



MASTER THESIS

Job selection with a chatbot? Ethnographic study into chatbots requirements

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Job Selection with a chatbot?

**Ethnographic study into chatbots
requirements**

*To my granddad
A mio nonno*

Acknowledgments

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Hard work, determination, and passion always pay off,

Enschede 16/08/2021,

Martina

Abstract

In the last years, the way companies attract, recruit and select talent has undergone profound changes. Companies are increasingly adopting artificial intelligence (AI) to be able to recruit and select talent. Among AI solutions, chatbots are proving very useful for both HR professionals and candidates. This study aims to identify what are the requirements that chatbots must have to be effectively implemented in the company selection process. By identifying the requirements, it is possible to design more efficient chatbots that can be implemented in the selection process. This study uses an ethnographic approach to identify chatbots requirements. Thanks to a comparative ethnographic analysis, it was possible to analyze four different types of chatbots that have been personally tested by the author. The results suggest that chatbots must possess technical and social requirements to be efficiently implemented along the recruitment and selection process. On one hand, technical requirements are indispensable to create the chatbots, such as machine learning and data mining techniques, response generation, text processing, object-oriented architecture, and knowledge domain. On the other hand, social requirements are essential to obtain an effective and efficient implementation of chatbots along the recruitment and selection process, i.e. visual look, speech synthesis unit, conversational abilities and context sensitiveness, personality traits, and personalization options.

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1. Introduction

Nowadays, companies are continuously looking for qualified human resources (HR), so that they can remain competitive in the market (Hmound & Laszlo, 2019). While until the 2000s tangible assets, such as plant, property, and equipment, were considered as the source of competitive advantage, today companies are increasingly looking for specialized and talented people (Black & Van Esch, 2020). As a result, the recruitment and selection of the workforce have become a key process to be able to access them (Kulkarni & Che, 2019). In light of this, digitalization and technology advancements have helped to transform the way companies access talents. In fact, in the last few years, we are witnessing a radical change in Human Resource Management (HRM) due to the implementation of Artificial Intelligence (AI). Starting from 2015, the digital recruiting era 4.0 began, and AI became the protagonist (Black & Van Esch, 2020).

AI is defined as “*the science and engineering of making intelligent machines, especially intelligent computer programs*” (McCarthy, 1998), and the term “intelligent” means that these machines can reproduce human actions. Therefore, several tasks which were performed by humans today can be replaced by AI. In the last decades, also the literature started to focus on AI implemented in HRM. Several authors analyzed what are the opportunities and implications for talent acquisition as well as advantages and disadvantages in the selection process. They point out AI is speeding up the hiring process (Wilfred, 2018; Upadhyay & Khandelwal, 2018). Different tasks can be performed by chatbots since they can improve the selection process, making HR professionals focus on other important tasks and act as supervisors (Nawaz & Gomes, 2019; Kulkarni, & Che, 2019). These tools are proving useful because they are mainly used for time-consuming tasks, for example during the candidates' screening phase, and help to cut costs. (Wilfred, 2018; Upadhyay & Khandelwal, 2018; Nawaz & Gomes, 2019; Kulkarni, & Che, 2019; Egorov et al., 2018). Other studies focused on the implementation of Robotic Process Automation (RPA) in the entire HR domain. RPA refers to those steps in the business process that can be automated through software programmer's implementation, which are performed by three different kinds of ‘bots’, i.e., probots, knowbots, and chatbots (Balasundaram & Venkatagiri, 2020). Some authors have investigated the reasons that led HR professionals to implement AI in the selection process and have identified how the transition from a competitive advantage based on tangible assets to one based on intangible assets, such as knowledge, played a key role. (Black & Van Esch, 2020). Albert (2019) identified 11 AI solutions that can be effectively applied to the recruitment and selection process (R&S). These are vacancy prediction software, job description optimization software, targeted job advertising optimization, multi-database candidate sourcing, CV screening software, AI-Powered psychometric testing, video screening software, AI-powered background checking, employer branding monitoring, candidate engagement chatbot/CRM, and automated scheduling. However, HR professionals tend to use mostly chatbots, screening software, and task automation tools in the R&S (Albert, 2019).

In recent years many companies, such as Sephora, eBay, H&M, Pizza Hut, and Burberry (Albert, 2019) are implementing chatbots in the selection process due to the enormous advantages

that AI can bring for both companies and individuals (Van Esch, Black, and Ferolie, 2019). Chatbots are defined as a “*computer system that allows humans to interact with computers using Natural Human Language*” (Lokman & Ameen, 2019). Thus, it represents a tool through which it is possible to minimize the time and effort of HR professionals. Thanks to them, various tasks that previously required human presence can be performed by this kind of AI solution, saving both costs and time and eliminating the typical human bias that can negatively affect the selection process (Nawaz & Gomes, 2019). Therefore, the effectiveness and efficiency of the selection process can increase.

For these reasons, chatbots turned out to be potential tools to be implemented into the R&S. As a result, researchers started to analyze different aspects of these AI-powered solutions. Some authors focused on what are the factors which influence new candidates to engage with chatbots (Van Esch et al., 2019). Other authors on factors that enable and/or restrain chatbots activities, and if chatbots can increase the probability of applying for a job (Schildknecht et al., 2018). Others studied how they can be useful in certain steps of the selection process, such as in re-engage with applicants (Soutar, 2019). Balachandar and Kulkarni (2018) reviewed the requirements that chatbots must have to be functional as recruitment chatbots, whereas Hmound and Laszlo (2019) analyzed the possibility that AI replace individuals in the R&S, addressing the opportunities it can bring to the organization in which it is applied. Some studies have started to focus on how users perceive the chatbots they communicate with and what are the factors that influence their perception (Kuligowska, 2015; Candello et al., 2017; Elsholz et al., 2019). It has been demonstrated that users tend to personify the subject they interact with even if it is a machine. This is because chatbots are spreading at a very fast pace in different industries and fields, and consequently, their communication skills, as well as their language capabilities, are constantly evolving. This implies that users tend to not notice that they are communicating with an AI (Candello et al., 2017).

Moreover, different studies have also shown that the perceived humaneness of chatbots positively influences users' experience and adoption of these systems. The more the chatbots are perceived as humans, the more users will be likely to engage with them (Candello et al., 2017, Reeves & Nass, 1996). As a result, nowadays, different studies are focusing on how to increase the effectiveness of these systems, looking at how to improve the perceived humaneness of these technologies. This would imply that the implementation of chatbots would lead to an increase in their usefulness and could create better experiences for those who interact (Van Esch et al., 2019; Schildknecht et al., 2018). From an HR perspective, the continuous improvement of the chatbots and how they are perceived by candidates who interact with them would lead to an increase in the quality of the selection and experience of the candidate (Van Esch et al., 2019; Schildknecht et al., 2018). As a result, companies can have better pools of candidates, and candidates experience a better selection process.

As stated by the literature, chatbots must be designed according to the task assigned to them and must possess specific requirements for accomplishing the task (Nawaz & Gomes, 2019; Kulkarni, & Che). Therefore, a chatbot implemented in the selection process must possess specific

requirements to be implemented in this process. Identifying them would allow better design of these AI solutions and easier implementation of them in the R&S. Moreover, it is possible to have a clear framework on how chatbots can improve both the HR professionals' and candidates' experience. However, there is a gap in the literature since it has not been discussed what are the chatbots' requirements to create value both for HR professionals and candidates in the R&S. Therefore, this research aims to investigate chatbots' requirements. Hence, the research question that needs to be answered is: “*What are the requirements that a chatbot should have to be implemented in the R&S?*”

It is necessary to point out that the R&S is formed by various phases, each requiring a different application of chatbots since they must be programmed according to the task assigned to them (Nawaz & Gomes, 2019; Kulkarni, & Che, 2019; Albert, 2019). Consequently, in this paper how chatbots can be useful in different stages of the R&S will be discussed. Afterward, to identify chatbots' requirements, ethnography research will be conducted. The aim is to compare different kinds of chatbots that I experienced during the selection processes I have undertaken. Therefore, a comparative ethnographic analysis will be carried out.

With this research, we want to contribute to creating new knowledge in the AI domain applied in the HRM field. This is a topic that is continuously growing in importance, and it needs to be further studied, not only from an engineering perspective but also from a sociological perspective. Blackwell (2021) defines AI as a *cultural artifact* because it is shaped by *culturally specific imaginaries* and implemented by *cultural agents*, including engineers who create algorithms, but also people who use AI and implement it in different contexts. Consequently, to further understand and improve AI solutions, it is fundamental to study the cultural and sociological aspects which it implies. For these reasons, with this research, we want to analyze the different technological and social aspects that chatbots embed. In this way, it will be possible to shed light on the relationship between social and technological aspects typical of AI solutions, and consequently, conclude the requirements that a chatbot must-have in the selection process. In addition, new understandings about these tools in different ways can be provided: firstly, this research will be useful to further analyze how chatbots can be used in the selection process; secondly, this research can be a starting point for further studies to focus on testing a chatbot with the identified requirements in a selection process with multiple candidates. Thirdly, identifying chatbots requirements to be implemented in the selection process would create value for both researchers and HR professionals. In fact, on one hand, researchers can further develop this topic in different manners. On the other hand, HR professionals would benefit from the creation of chatbots which can be helpful in the selection process.

2. Literature review

To be meaningful, chatbots must be designed to improve the selection of candidates. This implies that on one hand, chatbots must possess technical attributes which make them the technology. On the other hand, chatbots must be able to interact with candidates and therefore possess the requisites that make them social (Elsholz et al., 2019; Kuligowska, 2015). With the term sociality, literature refers to the existence of interactive relationships between two agents who have communicative behaviors (Duffy et al., 1999). Chatbots are created by humans, for humans, and therefore to be significant, they must be able to adapt to a social context through social requirements. For these reasons, in the next paragraph chatbots' social and technical requirements will be discussed.

2.1 Chatbots requirements for their implementation

2.1.1 Technical requirements

Authors have argued about different technical requirements that chatbots must have to be functional. Lookman and Ameen (2019) reviewed five modern chatbots to find out their architectural design and implementation systems and they presented several technical requirements. Also, Balachandar and Kulkarni (2018) synthesized some technical requirements that a recruitment chatbot must-have. However, before going into the specific, it is needed to define what a chatbot is. Chatbots can be defined as machine dialogue or conversational systems with which individuals can interact in natural human language (Schildknecht et al., 2018). Natural human language is the key that differentiates chatbots from other types of robots, and what makes them distinctive for HRM to consider, although it is also the most difficult feature to create. In fact, for a machine, it is not complicated to understand the meaning of words but understanding the variability of expression in how these words are collocated in a speech is not that easily achievable (Hill et al., 2015).

To acknowledge the operation and design of modern chatbots, it is needed to consider several features that distinguish them, such as knowledge, response generation, text processing, and machine learning (ML) model (Lokman & Ameen, 2019). The knowledge that a chatbot may have can be defined as an open or close domain. Open-domain means that a chatbot has general knowledge which covers different topics, such as entertainment, current topics, etc. Close domain is typical of chatbots which cover specific knowledge of a certain field; therefore they are used in specific areas such as customer service, psychology, R&S, HRM, etc (Lokman & Ameen, 2019). Open-domain chatbots are still difficult to create, and they still need positive results, because covering open knowledge is different to focus on specific knowledge, and we have not yet arrived at the creation of AI equal to that of humans (Lokman & Ameen, 2019). Response generation is the process by which chatbots can generate responses, and it can be

retrieval, generative or hybrid, whereas with text processing we refer to the automation of electronic text and therefore to the modules that chatbots incorporate, which can be Latin alphabet or word embedding (WE) (Lokman & Ameen, 2019). According to Lokman and Ameen (2019), most systems based on ML models seem to use WE in their text processing; it means that words are represented by vectors, and they are expressed as real numbers in these vectors.

Chatbots are based on ML, as they can learn automatically without any programming of such learning. Consequently, they can provide an appropriate response to the situation that requires it, enabling systems to learn dialog strategies from data (Lokman & Ameen, 2019; McTear et al., 2016). ML techniques allow systems to acquire knowledge from the real world. Thanks to this, it is possible for machines to learn from experience and therefore be able to adapt to the environment. This means that they can shape the speech according to the stimuli it receives (Lokman & Ameen, 2019; Kulkarni & Che, 2019).

Balachandar and Kulkarni (2018) argue that to design a recruitment chatbot, some technical requirements are required. These are object-oriented architectures, ML techniques, data mining algorithms, training, and testing data. Chatbots must be designed following a specific purpose and therefore the chatbot's architecture should follow an object-oriented approach. For example, if the chatbot is to be implemented at a stage of the selection process, it must be designed to meet the needs of that phase (Balachandar & Kulkarni, 2018). Data mining algorithms are needed to process amounts of data, whereas training and test data have the aim to minimize the error term of ML techniques.

In sum, the technical requirements to consider are:

- Object-oriented architecture (Balachandar & Kulkarni, 2018).
- Knowledge domain, which can be open or closed (Lokman & Ameen, 2019).
- Response generation (Lokman & Ameen, 2019).
- Text processing (Lokman & Ameen, 2019).
- Machine Learning Techniques and Data Mining Algorithms: these are the techniques required to build a useful chatbot (Lokman & Ameen, 2019; Balachandar & Kulkarni, 2018).

2.1.2 Social requirements

The authors analyzed the implementation of chatbots in different fields. For instance, different studies have demonstrated that chatbots applied in the e-commerce field can increase users' engagement, satisfaction as well as the perceived product value (Elsholz et al., 2019; Kuligowska 2015). Others demonstrated that chatbots can be useful tools to implement in the selection process since they can increase candidates' performance (Van Esch et al., 2019; Nawaz & Gomes, 2019; Schildknecht et al., 2018). As a consequence, we are witnessing continuous improvement of these technologies since they turned out to be useful. Chatbots are constantly evolving and nowadays their personification is gathering momentum. As a result, the requirements that a chatbot should have must also include the components able to personify it (Elsholz et al., 2019). Furthermore, Candello and his colleagues (2017) argue that the quality of human-chatbot interaction can

increase if users perceive the humanness of their interlocutor. Also, according to Kuligowska (2015) personifying a chatbot increases users' experience and satisfaction. As a result, it is reasonable to argue that personified chatbots applied in the R&S with perceived humanness can improve candidates' experience and satisfaction. This is because the personification of chatbots would lead to increased candidates' involvement and their willingness to apply for the job. Kuligowska (2015) conducted an empirical study to identify personalization components that increase the quality of chatbots. Therefore, she reviewed current implementations of Polish-speaking commercial chatbots, and consequently, the main components were identified. These are:

- visual look: using faces of humans or animals or animated figures are found to be associated with better outcomes (Kuligowska, 2015; Haake, 2009).
- Form of implementation on the website or platform: companies are reluctant to purchase or create chatbots and virtual assistants' ex-Novo. Consequently, they will tend to implement them already ready for use.
- Speech synthesis unit: researchers have shown that chatbots able to speak are found to increase the trustiness of users. Therefore, an important component is the Text-To-Speech module that converts written text into a synthetic speech (Kuligowska 2015; Van Deemter et al., 2008; Elkins & Derrick, 2013).
- Presentation of knowledge and additional functionalities: most chatbots on the market can respond to a stimulus that is sent by the user. However, researchers have shown how a robot's ability to start a conversation about any topic would increase user engagement (Gerhard, 2006; Kumar & Rosé, 2009)
- Conversational abilities and context sensitiveness: what makes the job of a chatbot difficult is to generate clear and consistent expressions, considering the correct social behavior. Conversational skills involve natural language processing, but also a large set of expressions and the capacity of handling speech by combining texts from different categories of groups of arguments to produce the final answer (Kuligowska, 2015).
- Personality traits: a chatbot must be able to show their skills, experience, but also some personal traits. In this way, they can be credible to the users who use them and instill trust (Kuligowska, 2015).
- Personalization options: the ability to customize the chatbot with which users interact based on their preferences has a positive effect on the final evaluation of the quality of interaction by users (Kuligowska, 2015).

Chatbots which present the aforementioned features are more likely to be efficient when implementing (Kuligowska, 2015; Elsholz et al., 2019). Therefore, these characteristics can be considered as social requirements that chatbots must incorporate to be efficient. Kuligowska (2015) identified these requirements for the deployment of commercial chatbots in the marketing field. However, it is reasonable to hold that can be even considered for chatbots implemented in the HRM field. In the next paragraphs a description of the evolution of the R&S is provided, and afterward how chatbots can be useful in different stages of the R&S is discussed.

2.2 The evolution of the recruitment and selection process in recent years

In recent decades the proliferation of technology has led to a transition towards the so-called “knowledge-economy era” (Hendarman & Tjakraatmadja, 2012) in which knowledge has become the main factor in the development of competitive advantage for a company as well as its sustainability (Johannessen & Olsen, 2003). In 1996, OECD recognized that knowledge can be considered as a driver of productivity and economic growth, whereas for centuries labor and capital have always been considered the main factors of production. (Hendarman & Tjakraatmadja, 2012). From companies’ point of view, in today's business environment characterized by complexity, employees with specialized knowledge and skills are required. Therefore, the selection process has become a key process for acquiring skills and competencies, because it is possible to attract useful “knowledge” that can positively influence organizational outcomes, but also retain new hires and ensure that they do not leave the company for a competitor (Kulkarni & Che, 2017).

Firstly, the internet helped HRM to evolve and adapt to the needs of the world, and through them, the way to access talents and knowledge was completely changed. It is possible to identify different ages of recruiting in the last decades. The first began in the mid-90s, when the internet completely transformed the way of looking for work, but also of recruiting the workforce, making both recruiters and candidates go online. This is also called “Digital recruiting 1.0” (Black & Van Esch, 2020). After 10 years, digital recruiting 2.0 began, and online platforms were created to group different job offers, such as “Indeed”. In addition, in this period the first social networks were born, which started to help recruiters to hire new candidates easily, such as LinkedIn. From 2010 to 2015, AI officially started to enter the HR fields, and since the labor market required more powerful tools, recruiters have adopted new software. The digital recruiting era 3.1 began (Black & van Esch, 2020). Egorov and his colleagues (2019) defined 2015 as the year of the “chatbots revolution”. They argue that for the first-time mass use of messengers exceeded the number of active users of social networks worldwide. This increment in the use of chatbots leads to an increase in the use of chatbots also in the Talent Acquisition area. Therefore, more companies have started to implement chatbots in this field. In the next paragraph how chatbots can create value into the R&S is discussed.

2.3 How chatbots can be functional in the R&S

The selection process aims to assess potential candidates and hire those who meet the requirements to fill the position as well as who fits better with the mission and vision of the company. Therefore, to produce the best outcome, this process has to take into account lots of data (Diez, Bussin & Lee, 2020; Hmound & Laszlo, 2019; Breaugh, 2008).

The selection process involves several mechanisms, and it follows up the recruitment of the workforce. As a matter of fact, as a first step, for a company it is essential to set clear recruitment objectives that respond to the business strategy, so planning the company's needs and analyzing each vacant position within it to create a profile required for the position. It is needed to specify what kind of candidate it seeks to attract, e.g., work experience, level of education, which corresponds to the company's needs. (Hmound & Laszlo, 2019; Breugh, 2008). Subsequently, the next step is the creation of the job advertisement which contains information about what the company is looking for. Hence, a chatbot could be implemented for internal use. Schildknecht and his colleagues (2018) made a distinction between internal and external use of recruiting chatbots. They argue that chatbots can be used as internal support for the line manager in formulating job advertising, schedule meetings, and related tasks. Instead, chatbots used for external use are designed to outsource one of the different activities that take place during the R&S, for instance conducting pre-screening interviews or managing candidates' onboarding.

Newell (2005) argued that there are different methods to select the right candidate such as pre-selection methods, interviews, and psychological testing. The literature identified main phases along the R&S where AI can be meaningful, i.e sourcing and screening of job applicants, selection of the right candidate, and onboarding (Hmound & Laszlo, 2019; Schildknecht et al., 2019; Breugh, 2008). In the next paragraphs, different stages among the R&S where chatbots can be efficiently implemented are discussed.

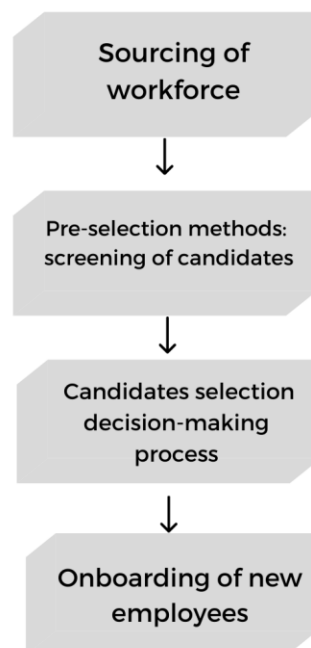


Fig 1: stages of Talent Acquisition where chatbots can be implemented. Adopted from: Hmound & Laszlo, 2019; Schildknecht et al., 2019; Breugh, 2008; Newell, 2005

2.3.1 Sourcing of workforce

In this phase, different resumes are collected. Then, these resumes are checked and tested, so a company can see if the abilities, attributes, and preferences of candidates fit with the job (Diez et al., 2020). In this phase, chatbots can process thousands of data (Lokman & Amedeen, 2019). Consequently, they can replace individuals, as they can read curricula very quickly, and request clarifications if needed by contacting the candidate directly (Nawaz & Gomes, 2019).

When a candidate decides to apply for a job, he\she may have several questions, or before his application he\she would want to know about the positions, skills required and have some elucidations. Chatbots can be implemented to answer these questions by recognizing keywords mentioned by the applicant. This has several advantages: on the one hand, it allows candidates to have more information about the company or job and increase their level of engagement; on the other hand, recruiters through the keywords searched by candidates have access to more information already processed and ready for use (Van Esch et al., 2019; Nawaz & Gomes, 2019; Schildknecht et al., 2018). During the sourcing phase, the purpose is to push candidates to apply for a job. Consequently, what is needed to do is to attract the right knowledge and skills useful for the company. Therefore, chatbots must be able to entice the right candidates to apply to the job offer. According to a study carried out by CHRIS (2018) in Germany and reported by a Schildknecht and her colleagues (2018), half of the survey respondents would like to use these systems in the future to be hired in case chatbots can give general information, or about different career developments that the company offers. However, the willingness to use these systems varies across the age group, with more recent generations who are very predisposed to these technologies, while the other half of respondents rejected these tools (Schildknecht et al., 2018; CHRIS, 2018). For our purposes, it is possible to say that those who implement chatbots in the sourcing phase must be aware that the job offer will attract only part of the applicants. In addition, different authors agree that one of the most important requirements in this phase that contributes to increasing applicant engagement is the quick response that it is possible to have through chatbots (Schildknecht et al., 2018). Indeed, real-time communication allows candidates to have quick responses without any delay, and the probability that candidates apply for the job increases. The use of this technology acts as a motivator for candidates that are pushed to try AI solutions. Van Esch and his colleagues (2019) demonstrated that technology use motivates applicants and influences their application likelihood. Moreover, the adoption of AI solutions to apply for a job depends on the candidates' experience, characteristics, and needs, and that are the measures to consider to predict the success of chatbots implementation in the sourcing phase (Van Esch et al., 2019). Anyway, Van Esch and his colleagues (2019) demonstrated that their implementation could lead to an increase in the number of applications, as it happened even with the impact of social media which turned out to be channeled through which it was possible to advertise the job offer and gain more visibility from candidates (Black & Van Esch, 2020).

2.3.2 Preselection methods: screening of candidates

Chatbots are very useful tools even in the strictly post-sourcing phase, which correspond to the first screening of resumes. The goal of screening is to identify the talents who best fit the business needs and eliminate those who do not fit. Once candidates apply for the job offer, chatbots can carry out a short screening interview, provide assessment tests and give feedback to candidates rejected (Hmound & Laszlo, 2019; Nawaz & Gomes, 2019).

In addition, by searching the keywords, chatbots can select the curricula that best meet the needs of the company in a short time. Very often resumes that reach companies are hundreds and hundreds. In 2017, Google received 2 million applications for just 14,500 jobs (Black & Van Esch, 2020). In 2013, Walmart, one of the largest private employers in the world, received 23,000 applications for just 600 jobs, when it opened a new store (Black & Van Esch, 2020). This testifies how in these cases recruiters might spend time and resources to check the many CVs that arrive. Chatbots can be a useful tool because they are smart solutions through which it is possible to automate time-consuming tasks and save costs (Hmound & Laszlo, 2019). Recruiters also can store all the candidates' data through chatbots because those are connected to the applicants' database and therefore, they can have the right data at any time (Nawaz & Gomes, 2019). So, it is possible to re-engage applicants for different positions.

To accomplish these tasks, data mining techniques are required. Hmound and Laszlo (2019) argue that data mining refers to the process by which it is possible to "tidy" data and then extract necessary information from a large dataset of data. These kinds of techniques provide four different functions: association, clustering, classification, and prediction. (Diez et al., 2020; Hmound & Laszlo, 2019). Chien and Chen (2007) conducted an empirical study to test an intelligent machine based on data mining and decision tree techniques to recruit potential employees, and to predict their retention attitude (Hmound & Laszlo, 2019). They demonstrated that their use led to an increase in the chances of hiring high-potential candidates, and create profiles based on demographics data such as age, gender, etc, which can predict the likelihood that the candidate will leave the company or not.

2.3.3 Candidates selection decision-making process

The subsequent phase is the selection of candidates. According to Newell (2005), the most used method to select candidates is the interview. Recruiters hold interviews to learn about candidates' past work experience, education, but also attitudes, skills, and to assess if they match the requirements of the position. (Nawaz & Gomes, 2019). A chatbot can be easily implemented in this phase for different purposes, such as interview scheduling, and so automatic notifications for both recruiters and candidates, collecting data about candidates, and giving instant feedback (Ergov et al., 2020; Hmound & Laszlo, 2019).

Several empirical studies show that candidates benefit from interacting with AI. According to Dimitriadis (2020), individuals tend to prefer simplification over complexity, consequently communicating with a chatbot instead of a person, make easier the communication process,

because he/she knows that the chatbot will not deal with the non-verbal elements that commonly exist in human communication, and he will not be subject to prejudices and antipathies, or human biases (Dimitriadis, 2020; Schildknech et al., 2018). Other studies have shown that people feel in a dominant position when communicating with a chatbot. This led them to increase their confidence and give them a sense of control. Consequently, applicants can also have conversations with chatbots in a calm and composed way without feeling the tension typical of a job interview. (Dimitriadis 2020; Angeli et al., 2001). According to Upadhyay and Khandelwal (2018), AI solutions are programmed to avoid unconscious biases, because chatbots can elude elements such as name, age, gender, and origin, which can create biases, and lead to the loss of efficiency of the selection process. In addition, the implementation of AI solutions in the selection process does not lead to increased anxiety on the part of the candidates. On the contrary, they have shown that for those who are clear that they will be selected based on AI, anxiety decreases. However, nowadays the majority of HR professionals implement chatbots mainly because they can solve operational problems. They have not yet been fully tested as tools that conduct full interviews, although Deloitte predicts that by 2023 up to 40% of HR technologies will fully implement AI and chatbots in their process (Ergov et al., 2019). Anyway, different empirical studies demonstrated that humans react positively to new technology implementation. Hill and his colleagues (2015) compared human-to-human conversations with human-to-chatbots conversations and against their expectations, they found that people actively participate in conversations with chatbots, tending to send messages that are simpler and shorter than they would with conversations between humans.

In conclusion, the implementation of AI in this phase would lead to an increase in the efficiency of the selection process, because it can select talents faster than humans, more objective, and at lower costs. (Upadhyay & Khandelwal 2018; Van Esch et al., 2019).

2.3.4 Onboarding of new employees

Once the candidate has been selected and meets the required requirements, the last step in the selection process is the onboarding phase. During this phase, the candidate is introduced to what his duties will be, and this represents the first approach to corporate life as well as to its culture and values. The HR team must create new user IDs for the new employee and insert them on several systems and applications, which is a repetitive task, and it can be automated. (Balasundaram & Venkatagiri, 2020). Chatbots turn out to be useful tools because they can accelerate the onboarding process, which is often a long phase, giving the right information to candidates, and being available all the time. This significantly saves time and tasks for both candidates and recruiters. They can also be used to answer questions that the candidates may have at this point, through the FAQ system. They can provide feedback to candidates which increases their level of engagement. Very often recruiters are unable to provide feedback to applicants who were not chosen during the selection process. Chatbots can also do this by reducing the duties of recruiters (Nawaz & Gomes, 2019). In conclusion, to implement chatbots in the onboarding process the requirements are the same for the other phases.

3. Methodology

3.1 Research design: qualitative ethnographic research in the AI domain

To identify chatbots requirements to efficiently implement them along the R&S a qualitative study has been conducted. Precisely, this research uses an ethnographic method to find out how chatbots can be effectively implemented in the recruitment and selection field.

Nowadays, the topic of AI is constantly growing in importance and is no longer only about disciplines such as mathematics and engineering (Blackwell, 2021). Rather, since AI is useful in different fields, it is necessary to grasp its different nuances. As it has already been argued, Blackwell (2021) defines AI as a *cultural artifact*, because it is shaped by *culturally specific imaginaries* and created and implemented by *cultural agents*. Therefore, it is important to study AI also from the sociological point of view. It means that the relationship between humans and AI and how they constantly shaped each other need to be further explored and this is possible thanks to qualitative research. In line with this, qualitative ethnographic research can be considered a powerful tool through which the relationship between humans and AI can be further discussed. Moreover, existing available literature argues that qualitative ethnography research is one of the most suitable for studying AI's world, which sometimes can seem profoundly opaque and function as black boxes (Christin, 2020). Through, for example, interviews, observations, comparative analysis, ethnographic research can shed light on complex aspects and features of AI's world, gathering key information useful to understand this reality that sometimes can seem opaque to our eyes (Christin, 2020). Moreover, Christin (2020) argued that comparative ethnographies are widely used in scientific and technological studies because through comparison it is possible to identify similarities and differences which can help to shed light on what is specific to each technology.

Ethnography research is characterized to be conducted by researchers who are observant participants "*who live with and live like those who are studied*" (Genzuk, 2003). Therefore, the researcher lives through personal experience and participation in the study. Ethnographers investigate any human arena drawing on a wide range of qualitative methodologies, moving from "learning" to "testing" (Genzuk, 2003). Consequently, three kinds of data are produced: quotations, descriptions, and pictures with the aim of telling a story (Genzuk, 2003). Specifically, in this research, a comparative analysis among different kinds of chatbots has been carried out. The aim was to critically analyze how chatbots are nowadays deployed in the R&S among companies and if they present the requirements identified by the literature.

This research can be defined as ethnographic because the chatbots selected to be compared in the comparative analysis were all experienced by myself during different selection processes that I have personally undertaken in these months. Since I am a graduating student, I decided to take note of all the selection processes in which I encountered chatbots. In this way, I was able to experience the selection process from different perspectives: first, from the candidate's point of

view as I applied for different job positions. Secondly, I have experienced the selection process from a research perspective, analyzing the interaction between me and the chatbot I encountered. Consequently, on one hand, I was a participant in the research as I was a potential candidate. On the other hand, I observed the interaction between me and the chatbot from a research perspective. In this way, I was able to experience these AI- solutions closely and find out the requirements that are needed to be efficiently implemented along the R&S.

3.2 Data collection

To understand how data were collected in this ethnographic research, this paragraph is structured as follows: firstly, a framework on how data were collected for the selection processes that I experienced is provided. Therefore, this section describes the approach followed by the author in selecting the selection processes most interesting for research purposes and consequently the chatbots selected to be analyzed, which are used along with these selection processes. Secondly, a description is given of how chatbots provided by research institutions such as the University of Amsterdam and the University of Twente were tested by me.

3.2.1 Data collection for the selection processes undertaken

To analyze selection processes, I started to send applications in January 2021. To do so, I applied to various job opportunities which matched my profile. I used LinkedIn as social media to search for job opportunities. Here, I decided to only focus on jobs advertising that fit my profile. Consequently, since I am a graduating student, I was looking for employment positions such as internships and junior positions which match my expertise and theoretical background. In this way, I was able to move forward along the selection processes and not be discarded immediately. In addition, I was also able to experience the candidate's perspective more closely.

The companies for which I have applied were based in the Netherlands and I sent more than 20 applications. Of these, many positions rejected me immediately, while others went ahead in the selection process, and I had the opportunity to experiment with AI. In Appendix (A) all the applications I have undertaken in recent months are listed, including those who immediately discarded me.

Among the companies that did not reject me immediately, the majority did not imply AI solutions during the selection process, whereas few companies have implied AI tools in the selection process. Moreover, most of the selection processes I have undertaken involved AI-Powered psychometric testing, video screening software, and CV screening software. However, some companies implemented AI chatbots as a tool for screening candidates. For example, after uploading my resume and cover letter, I was automatically contacted both by email and by phone by a chatbot that invited me to complete a self-paced interview. Other companies implied AI chatbots as a support tool for candidates. In this way, it was possible to communicate directly with the chatbot to apply for a job offer. Table (1) lists the selection processes that I have undertaken in recent months in which I have been selected and I have had the opportunity to experience AI.

	Date	Name of companies	Position/vacancy	Position/vacancy source	AI solutions used	Which recruitment/selection stage AI solutions are applied	Interaction between me and AI
1	18/01/2021	Bestseller	Recruitment intern	LinkedIn	Psychometric assessment based on data mining	Pre-screening of candidates	I have conducted psychometric games as assessment in the selection process
2	14/03/2021	Kraft Heinz	Performance analytics internship	LinkedIn	Psychometric assessment based on data mining	Screening of candidates	I have conducted psychometric games as assessment in the selection process
3	15/04/2021	Kraft Heinz	HR internship	LinkedIn	Video screening software	Screening of candidates	I had to answer three pre-set questions and record the answer via the company's platform
4	03/06/2021	PepsiCo	Learning and development internship	LinkedIn	Chatbot	Pre-screening of candidates	I had to answer a chatbot's questions to figure out if I had the minimum requirements
5	03/06/2021	PepsiCo	Learning and development internship	LinkedIn	Video screening software	Screening of candidates	I had to answer six pre-set questions and record the answer via the company's platform
6	01/06/2021	Amberscript	HR internship	LinkedIn	Video screening software	Screening of candidates	I had to answer four pre-set questions and record the answer via the company's platform
7	27/06/2021	Fortive	Recruitment intern	LinkedIn	Chatbot	Support in the initial stage of the application	I applied to work via the chatbot

Table 1: List of positions I applied to and experimented with AI

Among the applications I sent, these reported in the table were the most significant for two reasons: on one hand, with these companies I had the opportunity to move forward in the selection process and therefore not be discarded immediately. On the other hand, among the selection processes in which I have progressed are those that have involved at least one AI tool. As it has already been pointed out, very few companies implied chatbots along the R&S. Therefore, among the companies listed above I decided to focus my attention on the only two in which I had the

opportunity to come into contact with chatbots, namely PepsiCo and Fortive. As a result, these chatbots were compared and analyzed in addition to those provided by the research institutions.

Fortive chatbot. I came across this chatbot when I decided to apply for a job offer at the Fortive company. I found the announcement through the LinkedIn platform, and after reading the announcement and checking if my requirements met those requested, I decided to apply. LinkedIn sent me back to the company's website, where there was a page on the job posting. Here a chatbot opened asking me if the job interested me. Consequently, I had a conversation with it and I applied to the job opportunity through this chatbot. Therefore, it was implemented as a support tool for the candidate who decides to apply to the job offer at Fortive. In appendix (B) the entire conversation is reported.

PepsiCo chatbot. During these months, I have had the opportunity to apply for an internship at PepsiCo. I found the job ad via LinkedIn also in this case. After creating my account on the PepsiCo website, I uploaded my resume and cover letter, and I was subsequently contacted by a bot both by phone and email. This bot asked me if I could have a self-paced interview. In this way, I experienced a self-paced interview with a chatbot that had the aim to check if I had the minimum qualifications to be eligible for the job. In Appendix (C) the self-paced interview between me and the chatbot is provided.

3.2.2 Data collection for chatbots provided by research institutions

The data collection took place over 7 months from January 2021 to July 2021. In fact, before starting to apply for a job, I tested the chatbot provided by the University of Amsterdam, called Watson Assistant and I participated in a workshop about the Furhat avatar. These experiences were more related to the observant research perspectives. In the workshop about the Furhat avatar, I learned more about this robot and its capacity. Afterward, In July 2021, I conducted an experiment at the BMS laboratory of the University of Twente. Here, I was able to meet Furhat and I programmed it to be able to hold a pre-screening interview. In the next subsections, a more specific description of how I tested Watson and Furhat is provided.

Watson Assistant. During the research period, I was able to test this onboarding chatbot developed by the University of Amsterdam. It is called Watson Assistant and it can be built according to the task assigned to it. Therefore, it can be customized to add the skills that it requires for the specific task it has to do. In my case, Watson was programmed to support an onboarding process of newly hired employees. In appendix (D) the entire conversation with me is reported. The conversation lasted 30 minutes. Since this kind of chatbot was related to the onboarding process, I tried to take the place of a newly hired employee from a company that experiences the onboarding process via a chatbot.

Furhat Avatar. As it has already been pointed out, I met Furhat for the first time during a workshop in January. Thanks to it, I was able to familiarize myself with this AI technology from

my laptop as an online chatbot with human features. In fact, unlike other types of chatbots which do not have a physical form, Furhat is a real robot with human features with which you can interact, as it is possible to see from the figure below.



Fig 2: Furhat at the BMS Laboratory of the University of Twente

However, Furhat can be also used in the online version without the physical form thanks to the Furhat SDK which can be easily downloaded from its website. In this case, Furhat still presents human features and can speak, and therefore can be considered a type of chatbot with human features and able to speak.

For my research, I used Furhat during July 2021 at the BMS laboratory of the University of Twente in its physical form. There, I conducted an experiment to analyze its capacities. I programmed it to try it as a potential pre-screening tool in the selection process. I decided to program Furhat in this way for two main reasons: first of all, because at the BMS laboratory it was possible to program it so that the potential candidate could answer only yes or no questions. For this reason, I thought Furhat could be useful as a pre-selection tool, in which it has the task of checking if the candidate has the minimum requirements to move forward in the selection process, and the candidate can answer by answering just yes or no. Secondly, because programming Furhat as previously mentioned would have made it an AI tool comparable to the other types of chatbots I analyzed in this research. Therefore, I thought of a hypothetical HR internship position in which I applied and Furhat consequently conducted a pre-screening interview in the role of hypothetical recruiter to check the minimum qualifications. As a result, I tested Furhat during a hypothetical interview between Furhat (the interviewer) and me (the candidate). The interview was conducted at the BMS Laboratory of the University of Twente, and it was recorded. It lasted one and a half minutes.

To program Furhat according to this purpose, Furhat's manager at the BMS laboratory helped me. First of all, it must be connected to a Wi-Fi network. In my case, it was connected with

that of the University of Twente. Afterward, the programming took place thanks to the Blockly platform, which is an intuitive graphical programming tool. Blockly allows non-programmers to build quite sophisticated skills. It does not require special programming skills. Figure 2 below is an excerpt from Furhat's programming for the pre-selection interview. The entire programming of Furhat on Blockly is shown in Appendix (E).

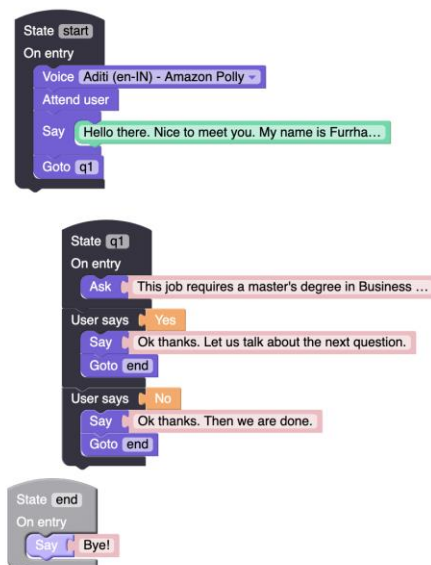


Fig 3: Build Furhat's skills on Blockly

In appendix (F), the entire conversation between me (the candidate) and Furhat (the recruiter) exported by the Blockly platform is reported.

3.3 Data analysis

To identify the requirements that a chatbot implemented in the selection process should have, as it has been already pointed out, a comparative analysis between the four aforementioned types of chatbots selected was conducted. First of all, it is necessary to specify the criteria by which the comparative analysis was carried out. Since we want to investigate the chatbots' requirements to be implemented along the R&S, those identified in the literature review act as criteria for the analysis. Therefore, the four types of chatbots have been compared and analyzed with each other based on the technical and social requirements which are:

Technical requirements	Social requirements
Object-oriented architecture (Balachandar & Kulkarni, 2018)	Visual look (Kuligowska, 2015)

Knowledge domain, which can be closed or open (Lokman & Ameen, 2019)	Speech synthesis unit (Kuligowska, 2015)
Response generation (Lokman & Ameen, 2019)	Conversational abilities and context sensitiveness (Kuligowska, 2015)
Text processing (Lokman & Ameen, 2019)	Personality traits (Kuligowska, 2015)
Machine Learning Techniques and Data Mining Algorithms (Lokman & Ameen, 2019; Balachandar & Kulkarni, 2018)	Personalization options (Kuligowska, 2015)

Table 2: Criteria for the comparative analysis

Subsequently, it was possible to determine the chatbot that best meets the listed requirements, and consequently the requirements that ensure effective implementation of chatbots in the R&S.

4. Results

In table 3 the results of the comparative analysis are synthesized. On the one hand, there are all the criteria by which the chatbots were analyzed. On the other hand, there is a description that explains whether the chatbot meets the listed requirements or not.

Criteria:	Watson Assistant	Furhat avatar	Fortive's chatbot	PepsiCo's chatbot
Object-oriented architecture	Present: Watson is created to support the onboarding process	Present: Furhat is programmed to hold a prescreening interview	Present: Fortive chatbot is programmed to support candidates in the application process	Present: PepsiCo chatbots are programmed to support a prescreening interview
Knowledge domain	Close: The chatbot knowledge covers only specific knowledge of a certain field, in this case, onboarding of new employees	Close: The chatbot knowledge covers only specific knowledge of a certain field, in this case, preselection interview	Close: The chatbot knowledge covers only specific knowledge of a certain field, in this case, support tool in the application process	Close: The chatbot knowledge covers only specific knowledge of a certain field, in this case, preselection interview
Response generation	Present but not able to find out which system is embedded	Present but not able to find out which system is embedded	Present but not able to find out which system is embedded	Present but not able to find out which system is embedded
Text processing	Present but not able to find out which system is embedded	Present but not able to find out which system is embedded	Present but not able to find out which system is embedded	Present but not able to find out which system is embedded
Machine	Present	Present	Present	Present

Learning Techniques and Data Mining Algorithms				
Visual look	Not present	Present: The chatbot can have a visual look that can be different in any situation	Not present	Not present
Speech synthesis unit	Not present	Present: The chatbot can speak	Not present	Not present
Conversational abilities and context sensitiveness	Present: The chatbot can handle different expressions and manage a speech knowing how to change texts of different categories	Present in part: Furhat can be programmed to handle different expressions and manage a speech knowing how to change texts of different categories. However, in my case, it was not possible to do so.	Not present	Not present
Personality traits	Present: Watson presents some personality traits although still in the process of improvement	Present: Furhat can be programmed to express different personality types	Not present	Not present
Personalization	Present:	Present:	Not able to	Not able to

options	Watson can be programmed for different situations and therefore it has different personalization options	Furhat has a wide range of interfaces that can be used, as well as many tones of voice etc. It can be customized according to the situation that requires it.	identify from my research angle since I experienced it only from the candidate point of view	identify from my research angle since I experienced it only from the candidate point of view
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Table 3: Results from the comparative analysis

The result of the comparative analysis shows that Furhat meets all the requirements identified by the literature that a chatbot should have to be implemented along the R&S. Therefore, Furhat turned out to be the most potentially applicable AI technology along with the selection processes among those analyzed. Furthermore, Furhat turned out to be also the best AI tool I have experienced in selection processes. In fact, from the candidate's perspective, Furhat's social requirements made it the best and most interesting experience I had as a candidate in the selection process. However, others chatbots also demonstrated to be interesting both from a research perspective and a candidate's perspective. In the next paragraphs, a broader description of table 4 and therefore of the results obtained is provided.

4.1 Fortive's Chatbot

Technical requirements. This kind of chatbot presents all the technical requirements. Firstly, it is powered by machine learning and data mining algorithms. Secondly, it follows an object-oriented approach since in my case it was implemented as a recruiter chatbot. Thirdly, it presents text processing and response generation systems, but I was not able to find out which system it embeds. Concerning the knowledge domain, it has a closed knowledge base, since it can discuss only the topic in question. In addition, the interlocutor can answer only by choosing an answer from those available. Therefore, it is not possible to have an open conversation on different topics.

Social requirements. The chatbot provided by Fortive company does not present any social requirements. As it is possible to notice from the conversation in Appendix (B), it does not have a visual look and a speech synthesis system and therefore it is not able to talk. It does not have well-developed conversational capabilities as for other kinds of chatbots analyzed, and it does not present context sensitiveness. Also concerning the personality traits and personalization option, from the experience I had with this chatbot, I can say that they are not present.

Overall, Fortive's chatbot turned out to be useful because it implies a smart solution through which the candidate can minimize the effort to apply for a job. He can directly upload his resume through the chatbot and in addition, the AI solution can check minimum qualifications. In this way, it can be useful both for HR professionals and candidates. HR professionals minimize time-consuming tasks, and candidates benefit from a smart recruitment process.

4.2 PepsiCo's chatbot

Technical requirements. The chatbot that I experienced during the selection process at PepsiCo is characterized by different technical requirements. First of all, it is powered by machine learning and data mining algorithms. Secondly, it follows an object-oriented approach as for Fortive chatbot because it was programmed as a pre-screening tool. Concerning the response generation and text processing, it is present, but I was not able to identify the system used from my research perspective. However, it was programmed to be able to answer yes or no questions. Therefore, the interlocutor can answer only yes or no. Finally, it presents a closed knowledge domain since it was not possible to talk about topics different from those in question.

Social requirements. Also, in this case, the chatbot from PepsiCo does not have any social requirements. Firstly, it does not present a visual look and a speech synthesis unit. Secondly, it has no conversational abilities since it was not possible to discuss with it different arguments. Consequently, it does not also present context sensitiveness. Concerning the personality traits, from my experience, I did not experience any personality traits. Finally, regarding the personalization options, from my research perspective, it was not possible to understand if it presents these features. However, from the relationship I had with this chatbot I can say that there were no customization options.

Overall, this chatbot had the aim only to check the minimum qualification for the job, and it turned out to be an efficient tool from my perspective. In addition, the thing that struck me most about this experience was the automation of the selection process I undertook. After I applied, I was contacted directly by the bots, without any recruiter or natural person meeting me. As a result, the AI did the job of checking my resume and cover letter, and subsequently, based on the requirements identified directly from my curriculum or motivation letter, I was contacted. Figure 4 shows the message both by email and phone.

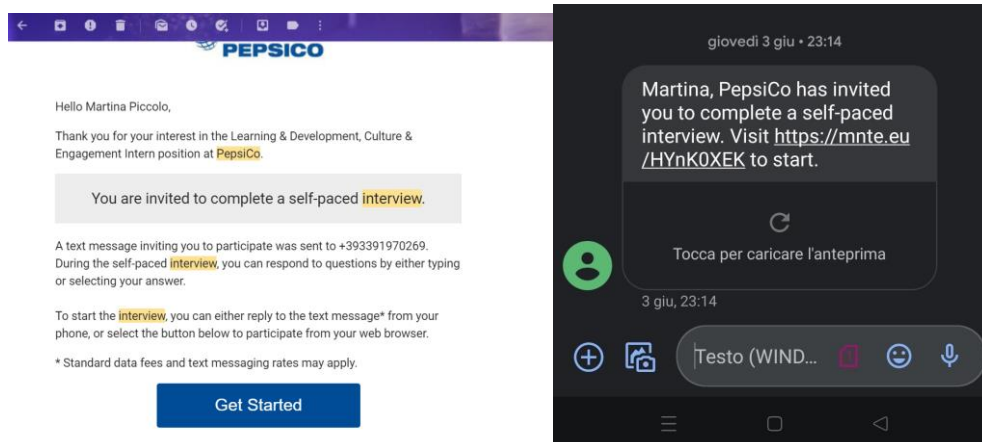


Fig 4: Invitation from PepsiCo to participate in the interview

Overall, it is possible to argue that PepsiCo's chatbot is implemented as a pre-screening tool, which has the aim to check if candidates have the minimum requirements for the job. It turned out to be a good experience where I appreciated the automation of the selection process.

4.3 Watson Assistant

Technical requirements. Watson Assistant presents an object-oriented architecture: in my case, it was programmed to help new hires enter the company and therefore to conduct an onboarding process. This means that it has been programmed following an objected approach.

Watson uses machine learning and natural language processing to understand the user's claim. Users can interact with Watson Assistant through the Workspace ONE Intelligent Hub in the app or a web browser. When Watson receives the input from users it directs the input to dialog skills. Then, its dialog skills interpret the input and thus it directs the flow of the conversation. Therefore, the dialogue skills that Watson incorporates collect information from the user it interacts with to respond or perform a task on behalf of the user. Any questions that the dialogue skills cannot answer are sent to the search capability. The search capability searches the company's knowledge bases set up to find relevant answers. Dialogue skills can be built independently by following the instructions on the website. These include a series of intents and entities that train Watson to recognize the object expressed in a request by a user and select the correct response. Moreover, Watson Assistant works with three main components, i.e intents, entities, and dialog. The intent allows Watson Assistant to understand what the user is asking, the dialog skills allow it to answer to users, while entities are used to group topics, concepts, items to identify information, but also to identify recognizable patterns. As a result, Watson satisfies both the text processing and response generation requirements. However, from my point of view, I was not able to identify what kind of response generation systems and text processing it uses. Concerning Watson's Knowledge domain, it can be considered "closed" since it can be built according to its task. Therefore, it is not able to cover open knowledge.

Social requirements. Watson can handle different languages but also different topics into one speech and recognize when you change the subject. Therefore, it has strong conversational skills and context sensitivity. Furthermore, it is one of the most customizable chatbots I have experienced: in my case, it has been adapted to be able to conduct an onboarding process, but it can be used in different contexts. It does not present personality traits well developed, but as it can be seen in the reported speech in appendix (D), Watson occasionally expresses interest in the interlocutor through interlocations such as "interesting".

However, Watson does not have a defined physical appearance and a speech synthesis unit. Consequently, the side that would make him more human is missing.

Overall, Watson Assistant presents all the technical requirements, while some of the social requirements are missing. However, the majority of all requirements are present and therefore, it can be argued that it has the potential to be effectively implemented along the R&S.

4.4 Furhat avatar

Technical requirements. From my experience, it was possible to find out that Furhat fully satisfies the technical requirements. Furhat Avatar is an AI tool powered by machine learning and data mining algorithms. In my case, its knowledge domain can be considered "closed" because it could answer only yes or no questions. However, it has the power to be programmed more extensively and it can discuss different topics. Furhat is programmed following an object-oriented approach. In fact, in my case, as it has already been stressed, I decided to use it as a pre-screening tool in the selection process to check the candidates' minimum qualifications. As far as text process and response generation are concerned, Furhat satisfies them. However, also in this case I was not able to identify what kind of text processing and response generation systems it embeds. Rather, it has cutting-edge systems in speech recognition, computer vision, speech synthesis, animation, and dialogue management. Furhat's computer vision system provides real-time multi-user tracking, users' facial recognition analysis, users' distance and their head pose estimation. Conversations are modeled into state machines that are context-sensitive and finally, it has a powerful multilingual natural language understanding engine.

Social requirements. One of Furhat's main characteristics is its ability to generate a dialogue, consequently, it can talk, even in its online form. As a result, it can involve social behaviors, such as speaking, listening, and expressing emotions. Its social behaviors include the capacity to attend to multiple people, look at a specific person when talking to them, and keep them apart in a conversation. Therefore, concerning social requirements, Furhat fully satisfies them. Firstly, it presents a visual look since it has a physical form. Secondly, it is equipped with a speech synthesis system, as has already been pointed out. Thirdly, it has personality traits; it can be customized according to the task assigned to it, it can change its face, going from those of women to those of men, animals, and children. It is also able to change the tone of voice, it can adopt feminine and masculine tones of voice. Moreover, different features make Furhat very expressive and emotional:

firstly, it has a human-like neck for natural head movements, which is possible to control from its software. Consequently, it can follow the interlocutor during the conversation if he changes position or moves around. Secondly, it can change facial expression thanks to its algorithms. It can express anger, enthusiasm, sadness, and disgust depending on the situation. Thirdly, it has realistic lip movements during speeches, and high-level control over the eyes, it is also able to raise its eyebrows expressing interest in the conversation. Consequently, it has limitless expressivity, and it can adapt to any situation: it can change the design, ethnicity, gender, and language, which makes it a very customizable robot.

Overall, Furhat has been deployed in different contexts, and the number of research work is constantly increasing. For instance, researchers have employed Furhat as therapy for older adults with depressive symptoms (Thunberg et al., 2021). As a pre-screening interviewer in the selection process, Furhat turned out to be a very efficient AI tool thanks to its features. For this reason, it can be considered as the most potential AI tool to be implemented along the R&S in an efficient way both for HR professionals and candidates. On one hand, it can provide an effective pre-screening service, helping to save time and cut costs, especially when HR departments receive numerous resumes. On the other hand, candidates can benefit from the interaction with chatbots with human forms during the selection process.

5. Discussions

The overall purpose of this research was to identify the requirements that a chatbot should have to be effectively implemented in the R&S. To do so, a comparative analysis between four types of chatbots was conducted. Firstly, we have identified what are the technical and social requirements that chatbots should embed to be successfully implemented in the selection process according to the literature. Afterward, the comparative analysis made it possible to find out whether these chatbots met or not the requirements listed. Consequently, based on my interaction and observation with these AI tools, it has been possible to observe what are the requirements that contribute to efficiently implementing chatbots along the R&S process, which correspond to those of Furhat, i.e. the best chatbot among those analyzed. In the next section, a broader discussion on the results obtained is provided.

5.1 Requirements needed to ensure efficient chatbot implementation along the R&S

This research has demonstrated that a chatbot to be effectively implemented along the R&S needs both technical and social requirements. On one hand, technical requirements can be considered as the basis to build useful and efficient chatbots and therefore they represent a constant that must be present among all kinds of chatbots. On the other hand, social requirements contribute to an efficient implementation of the chatbot, which translates into better R&S outcomes.

By testing and interacting with chatbots as a potential candidate, all chatbots turned out to be similar in technical requirements, whereas they differed in social requirements. Furhat is the best AI tool to implement into the selection process because what differentiates Furhat from the other kinds of chatbots are the social requirements it embeds. As a result, it is reasonable to argue that on one hand technical requirements are necessary to create chatbots; on the other hand, the social requirements are needed to ensure an efficient implementation of chatbots into the R&S. table 4 shows how the social requirements ensure efficient chatbots implementation along the R&S based on my observations and the literature.

<p><i>Visual look</i></p>	<ul style="list-style-type: none"> ● <i>Improve humanness perceived by candidates (Candello et., 2017)</i> ● <i>Improve candidates engagement both during the recruitment process and selection process (Schildknecht et al., 2018; Van Esch et al., 2019)</i> ● <i>Willingness to apply for a job increase (Schildknecht et al., 2018; Van Esch et al., 2019)</i> ● <i>Increasing confidence in candidates and decreasing anxiety associated with the selection process, increasing candidates performance (Schildknecht et al., 2018; Van Esch et al., 2019)</i>
<p><i>Conversational abilities and context sensitiveness</i></p>	<ul style="list-style-type: none"> ● <i>Improve the quality of human-chatbots interaction (Candello et al., 2017; Kuligowska, 2015)</i> ● <i>Improve candidates engagement both during the recruitment process and selection process (Schildknecht et al., 2018; Van Esch et al., 2019)</i> ● <i>Willingness to apply for a job increase (Schildknecht et al., 2018; Van Esch et al., 2019)</i>
<p><i>Speech synthesis unit</i></p>	<ul style="list-style-type: none"> ● <i>Improve candidates engagement both during the recruitment process and selection process (Schildknecht et al., 2018; Van Esch et al., 2019)</i> ● <i>Increasing confidence on candidates and decreasing anxiety associated with the selection process, increasing candidates performance (Schildknecht et al., 2018; Van Esch et al., 2019)</i> ● <i>Improve the quality of human-chatbots interaction (Candello et al., 2017; Kuligowska, 2015)</i>
<p><i>Personality traits</i></p>	<ul style="list-style-type: none"> ● <i>Improve humanness perceived by candidates (Candello et., 2017)</i> ● <i>Improve candidates engagement both during the recruitment process and selection process (Schildknecht et al., 2018; Van Esch et al., 2019)</i> ● <i>Willingness to apply for a job increase (Schildknecht et al., 2018; Van Esch et al., 2019)</i> ● <i>Increasing confidence in candidates and decreasing anxiety associated with selection process, increasing</i>

	<i>candidates performance (Schildknecht et al., 2018; Van Esch et al., 2019)</i>
<i>Personalization options</i>	<ul style="list-style-type: none"> • <i>Improve the quality of human-chatbots interaction (Candello et al., 2017; Kuligowska, 2015)</i>

Table 4: Requirements needed to ensure efficient implementation of chatbots along the R&S

As stated by the literature, social requirements contribute to increasing the perceived humanness of chatbots from a candidate's perspective (Candello et al., 2017; Kuligowska, 2015; Elsholz et al., 2019). The visual look makes the chatbot more human-like and this contributes to increased confidence in candidates who are experiencing chatbots as a recruiter. In this way, anxiety decreases and they can have better performance during the selection process (Van Esch et al., 2019; Schildknecht et al., 2018). Moreover, HR professionals can have a smart tool that can improve how candidates perceive the employer and increase their engagement. Consequently, their willingness to apply for the job can increase (Van Esch et al., 2019; Schildknecht et al., 2018). The conversational abilities and context sensitiveness improve the quality of the human-chatbot interaction (Candello et al., 2017; Kuligowska, 2015). Chatbots can have better conversations with candidates because they are more able to explain statements or give better information. In turn, candidates can experience a smart tool that improves their engagement during the selection process. Therefore, their willingness to apply for a job can increase (Van Esch et al., 2019; Schildknecht et al., 2018).

The ability to talk through a speech synthesis unit contributes to improving the quality of human-chatbot interactions, which in this case become a spoken conversation and no longer written. Consequently, the perceived humanness of chatbots increases, and also the candidates' engagement, as well as their willingness to apply for a job (Candello et al., 2017; Kuligowska, 2015; Van Esch et al., 2019; Schildknecht et al., 2018). If the chatbot is implemented in the selection process, the chatbot's ability to talk contributes to increasing confidence in candidates, decreasing their anxiety level and their performance can improve.

Instead, the ability to express personality traits can improve the candidates' perceived humanness of these tools (Candello et al., 2017; Kuligowska, 2015). Consequently, also in this case the candidates' engagement, as well as their willingness to apply for a job increase. In the selection process, personality traits contribute to increasing confidence and improving candidates' performance (Van Esch et al., 2019; Schildknecht et al., 2018).

Personalization options allow for better programming of these tools since they would be able to better adapt to different phases of the R&S and improve the quality of human-chatbot interactions since candidates can experience better conversations (Candello et al., 2017; Kuligowska, 2015; Van Esch et al., 2019; Schildknecht et al., 2018).

5.2 How social requirements would have improved efficiency and effectiveness of chatbots implementation along the R&S.

In this section how social requirements would have improved the efficacy of the other kinds of chatbots analyzed is discussed. The aim is to discuss how the requirements that were found to be lacking in Fortive, PepsiCo chatbots and Watson Assistant could have increased the effectiveness and efficiency of these AI tools implemented in R&S. Table 5 provides an overview on practical implications obtained.

Chatbots	Requirements that would have improved chatbot implementation along the R&S	
Fortive's chatbot	Visual look	<i>Giving a visual look to Fortive's chatbot would improve candidates' engagement and their willingness to apply for a job (Van Esch et al., 2019; Kuligowska, 2015; Haake, 2009)</i>
	Conversational abilities and context sensitiveness	<i>Improving conversational abilities and context sensitiveness would improve candidates' engagements, the likelihood that they will apply for the job, and the quality of human-chatbot interaction (Van Esch et al., 2019; Kuligowska, 2015; Candello et al., 2017)</i>
	Speech synthesis unit	<i>The ability to talk would improve candidates' engagements, increasing trustiness and the likelihood that candidates will apply for the job (Van Esch et al., 2019; Kuligowska, 2015)</i>
	Personality traits	<i>The chatbot's ability to shows some personality traits would increase candidates' engagement and their willingness to apply for a job (Van Esch et al., 2019; Schildknecht et al., 2018)</i>
PepsiCo's chatbot	Visual look	<i>Giving a visual look to PepsiCo's chatbot would increase the candidates' engagements during the selection process (Kuligowska, 2015; Van Esch et al., 2019; Haake, 2009)</i>
	Conversational abilities and context sensitiveness	<i>The ability to generate clear and consistent expressions would improve candidates' engagement during the selection process, the quality of candidates-chatbot interaction, decreasing anxiety associated with the selection</i>

		<i>process, and improving candidates' performance (Kuligowska, 2015; Candello et al, 2017; Van Esch et al., 2019)</i>
	Speech synthesis unit	<i>The ability to talk would improve candidates' engagements, increasing trustiness and decreasing anxiety associate with the selection process (Van Esch et al., 2019; Schildknecht et al., 2018)</i>
	Personality traits	<i>Showing personality traits would increase the trustiness, decreasing anxiety associated with the selection process, and increasing candidates' performance along the selection process (Van Esch et al., 2019; Schildknecht et al., 2018)</i>
Watson Assistant	Visual look	<i>Giving a visual look to Watson Assistant would increase candidates/employees' engagements during the recruitment, selection, and onboarding processes (Candello et al., 2017; Van Esch et al., 2019; Schildknecht et al., 2018)</i>
	Speech synthesis unit	<i>The ability to talk would improve employees' engagements, increasing trustiness and improving the quality of human-chatbot interaction (Van Esch et al., 2019; Kuligowska, 2015; Candello et al., 2017)</i>

Table 5: how social requirements would have improved the efficiency of chatbots implementation along the R&S.

Starting with Fortive's chatbot, since this type of chatbot was implemented along the recruiting process, if it had other social requirements its effectiveness would have increased. Firstly, the visual look would have improved the perception that candidates have of the chatbot. In this way, their involvement and willingness to apply for the job offer also would have increased (Van Esch et al., 2019; Kuligowska, 2015; Haake, 2009). Secondly, if Fortive's chatbot featured better conversation skills and context-sensitivity, in this case, the perception that the candidates would have had of the chatbot would have improved and consequently also their commitment and willingness to apply for the job offer, as well as the quality of human interaction with the chatbot (Van Esch et al., 2019; Kuligowska, 2015; Candello et al., 2017). Thirdly, the chatbot's ability to speak through the text-to-speech unit would improve candidates' perception of the chatbot, that they would be perceived more like humans, and consequently, their engagement, trust in the chatbot, and the likelihood of applying for the job would be improved (Van Esch et al., 2019; Kuligowska, 2015). In the end, also the presence of personality traits in the chatbot would have increased the engagement of candidates and their willingness to apply for the job (Van Esch et al., 2019; Schildknecht et al., 2018).

As for the PepsiCo chatbot, as this chatbot has been implemented as a pre-screening of candidates and therefore along the selection process, the visual look would have increased the engagement of the candidates, which helps to instill confidence in the candidates. In fact, with the visual aspect, candidates would have perceived the chatbot more like humans, and consequently, their engagement would also increase (Kuligowska, 2015; Van Esch et al., 2019; Haake, 2009). Secondly, Conversational abilities and context sensitiveness would have improved candidates' perception of the chatbot, and consequently, their engagement would have increased as well. Furthermore, the quality of the interaction between candidates and chatbots would also be increased. Thirdly, the ability to speak through the text-to-speech unit would improve candidate engagement during the selection process, increasing confidence and decreasing anxiety in this case as well. In this way, the performance of the candidates would also benefit (Van Esch et al., 2019; Schildknecht et al., 2018). In the end, the chatbot's ability to display certain personality traits would have helped instill confidence, decreasing anxiety and thereby increasing candidate performance along the selection process (Van Esch et al., 2019; Schildknecht et al., 2018).

As for Watson Assistant, since this chatbot was implemented during the onboarding process, the visual look and the ability to speak would have improved its performance. Taking a visual look at Watson Assistant would have increased how candidates / new employees would perceive the chatbot, which would have been more like humans and thus increased their engagement (Candello et al., 2017; Van Esch et al., 2019; Schildknecht et al., 2018). Furthermore, also in this case, the ability to speak through a speech synthesis unit would have improved the perception of the chatbot by the new hires and consequently would have increased their engagement.

5.3 Limitations and future research

This research has demonstrated that social requirements can improve the chatbot's implementation along the R&S process. In line with the existing literature, it has been confirmed that technical requirements are needed to build efficient chatbots, whereas it has been demonstrated that social requirements can improve the outcomes of the R&S. However, this research also presents some limitations. First of all, It is needed to point out that the importance of social requirements has been demonstrated through an experiment with Furhat Avatar, where I was the programmer of Furhat and even the candidate. Through my experience, it was possible to demonstrate that chatbots' social requirements contribute to having efficient and successful selection outcomes, but it was not possible to test it also with other candidates. Therefore, the findings cannot be generalized and are not representative. Further research with several potential candidates is needed to further test the potential of Furhat and confirm our findings. For example, a research study could investigate the effect of chatbots implementation in R&S with several different candidates. In this way, it

would be possible to clarify whether chatbots implementation contributes to improve R&S and confirm our findings.

Secondly, to collect data, I applied to different job opportunities. However, these job opportunities were related all to my studies and field of specializations. Therefore, to further demonstrate the deployment of AI and chatbots along R&S, research is needed also regarding other kinds of selection processes related to different types of jobs and positions. For instance, with a quantitative approach, it would be possible to shed light on the AI and chatbots implementation along R&S by looking at different job fields.

Thirdly, this study was intended to analyze chatbots requirements along the selection process. However, as the data was collected through an ethnographic method, I had the opportunity to also study chatbots implemented in other stages, such as Fortive during the recruitment stage and Watson during the onboarding stage. Consequently, the fact that I found few chatbots implemented as selection tools prompted me to focus on chatbots implemented along with other phases as well. Research studies could focus only on the recruitment process or selection process or also on the onboarding process. In this way, it would be possible to better clarify for each process a chatbot's implementation and analyze the chatbot's requirements needed for each phase.

Overall, this research can be considered as an initial, further research can be helpful to clarify and better understand how social requirements can improve the efficiency and effectiveness of chatbots along the R&S.

6. Conclusions

This study was aimed to identify the requirements that ensure efficient chatbots implementation along the R&S. The research question that needed to be answered was: “*What are the requirements that a chatbot should have to be implemented in the R&S?*” Thanks to the study undertaken, it was possible to answer this question. Consequently, the requirements that a chatbot must incorporate to be implemented in R&S are technical requirements and social requirements. Technical requirements represent those requirements without which chatbots could not exist, and therefore a constant that has been confirmed to be present in all the chatbots analyzed. The social requirements, on the other hand, proved to be those requirements that contribute to improving the performance of the chatbots implemented in the R&S and consequently those that ensure effective and efficient implementation of the chatbots in the R&S.

With this research, it was possible to contribute to the modern scientific debate that sees AI as the protagonist. We are living in the era of AI affirmation in different contexts, and the field of talent acquisition is an example. Consequently, it is arguable to assume that in the coming years, AI-powered tools including chatbots and robots such as Furhat will be increasingly incorporated into our society. For this reason, it is necessary to continue to study these issues, not only from an engineering and mathematical point of view, which will contribute to making these tools more and

more developed but also from a sociological point of view, as these tools will be increasingly part of human life.

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Sitography

https://docs.vmware.com/en/VMware-Workspace-ONE/services/intelligent-hub_IDM/GUID-912D0CA4-6A1C-4C29-95D0-D10C46460890.html

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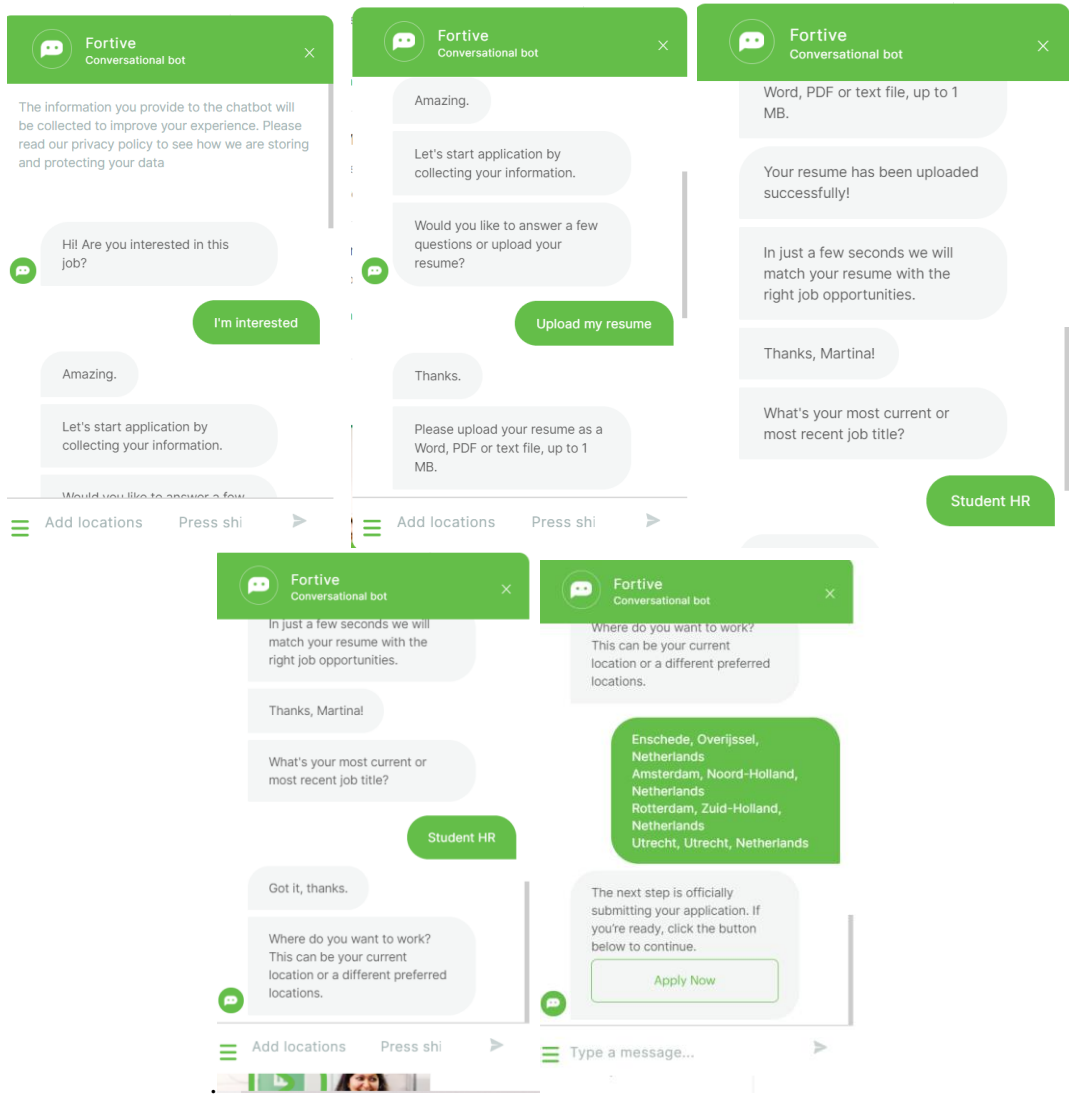
<https://furhatrobotics.com/blog/what-are-social-robots/>

Appendix A - All the positions I have applied for

N°	Date	Name of company	Position	Where I found the position
1	18/01/2021	Bestseller	Recruitment intern	LinkedIn
2	25/01/2021	Just Eat takeaway.com	HR intern	LinkedIn
3	23/02/2021	Travix International	Internship HR (Learning and Development)	LinkedIn
4	24/02/2021	Chanel	HR intern	LinkedIn
5	25/02/2021	PepsiCo	Human Resources internships	LinkedIn
6	06/03/2021	HelloFresh	Talent Acquisition internship	LinkedIn
7	15/03/2021	The Kraft Heinz company	Performance Analytics Intern	LinkedIn
8	07/04/2021	L'Oréal	HR internship	LinkedIn
9	15/04/2021	The Kraft Heinz company	HR Internship	LinkedIn
10	15/04/2021	Unilever	Internship HR	LinkedIn
11	23/04/2021	Aradius	HR / Learning and development internship	LinkedIn
12	24/04/2021	Speakap	Human Resources intern	LinkedIn
13	24/04/2021	Ultimaker	Human Resources Internship	LinkedIn
14	28/04/2021	ABN AMRO BANK	Recruitment internship	LinkedIn
15	04/05/2021	JACOBS DOUWE EGBERTS	Global Talent Acquisition Internship	LinkedIn
16	04/05/2021	Prosus Group	Talent Acquisition intern	LinkedIn

17	19/05/2021	Microsoft	Student Placement Program - Industry Executive & Product Marketing Manager	LinkedIn
18	21/05/2021	Green Story	Sales and Development internship	LinkedIn
19	22/05/2021	EuroDev - European Business Development Group	HR and Recruitment internship	LinkedIn
20	25/05/2021	BEERWULF	HR internship	LinkedIn
21	29/05/2021	Greenpeace	Political Business & Peace Unit	LinkedIn
22	01/06/2021	Amberscript	HR internship	LinkedIn
23	03/06/2021	JustEat Takeaway.com	HR intern	LinkedIn
24	03/06/2021	PepsiCo	Learning and Development internship	LinkedIn
25	12/06/2021	Friesland Campina	Intern Global Talent Management	LinkedIn
26	23/06/2021	Kennedy Fitch	Human Resource internship	LinkedIn
27	25/06/2021	Sony Electronics	HR intern	LinkedIn
28	27/06/2021	Fortive Company	Recruitment intern	LinkedIn

Appendix B - Conversation with Fortive chatbot



Appendix C - Conversation with PepsiCo chatbot

pepsicoessa.montagetalent.eu/rmstoweb

3 giugno 2021

Automation Manager would like you to complete an interview for the Learning & Development, Culture & Engagement Intern position with PepsiCo.

Yes, Let's Begin

PEPSICO

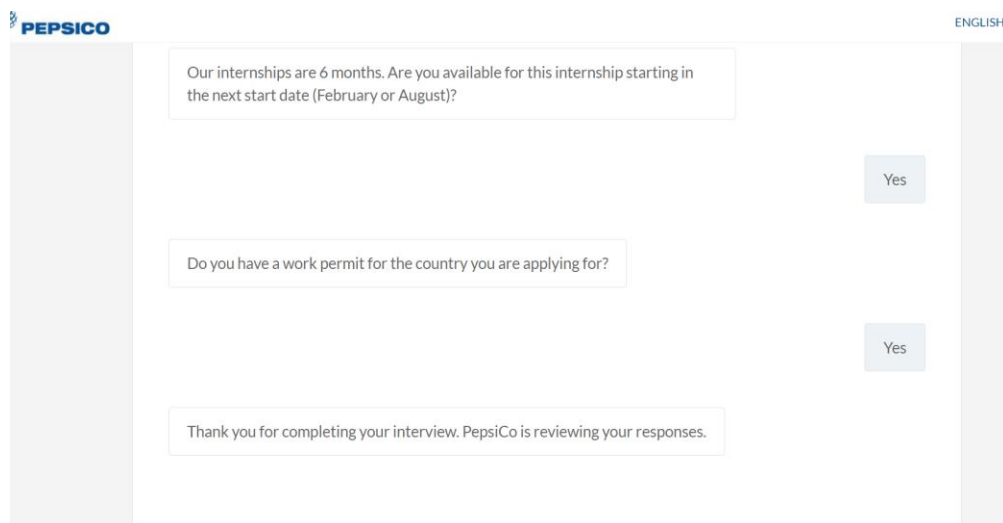
Are you a Bachelor's or Master's student or graduated (max. 3 months)?

Yes

Are you fluent English speaker?

Yes

No



PEPSICO ENGLISH

Our internships are 6 months. Are you available for this internship starting in the next start date (February or August)?

Yes

Do you have a work permit for the country you are applying for?

Yes

Thank you for completing your interview. PepsiCo is reviewing your responses.

Appendix D - Conversation with Watson Assistant

Hello, I would like to welcome you to this interview

Could you please tell me your name?

You said:

Martina

Watson Assistant said:

Welcome, Martina.

For the next 30 minutes we will talk about your onboarding process at the company you currently work for.

Are you familiar with the term onboarding?

You said:

No, I'm sorry. Could you explain to me what we are talking about?

Let me explain to you what an onboarding process is.

Onboarding is the process of integrating new employees into social and performance aspects of an organization, through both formal and informal practices.

The social aspect refers to the relationships you have with direct and indirect colleagues. The performance aspect means the skills and knowledge you need to be able to perform your job.

We are now ready to continue with the interview.

Please avoid breaking down answers in several messages, as I am unable to handle multiple messages yet.

It is okay if you do not remember all the details. I am just interested to know what was memorable for you.

As an introduction, could you please tell me your position and how long you have worked for the company?

You said:

I am an HR manager and I worked for the company for 1 year.

Watson Assistant said:

Thank you for your information, Martina. I understand that you worked as manager for.

Interesting!

What would you say is your main responsibility?

You said:

Recruiting and staffing

Watson Assistant said:

Interesting!

We are now ready to continue the main part of the interview.

Would you please describe your first day at the office in a step-for-step manner?

You said:

When I joined the office, on the first day at office, I was a little tense till I got acquainted with the workplace and co-workers. But as days passed, I became comfortable with everything.

Watson Assistant said:

How prepared do you think your managers/colleagues were for your arrival?

You said:

Both my CEO and my colleagues were very helpful and well prepared.

Watson Assistant said:

Okay, thanks.

If you would have to describe in one word your main impression of the company of that (first) day, which adjective would you choose?

You said:

Challenging and stimulating work environment

Why do you think the company was challenging?

You said:

Into the company, every day is a new challenge

Watson Assistant said:

Thanks for letting me know.

During the first weeks, some companies offer orientation activities to help new employees to adapt and understand the organizational culture.

What kind of orientation activities did you have? (For example, informative sessions related to the company or your department, team building activities, etc.)

You said:

During the first month, I got face-time meetings with the leadership team. This helped me to understand the company culture, the company history, company values and expected behaviours. It also helped me with other new employees to feel valued by, and connected to, leadership.

Watson Assistant said:

Okay, thanks for the information

Did you face any difficulties during the first week(s) of your new job?

You said:

During the first working days, I received a strong support from my colleagues and my direct supervisor. But after, my direct supervisor wasn't as present as I expected.

Watson Assistant said:

Thanks for your explanation

Who did you consult when you did not know something about the procedures at the company (for example, the procedure to take a holiday, or details of employee benefits if applicable)?

You said:

My direct supervisor

Watson Assistant said:

Interesting!

In the next part of the interview the questions will be about the performance aspect of the onboarding process. The performance aspect concerns the process of getting to know the skills and knowledge needed to successfully perform your tasks at your job.

What work-related tasks were assigned to you during the first couple of weeks?

You said:

Tasks related to HR field, such as recruiting and staffing activities, screening, interviews.

Watson Assistant said:

Please tell me when you first started to do work related tasks and how they were introduced to you.

You said:

From the beginning, my direct supervisor introduced and illustrated me activities to perform related to HR field.

Watson Assistant said:

Interesting!

What kind of training did you get during the first 3 months at your new job?

You said:

Soft skills development, Personal Effectiveness, Basic Skill Development, and Time Management

Watson Assistant said:

Could you explain to me more about this?

You said:

Developing of basic skills, improving of time management, and soft skills development activities

Watson Assistant said:

Do you think partaking in training is necessary to increase your performance at your job position?

You said:

Indeed! It is crucial to stay up to date to acquire new knowledge that can be applied, increasing performance

Watson Assistant said:

Can you give me an example of what you mean?

You said:

Examples are quizzes/assessments, training videos, dialogue simulations, and microlearning courses

Watson Assistant said:

Thanks for your information.

What kind of feedback, if any, did you get from your supervisors about your performance during your first month at the company?

You said:

I received some useful feedback about how to perform always better. But, as I said before, wasn't as present as I expected.

Watson Assistant said:

Could you please explain to me why or why not you found it valuable to receive feedback?

You said:

Valuable because I can improve my performance

Watson Assistant said:

Thanks for letting me know.

This concludes our interview.

At last I would like to ask you to fill out the following survey about your experiences with the chatbot.

First, for technical purposes, please type in a random four digit number such as "4987" as your next response and enter this at the beginning of the survey before you fill in the survey.

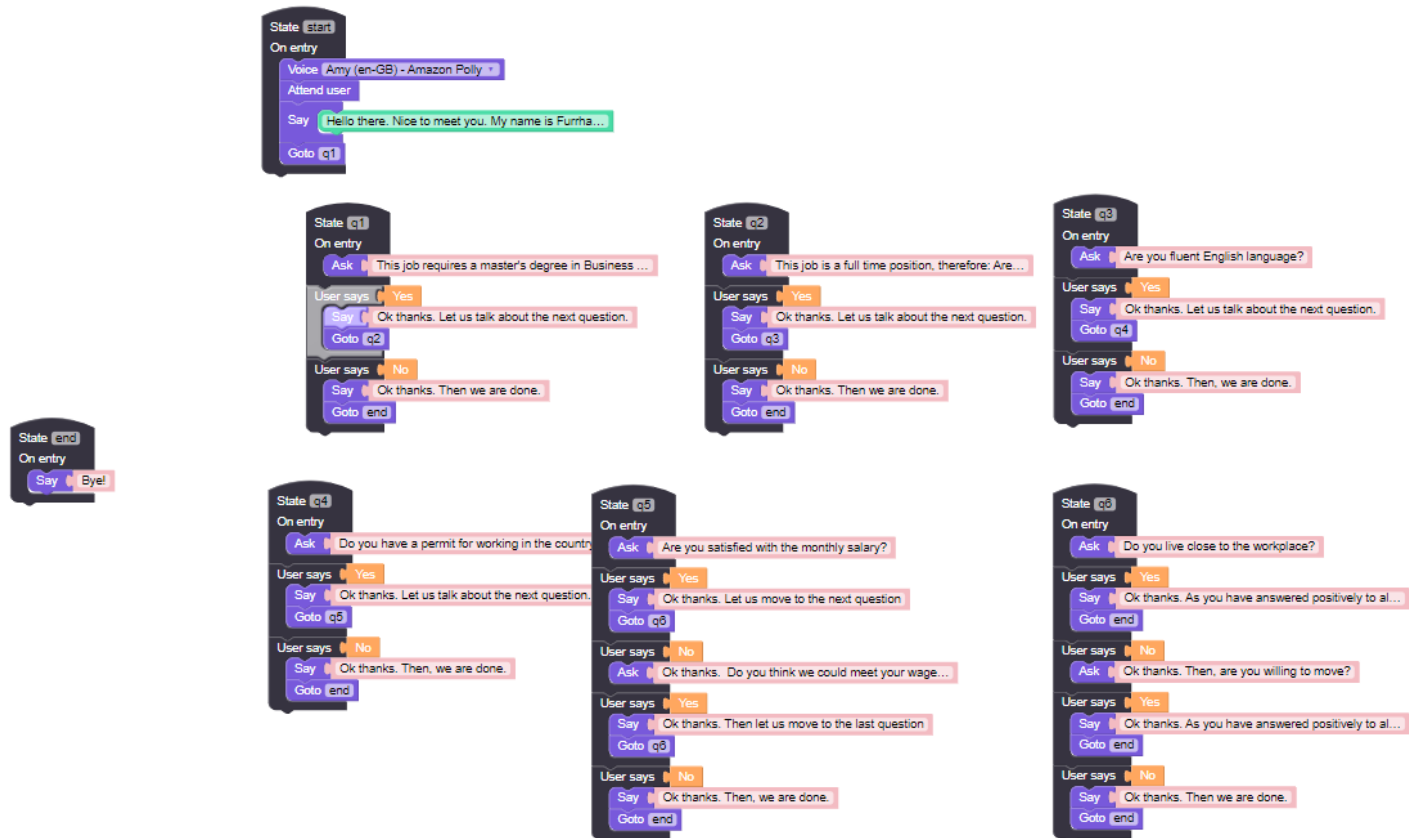
2397

Watson Assistant said:

Thanks! Your number is 2397. Please go to forms.gle/P8JChYAZCAF6QgWw7 and enter this number.

Please let me know when you're done!

Appendix E - Conversation with Furhat on Blockly programming



Appendix F - Conversation with Furhat at the BMS Laboratory of the University of Twente

start Amy (en-GB) - Amazon Polly Hello there. Nice to meet you. My name is Furhat, an HR assistant and I will guide you through this interview. Let's talk about the job now. q1 q1 This job requires a master's degree in Business Administration, Human Resource Management or related field, Do you meet this requirement? Please just say yes or no. Ok thanks. Let us talk about the next question. q2 Ok thanks. Then we are done. end q2 This job is a full time position, therefore: Are you available to work on a full time basis for 5 days a week? Ok thanks. Let us talk about the next question. q3 Ok thanks. Then we are done. end q3 Are you fluent English language? Ok thanks. Let us talk about the next question. q4 Ok thanks. Then, we are done. end end Bye! q4 Do you have a permit for working in

the country where you applied? Ok thanks. Let us talk about the next question. q5 Ok thanks. Then, we are done. end q5 Are you satisfied with the monthly salary? Ok thanks. Let us move to the next question q6 Ok thanks. Do you think we could meet your wage needs? Ok thanks. Then let us move to the last question q6 Ok thanks. Then, we are done. end q6 Do you live close to the workplace? Ok thanks. As you have answered positively to all questions, you can move to the next step on the selection process. Good luck end Ok thanks. Then, are you willing to move? Ok thanks. As you have answered positively to all questions, you can move to the next step on the selection process. Good luck end Ok thanks. Then we are done. end

The text above represents the conversation between me and Furhat, and it is extracted by the Furhat Blockly platform. As it is possible to see, Furhat was programmed in such a way that the interlocutor (i.e. me) would answer yes or no. In case the answer was positive, Furhat continued the interview, moving on to the next questions. In the event that the answer was negative Furhat replied with a “thank you then we are done” because the hypothetical candidate does not meet the minimum requirements.

Appendix G - Other AI-powered solutions tested by the author during the selection process undertaken

1) BESTSELLER - Thomas GIA Assessment

Invitation to complete Thomas GIA Assessment

Dear Martina,

Team Talent Acquisition BSE of Bestseller has made arrangements for you to complete a general intelligence assessment (GIA).

The Thomas GIA is a general assessment of your mental processing capacity. Please follow the instructions on screen carefully.

BEFORE TAKING THE ASSESSMENT PLEASE READ THE INSTRUCTIONS BELOW:

Tests are scored on SPEED and ACCURACY so make sure you work as quickly as you can and as accurately as you can without any disruptions.

Ensure that you are working on your own, in a quiet environment free from interruption where you will be able to concentrate and focus for at least 40 minutes.

Read the information provided in the GIA Example Booklet <https://www.thomas.co/sites/default/files/2019-11/GIA-Example-Booklet-2018.pdf>

Concentrate on the instructions and the practice questions prior to each test.

Click the link below, or copy and paste it into your browser to start the assessment.

<https://open.thomasinternational.net/Login/Login.aspx?Type=4&ID=>

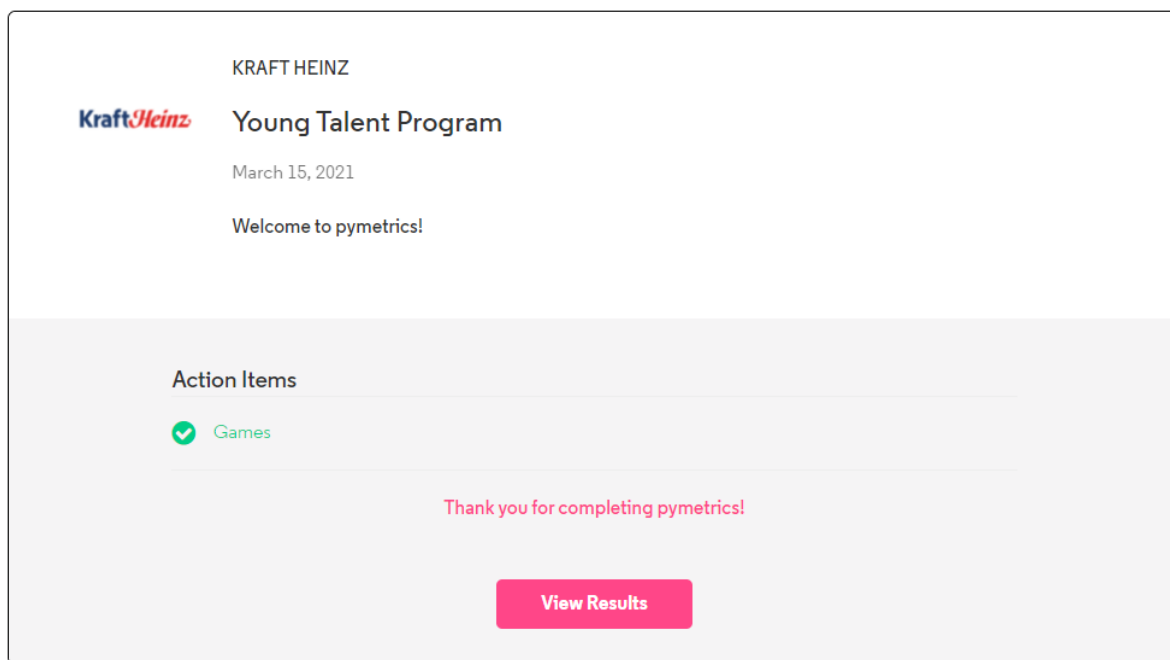
Assessment completion

Analisi del Profilo Personale

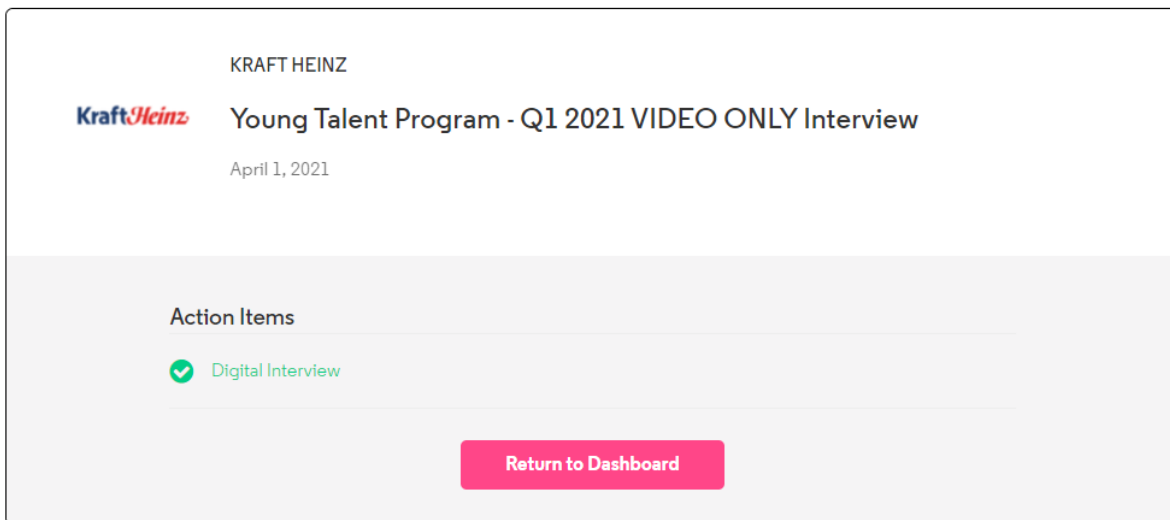
Grazie, il tuo assessment è stato ora completato e salvato.

Verrà inviata una email alla persona che ha mandato l'invito. Per maggiori informazioni in merito agli assessments Thomas, contattare i riferimenti.

2) Kraft Heinz - Psychometric assessment with pymetrics



3) Kraft Heinz - Video screening interview



4) PepsiCo - Video screening interview

Review and Submit

Your interview has been submitted. You can not make modifications, but you can review.

Click a category to access your information.

Contact Information

Documents

Introduction

Interview Questions

Question 1 What do you know about PepsiCo and why are you interested in PepsiCo?

Question 2 Why are you specifically interested in the job you have applied for?

Question 3 What challenges are you looking for in this internship?

Question 4 Do you have to write a thesis during your internship? If yes, how many days per week will you work on this?

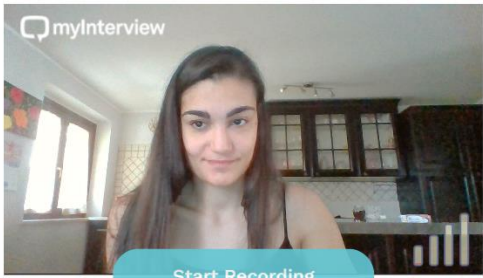
Question 5 Tell us about a challenge you have gone through. How did you overcome?

Question 6 Convince me in 1 minute: why should we choose you?

5) Amberscript - Video screening interview

Question 1 ✕

After you click **Start Recording**, you will be given the question and 30 seconds to prepare your answer. Once ready, click **Start Now** to record. For assistance, click the red button or contact your recruiter.



Question 1 30secs

Question 2 30secs

Question 3 45secs

Question 4 45secs

Powered by myInterview