as the second most effective measure to improve their CX in the next 5 years – right after artificial intelligence.
- Due to the rapid evolution of AI technology and an increasing number of companies marketing proprietary AI products, it is becoming more and more difficult to keep up with the appropriate terminology and evolving capabilities of bots. In addition, most technology suppliers want to market their product as "the next big thing". This means difficulties in understanding what technology people are buying into and what features they can expect - whether it is a "chatbot" or a "virtual agent".
- The creation of virtual agents by employees without a deep technical background, can quickly become chaotic. The result is redundant and orphaned agents, which are with contradictory or incomplete data or agents who use sensitive data unintentionally sensitive data unintentionally and violate security protocols.
- Furthermore, there are many IVA which will be deployed at a too early stage which oftentimes results in ambiguous conversation and high frustration on customer side. It is also helpful to permanently collecting feedback from customer for improvements. There are several helpful tools such as Hotjar to collect such feedbacks.
- Companies are encouraged to test the IVA in a test environment before deploying it to live. Also, they are advised to clearly state that customers speak to a robot instead of a human to set expectation on customer's side accordingly.
- Experience shows that personal advice from a human salesperson is still more profitable than from robots. Interpersonal connections and sympathies cannot be created through an IVA.

2. Please discuss the following use cases and prioritise them according to their most usage potential:

- The greatest potential of IVAs is in the aftersales market. Whether the consumer has a complaint or a defect with his/ her vehicle. Consumers want quick feedback and the biggest advantage of IVAs is that they can react quickly, respond out of office hours and automate standardised requests. Frustrated customers can be turned into loyal customers when a company works in their interest and in a solution-oriented way.
- IVA can be programmed to recognise similar cases and react accordingly. They can continuously learn and optimise themselves.
- Another stage with potential to use IVA is the configuration stage. The roles of AI-enabled services in the pre-transaction phase is to select relevant information, customize choice sets, and advise customers on choices. For example, online retailers may use so-called "recommendation agents" when searching and selecting products or services online. Such personalised product recommendations are based on prior browsing and purchase history and/or collaborative filtering methods that infer recommendations based on what other users who bought the specific product has also bought.
- There is not much potential for IVA uses cases serving as assistance for money transaction. This feature is already being used by many banks, as a voice payment technology offers a new emerging and secure variant of payment. However, this technology is still in its infancy. Facilitating and speeding up payments only makes sense for impulsive purchases that create additional convenience. This is demonstrated by Amazon with its one-click ordering function.

Interview C	**Reach**	**Impact**	**Confidence**	**Effort**	**TOTAL**
Pushup Notification, Newsletter, Customer Engagement, FAQ	2	0	3	8	13
FAQ	3	4	3	8	18
Product Recommendation, Upselling/ Crosselling	9	10	3	3	25
Schedule Appointment	6	8	3	4	21
Transfer to Human Agent	8	8	3	4	23

Money Transfer	1	3	3	2	9
Customer Complaints	8	9	3	7	27
Order Requests & Drop Off	5	6	3	5	19
Handle Spare Parts	6	7	3	4	20
Collect Customer Feedback	8	4	3	8	23
Document Exchange	8	10	3	3	24

3. What are potential bottlenecks and key enablers for a successful deployment?

- The greatest advantage of IVAs is the data basis and the accompanying possibilities for personalisation and marketing.
- Nevertheless, it can be seen that people are still reluctant to disclose data and there is still a certain scepticism about these technologies.
- Companies must ensure that they handle data in a trustworthy manner and can also demonstrate this to the customer. There should always be a benefit when the customer has to provide personal data.

Appendix V: Expert Interview D

Questionnaire

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1. What are the main advantages of IVA's along the customer journey?

- Artificial intelligence can be used to analyse large amounts of data and make predictions for the future on this basis. It facilitates customer segmentation and in-depth customer profiles.
- Repetitive tasks and standardised processes can be automated. This relieves employees of routine tasks while they can focus on high bound requests.
- Customers profit from a service that they can access at any time and from anywhere in moments of high intent. Furthermore, they can expect instant feedback unlike the waiting time when reporting a concern through other common channels such as phone or email.
- New customer service representatives or those who are overwhelmed with multiple chats at once can make mistakes, such as mixing up numbers or giving the wrong return address. Chatbots have a lower error rate.

- Using chatbots for detailed data responses, such as price lists or phone numbers and addresses, can help reduce incorrect responses due to human error.
- The greatest benefit can be found when combining the work of human agents and intelligent virtual agents. People and IVA technology therefore can enhance their complementary strengths: The advantage of humans is leadership, teamwork, creativity, emotional response and human capabilities while the advantage of IVA technology lies in speed, scalability and quantitative capabilities.

2. Please provide uses cases you are familiar with. What are the use cases with the most potential?

- To complement the use cases: IVAs can also be used in the processing of documents. With the help of an IVA, unstructured documents such as invoices and receipts, copies of ID cards or the like can be converted into structured data. To do this, the customer is asked to take a photo of the documents to be delivered, while the IVA receives the documents, processes them and automatically enters the data into the system.
- Microsoft has several in-house tools that are suitable for this purpose, e.g. AI builder forms processing: Document Automation and Processing is an AI solution with the Microsoft Power Platform that provides functional end to end document processing to accelerate and optimize existing operations.
- Customer complaints are often similar problems that can be easily programmed. This is where I see the most potential and savings. The human employees in customer support should be able to concentrate on problems that require "human judgement". The bot should process frequently recurring enquiries from customers independently and automatically.

Interview D	Reach	Impact	Confidence	Effort	TOTAL
Pushup Notification, Newsletter, Customer Engagement, FAQ	2	2	7	8	19
FAQ	3	6	7	8	24
Product Recommendation, Upselling/ Crosselling	9	10	7	3	29
Schedule Appointment	6	8	7	4	25

Transfer to Human Agent	8	5	7	4	24
Money Transfer	1	1	7	3	12
Customer Complaints	7	7	7	7	28
Order Requests & Drop Off	5	6	7	5	23
Handle Spare Parts	6	7	7	4	24
Collect Customer Feedback	2	6	7	8	23
Document Exchange	7	8	7	4	26

3. What are potential bottlenecks & key enablers for a successful deployment?

- Some customers may not be eager to accept this change or may distrust AI-enabled tasks. In such situations, managers need to identify these hesitant customers and then possibly adopt a traditional approach to customer care.
- The main advantage of IVAs is the data collection. This is not only for marketing purposes, but also for the entire company, as strategies and trends can be derived on the basis of this data.
- Automotive AI-enabled chatbots are able to deliver a personalised buying experience by suggesting the most suitable vehicles to customers and improving post-purchase service.
- Indeed, automotive companies are using AI in their vehicle systems and infotainment messengers to help customers service their vehicles and provide them with a pleasant user experience.

Appendix VI: Expert Interview E

Questionnaire

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1. Please describe your perspective of the recent developments in the automotive industry in Europe?

- **How has the market developed in recent years?**
- **What were the main trends/developments in the last 5 years?**
- **What would you say has changed by 2030 in the automotive industry?**

- In fact, there is no single mobility that will determine the future, as the needs of individual customers are too different.
- However, it can already be predicted that individual mobility will persist regardless of emerging concepts. People strive for maximum flexibility, and this is still most likely to be provided by having one's own car. Of course, this varies depending on where people live and certain life circumstances.
- Nevertheless, it is important that manufacturers provide a wide range of propulsion systems and placing the highest value on efficiency, the environment and resource conservation.
- One of the greatest trends will be autonomous driving. There will certainly be a high number of people willing to spend more money for autonomous vehicles if it gives them more time. For example, the possibility to take a nap or to read the newspaper while driving.
- The factor of time management and time efficiency will increase enormously, not just in business processes but also among customers.

2. The traditional vehicle buying process is perceived as a time-consuming, intimidating, untransparent and complicated task, instead of an exciting experience.

- **How can the digitalisation of this process change this attitude towards it?**

- The customer journey in the automotive industry is undergoing a belated digital transformation. Large part of the research and even the customisation and purchase of a vehicle takes place through the digital channel.
- It can be seen in recent years that product quality is getting better and better, so it is hard to differentiate oneself as an OEM through product quality. Of course, customer experience varies greatly from customer to customer, but it is now a key driver for OEMs and franchised dealers to strive for great customer experience, which leads to brand loyalty, increased sales and better customer retention.
- However, even though digital makes life more flexible and personal exchange remains valuable.
- Personalisation has become a key driver for exceptional customer experience. This shift has been reinforced by customer expectations and increasing price and product parity, and correspondingly fierce competition, which has increased the importance of creating superior the customer experience and perception at every touchpoint. It has made personalisation and especially empathy even more important.

- **Please provide some of the uses cases you are familiar with.**

- The main goal should be to reduce complexity while ensuring personalization throughout the whole process. This can be mainly achieved by the configuration process by providing suggestions based on customer preferences and profiles.
- By using artificial intelligence, the company‘s new vehicle configurator aims at making the configuration process easier for customers.
- For this purpose, the company using AI technology to create a truly personalised online experience where they display relevant equipment options.
- Early this year, the company introduced an AI-based recommendation system with more than 270 market- and derivative-specific neural networks and a complex AI-based algorithm to find specific patterns in the data and recommend the most relevant items for a particular customer
- Throughout the process, customers are directed to a lighting configurator that allows them to modify their vehicle and add specific additional features based on simple needs, inspirations and comparisons. The system makes it possible to highlight the products that other customers prefer most and to introduce these to new customers. This creates an opportunity for cross-selling and upselling which is beneficial for higher margins.
- The aim is to offer a limited number of alternatives that can be fully combined without hindering consideration of the full range of options.
- The stage with the most potential to use IVAs is the configuration stage, followed by the after sales market.
- Chatbots serving to provide basic information and push brand campaigns are already state-of-the-art on most websites. There are “nice-to-have” but no longer a differentiator on the market.
- In addition, with an increased request for basic questions, it should also be questioned whether the usability of the website needs to be revised. Chatbots should not be a fallback option for existing problems.

Interview E	Reach	Impact	Confidence	Effort	TOTAL
Pushup Notification, Newsletter, Customer Engagement, FAQ	4	0	10	8	22
FAQ	3	6	10	8	27
Product Recommendation, Upselling/ Crosselling	10	10	10	3	33
Schedule Appointment	6	7	10	4	27
Transfer to Human Agent	8	4	10	7	29
Money Transfer	2	0	10	3	15
Customer Complaints	7	5	10	7	29
Order Requests & Drop Off	5	6	10	5	26
Handle Spare Parts	10	10	10	4	34
Collect Customer Feedback	3	7	10	6	26
Schedule Appointment	7	7	10	4	28
Document Exchange	5	6	10	5	26

4. What are potential bottlenecks & key enablers for a successful deployment of IVAs?

- Product Recommendation System will become a key differentiator and a competitive advantage in the market in the long-term.
- However, personalisation in the automotive industry also implies knowing who the customer is. It is not possible to configure models according to personal habits, needs, and wishes yet, as opposed to defining them through technical parameter by selection from the product features and parameter offered.
- Customer seek the question “what is the best product offer for me, considering my lifestyle and circumstances?”
- The focus should be on what brings the most value to the client. In this way, customers can be provided with a highly personalized suggestion based on an overall assessment of data available.
- However, the lack of robust collaboration between manufacturers and dealers often results in fragmented lead management and inconsistencies in the customer experience, making it difficult to deliver personalized marketing and consistent information at scale.

Appendix VII: Expert Interview F

Questionnaire

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1. Please describe your perspective of the recent developments in the automotive industry in Europe? What role do dealer play in the future?

- Most manufacturer use a network of franchised dealers to sell and service their products. These dealers handle both initial sales and after-sales service, putting them at the forefront of the customer relationship and experience. The power and influence that their perception and service have on the manufacturer's overall brand perception is often being underestimated, yet it shows how interconnected they are in the eyes of customers.
- There is as yet no seamless integration between the individual stages of the buying process - from the first click on the manufacturer's website to the test drive in the dealership to any advice on financing options.
- Manufacturers and dealer hardly exchange any information or customer data, as dealers operate independently of manufacturers. This lack of robust collaboration between manufacturers and dealers often results in fragmented lead management and inconsistencies in the customer experience, making it difficult to deliver personalised marketing and consistent information at scale.
- In the future, there will be more OEMs offering direct sales and dealer will become an experience center in the long-term. However, there will only be a limited option of vehicles available, as AR/VR technologies will help to illustrate different colours without the need to have them physically in front.

2. Please prioritise the use cases presented according to their most potential.

- I consider the synergy of several use cases to have the greatest potential. The use cases Schedule Appointment, Transfer to Human Agent are all based on a data gained by configuration. Together, they can create enormous added value and, above all, close the existing gaps in the customer journey between OEM and dealer.
- I still see the use of IVAs in social media as very difficult. Chatbots in social media still have a negative connotation, as they are often used for manipulation and error messages. If brand decide to be present social media, the human capacity must also be created to enable customer service via this channel.

- Virtual agents used as newsletters or advertisements are hardly noticed and if so, often perceived as annoying. This is because they often meet the customer in the awareness and consideration phase, when the customer is not yet dealing with his need or problem. In these phases, the customer should rather encounter an emotional or interest-generating advertisement.
- The IVA case to support the transfer of funds should not be the responsibility of the manufacturer, but an incentive for bank providers. There are numerous other pain points in the customer journey that can be solved first through IVA. Once you have convinced the customer to buy, the purchase is only a fraction of the way.

Interview F	**Reach**	**Impact**	**Confidence**	**Effort**	**TOTAL**
Pushup Notification, Newsletter, Customer Engagement, FAQ	5	1	6	6	18
FAQ	7	2	6	8	23
Product Recommendation, Upselling/ Crosselling	10	10	6	3	29
Schedule Appointment	6	8	6	5	25
Transfer to Human Agent	6	8	6	5	25
Money Transfer	3	2	6	2	13
Customer Complaints	7	7	6	4	24
Order Requests & Drop Off	5	7	6	4	22
Handle Spare Parts	5	8	6	3	22
Collect Customer Feedback	5	4	6	8	23
Document Exchange	7	2	6	8	23

Appendix VIII: Expert Interview G

Questionnaire

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1. Please prioritise the use cases according to the most potential.

Interview G	Reach	Impact	Confidence	Effort	TOTAL
Pushup Notification, Newsletter, Customer Engagement, FAQ	2	3	8	8	21
FAQ	3	7	8	8	26
Product Recommendation, Upselling/ Crosselling	8	10	8	1	27
Schedule Appointment	8	7	8	4	27
Transfer to Human Agent	5	7	8	4	24
Money Transfer	1	1	8	3	13
Customer Complaints	7	7	8	7	29
Order Requests & Drop Off	5	6	8	5	24
Handle Spare Parts	6	7	8	4	25
Collect Customer Feedback	2	6	8	8	24
Document Exchange	5	7	8	4	24

Appendix IX: Expert Interview H

Questionnaire

Interview H	Reach	Impact	Confidence	Effort	TOTAL
Pushup Notification, Newsletter, Customer Engagement, FAQ	5	1	6	6	18
FAQ	7	2	6	8	23
Product Recommendation, Upselling/ Crosselling	10	10	6	3	29

Schedule Appointment	6	8	6	5	25
Transfer to Human Agent	6	8	6	5	25
Money Transfer	3	2	6	2	13
Customer Complaints	7	7	6	4	24
Order Requests & Drop Off	5	7	6	4	22
Handle Spare Parts	5	8	6	3	22
Collect Customer Feedback	5	4	6	8	23
Document Exchange	5	7	6	4	22

1. **What are potential bottlenecks and key enablers for a successful deployment of IVAs?**

- More AI means more insights and more data. The use of IVAs in the customer experience process will exponentially increase the possibilities of data collection and thereby possibilities for personalisation.
- By using chatbots and conversational AI, OEMs can gain additional valuable insights into their customers' behaviour, preferences and needs. In particular, this offers important data that contributes to personalisation in the buying process,
- It is therefore essential to introduce artificial intelligence and systems that can merge and analyse structured and unstructured data, algorithms that can identify behavioural patterns and customer preferences, and analytics to feed this information into easy-to-use dashboards.
- Nevertheless, data security has become an important topic in today’s time as people become more careful and sensitive about their data.

Appendix 3: Hypothesis Testing

Hypothesis 1:

There is a positive relationship between the user's relationship expectancy (X1) user's usage intention (Y) in the case of IVAs applied to the automotive industry.

Step 1: Compute Variables

Step 2: Linear Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	User_Intention[b]	.	Enter

a. Dependent Variable: Relationship_Expectancy

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.570[a]	.324	.319	.74891

a. Predictors: (Constant), User_Intention

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.234	1	31.234	55.689	<.001[b]
	Residual	65.061	116	.561		
	Total	96.295	117			

a. Dependent Variable: Relationship_Expectancy

b. Predictors: (Constant), User_Intention

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	2.928	.613		4.779	<.001
	User_Intention	.584	.078	.570	7.463	<.001

a. Dependent Variable: Relationship_Expectancy

Step 3: Indicating strongest variable explaining dependent variable

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	5.276	.547		9.646	<.001
	Please indicate how much you agree with the following statements about IVA's: – I think that I would be able to correctly describe my interests	.409	.085	.513	4.785	<.001

Hypothesis 2:

There is a positive relationship between the user's performance expectancy (X2) user's usage intention (Y) in the case of IVAs applied to the automotive industry.

Step 1: Compute Variables

Step 2: Linear Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	performance_expectancy[b]	.	Enter

a. Dependent Variable: user_intention

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					R Square Change	F Change	df1	df2	Sig. F Change
1	.565[a]	.324	.319	.73079	.324	55.689	1	116	<.001

a. Predictors: (Constant), performance_expectancy

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.741	1	29.741	55.689	<.001[b]
	Residual	61.951	116	.534		
	Total	91.693	117			

a. Dependent Variable: user_intention

b. Predictors: (Constant), performance_expectancy

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.632	.560		6.481	<.001
	performance_expectancy	.556	.074	.570	7.463	<.001

a. Dependent Variable: user_intention

Step 3: Indicating strongest variable explaining dependent variable

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.718	.518		9.115	<.001
	Please indicate how much you agree with the following statements regarding your perceived performance of IVA's: – I believe that using IVA would make it faster to find a right vehicle	.213	.069	.485	5.981	<.001

a. Dependent Variable: User_Intention

Hypothesis 3:

There is a positive relationship between the user's effort expectancy (X3) user's usage intention (Y) in the case of IVAs applied to the automotive industry.

Step 1: No computation of variables, as there is only one independent variable.

Step 2: ANOVA

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Please indicate how much you agree with the following statements about IVA's: – I think that it would be easy to use IVA[b]	.	Enter

a. Dependent Variable: User_Intention

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.464[a]	.215	.208	.78779

a. Predictors: (Constant), Please indicate how much you agree with the following statements about IVA's: – I think that it would be easy to use IVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.702	1	19.702	31.746	<.001[b]
	Residual	71.991	116	.621		
	Total	91.693	117			

a. Dependent Variable: User_Intention

b. Predictors: (Constant), Please indicate how much you agree with the following statements about IVA's: – I think that it would be easy to use IVA

Step 3: Indicating strongest variable explaining dependent variable

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	4.464	.594		7.517	<.001
	Please indicate how much you agree with the following statements about IVA's: – I think that it would be easy to use IVA	.473	.084	.464	5.634	<.001

a. Dependent Variable: User_Intention

Hypothesis 4:

There is a positive relationship between the user's private expectancy (X4) user's usage intention (Y) in the case of IVAs applied to the automotive industry.

Step 1: Compute Variables

Step 2: Linear Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Privacy_Expectancy[b]	.	Enter

a. Dependent Variable: User_Intention

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.617[a]	.380	.375	.69981

a. Predictors: (Constant), Privacy_Expectancy

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.884	1	34.884	71.232	<.001[b]
	Residual	56.808	116	.490		
	Total	91.693	117			

a. Dependent Variable: User_Intention

b. Predictors: (Constant), Privacy_Expectancy

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.766	.481		7.837	<.001
	Privacy_Expectancy	.496	.059	.617	8.440	<.001

a. Dependent Variable: User_Intention