The potential of Data-Driven Virtual Assistants to enhance Customer Experience in the Telecommunications Industry

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Abstract

Our day to day is becoming increasingly technological. We use more devices, manage more aspects of our life online, check whatsapp dozens of times a day, etc. We have even started talking to our phones in search of information and answers to make our lives easier. This is why we keep hearing words like Virtual Assistants or Artificial intelligence, which have become familiar through Siri, Cortana or Google Assistant. We do not hesitate to ask them for information about the weather, routes, reminders, etc. However, when it comes to interacting with organisations and service providers, users still tend to do so through traditional channels, such as phone calls or visiting shops, which quite often result in a poor customer experience and low customer satisfaction. This usually happens because it has become difficult for both customers and firms to access and filter information in this overwhelming era of Data Growth, the core challenge of Big Data. Consequently, how could large organisations implement new technologies to improve customer experience and utilise Big Data? This paper explores the benefits and needs of applying Data-Driven Virtual Assistants and Artificial Intelligence principles to enhance customer experience when managing Telecommunications services, as well as what such applications would imply compared to existing models. It identifies the perceived benefits from both users and the Telecoms organisations that implement a Data Driven Virtual Assistant.

Key-words: Virtual Assistant; Artificial Intelligence; Customer Experience; Big Data; Telecommunications.

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1. Introduction

Even at user level, in the last five years we have adopted certain words in our vocabulary that we had never used before: big data, virtual assistants, chat bots, virtual intelligence, etc. They represent very relevant concepts of our day-to-day.

Most multinational organisations and enterprises have immense amounts of data about their customers. Quite often those data are difficult to make use of because they are not organized in order to provide a better customised and personalised customer experience, which can also optimise internal processes and customer management. This data disarray is one of the reasons why customers tend to turn to traditional channels in which they can be speak to a person that can help them find the information or solve their customer issues.

This research paper will explore the challenges, uses and advantages of virtual assistants and their potential value to provide a better customer experience and, specifically, a robust value proposition in the Telecommunications industry.

2. The problem: Data growth

While the value Big Data brings to products and services in which it is utilised it is not something new (Labrinidis and Jagadish, 2012), it still faces an immense challenge for large organisations: Data Growth (Khan et al, 2014). This challenge comprises four different aspects to consider: volume, velocity, variety and value of the data generated (Tole, 2013), so it is not only about managing the vast amounts of data but also considering the radically different kinds of data, real-time generation and the necessity to properly distil it in order to improve an organisation product or service experience. Data Growth has impact on two aspects: (1) Firstly, it complicates customers' interaction with their services because they do not have access to information due to its high volume, making difficult to provide personalised answers and (2) secondly, it makes organisations less efficient as they need to invest more time and resources in satisfying all the queries and incidences customers generate because they do not understand what the user says or needs.

3. Literature Review

3.1 Customer Experience and Access to Data

When Data is not properly managed, the direct consequence for customers is a negative customer experience and low levels of satisfaction. This deficit takes place in multiple situations and channels as the customer experience is the entire compendium of touchpoints during the interaction between a customer and an organisation, brand or business (Holbrook and Hirschman, 1982), which ranges from customer care, advertising, ease of use, trustworthiness and product or service features (Meyer and Schwager, 2007). It is therefore rather important for organisations to shape the same customer experience across all these different types of interactions with cus-

tomers. However, this is not frequently the case: many organisations fail to view their products and services as a holistic experience. Some choose to focus on website and social media experience while others focus their efforts on face-to-face retail service or over-the-phone customer service (Zwilling, 2014).

To explore this aspect, Allen et al (2005) undertook a study to understand if both businesses and customers perceive the same quality of customer experience. They found that while 80% of corporations considered they were offering a "great customer experience", only 8% of their customers stated they were satisfied with the experience they were receiving. This study highlighted the discrepancy in how customers versus firms perceived the quality of customer experience. Customer satisfaction and customer-perceived service quality are two well established success factors for service providers (Wang et al, 2004; Kuo, Wu, and Deng, 2009), however, how can customer satisfaction be measured? Kim et al (2004) identified: (1) value-added services, to enhance enjoyment and convenience, and (2) customer support, to rapidly process customers' complaints, are two impact metrics of customer satisfaction.

Making a phone call to customer care tends to lead to low customer satisfaction (Miciak and Desmarais, 2001; Santouridis and Trivellas, 2010). As a result, many services have been developed in the last decade to improve customer experience. For example, GetHuman.com in 2007, was created to provide customers with shortcuts to avoid long waits when calling customer service numbers in large organisations or, alternatively, paying an expert to call on your behalf. Other companies, such as Time Warner Cable (now Time Warner Cable Spectrum), which had a very poor reputation for customer service, have opted for an online chat support available 24/7 to address this issue.

The time and effort customers need to invest in problem-solving and to access information is a parameter to consider in successful customer experience. The WSJ undertook a survey in 2007 to understand customer service calls and the behaviours customers go through. It showed that, at the time they get to talk to the customer-care worker, 70% are already in a rage: they also start to shout (24%), threat to sue (8%) and curse (5%). This behaviour has a negative impact on the call centre workers, who are told to remain polite under these circumstances, as it raises their stress levels (Tuttle, 2010). This is not a new issue in customer service but it has not been addressed, continuing to be a common concern for many companies.

3.2 Artificial Intelligence and Virtual Assistants

We undertook a review of existing literature to clarify the meaning of Artificial Intelligence and Virtual Assistants for this research study. Within this context, Artificial Intelligence (AI) will refer to a system or machine that carries out a series of functions to maximise task success and is typically used when such machine imitates cognitive functions similar to humans, such as problem-solving or learning (Russell and Norvig, 2002). It is a system that behaves intelligently, capable of adapting to diverse circumstances, change goals, learn from experience and make appropriate decisions always within its own limitations as a machine (Poole and Mackworth, 2010).

Gartner, the IT Research firm, defines Virtual Assistants (VAs) as computer-generated characters able to simulate conversations through voice or text in a web, kiosk or mobile interface. VAs' main benefits are their capacity to acquire knowledge, to control dialogue, and, above all, to process users' natural language. In terms of input-output, given that a VA can process both voice and text, interactions can form several combinations: text-text, text-voice, voice-text and voice-voice. This opens a wide range of multi-modal interactions that can be adapted to very diverse situations and contexts.

Artificial Intelligence and VAs might seem like a tech novelty, but in reality, they appeared fifty years ago. For instance, the discipline of Artificial Intelligence was formally founded in 1956, and became, since its beginnings, a very appealing area for scientists and researchers (Russell and Norvig, 2002). VAs appeared a decade later. In 1966, MIT professor Joseph Weizenbaum built ELIZA, the first chat bot that acted as a psychotherapist that repeated fragments of sentences or asked questions to stimulate a discussion with a patient. Only two years later, Terry Winograd, then PhD student at the Artificial Intelligence Lab at MIT, started building a programme that, via text, could talk to humans through natural language. Unfortunately, Winograd gave up this project a few years later because he considered it was impossible for machines to behave that way with the resources and technologies available at the time. He was right: even today natural language is still a significant challenge with VAs.

Artificial Intelligence enables machines to carry out complex tasks via Deep Learning that previously could only be solved by humans (Knight, 2016). Nevertheless, there is still a long way to go. For instance, Deep Learning expert Ruslan Salakhutdinov (2016) has identified three core areas in which AI must be developed: (1) computers should have a better understanding of natural language, (2) they should also be capable of learning it through repetition and (3) by exploring new ways in which machines could learn through tag-free content (photos, videos, audios, etc.).

According to Medina et al (2013) there are two types of Virtual Assistants: (i) general purpose assistants and (ii) specific purpose assistants. The first ones are the ones we associate to Siri (Gruber, 2009) and Google Now (Reed, 2012), which provide us with information about the weather, routes, alarms, messages, etc. On the other hand, specific purpose assistants focus on answering questions and giving information about a specific context, such an institution, brand or shop. So far, its key advantage has been the ability to solve issues *in situ* (whether it is a physical or virtual space). This is why BenMark and Venkatachari (2016) consider VAs to be remarkable tools for "brands to create and promote a new form of relevant, personalised and useful interaction with customers". We focused on specific purpose assistants for this study because it specifically involves solving customer problems in the Telecoms category.

3.3 Literature Summary

The literature has showed Artificial Intelligence and VAs are on the rise. Gartner IT Research has estimated that in the next four years 20% of interactions with our

smartphones will take place through VAs (Darrow, 2016), highlighting that it is a key area in which to develop better human-machine experiences. It has also pointed out a series of struggles both organisations and customers are currently facing involving Data Growth. The potential solution that can be inferred from the literature is to address this problem by reducing the computational gap through Big Data to provide personalised answers and the use of a Virtual Assistant to improve the interaction between the organisation and the customer. It is not only about having lots of data but establishing how can an organisation utilise it to offer these customised conversations (through Big Data) and understand what the customer is saying and what the customer needs (through Virtual Assistants). Therefore, this study sought to investigate the potential of a Data-driven Virtual Assistant, that combines the advantages of Big Data and Artificial Intelligence, as an effective tool to optimise the time and effort invested by both the clients and the service provider, thereby enhancing the overall customer experience.
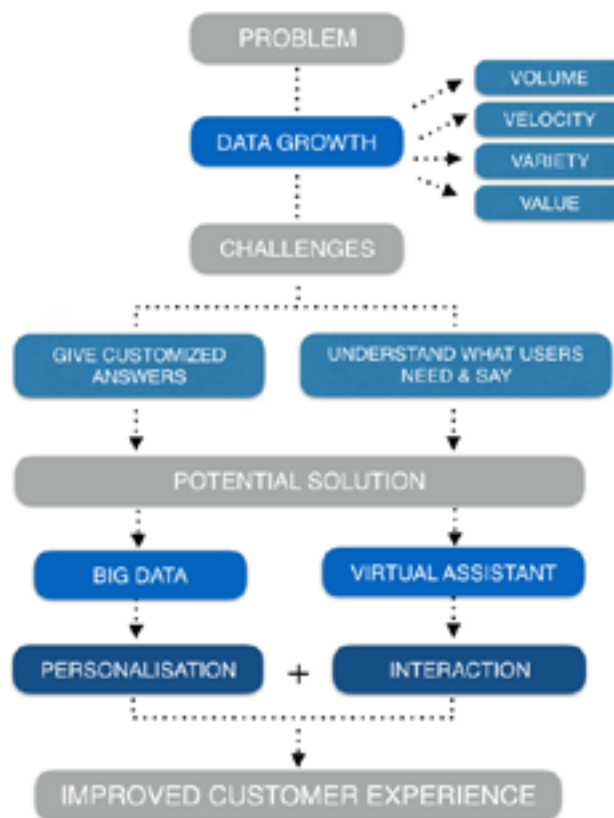

Figure 1: Literature summary: Core problem, challenges and potential solution

The study sought to focus on an industry that was not traditionally digital. The Telecommunications industry was considered rather suitable as it has been swept along by Digital Transformation. In a world where e-care, digital processes and digital customer experiences are raising, it is crucial for this industry to combine traditional Telco services with digital experiences to generate meaningful interactions with customers who do not settle for offline-only experiences. In summary, Big Data is a key driver for Telecoms innovation to improve the efficiency of both its data growth—

which is rather complex and diverse (calls, movies, internet traffic, TV consumption, Wi-Fi use...) – and its relationship with customers.

4. Methodology

In order to explore this topic, we conducted an exploratory research study based on forty qualitative interviews and 500 quantitative online questionnaires, aimed at:

• Exploring current and ideal experiences between users and virtual assistants.

• Establishing the relevancy of integrating this technology in the relationship between the Telecoms and its clients.

• Clarifying a differentiated value proposition compared to existing options.

Participants in this study included people from 16 to 55 years old, encompassing Generation Z, Generation Y and Generation X. This demographic variety helped determine the existence of differences and similarities around the use of this type of technologies across segments. Other aspects to consider during recruitment was the degree of VA usage, including heavy users, ex-users and people who had heard about VAs but had never used one.

5. Results

The interviews with users helped identify a series of emerging issues across the user experience with both VAs and their Telecommunications company:

5.1 Key Advantages for users from using a Data-Driven Virtual Assistant to manage their Telecoms services

I. **Time Saving**: This study found that one of the key benefits from Data-Driven VAs is that they can help save time when managing their services because they unify the information they are currently searching from different sources into a single place. Consequently, a VA helps them to accomplish tasks while minimizing time and effort, improving competencies in performance.

II. **Convenience**: One of the key difficulties for users is to find information about their services. This centralisation of information helps users by providing a single point of contact regardless of the service. Users also perceive a Telecoms Data-driven VA could give them very precise information. They value this because they often seek specific data only to find vague pieces of information.

IV. **Flexible interactions**: VAs can be interfaced either by voice or text, which provides users with the option to interact as they deem convenient depending on the situation or context. Context plays a key role in the user-VA relationship because it influences the type of chosen interaction (this flexibility is a positive aspect of multi--modal interface assistants). For instance, voice interactions are more frequently used in private or when surrounded by family or friends, while textual interaction is more frequent in public spaces. Users have also stated that they tend to make more use of the

VA during their free-time and mostly at home while they are multitasking. The use of Artificial Intelligence typically generates personal satisfaction as people feel that they are making better use of new technologies. In fact, this study has showed that 77% of users attribute very positive connotations to VA, such as intelligence and progress, which brings them closer to technology.

ADVANTAGES FOR THE TELECOMS CUSTOMERS

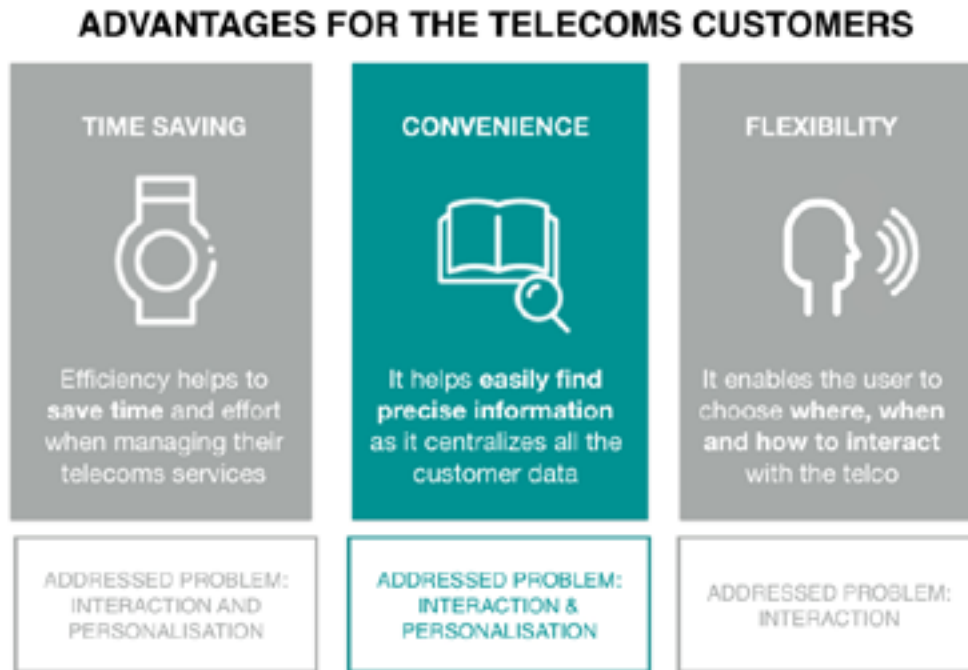| TIME SAVING	CONVENIENCE	FLEXIBILITY
Efficiency helps to **save time** and effort when managing their telecoms services	It helps **easily find precise information** as it centralizes all the customer data	It enables the user to choose **where, when and how to interact** with the telco
ADDRESSED PROBLEM: INTERACTION AND PERSONALISATION	ADDRESSED PROBLEM: INTERACTION & PERSONALISATION	ADDRESSED PROBLEM: INTERACTION

Figure 2: Perceived benefits for users of a Telecoms Data-driven Virtual Assistant

The implementation should still undergo verification and validation phases, ensuring its accuracy and effectiveness (Silva et al., 2014). Verification focuses on analyzing the technical system for incoherence and bugs. Validation tends to be more costly and difficult, checking the system coherence to reality. This task is usually carried out with experts other than the main HE, who can give a deep evaluation of the content, and non-experts, who test interface, easiness of use and effectiveness of outcomes.

5.2 Implications of Data-driven VAs for Telecommunications Organisations

The use of a Data-driven VA to manage Telecommunication services not only represents a series of advantages for users but also for the operators:

I. **Improved customer satisfaction, service and experience**: The Telecommunications corporation can help improve the satisfaction of its clients by addressing the core problems users are currently facing, such as sorting issues related to the services in their package, accessing information about their consumption and billing, and customizing their service through a Data-driven VA. Moreover, by putting their information at service they are able to make more informed decisions, which increases trust in the operator as a more transparent organisation. This study has also helped identify a series of aspects that impact on the quality of the customer experience: (1) the time it takes to solve problems, (2) the inability to find information; and (3) systematically resorting

to customer care call centres as the only (perceived) channel to solve issues and get answers/solutions. Users expressed that a Data-driven VA would be able to address these issues by offering a more personalised, fast and efficient customer experience, thereby radically improving the overall service quality.

II. **Increase in customers' trust, transparency and loyalty**: As customers foresee a development in the capabilities of this type of Artificial Intelligence and are aware of the fact the VAs will learn from their habits, usage and management of their services, they would not be willing to switch operator because it would entail losing the potentially satisfactory experience they are receiving. Users would not only expect the VA to provide the information they seek, but would also expect it to be proactive and smart, able to make relevant recommendations about their services, their patterns of use, and any anomaly they identify in the services, resulting in a customised user experience.

III. **Attracting new customers and differentiate from competitors**: 70% of the participants of the quantitative questionnaire were interested in a VA that would interact with their Telecoms provider, perceiving the potentially beneficial functionalities it would give them when managing their services. Consequently, a Data-driven VA could help attract new customers, specially those seeking a more personalised experience with a Telecommunications operator. The first level of the value proposition focuses on simplifying the management of services and issues with the Telecommunications provider and the second seeks to maximise user experience by proactively making recommendations and suggestions according to their usage and habits when interacting with their operator services. Users have stated this value proposition would represent a clear advantage for the first operator to provide it, positioning it in a more innovative and customer-centred space. Since no firms in the Telecommunications industry are providing this value proposition, it would give a provider a clear first-mover advantage.
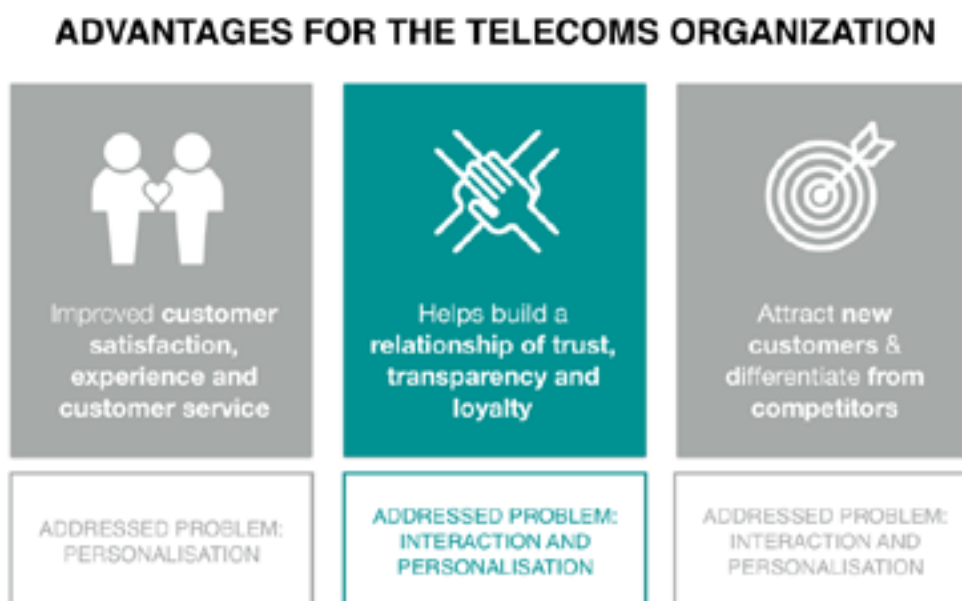

Figure 3: Benefits for a Telecoms Organisations using a Data-driven Virtual Assistant

6. Conclusions

Despite having valuable resources, many organisations continue to fail at providing good customer care service because users are burdened with wasting time and effort to access to their own information — mainly because it is spread across different channels and data sources—and to solve issues with their services.

The research study has shown the potential of a Telecoms Data-driven VA to address weaknesses and challenges in customer experience and customer care. It has deepened our knowledge about current and expected future use of VAs, and sheds light on opportunities involving the use of VAs to interact with Telco operators in a more efficient way, empowering users with a more personalised and interactive access to their information. A user would expect to access the VA through a multi-modal interface (voice and text), affording her the flexibility needed to use the tech in various diverse contexts.

The existing literature has consistently shown that poor customer service has a negative impact on customer satisfaction and loyalty. This study has highlighted how a VA could facilitate the access to data and provide a more efficient service (core and value-added) and improve customer support by saving time and effort when solving issues. This would benefit both customers and corporations in a wide range of aspects. Consequently, in this study we propose the use of a specific purpose Data-Driven VA to simplify, enhance and strengthen the relationship between Telecommunication providers and their customers.

7. Future research opportunities

During this research study a series of themes emerged, which are of special interest to pursue in the near future. For instance, users foresee more complex Virtual Assistant uses in the future, considering them not a fad, but rather a technological wave that will keep evolving, so, when they consider how this will impact on a Telecoms Data Driven Virtual Assistant, the futuristic functionalities are mostly focused on home automation functions, where users will be able to turn on and off the lights and appliances, to control the blinds, etc. as well as to control the TV and manage their internet service by voice via the VA. These functionalities highlight users already consider the Telecoms Data Driven Virtual Assistant as a way to have access to value--added services that differ from the core activity of the Telecoms provider, which are well worth exploring.

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