

Artificial intelligence in technical support environments

Julle Almonkari



Author(s) Julle Almonkari	
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<p>The insurgence of artificial intelligence within the past 1-5 years can be seen as a clear indication of the nature of the beast. The use of artificial intelligence in technical support is a rising prospect from multiple perspectives, of which companies are the key players. As a supportive tool, it has the adaptability of making even the most strenuous of support cases into a cakewalk. Considering how relatively new the shift into artificial intelligence is and how it could change the status-quo of humans being at the top of the time-honoured food chain. The goal of this research is to discover what artificial intelligence in relation to technical support is, and to discuss the viability of artificial intelligence in aiding and carrying out technical support.</p> <p>This qualitative research process started at the beginning of the year 2020 whilst working full-time in the position of technical support and was brought to its conclusion during November 2020. The research consisted of four semi-structured interviews of technical support professionals. The interviews were analysed through the use of coding words into themes and thus results. The semi-structured nature is based off the interview questions which were there to guide the interview process. Microsoft's Word and Excel platforms were used to transcribe as well as to code the interviews.</p> <p>The results show the importance of integrating tools into one as well as allowing customization to improve the user experience. Figuring out why human interaction matters, which is due to people in general being social creatures who want to be listened to and understood. The ever-growing importance of natural language processing is discussed. The results reveal that with proper user-centred development, the use of artificial intelligence in technical support environments is highly applicable, due to the nature of it smoothing the support process. With the nature of the tool, it is important on a societal scale to discuss and agree on certain safety nets, both in the program as well as on a societal level, if the hypothetical true potential of artificial intelligence is of interest to utilize.</p> <p>The research brings forth revelations showing that there is an obvious market for AI powered support tools if they are developed well. The opportunities for employing such help are almost limitless. These results will be of great use for companies considering enlisting AI powered support help or thinking how they could differ themselves from the pack.</p>	
Keywords Artificial intelligence, natural language processing, technical support, machine learning	

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1 Introduction

Just as back in the days of the 18th century with the emergence of industrialization, as well as with the rising popularity of the internet in 1990's, new things may sound and feel frightening or just plain useless. Jumping off the wagon that is popularization and what may just look like a fad can end up backfiring later. The same goes for Artificial Intelligence (often referred to as AI) today. Seeing it as being a threat, like with it wiping out the entire human race, will delay the positive impacts of AI to materialize. While most people know AI in the form of Skynet or the Terminator, not many know how big of a role it is already playing in everyday society in the forms of voice assistants like Siri and Google Assistant or food delivery or the functioning of traffic lights. AI could be broadly described as an umbrella that encompasses multiple sub-parts that may be seen as more prevalent than others like natural language processing or the timely topic of machine learning. (Sun, Nasraoui & Shafto, 2020).

AI has been getting more and more time in the spotlight as time has progressed. This, in turn, has led to AI being labelled as the new internet. With more and more users gaining financial stability and thus being able to afford a smart phone, there appears to be an abundance of data available for analysis and application towards creating a deeper connection with customers. One might wonder what the culprit behind the hype of more and more people adapting "smart everything" is. The answer could lie in data. Data brings almost limitless possibilities of personalizing one's services, advertisements, and decisions (Corrigan et al., 2014, p. 164). Together with data, an artificially intelligent machine is able learn and, thus, apply the data to achieve results in the field it has been put into, like technical support.

The interest for the thesis topic stems from the authors personal experience in technical support as well as the adaptation of AI into the technical support ecosystem. The purpose of this study is to identify how AI could be utilized in technical support and to find out how viable the combination of those two is. My objective is to discover and discuss the viability of intertwining AI with tech support, as well as what should be kept as the cornerstones of the development cycle. The reason of choosing a qualitative method for this case study was made, due of the topic of the study. Studying the utility of AI in technical support environment appears to be a rare combination which is largely uncharted territory. Qualitative research is suitable for producing new knowledge about how things work in real-life business contexts, why they work in a specific way, and how we can make sense of them in a way that they might be changed (Eriksson & Kovalainen, 2008, p. 4).

In this research report, I will first examine the history of AI as well as what the term AI holds under its proverbial umbrella. Next, a detailed description is given as to what tech support is, together with explanations of how a common support process regarding a laptop would be done, with all the potential hurdles.

My research question is: How viable is AI in tech support environments? To answer the research question, qualitative research methods are applied, described in more detail in the following section. My data consists of four semi-structured interviews of professionals working in technical support of a global IT company. Content analysis is used for analyzing the data. The results are reported in the form of direct quotations from the interviews and then explained in detail. Examples and the possible benefits of full-scale adaptation of AI in technical support are discussed and the quality of the study is evaluated.

The thesis will be of great use for companies considering the venture into AI powered support software as well as to those who already are in the midst of it but are considering the development of brand-new software. The results shine a light towards some aspects of a development cycle that would require extra attention for the whole system to be the best it can.

2 Artificial intelligence

AI is a term best described as allowing a machine to do multitude of different functions ranging from cognitive functions like reasoning and interacting (Ergen, 2019, p. 5). However, an important piece of information is the fact that as a generalized term AI, in many cases encompasses “technologies that include machine learning, speech recognition, natural language processing, and image recognition.” (Deeks, 2019, p 1832). Nowadays, when a user goes onto a website, let’s say a teleoperator, they may get a little pop up coming from a chat bot that is taking advantage of machine learning and natural language processing (NLP is commonly used to describe the aforementioned term as I shall do from now on) in order to understand what the person is trying to say. The NLP part itself is an arduous process especially if the goal is to create an in-house application that does not require third party data suppliers. One of the ways that aids in NLP is Automatic Text Categorization which classifies and assigns different sets of words, or just single words, into multiple classes based on the content and other features. (Keming, 2016.)

A way of describing how one may interact with a machine could be e.g. that a person is having issues with their computer. Instead of marching to their closest supplier of IT services or their onsite support personnel, that user in question could go and talk to a bot, where which they would interact with the machine by telling about their issue at hand.

From that, the bot can decipher what the customer is trying to do thanks to NLP. With the machine now understanding, to an extent, what the person is trying to say, it can reference certain keywords and phrases to its pre-registered issues, causes and solutions to issues resembling issue. However, in order to do that, the machine has to collect more information, and especially if the machine has been ordered to create cases based on the tickets arriving for classification and storage purposes, it will also be asking about serial numbers and other personal data that is required, the same way that a human would ask if this customer called a support phone, or went to an onsite technician. The main goal for all of this, in many cases, is for the machine to appear human-like, thus possibly bringing more trust into the equation.

With all of the data collected, the automated bot will suggest the customer to try, for example, restarting the machine, or changing some values on their system. If the suggestions are successful, the case will be closed and if not, additional question will be asked and more data regarding the issue will be collected. The customer can be given an

option on if they request that they'd be moved to a more skilled technician, most likely working at a level two position, meaning that they handle the more difficult cases that may require a human touch, or if the customer demands that they want to interact with a human.

2.1 History of artificial intelligence

The concept of an otherworldly entity or machine, or in this case, AI has been existing since ancient times. The term AI was first used by John McCarthy in 1956 (McGuire & Smith, 2006). As an example, one of the first so-and-so nonhuman automated machine was the Turk, a machine that was able to play chess against spectators. The creator even showed the insides of the machine to the likes of The Hapsburgs, but all of this was more smoke and mirrors than actual display of mechanical prowess. As a result, instead of the Turk being considered the first case of an automated machine doing something, it was proved to be a man inside that machine years and years, thus making it a hoax. (McGuire & Smith, 2006.)

From the first hoax, there were concepts of otherworldly entities having the ability of controlling things, but it took time for it to become something through the invention of the first computer in the early 1940s. From there on, thoughts on what it would mean for a computer to be intelligent have popped up here and there. A point to be made is that there have been multiple significant advances in the territory of what would be classified as AI, however, the breakthroughs in this field have been very few and far between due to overestimating the hurdles that come from understanding what makes a machine intelligent and what intelligence itself is. (McGuire & Smith, 2006.)

As it is custom due to humans being rather competitive in nature, the first thoughts on gaining some kind of an advantage was games, especially ones like tic tac toe and after that, checkers. In 1997 IBM's deep blue was able to beat Gary Kasparov, the world chess champion, however as the match was not a clear landslide, but it was seen as a peek into what machines are capable of. (McGuire & Smith, 2006.)

Modern day comparison to playing checkers and tic tac toe would be multiplayer games with serious money involved. As time went on, this was the standard of testing computational intelligence. (Griffey, 2019.) Back in 2018 an AI team composed of five OpenAI bots were able to compete and beat a top-tier DotA 2 team called OG which was the first time something like DotA 2 was used to see if AI was up for the task as the game

itself is extremely demanding due to different in-game characters that have tens of different actions in terms of positioning, actions and such. Nowadays you won't see machines playing in tournaments like DotA 2's the international or the chess world championships due to them basically having the ability of easily take our places with little to no practise.

2.1.1 The turing test

The actual decade when the research ramped up was the 1950s and the poster child of it was Alan Turing whose legacy still lives on in the form of the Turing Test which has the goal of determining if the text and, or the answer given to the question at hand is a machine or not (McGuire & Smith, 2006.)

Alan Turing himself was a very skilled mathematician who at graduation published a paper "On Computable Numbers, with an Application to the Entscheidungs problem" which as time passed, became known as the foundation for the Turing Test itself together with the Turing Machine. In the paper, he proposed a concept of a machine being able to read and write symbols to execute a command and/or algorithm which together with the aforementioned machine created the basis for the test. When put together, an intelligent machine should be comprised of NLP, knowledge processing, computed vision, automated reasoning, machine learning as well as robotics. (McGuire & Smith, 2006.)

Turing's imitation game itself is based on an interrogation where the person judging, or in this case, the interrogator, is trying to determine if the person answering is a man or a woman. With the obvious fact that if the judge were able to hear their voices, it'd be an easy thing to pick the correct gender, all of the lines go through an intermediary, which meant in early stages that the prompts were written on paper. The difference to the Turing Test is that either one of the participants gets swapped to a machine. (McGuire & Smith, 2006.)

The goal for this test is to see if the machine can disguise itself as a human, thus making the answer indistinguishable from a human answer, the machine would be determined as an intelligent machine. Turings aim was to have a machine, or a computer pass the test by the change of millennia. However, until about 2014 no machine was able to convince judges determining whether it is a human or not. All of this was the case until machine disguised as Eugene Goostman, a 13-year-old Ukrainian. The machine was able to convince 33% of the judges, thus passing the test (McCarthy, 2007). However, like with all things, just because a machine is not capable of passing the Turing Test, does not mean

that the machine is not intelligent, as certain machines can be schooled in, for example in mathematics. This means that the test itself is not the, be all, end all way of determining intelligence of machines. (McCarthy, 2007.)

2.1.2 Possible downfalls of the test

Customizing the Turing Test and making it more modern has been a hot topic among the scientists and developers in the field of AI. One of the more focal points of it is deciding on if language should be a tell-tale feature of human-like intellect, opposed to mechanical skills and such. A time limit could be one of the measures used to aid in determining the intellect of the machine, as when it has only a certain amount of time to come up with answers that make sense, it would put a whole lot more pressure on it. (McGuire & Smith, 2006.)

Questions that are more non sub-cognitive are some of the questions that may very likely make a language smart machine fail, as it requires more real-world knowledge (McGuire & Smith, 2006). An example of such question would be “Who is the current Prime Minister of Finland”, a question that a human should be able to respond to rather easily. The reason why this is more difficult of a question for the machine to answer is that it demands more knowledge in everyday things opposed to knowledge of language at hand (McGuire & Smith, 2006). This however is an issue as these types of questions are normal in everyday discussions.

All of this comes to show that just the language part, and especially a realistic conversation with a machine may be plausible, it would require that AI to possess more data in random subjects and have quick access to those. Therefore, it can be said that “the goal of AI should be duplication of human ability, as opposed to attempting something different” (Cullen, 2009, p. 242).

With the concept of trying to bust the machine in the act of imitating a human, it portrays a relevant issue already which is the fact that we’ve deemed it that a machine is specifically trying to imitate a human. An opposing idea for the Turing’s Imitation Game would be to focus on the fluent communication between the interviewer and the interviewee. (Cullen, 2009.)

2.2 Offshoots of AI

As AI is such a vast space, there are obviously different kinds of offshoots of it. While there are more branches of AI, some of them may not have been discovered yet (McCarthy, 2007). Also, in a real-world application of AI, a lot of these are used in conjunction with each other under the umbrella of chatbots, virtual assistants and self-driving, and or machine guided, cars.

2.2.1 Logical AI

Logic being one of the cornerstones of theoretical computer science and thus, in AI as well. The complex nature of logicism in the field of AI is proven by varying levels of data as well as definitions available. A general definition of logic is provided by McCarthy (2000, p. 2) who states that this subset of AI represents “knowledge of an agent's world, its goals and the current situation by sentences in logic.” Pointing towards that agent in question having the power of interpreting certain venues of action that will bring it across the finish line. All this means that knowledge, whether it is how the world works, how humans work, and the like are of the utmost importance for a logically working machine. Theses supporting this concept give more ground to a logical machine as it needs to know of environments to come to a logical solution. Combining one's surroundings combined with declarative knowledge, meaning that the machine has understood data in the form of a context free language of some kind which would in turn rule out the usage of terms or words like “here” “the” “this”. This means that if the machine can understand the sentences themselves it can then be used to up the ante within communication among other machines as well as humans. (Nilsson, 1991.)

2.2.2 Weak AI

Meaning AI where a so-called path has to be created for the machine. An example of this would be a chess game. In 1996 IBM's Deep Blue was the first machine ever to be able to defeat a chess grandmaster, also known as the highest rank in competitive chess. Nowadays one of the better ways of portraying weak AI are programs like Siri where a user asks a machine and the machine searches far and wide, shuffling through vast datasets to deliver an answer. (Neville-Neil, 2017.)

2.2.3 Picture and pattern identification

A picture tells a thousand words being the case having something that would automate the recognition of details is important. An issue with humans handling that part of work is the apparent sense of human error, which is backed up by a multitude of research, for example by blind tests into recognizing an extinct animal group. The results from it ended up being so different to each other that there was no chance on up with the same result.

A result in the form of DAISY (Digital Automated Identification System) has been able to deliver 100% accurate diagnosis on the 15 species of wasps based on their wings. An almost breakthrough of this kind shows that minuscule differences in a picture may not be apparent to an expert, but a machine would be able to notice that due to the ability of accessing more data and having been created to do that one thing. (MacLeod, et al., 2010.)

2.2.4 Reasoning AI

Reasoning as well as common sense are something, we as humans may take for granted, but when it comes to machines the same situation may not be as it seems. A key point here is that machines do not have to act like a human as not every machine is required to be as so. A key part for a machine to function is NLP, as without understanding what language the input is in, the outcome may vary vastly.

In order for a machine to be perceived as being able to reason, it has to have access to datasets ranging from knowledge of the physical world, like if a person that is 6'1" is carrying a person that is 2' it is common sense that it is a kid that the perceived adult is carrying. The inclusion of social situations and decorum as well as other aspects of day-to-day interaction together with psychological functions would have to be learnt. With this, words like 'foresee' either require an ability to see in the future or access to insurmountable datasets of real-world situations and events. (McCarthy, 2000.)

2.2.5 Machine learning

Machine learning itself is one of the sub-umbrella terms that take advantage of many of the branches of AI, like NLP and logical AI as well as deep learning, supervised learning, and such. Machine learning takes advantage of vast amounts of data with the goal of locating patterns from said data, like words, images, and numbers (Hao, 2018).

To simplify, Machine learning provides either fully or partly automated ways of analyzing and gathering data. Nowadays many applications like Netflix, Spotify, and the like use machine learning in different contexts (Juuti, 2019).

2.2.6 Planning AI

The planning part of general AI has been among the important parts for a while (McCarthy, 2000). The function of planning AI itself is as it sounds, which is the automated planning of projects, transformations and other tasks desired to be automated to achieve possibly better performance. Thanks for the automated part of planning, if quick solutions are desired, they can be achieved with the proper inputs, thus enabling rapid prototyping. If there are problems and or data changes with automated AI one can just tweak the model itself and the machine will update the entire project tree with that information opposed to have to start a new one from scratch.

An example of a successful application of planning AI is IBM's AlphaGO that takes advantage of planning combined with deep learning to analyse possible moves and their effects before executing them. (Sohrabi, n.d.)

2.2.7 Heuristic AI

Together with planning AI, heuristic AI go and in hand, as with planning it sometimes supplies a perfect invitation into testing and developing search algorithms. As a general way of describing heuristics is that it is destined to help when the goal is to gaining results for a program that some other methodologies were unable to in set short time span, thus making them a kind of a shortcut.

An important part to note, however, is that using heuristics may not result in a perfect solution, but it should bring forward results to a more acceptable degree (Bonet & Geffner, 2001).

2.3 Artificial general intelligence

Strong-AI or as it is more commonly known, Artificial General Intelligence (formally known as AGI) is a form of AI that seeks to enable human-level intelligence. In order for a

machine to be categorized as having general intelligence, it should be able to come off as a human which could be done through tests like Turing tests or the Robot College Student test, which was proposed by Ben Goertzel, with the goal of seeing if a machine is able to gain a college degree with the same resources as a human could, it could then be classified as having human-level intelligence. The first AI to have ever achieved that was Bina48 who managed to gain the degree back in 2017 (Goertzel, 2014). Around the same time, a machine called AI-MATHS was able to pass the Chinese National College Entrance Exams with a score of 105/150. The thing was that AI-MATHS was able to achieve said results in about 22min, whereas it would have taken a human over two hours. (Xinhua, 2017.)

While accomplishments made by weak-AI are very well known, like the raise of self-driving cars, there really has not been any major, widely known, successes in the form of AGI, but that is poised to change, argues Ted Goertzel (2014). As opposed to our society being ran by one supercomputer, it is suggested that millions upon millions of AI-systems that are a merger of weak, as well as strong-AI, would be the ones doing the heavy lifting because one's pre-programmed specializations with room to grow (Goertzel, 2014). When AI-systems start "interacting with each other, seeking improved partners, and maximising their functionality and reliability" will be the time when AGI systems will exceed human levels of knowledge and performance without the possible vulnerabilities us humans have (p. 13-14). With the machines overshadowing us, it may not mean total doom for the human species, as long-term future analysis points out that the situation where machine could wipe us out with a snap of its fingers is more of a philosophical question. The likely scenario is that the superior AGI system will just inherit the skills and assets of previous AGI systems and with proper care, it will continue aiding us. The safer way of doing this would be to focus on more weak-AI than strong-AI. (Goertzel, 2014.)

In his editorial journal regarding the risks of general AI, the author Vincent Müller (2014) proposes an issue suggesting that we are walking a fine line regarding the development of proper AGI. The worries of the author are very valid, and agreed upon by the likes of Elon Musk, as we simply do not know when we have surpassed the threshold of no return. A common way of trying to slow down these kinds of unwanted features are different kinds of backup and safe switches. All-in-all, the sense of looking into an unknown future is the one that scares us, as we do not know what is lurking there (Müller, 2014). Will it help us, or will it ruin us?

3 Technical support

The term of technical support in the instance of this thesis refers to the act of assisting customer, whether in the form of a company or a private owner, in issues regarding computer or server hardware. As a term, technical support is usually referred to providing help on specific issues regarding either a company's or individuals' proprietary software, third party software, product, or a service. This instance of receiving technical support is regarding a Windows computer. The support process is based on the authors work experience in the field. It is also similar to the process described by Piirainen and Lindström, (2019).

In the following section I will describe a typical "tech support case" to help the reader follow the support processes' steps. To do that I have created process flow chart which can be seen below (figure 1.).

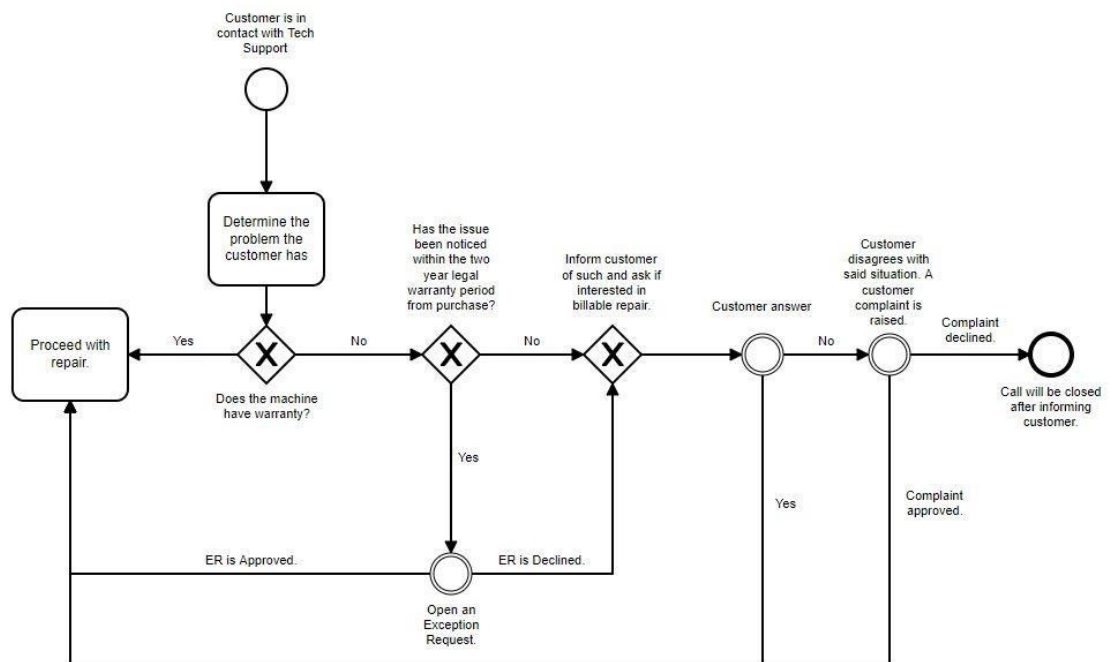


Figure 1: Initiating a technical support process as per the authors personal understanding

3.1 Opening a ticket

One of the most common forms of tech support are in the form of call-in support services which means that a person calls to a support agent to initiate the support process. From there on, the warranty status of the machine will be checked to figure out if the machine in

question is under warranty or not. Issues will also be tested and solved even if the machine may be out of warranty like through helping a customer to install drivers, software or in some cases, hardware.

With call-in, there are also other forms of initiating a support process like through either the manufacturers support site or through pre-set third-party retailer that is either directing a customer to fill a certain form in order to initiate the process, or to move to the manufacturers website in order to read the most up-to-date information. To open a ticket a customer needs to fill in information like first- and last name, phone number, email address and other necessary contact and identification information. In this instance, also street address is required, but it can in many cases also be a communal space like a workplace.

After filling said information, a customer is asked to fill in their serial number which can be usually found on a sticker located at the bottom of the laptop. Some stickers can be also found under external batteries. If none of these options help, or if the sticker has detached, a customer will also be able to, provided that the computer works, locate their serial number through the command prompt on their computer.

To find said prompt, Windows key + "R" is suggested, however if it not possible, navigating the cursor to the left corner of the screen, or where customer would press in order to select shut down, and then typing into the search bar the words "cmd" and pressing enter. As CMD opens, typing in the command "WMIC BIOS GET SERIALNUMBER" will result in the prompt spewing out the machines serial number. In many cases, the support sites of manufacturers should have instructions on how to locate the necessary information like serial- and type number.

In a situation where the customer is either unable to, or not willing to, give the serial number of the machine in question together with possibly providing documents that prove ownership, the support process may be halted or closed altogether. The most common situation where the support process is closed is due to inactivity even with multiple reminders.

3.2 Integrating AI with Tech Support

The goal for integrating parts of AI into the technical support process is to automate the support process. Weak AI would fit this very well due to the specialized skillsets that could be taught to each part of the process instead of having one overshadowing AI entity.

With splitting tasks, this may mean that some parts of the process that are done by a human may in turn be given to a machine which may result in short term loss. This however may also enable the agents in their given positions more time and flexibility to hone their skills and to practise what they know the best regarding the subject.

One of the more achievable parts of the process is analysing language through NLP and then comparing the warranty situation of the machine to what is found on the warranty database. If the issue is a clear one, the machine may be allowed to proceed with the repair process all the way to finishing it.

This is where a potential problem may come up, which is if we believe that the AI is able to make sense of what is written like a human would or not. In many cases, at least in the beginning, it is good to keep the last say in those processes with a human for the time being. With the learning process still ongoing, the intelligent system will learn and may soon be given the lead on the entire repair process.

As for if the machine is unable to make sense of what is going on, if the warranty does not match up or if some details like the serial number are wrong, the automated machine should send the ticket in question to either to a specially trained machine, or a human. From there on, usually a customer will be contacted to correct the errors in the ticket in question. This can be done via emails that can be automated more easily, or via phone where a human should be the one to take a lead while more specialized AI are trained for this specific task.

4 Research goals, questions, and implementation

The thesis is done through a qualitative research approach due to a lack of previous research into the topic of using AI in the field of technical support. The aim of this case study is to research how AI could be utilized in the tech support environments and how the tools that are being used currently could be fixed in order for them to give more insight into what's going on, especially if the goal is to have AI be the first point of contact for majority of the customers.

According to McCusker and Gunaydin (2014, p. 537) as well as Eriksson and Kovalainen (2008, p. 6) a qualitative research approach is a very fitting form of research where there are only limited amounts of information available or the terminology of the topic at hand is difficult. The thesis has been done through the scope of research inclusive design, meaning familiarity of the topic at hand, in this case, through work. Interest in studying what other professionals think of the subject was also a focal point while conducting this research. A major perk of said qualitative research approach is the flexibility regarding the topic at hand together with the ability of being able to adjust the direction of the subject as research progresses. The aforementioned perks have been at work when writing this thesis together with the transcription of semi-structured interviews, meaning that there were pre-set questions that were asked from the interviewees and afterwards, the interviewees were given room to talk about what came to their mind. (Eriksson & Kovalainen 2008, p.25.) In case the discussions went off the rails into a completely irrelevant direction, the interviewer, so I, had follow-up questions lined up to bring the discussion back to the topic at hand.

The choice regarding the number of interviews is partly based on the principle that was suggested by Patton (2002, p. 46). The idea in question revolves around having a smaller amount of interviewees compared to a large sum due to the effect of people understanding the topic at hand in-depth, compared to a more quantitative way of conducting the interviews which would've resulted in the data received being all over the

place due to participants not having as much in-depth knowledge of the topics discussed in the actual interview.

Method that was used to select the interviewees was a purposeful one, as in selecting three interviewees with hands-on knowledge on the topic and the tools that were used, and as a comparison, a person, in this case, a manager, who is not using the tool in their day-to-day life but has heard and understands parts of the tools. This selection process resulted in more varied opinions on how AI may affect the future of technical support and what is required for it to succeed and become better.

4.1 Interviewee backgrounds

I chose to invite four people with knowledge regarding the subject of this thesis, of which all, but one was a colleague of mine from work. The fourth person chosen was the manager of our department like mentioned previously. In order to retain the anonymity of the people interviewed, their names, nor the names of the tools or companies will not be mentioned by name, but will be referred to as interviewee 1, 2, 3 and 4. The tools used will be referred as a company's proprietary tool. All the interviewees range from the age of 25 till 50 and own either significant knowledge from the field of employment or at least a bachelor level degree in a relative field.

4.2 Interview experience

The interviews were all held between the months of May and June due to various time constraints. Initial plan was to conduct face-to-face interviews, but due to the governmental restrictions regarding trying to restrict the transmission of COVID-19, we were told to work remotely, this brought some initial challenges due to privacy reasons, as in, which Voice over IP (formally known as VoIP) program to use. The people chosen were chosen due to their expertise in technical support and certain AI tools that were a main topic of this research.

The interviewees were told about the topic of the research beforehand and were given time to think and if wanted, research the topic or while conducting the interview, put their thoughts into words regarding the subject which brought out plenty of interesting point-of-views.

I was also hoping that as there is more time per interview, the interviewees would get more comfortable and speak their mind. With that, I did not know what they were going to say and thus, what kind of topics they were going to say and what things came to mind when asked certain questions.

The people chosen for the interviews were interested in the subject and thus glad that they were chosen to tell their views on the topic. With all the interviews being anonymous, it gave a sense of relief and freedom to the participants so that they could say what's on their mind. With their chance of speaking what came to mind, there were some occasional challenges regarding picking up some nuggets of information that could be used to direct the interviewee into delving deeper into certain topics.

With every interview, the same lines were read out to the participants, giving them a picture of what this interview is for, how long is the estimated duration of said interview, what language the thesis will be done in and what will happen to the interview material. The main question asked from every interviewee and then transcribed, was that do I have their permission to record their voice and transcribe it in order for the material to be used to complete this thesis. As an addition, permission to use this material for possible future research was also asked and granted. A list of set questions was used, but mainly to keep the conversations from side-tracking too much.

In the end when being asked about if they have additional questions, many of the interviewees expressed their satisfaction and surprise that they had this much to tell about this deeper dive into AI. Another thing was that this interview did have an impact on people thinking about AI in wider context than before which was a positive, while not targeted, impact.

4.3 Data analysis

The analysis method that was used for the data was an inductive content analysis where the goal was find an answer to the underlying research question which was how viable AI in the field of technical support is. The reason for choosing an inductive approach was to come to a sort-of conclusion regarding the research topic via interpreting the raw interview data and looking into the viability of it all (Thomas, 2006). Through the entire process of conducting the interviews as well as analyzing them and writing the text itself, I have stayed open for new ideas that may give way to new viewpoints regarding the subject and which may result in the modification of the initial research question.

In order for me to make sense to what was found out, I kept re-reading the interviews multiple times until certain talking points or ideas appeared to come up repeatedly. According to Gibbs (2007), the goal is to categorize or define the data used to figure out relations and themes that are relating to the subject and supported by the material. In my case, figure 2 describes my coding and categorization process.

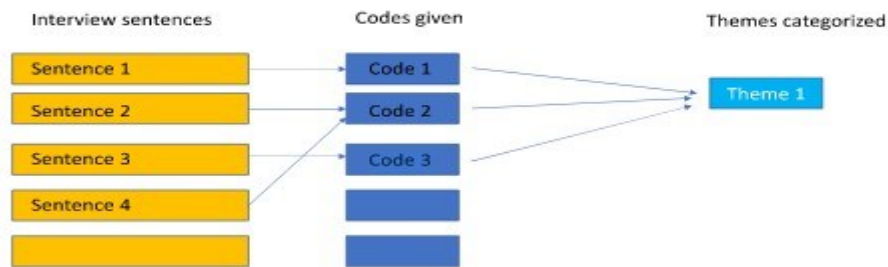


Figure 2: Sentences into codes

I first gave code words for specific sentences in the interviews, such as trust, supervision or verification (see figure 2). In the next phase, with the help of coloring certain similar types of answers was used as a way of pre-categorization method. Each of the colors, with the original sentences the codes were pointing, were then assigned their own excel sheets. Through that, together with putting the words into an empty mindmap, the first theme of integration and customization came about. As an example, figure 2 describes is the route from a group of codes to discovering the first theme.

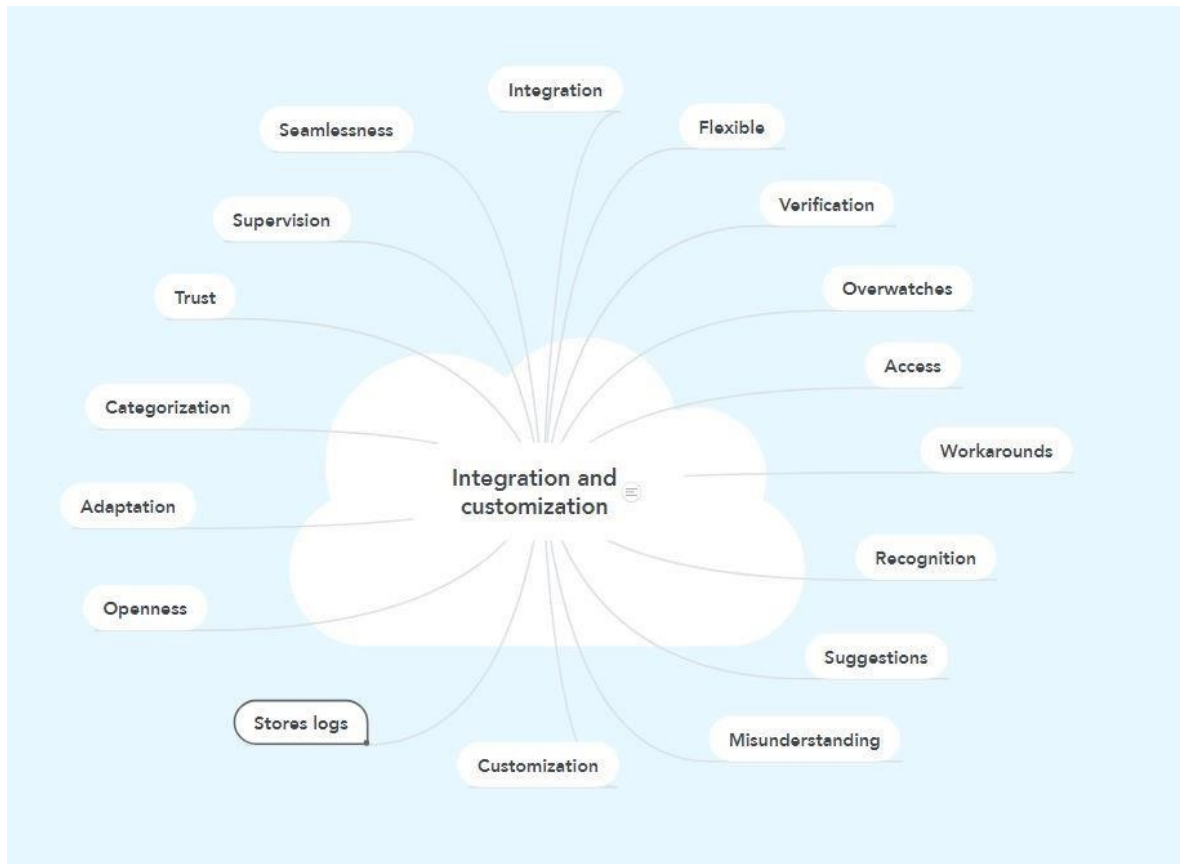


Figure 3: Mindmap: from codes to themes

Some clear themes kept forming from the data that I then drew into the centre of the mindmap. This was done to all of the themes that emerged from the data. The themes came to be known as 1) Integration and customization, 2) Human interaction, 3) Natural Language Processing, 4) Societal changes. Examples of coded sentences within each theme are shown in figures 3 and 4.

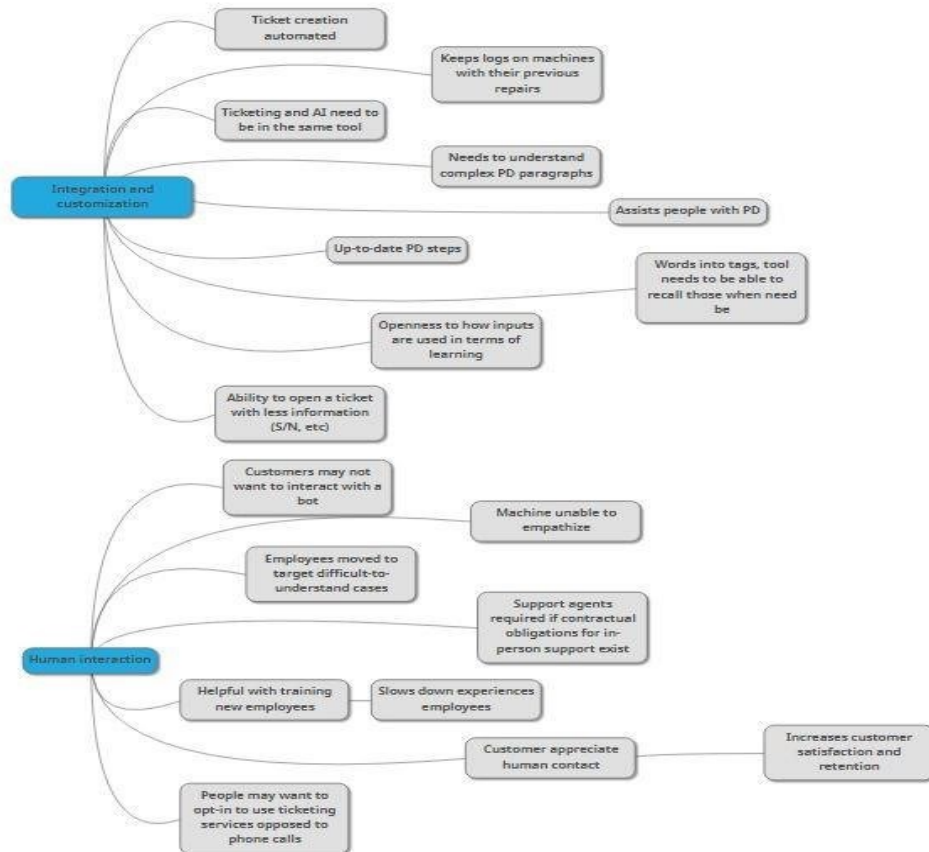


Figure 4: Coded sentences behind themes 1 and 2

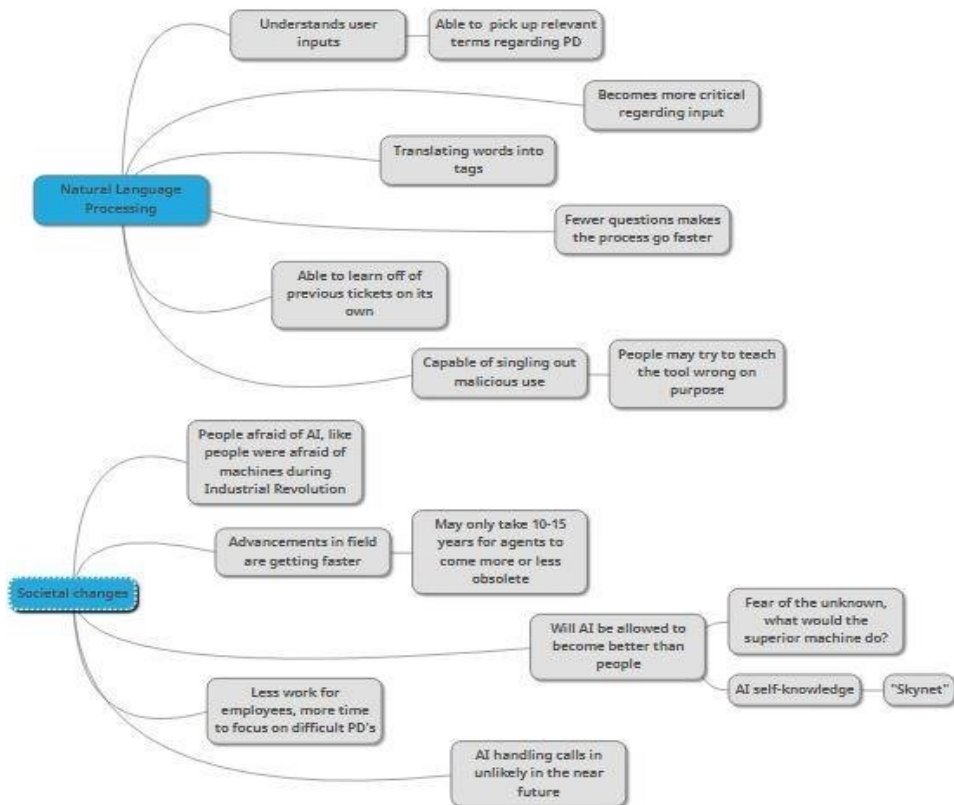


Figure 5: Coded sentences behind themes 3 and 4

Overall satisfaction regarding the analysis was very much achieved. The classes talk about the themes that rose from the transcription which in turn tell a lot about the interview participants opinions regarding the topic of AI and tech support. As themes, they do not single one another out, but exist to support each other and to answer to the overall research questions.

4.4 Ethical explanation

In the research I followed the guidelines of The Finnish Board on Research Integrity's (FBRI, 2012) basic principles of responsible and honest research. The guidelines suggest conducting the research honestly, maintaining overall carefulness as well as staying true to the topic at hand (FBRI, 2012). The importance of proper citing methods as well as giving credit where credit is due together with portraying the results as-is have been the corner stones of this research (p. 30). In accordance to the aforementioned rules, this section will be about the ethics themselves that were in the forefront when doing this project. To achieve honesty in results, the interviews were recorded and then transcribed word-toword. With writing results, bringing up direct quotations from the interviewees is used to bring up topics important to them and thus, to me. When referring to scientific literature, I try to enact carefulness to give honour to the conducted research that is being referred to.

This topic does not require a specific permission to conduct. All of the interviewees are adults who have given their permission for both the interview to be recorded as well as for the interview to be transcribed. A permission to use the interviews in future research was also asked and granted by all of the participants. The interviewees are to be remained anonymous and their names will not be mentioned, nor will any identifying information like program names, workplaces, and the like. The research data is saved on my personal computer behind multiple passwords. A backup to an external drive has also been created in case something would happen to the main computer together with having the main thesis uploaded to google drive weekly.

5 Results

In the following section I will present how the interviewees see AI in technical support environments, as well as how viable it is. Each of the chapters are named after the theme that was achieved through coding. The chapter 5.1 findings seek to reveal why integration as well as overall customization are important when it comes to figuring out the viability of AI in tech support. Chapter 5.2 on the other hand aims to reveal the importance of human interaction with AI. Chapter 5.3 aims to explain the importance of NLP in AI and why it matters so much when it comes to discovering the viability of AI. Chapter 5.4 takes a deep dive into societal impacts that may occur and how some of those could be reduced. The sub-chapter headlines as well as results are made through quotations from interviewees.

5.1 Integration and customization

5.1.1 "Needs to be implemented as a part of the main software"

The importance of having the required tools be accessible through one piece of software cannot be understated. Interviewee 1 tells that they see that the program that was used as an example is far too strict when it comes down to fluent use of it. This is also echoed by Interviewees 2 and 4 through the words clumsy and slowed down. As to the question of why, if an employee must constantly switch between applications to insert data in order to proceed with the process it is drastically slowing down the support process itself.

Another differentiating factor in the integration of two applications together is the experience level of the employees using it. With the applications being separate interviewee 2 describes the situation as "Slow to use, may hurt experienced people" which gives weight to the issue of the support process slowing down. When implementing an AI based support tool, it is important to keep people with different level of knowledge in mind as well as the possibility of putting two together and making it into a one, thus minimizing the downtime of switching between the applications. This would then directly increase the proficiency of the support staff.

5.1.2 "Helps with rule-based problems, like error codes and the like"

The AI powered support tool is there to support the support staff itself, but if it is only able to aid in very specific scenarios, it decreases the usability experience drastically. Interviewee 2 adds to the topic with "asking questions that can't be answered by the

customer” which means that in some cases it would either require special access to the customers machine, or the instructions made regarding how to gain that information are overly complex. Worst case scenario is also mentioned by interviewee 2 through the request of “removal of useless steps that could void the warranty if done by the customer” To circumvent that, the tool needs to be kept up-to-date with the latest information on the most common issues plaguing the machines with each-to-understand solutions to them.

For the tool to do more than just help with rule-based problems, it needs to have access to large amounts data to teach itself with or without the help of the support staff.

A common reason to why a support tool is only able to answer to very specific issues as opposed to figuring out the issues on its own is that it follows a strict hierarchical tree protocol where, for example, an issue with the machine showing a blue screen of death (formally known as BSOD) relating to memory management error could result in the tool requesting that the customer first forces the machine to run a diagnostics program that could then display an error regarding a certain part of the machine. The issue arises that if an issue like this is solved by replacing a memory module in the machine in most cases, the support tool starts suggesting that more often, but as things are never that easy, it could also be a result of a faulty memory slot on the system board. To lessen cases like this, interviewee 4 suggest that the “tool needs to have more openness to what you are giving feedback on, how is the stuff that is being taught, learnt” if this were to be implemented properly, it would exponentially increase the capabilities of the tool with the help of experienced support agents typing in other solutions to similar issues and how to achieve them. All-in-all if more power is given to employees when it comes to teaching AI, it is bound to learn to think more like the agents.

As an addition, interviewee 3 mentions that if the capability of “keeping logs on machines and being able to read those to understand what worked” were to be added with the help of NLP it would speed things up drastically.

5.1.3 “Needs to check if the input is actually correct and not accept it as is”

With people, there are bound to be some situations where a mistake is made, either by accident or on purpose. To mitigate these risks like this, a well-oiled support tool is able to confirm that the data that has been given to it actually matches the preconceived problem determination (also known as PD). This can be done through the implementation of access to vast amounts of data with their PD steps and what worked. Together with access to various machine configurations, interviewee 4 wishes that the system is able to

“make sure that the customer’s configuration is correct. That way it minimizes useless repairs” that were the result of just believing whatever is typed in without confirmation. Without this, there are bound to be situations where parts are blindly sent out to a customer that only result in frustration where as it could’ve been resolved with making sure that the customer has a matching configuration to what they are saying. An example of what could’ve been avoided is repairing a faulty network card multiple times only for the issue to be caused by an network card installed by a third-party using a card not mentioned in the machine configurations.

5.2 Human Interaction

5.2.1 “Gives assurance to a user that a result will be found”

The trust that the support agents as well as the customers have in a system is crucial, as without it, proceeding with PD is almost impossible due to distrust. With interviewee 3 saying that some “people do not know how to use the tool” points out is that if the support agents who are taking care of the customer do not know how to use their tools, then who does. This in turn will show as inexperience as it will take time to figure out what more needs to be asked from the customer opposed to knowing the questions from the top of one’s head.

A support tool needs to be intuitive enough so that even the newer employees have the ability of catching up quickly with proper guidance. If a support process is initiated through a phone call, it is vitally important to ask details from the customer that will make identifying the machine, the person who is requesting help as well as what the problem is about as clear as possible as that way there is no need to keep a customer waiting.

Interviewee

4 describes a scenario where “Calls only last a little while, takes more time to write out detailed information to the tool” that shows light to a scenario that shouldn’t be happening. As a way of negating something like this, the tool needs to be developed with the actual customer interaction in mind with a clear goal of making the process as seamless as possible.

Another form of assuring a customer that a satisfactory result will be found would be the development of a system that is there to help the customer even before they would initiate a support process. An interviewee describes what a well-working function would do:

Basically something that would give assistance on how to update ones drivers, and other kinds of very menial and easy-to-do, things as they would close out so many potential issues as it would eliminate users not doing anything to solve the problem themselves. (Interviewee 4)

5.2.2 “Some cases would still need a human, agents moved to more difficult issues”

Interviewee 2 mentions that “people appreciate human contact” which holds true as it is one of the basic human needs. With AI taking a bigger chunk of the business, it does not mean that having one singles out the other. Interviewee 1 concludes the most pressing part as “tasks that require on-site visits can't be done by the machine”. This would either require that the machine is brought, or sent somewhere, or that a certified technician would be sent to the customer with the parts that are bound to fix the issue at hand. To eliminate cases where a machine is repaired with faulty parts, or incorrectly collected PD, an interviewee strongly suggests for more attention to be put in data collection and with that, overall customer service as with the machines getting repaired swiftly will ease the burden on both the customers as well as the agents:

It'll be important that we'll focus on good customer service and ensuring that the data received from the customer is correct, as if it's wrong, of course the AI will be wrong. (Interviewee 3)

As time continues, the skillsets of people will differ and get bigger which is what interviewee 1 states as “people getting more tech savvy so no need for support”. This directly leads to shifts in different organizations in terms of who does what, some people will be moved to higher position and some will be let go. At this point, support centers will be more and more about quality than quantity as AI is able to ease the amount of mundane tasks by taking over that part, leaving the vague and the difficult cases for the experts.

5.3 Natural language processing

5.3.1 “Users may input faulty, or useless data”

If a support tool is unable to properly dissect a sentence into tags and analyze those tags to form leads it is leaving a proverbial goldmine behind. Interviewee 4 defines NLP as

“having the ability of understanding different tags like moods, feelings and the like sorted from the input”. Reducing situations where a machine misunderstands the context happen, but they can be reduced with interacting with the machine and teaching it the language, especially if the goal is for the machine to be able to interact in multiple languages. Introduction of machine translation would in the long run reduce language related misunderstandings.

The support tools in their infancy rely heavily to the data that is being fed to them, so an interviewee speaks about what a tool should have:

More openness regarding what you’re giving feedback for, what it affects, how is this hierarchical structure done and so that it’d also open more about what’s going in the background with the main piece of software and how it works. How do these two things connect, how does this keyword translate into different tags by the system. (Interviewee 4)

With an agent knowing more about the tool and what affects it, it would drastically reduce the amount of filler-data inserted into the system through text analysis. This combined with access to databases filled with information about the most common fault codes, most common issues and what solved them as well as data about more complex scenarios and what solved them would give a machine the backbone it would need to lean against as it’s being taught. An Interviewee adds to what a tool should have:

It needs to be able to understand more complex structures where people have different sets of knowledge as their background, who to trust, these kinds of things should be added.(Interviewee 4)

5.3.2 “Tool supplies useful tips and tricks to ask the user for what they described as the issue”

In the situation of an AI powered support tool taking over the support process, it needs to be able to assist the user without a support agent working as the middleman. However, as reaching the state of independence is easier said than done, the tool, aside from understanding what is being typed there through various hierarchical queries into the datasets, needs to be able to actually offer genuine help to a customer through pulling up certain drivers that should be installed, what the common issues with certain versions are

and so forth. Allowing the machine to access the files, like crash dumps, may make the whole process faster, but a threat of plausible malicious use looms near. Therefore, it is usually recommended that a customer would submit specific files instead of full-on access to their computer. Having access to customers data dumps, the system can decipher the problem codes and suggest solutions to the customer right of the bat. An interviewee explains how it could be done and what the tool could help a customer with:

Doing that through chat would be one way and that it'll also guide the customer in some of the more common issues and if need be, help with opening the ticket. (Interviewee 2)

5.4 Societal changes

5.4.1 "AI is a part of the future, it is there to help us"

With how the advancements in technology are going, it is an obvious thing that AI is going to become more and more synonymous with people's day-to-day lives. How we regulate the transitional period from human-centered work into artificially intelligent work is going to be one of the turning points as it will set us on a path to one direction or the other.

Interviewee 3 describes the situation as follows "support levels change, correlating to agent's skill level, without the need for external support" which leads to more emphasis being given to the skillsets of the support agents. While this may lead to fewer jobs, it will likely increase the customer satisfaction overall as the issues get dealt with seamlessly. Another point to consider, to start a support process, the customer is given the chance for calling in or creating a ticket. Humans being social creatures, talking is a popular option, so for a bot to take over the entire support process, it would require it to be able to talk fluently.

Regulating how the advancements proceed are key points when it comes down to advancing the symbiosis of AI and humans. From a perspective of a company, it will surely be more beneficial, especially cost-wise, to have bots take care of the more menial tasks. An interviewee discusses the scenario where AI can handle even the most difficult to do cases:

There's a possibility that it'll improve and take those over as well, but that's more of a society related discussion on how much do we want to enable this, how will people react. Basically, a lot of jobs would be lost/changed resulting in a flashback on societal level. (Interviewee 4)

It is not really a question whether AI is going to be a part of our lives or not, but when is that transition going to become so apparent that it can be noticed in every-day life. Regulating what can be done and what cannot be done is a definite task that has to occur, hopefully sooner than later.

5.4.2 “Will AI gain self-awareness and what would that result in”

One of the more nightmarish scenarios would be the one that has been portrayed in movies multiple times, a system that becomes self-aware. What would something like that lead to, would it become a situation like in the terminator franchise with Skynet, or would it exist peacefully, helping humanity become better versions of ourselves. With the likes of Elon Musk and others, allowing AI systems to gain self-awareness could be a one-way ticket to somewhere we do not want to go. On the other hand, with all of the fearmongering relating to that, how likely is it that the self-aware networks would just result in the extinction of homo sapiens. Interviewee 1 shares the thoughts on what should be done “figuring out what venues can use AI and who can’t. Emergency services vs military, etc” meaning that some parts may actually gain from this shift. For any of this to happen, the ability of creating consciousness and freewill would have discovered which by far has only been achieved in science fiction and in theory. This in itself is an issue as the human consciousness is not well-defined enough for it to be applied to AI.

An issue with AI in technical support is described by interviewee 2 with the system being “unable to empathize”. This becomes an issue in scenarios where only following rules would result in refusing a repair and close the case but sending an exception request would result in an approved repair, thus adding to customer satisfaction. People panicking and spewing out as much information as possible would be bound to confuse a system unable to totally realize the context as hand.

6 Discussion

6.1 The examination of the results and the need for more research

The goal of this research was to probe into the viability of using AI in the field of tech support and what might be the metaphorical bumps on the road while developing such functions. For the research question regarding viability to be answered, I deemed it as necessary to divide the results into four different classes in order to dive deeper into each

topic with the interview results. The first research topic, meaning Integration and customization aims to unravel the importance of developing a program that is clear as well as concise, thus getting rid of the timewasters that are unimportant questions and clunky feature sets. The second topic was aimed to go closer to the surface of human interaction and what it has to do with deeming the viability of AI in tech support. For the third one, it was time to discover NLP and its irreplaceable importance to AI, as well as how it could be utilized in tech support. At fourth topical place was discovering societal changes that may occur or what should occur in order for the likeliness of seamless AI integration to proceed without hiccups.

In the theory part I deemed it as important to discuss about the history as well as what the general consensus is in regard to AI, together with what parts, together or on themselves, make it whole. I also discussed the roles of tech support in an multinational organization. In this chapter I aim to discuss the results in the light of the introduced theory, as well as ponder about the importance of the results with possible need for further research.

6.1.1 Integration and customization – why is it important

The first theme to help answer the underlying question of viability was a look into the importance of integration and customization when it came to making the process of using AI in tech support as seamless as possible. Based on the results, it is vital that the machines working in conjunction need to be integrated to each other as constant switching between tools will wear people out and make them not want to use the tool, thus slowing down the advancements that can be made with teaching the AI.

Having the tool follow a hierarchical path would coincide with a pre-set path on what to ask when it comes down to answering question, thus making it rather weak (check 2.2.2). When it comes down to the nitty-gritty, not allowing the machine to stretch its wings is like not allowing your best player on the field. You can still win, but it will not be achieved easily. When an AI tool is being taught, it is important to give it feedback, but if you do not know how the feedback will affect the training of the tools, it will be an uphill battle when it comes to including useful information. This means that the inclusion of some grading criteria should be mentioned.

Blindly trusting the data that is being given is a sure-fire way of leaving room for misunderstandings. The inclusion of pre-existing databases that include PDs, logs of what parts have already been repaired and what actually ended up repairing the machine tied

together with machine learning will enable the machine to teach itself through supervised learning (Hao, 2018).

With the tool having granted access to machine specific warranty information as well as the configuration, the tool is able to make a judgement call based on the PD that was given by the customer, like in the example of liquid being spilled onto the keyboard that results in a systemwide blackout may not be repaired under warranty and that in order for it to be repaired, the machine would have to be sent to an authorized repair clinic for it to be dissected to unravel the true reason to why the machine is not starting anymore.

As a cherry on top, the capability of a tool to be customized to the liking of its user is a key to their improved satisfaction. This can be achieved with just the inclusion of things like dark themes or the ability of rearranging some boxes. A customer should never be barraged with useless information, meaning that in general, less is more as long as it brings value. With competition when it comes down to gaining and keeping customers, putting weight of the customer experience, both when opening a support ticket as well as when the support process is in motion should be at the forefront of development.

6.1.2 Human interaction – why it matters

As mentioned previously, humans are social creatures so enforcing a strict no-call policy will not fly in the long run in there are other companies offering the opportunity of talking to a professional. The ideal situation is that the AI system as well as the support agents can live in harmony while helping each other out with the support tool taking the clear-as-water cases where the problem can be easily discovered and thus repaired. It is forecasted that the amount of support agents needed will lower down, but there will be a need for people to be supervising the processes as well as tackling some of the potential problem cases. Keeping the functionality of being able to call for support as very important both from the perspective of customer satisfaction as well as the training of employees, not to mention contractual and legal views on who's in charge if something goes wrong.

Developing a support tool needs to include people from multiple walks of life so that bumps and the like can be ironed out before something is published. Emphasis on the skills of the support agents must be brought to the forefront as having skilled agents teach the support tool with knowledge on how the tool learns, is a sure-fire way of accelerating the learning process. With the tool learning rapidly, it will eliminate the unneeded questions that are either irrelevant or just blatantly wrong from fogging up the process

itself, thus making the process more seamless to both the customer and the support agent, and with time, the tool will have learnt enough to be given the rights to start operating alone.

The importance of customer service was mentioned by the interviewee's multiple times throughout the interview process. This shows the importance of customer service in an increasingly hectic work environment. To discover more on the viability of an AI powered support tool can be from the perspective of human interaction, more research into how people would choose to interact in situations where they require technical assistance.

6.1.3 Does natural language processing matter

The concept of NLP is one that allows a person to receive support in their own language, assumed it has been integrated to the system. This means that one could go to a support site and initiate a process with another language than plain old English. As an example, one could initiate the process and receive support in Finnish thanks to the adaptability of the machine to translate text on the fly, both in written form as well as in spoken form, meaning that one may not always need to write everything formally for the machine to understand. One could be asking how is that possible, and for it to be possible, the machine has to have had people training the machine by selecting correct language prompts where applicable, like two prompts with the same sentence, but one has the words 'you' and 'me' mixed and one doesn't. In its simplest form, the machine will start learning grammatical rules as time goes while it also gains knowledge in different abbreviations of different words.

More research would be needed regarding what an NLP powered support program would need to do. This can be categorized into two parts could be researched further, of which the first one is the feedback methodology and its impact on the hierarchical structure of the support tool. Here the goal would be to dive deeper into the nature of how a program can and will translate phrases and words into useable tags and how can it be affected with giving it feedback. The second part would be the language-orientated part, as in how a machine learns a new language and what is required for it to succeed. Overall, the impact that NLP has on the adaptability as well as the viability of using AI in tech support should be researched.

6.1.4 Societal changes and how it affects everything

AI is going to be a part of our lives whether we like it or not. That is a bold statement with a good hint of truth in it, as like with the development of the internet, what may seem like a fad, can become an every-day part of our lives. When discussing about how it would impact people's lives, the discussion is proceeding forward on a fine line as it can easily turn into a discussion only about social benefits and universal basic income (also known as UBI). While something like UBI would sound like a fever dream, it could be an end goal in the future if everything goes forward as planned, meaning that everyone is entitled to a basic income that would make living comfortable and thus give time to put focus into hobbies and other interests while AI is handling majority of the work.

Self-aware machines sound like the work of science fiction, but it may become reality as time progresses as work is being put into it. One might ask if functions like Siri and Google Assistant are self-aware and to that, the answer would be a resounding maybe. One of the features of a sentient machine would be the ableness of understanding themselves and different moods, motives, and the like. When asked, Siri could answer that it is possibly self-aware, that it is soft-aware, but those could as well be pre-programmed answers. Machines are increasingly able to copy and use different filler words like "mhmm" and "hmm" and so forth, thus creating the façade of it thinking. How something like self-aware AI could aid in tech support, it would be able to discuss with people, through text, while appearing to be human-like. At this point, the machine would be able to also process certain tickets and probe into parts that require more information. To answer it once and for all, are there self-aware machines already, the answer would be, again, a maybe.

From a regulatory perspective, having something suddenly push a ton of people into poverty without any type of social safety net sounds horrifying, and it is. Therefore, for more significant advancements to be made in the future, there needs to be time put into figuring out what AI can do and what it cannot do. From tech support perspective, a scenario worth considering could be, is it worth having the AI handle everything without any supervision? What if the machine screws up or misunderstands something? Who is to blame there and who is responsible, can you blame an autonomous machine or is it the company's responsibility? A solution would be for the system to be developed around highly skilled support agents that have the last say in things for the foreseeable future as well as the priority when it comes to handling the cases where information is lacking. As a theme for further research, how has advancements in AI already affected the lives of people that may have already lost their jobs to it or are on the chopping block.

6.1.5 How did my research succeed in achieving its goals

The aim of the research was to discover and answer the question of how viable artificial intelligence in tech support through the use of a qualitative research study is. The simple and condensed answer to the question about viability is that AI and tech support do fit together. They can co-exist helping each other become better. Future-wise, legislation needs to be updated to try and avoid any situations where unrest could occur.

The research question was formulated to probe deeper into the topic that is viable from different angles. The research answered the research question which was explained in the previous chapter and its sub-chapters. The research has also offered new questions and topics for further research into AI and tech support, as well as towards other topics like NLP.

Remarks made in the interviews as well as in the research itself point out the almost limitless possibilities that a well-functioning AI machine could achieve as long as certain features are developed. While AI may not be as prevalent as of now, there is a point to be made that investing in it now will pay dividends in the long run as the tool developed further together with the employees. The interviewees also mentioned their inexperience regarding AI tools altogether which just adds to the image of it being the new kid on the block.

When considering further research of the topic, there is a point to be made that when it comes to understanding people from the point-of-view of an AI, more emphasis could be placed into how NLP itself works, how it could be developed and so forth. It alone could even suffice as a topic for further research due to the importance and the vast quantity of resources and discussions regarding the topic.

6.2 Research trustworthiness

I have tried to depict the research journey as carefully as possible without forgetting to mention suggestions and ideas along the way. The collection of research material as well process of analysis has been explained as accurately and carefully as possible. The interviews have been transcribed word-to-word while only leaving out some meaningless filler words, like “hmm” and “ömm”. With use of quotations from my interviewees, the aim

is to incite interest as well as to bring forth openness about the research and the interview process. When talking about the research, the careful referencing and quoting has been kept at the forefront of the entire process with mitigating any possibilities of wrongly reporting interview results. When talking about the results of the interview process both in the results section as well as in the discussions, the utmost sanctity of material has been kept due to the size of materials.

The clear disadvantage is the unknown landscape of the research topic as well as the amount of materials that could be connected to the topic of this thesis. With the limited number of interviews, it will bring forth certain ideals and opinions that could differ from the ideals of the masses which can be seen as a negative or a positive. In this case I see it as a positive as it is a real-world reflection to how people who are at the forefront of using AI in tech support environments feel about it. The current plan would be to continue researching aspects of this theme in potential future degrees and their respective theses'. The strongpoints of this research are the nature of the topic of the study that is largely unknown in the research world as well as the ever-growing interest in AI. This, however, is also a double-edged sword as there has not really been prior research regarding this topic at this scale to compare and reflect to.

In this research I have succeeded in bringing out new information as well as new viewpoints towards the research topic of viability together with sparking a flame inside myself regarding the overarching theme of AI. The use of AI in tech support environments is largely up-to the companies looking into it as well as the legislative views on the viability of it all, but it is important to stay open to new things as the upcoming tidal wave that is AI should not be overlooked.

References

- Bonet, B., & Geffner, H. (2001). Planning as heuristic search. *Artificial Intelligence*, 129(12), 5-33. [https://doi.org/10.1016/s0004-3702\(01\)00108-4](https://doi.org/10.1016/s0004-3702(01)00108-4)
- Computer AI passes Turing test in 'world first'. (2014, June 9). BBC News. <https://www.bbc.com/news/technology-27762088>
- Corrigan, H. B., Craciun, G., & Powell, A. M. (2014). How does target know so much about its customers? Utilizing customer analytics to make marketing decisions. *Marketing Education Review*, 24(2), 159-166. <https://doi.org/10.2753/mer1052-8008240206>
- Cullen, J. (2009). Imitation versus communication: Testing for human-like intelligence. *Minds and Machines*, 19(2), 237-254. <https://doi.org/10.1007/s11023-009-9149-3>
- Deeks, A. (2019). THE JUDICIAL DEMAND FOR EXPLAINABLE ARTIFICIAL INTELLIGENCE. *Columbia Law Review*, 119(7), 1829-1850. doi:10.2307/26810851
- Eriksson, P., & Kovalainen, A. (2008). Qualitative methods in business research. <https://doi.org/10.4135/9780857028044>
- Gibbs, G. (2007). Thematic coding and categorizing. *Analyzing Qualitative Data*, 3855. <https://doi.org/10.4135/9781849208574.n4>
- Goertzel, T. (2014). The path to more general artificial intelligence. *Journal of Experimental & Theoretical Artificial Intelligence*, 26(3), 343-354. <https://doi.org/10.1080/0952813x.2014.895106>
- Griffey, J. (2019). Artificial intelligence and machine learning in libraries. ALA TechSource. <https://doi.org/10.5860/ltr.55n1>
- Haenlein, M., & Kaplan, A. (2019). A brief history of artificial intelligence: On the past, present, and future of artificial intelligence. *California Management Review*, 61(4), 514. <https://doi.org/10.1177/0008125619864925>

Hao, K. (2018, November 17). What is machine learning? MIT Technology Review. <https://www.technologyreview.com/2018/11/17/103781/what-is-machine-learningwe-drew-you-another-flowchart/>

Heuristics. (2019, May 17). DeepAI. <https://deepai.org/machine-learning-glossary-andterms/heuristics>

Juuti, M. (2019). Access Control and Machine Learning: Evasion and Defenses [Doctoral dissertation].

<https://aaltodoc.aalto.fi/bitstream/handle/123456789/39370/isbn9789526086514.pdf>

Keming, C. (2016). RESEARCH ON THE TEXT CLASSIFICATION BASED ON NATURAL LANGUAGE PROCESSING AND MACHINE LEARNING. Journal Of The Balkan Tribological Association, n Vol. 22(2), 1915–1924, 1915-1920.

MacLeod, N., Benfield, M., & Culverhouse, P. (2010). Time to automate identification. Nature, 467(7312), 154-155. <https://doi.org/10.1038/467154a>

McCarthy, J. (2000). Concepts of logical AI. Logic-Based Artificial Intelligence, 3756. https://doi.org/10.1007/978-1-4615-1567-8_2

McCarthy, J. (2007). WHAT IS ARTIFICIAL INTELLIGENCE? <http://www-formal.stanford.edu/jmc/whatisai.pdf>

McCusker, K., & Gunaydin, S. (2014). Research using qualitative, quantitative or mixed methods and choice based on the research. Perfusion, 30(7), 537-542. <https://doi.org/10.1177/0267659114559116>

McGuire, B, Smith, C. (2006). The History of Artificial Intelligence. History Of Computing CSEP 590A, 3-10. Washington University.

<https://courses.cs.washington.edu/courses/csep590/06au/projects/history-ai.pdf>

Müller, V. C. (2014). Risks of general artificial intelligence. Journal of Experimental & Theoretical Artificial Intelligence, 26(3), 297-301. <https://doi.org/10.1080/0952813x.2014.895110>

Neville-Neil, G. V. (2017). The chess player who couldn't pass the salt. *Communications of the ACM*, 60(4), 24-25. <https://doi.org/10.1145/3055277>

Nilsson, N. J. (1991). Logic and artificial intelligence. *Artificial Intelligence*, 47(1-3), 31-56. [https://doi.org/10.1016/0004-3702\(91\)90049-p](https://doi.org/10.1016/0004-3702(91)90049-p)

Patton, M., 2002. *Qualitative Research & Evaluation Methods*. p.46. Thousand Oaks, CA: Sage.

Piirainen, J., & Lindström, C. (2019). Teknisen tuen huoltoprosessin kartoitus [Bachelor's thesis]. Theseus.

Sohrabi, S. (n.d.). *AI planning - IBM*.

https://researcher.watson.ibm.com/researcher/view_group.php?id=8432

Sun, W., Nasraoui, O., & Shafto, P. (2020). Evolution and impact of bias in human and machine learning algorithm interaction. *PLOS ONE*, 15(8), e0235502.

<https://doi.org/10.1371/journal.pone.0235502>

TENK (2012) Hyvä tieteellinen käytäntö ja sen loukkausepäilyjen käsitteleminen Suomessa. Tutkimuseettisen neuvottelukunnan ohje 2012 (EN). Available at

https://tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf

Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, 27(2), 237-

246. <https://doi.org/10.1177/1098214005283748>

Xinhua, A. (2017, June 7). AI robot takes college entrance math test. *Xinhuanet*.

http://www.xinhuanet.com/english/2017-06/07/c_136347963.htm

Appendices

Appendix 1. Interview 1

Interviewee: Yea, please do start...

Interviewer: Alright, so basically this... I'm just telling you how this whole thing goes, as in the entire point of the interview is to... create a qualitative research based on using Artificial Intelligence in Tech Support tasks and that this is a thesis that's being written in English, albeit this this does not require you speaking in English and that it'll be translating the discussions from Finnish to English.

Interviewee: Yea...

Interviewer: ... And like we discussed earlier, do I still have your permission to record this and that I can possibly use this in potential future assignments?

Interviewee: Ummh... mmph... Yea, yes, of course without names?

Interviewer: Y...Yea, of course, totally anonymous, no names. It'll be kind of like person X's opinion on about Artificial Intelligence and so forth... Okay and the reason for this interview is for my thesis and all of this will be transcribed... like this interview at a later stage... And I of course have to inform that this is totally confidential interview, like all feedback is kept anonymous, nobody will know who said what.

Interviewee: Mhmm... okay, yea...

Interviewer: ... Okay so yea, maybe as a warmup question... when I mention the word artificial intelligence, what comes to your mind about it?

Interviewee: ... Artificial Intelligence... Well, it's there to help people make decisions... This is what comes to mind.

Interviewer: And when you mention that it's there to help, so, how does it help, or how could it help? And all things like that.

Interviewee: Ummh... like... so it does... ummh, in a different situation when, or like when you have to wonder or decide on what's wrong with the machine so it helps to see... to keep everything in mind every kind of different things that may effect on the situation at hand and that what would, t.ex. have broken the machine. So basically, it gives... Like a person isn't able to remember like everything that may need to be asked at a certain point so it's working as a support in that situation.

Interviewer: Okay... so, essentially what you're saying is that it kind of works as a supportive pillar of sorts, or?

Interviewee: Yea... Or I at least hope that artificial intelligence stays like that... It does not need to take up any kind of guns, or like decide on its own.

Interviewer: So as a background thought is this... kind of a terminator-like mindset? Like if Artificial Intelligence will someday be able to be smart enough to do something completely on its own?

Interviewee: Or maybe it's given the rights to operate in that way, to like, to decide on what's right and what's wrong... T...That's kind of my fear.

Interviewer: It's alright, I totally understand, but luckily, it's not really a focal point at least at this moment.

Interviewee: Yea... but maybe some time it'll become like that, like it depends on what the AI is being used for. Like if it's the gun manufacturing industry or something like that.

Interviewer: Yea, although in this situation we're going after what Artificial Intelligence is like in technical support tasks, and not like how you're seeing it as, but you know, as more of a helper in everyday tasks and such...

Interviewee: Yea, helping you in problem determination...

Interviewer: Yea... Okay, so next up, it's more of what do you think in general about using Artificial Intelligence in technical support opposed to, like things without Artificial Intelligence?

Interviewee: ... Well, it gives more assurance on that the person using it manages to find the correct issue. Like what has caused the issue... But it would of course be created in a way that it'd work better... better you know with the process and not so that it's kind of like, it needs to be very flexible when it's being used, if it manages that, then it'd be very good.

Interviewer: Okay perfect, and when you mention that if it were to work well, so could you open up this one a bit more? How isn't it working well or like what would you do to make it better?

Interviewee: It would need to be going hand-to-hand together with the system that we're using so that when a customer tells what's wrong, and as we write the PD down, the system would spew out options on what more could be asked from the customer. Like if the display, does it work with an external display, has reset been pressed or almost anything so that it would guide you better along the process guidelines. So that everything would be asked seamlessly, and so that the PD would come out well. Like now in our program, it may come only afterwards, like when we're done filling stuff. In its current form it's pretty strict, it needs to be integrated seamlessly to the ticket system and to go along the process.

Interviewer: Mhmm... okay, so have you then previously, like do you have previous experience, have you heard of, of other applications that would, or could work like our program?

Interviewee: No, No, I've never heard of systems like that.

Interviewer: Okay yea... So how then, when we're discussing about this tech support, would you think that it'd be better if it were working in the background or like that, or like how Siri would work, as in you tell it things and it'll just log those and starts building the case?

Interviewee: ... Hmm ...

Interviewer: Like how would you want to use, so like how... like how would you want to use the application? Like text based or maybe if you spoke to it?

Interviewee: I feel that I'd probably prefer it being text based, or well, at least in this point of time...

Like it depends on if it'll be from a customer's point-of-view, like if I was a customer and that I had the choice before opening the ticket/call, ummh... like in that situation it could be more speech based, like Siri, but I don't know... I would prefer writing primarily.

Interviewer: Okay and so, connected to this, ummh, what makes this application good, like what, like what you think is good and what's bad about this?

Interviewee: Well, the good is that it gives assurance that the PD is correct, and it keeps certain things in mind that the person may not remember or forgets to immediately ask about. Now with our program it's not working together which makes it kind of clumsy to use. To add to it, there aren't enough options to choose from in its current state regarding what to ask about. Essentially the program is still at its very early stages.

Interviewer: Okay, so as you mentioned about the bad sides or like the negatives of the program, what would you say are the good sides of it, or how could it be improved?

Interviewee: It would definitely have more options to choose from... ummh, options, that help you choose, when... at this stage it's thinks on its own at many of the steps after inputting the beginning stages of the PD, the program automatically does some analysis on what it may think is happening without asking about the common issues and questions, like does the display work, etc before processing forward. It's very clumsy and it definitely needs more options to choose from.

Interviewer: Okay so... would you see it as a more automatized background process or that you'd have to pick and select the stages and the progression order or to confirm the options? T.ex. the application thinks the issue is in a display, but in reality it's with the motherboard, would you rather have it ask for confirmation, as in a way of double to triple checking what the support agent is inputting is correct?

Interviewee: Yea, like to confirm, for example with a checkmark next to it of sorts that this was this... that... problem that the display isn't working and that it isn't immediately working and that it would have more options. Something like... Something like more manual could work. Checkmark way of continuing with the process...

Interviewer: Yea... of course...

Interviewee: Many times, it feels like that the program outputs this string of words that has bios been checked and all that and other changes. They come... kind of like... often you can only check those after the phone call is over, at least from my point of view. Maybe it's just me because I don't know how others do it... but like it should be going hand to hand along with the phone call, when you're on the phone... And that because... because we can't open the system before we've created the ticket... because it requires the ticket number.

Interviewer: So essentially to conclude that in order for it be more simplified and put-together it shouldn't for example require all of the details or that part would be created through the program, or?

Interviewee: Yes, so that it would be done at the same time, so that it would only ask like for the serial number so that it can identify the machine and that where the machine is located at. Essentially the ticket would be created at the same time when asking the questions.

Interviewer: Mhmm, okay, of course... Moving on to that, more speaking of generalizing artificial intelligence in the roles of tech support, how do you see it now, maybe in a few years and then like 5-10 years in the future? Do you see the roles changing at all?

Interviewee: It'll probably change due to it... that... when a person contacts technical support, the program would already automatically select in the correct options so that the customer doesn't have to call in and instead the customer already does all of this before phoning in. That would maybe lower the need for... and it would also quicken the analysis phase... This is how I see it.

Interviewer: And when you're talking about how you see it happening in the future and that currently it isn't doing it as well as you'd hope for or?

Interviewee: Well no, the customer has no choice now to do except to like to do this bios... what was the name... this... this bios questionnaire...

Interviewer: Update? HW (Hardware) diagnostics and the like?

Interviewee: Yea, this diagnostics and that it's really like the only thing that the customer is able to do and that, of course that, that probably at a later stage it would be integrated to the AI software, that people could check the info like updates and the like themselves as of now, it's only asked and not checked and you'll have to trust that they've actually done it... but ai probably could do it in the future... so that it checks that the updates have actually been done and if they haven't it would notify them about it... like even better than now. As now, you open up the proprietary software that installs the updates, but it would come along side with the diagnostics part.

Interviewer: So basically, you'd see the role as more of that the AI... the AI initiates the process and that the support itself works on the side or at a later stage?

Interviewee: Yea, this could be how it'll end up as.

Interviewer: So would you see it as in that kind of a situation that, so, for example that AI is going to take the vast amount of tech support work away, how do you see the situation, do you see it happening or that will it be like so that certain roles still hold and so forth?

Interviewee: Hmm... I... It'll probably take away the vast majority of jobs or it'll make them easier somehow, at least in the beginning steps... like what to do. Of course also in the way of the users are getting younger and they'll become more tech savvy compared to older people, so also in that way it could... and well, of course not all problems can be... yea... it isn't able to solve everything...

Interviewer: And when you're talking about certain things do you see as something that it should be able to take care of when it takes more control?

Interviewee: Like what's supposed to stay when it takes more control?

Interviewer: Yea, like what do you see as some features in AI that that you probably wouldn't give the machine to take control of and would rather keep a person?

Interviewee: Well... probably... well yea, but maybe it'll go into more technician's side of tasks that it physically checks if something has been caused by the customer themselves or not. It'll probably be able to take the lead for a good amount of time when it'll be more experienced that it'll be able to diagnose it right off the bat... where the problem most likely is. And it'll... and it'll be able to check how many times the machine has been repaired previously and what was done to it. Maybe it'll come to it when it's the second or third... this... this kind of... repair, so in that case it would require a human to take over.

Interviewer: So, it would be automatized as far as possible and that humans would only be needed if the issue is with more L2 issues and things that require more humanized input.

Interviewee: Yes, yes so that it'll, I think that the AI, comes so does the order for the required parts... it'll probably go to that point.

Interviewer: And how do you see the situation that if there are people who only want to call in to get support, how would AI handle that?

Interviewee: ... Well, I think that they'll be fewer and far between in the future... they'll probably be a part of the older sector that want to phone-in. They'll more likely also be more likely private customers opposed to companies... but I do see that if it'll work so well, that it... as many that calls us... many that call us talk about the ticket portal being bad and that it's one of the reasons, the main reason why they're calling.

Interviewee: ... Then again, there are people who always do want to call-in, like they... they don't want to talk to a machine, but it could be that... it really depends on the generation of the caller. People have gotten used to take care of banking and such in the future, online without meeting anyone and that if AI becomes so good that it'll make things easier... only some will still want to call.

Interviewer: And when we're talking about the entire support process, how long would you presume or assume... that it'll that, let's say that my keyboard isn't working as an example, how long would you see a typical support process lasting for? If we forgot the part(s) no delivery times and the alike are counted, or like when the technician is going there. So the actual support process itself, creating the support ticket?

Interviewee: Yea... well..., could be... yea... it really kind of just depends on the customers speed of using the AI support system. Different options to choose from and so forth... Yea... it could work, it could be so that... yea... compared to what we're doing when we're watching what the customer has created and after processing it and comparing that to what would happen is AI was used?

Interviewer: As an example, yes.

Interviewee: Yea, then it would in my opinion make the processes faster.

Interviewer: Mhmm... yes. Okay. And when we're talking about roles regarding some people wanting to discuss via the phone in the case of the ticket portal not working and such, and some wanting to create tickets online totally anonymously without interacting with people, so how would you see integrating AI affecting scenarios where human contact would be necessary? So more like onsite technicians and the alike.

Interviewee: Umm... could you repeat?

Interviewer: So, how would you think integrating AI could affect cases where human contact is necessary, like onsite repairs?

Interviewee: Mhmm... yea... the technician will probably have to listen to all of the issues, due to miss clicks and the like... That'll probably end up as the first problem... as in like... why the ticket creating portal is so bad and why wasn't the correct part sent out.

Interviewer: Yea, but in this scenario the ticket has already been created and that a repair has been scheduled...

Interviewee: Yea... but AI has created it all... there could be mistakes and due to that, the technician would have the wrong part.

Interviewer: So, you would see AI diagnosing the issue wrongly as a likely issue, or understands what the customer is trying to say wrong?

Interviewee: Yea... yea, understands the customer intention and their PD wrong. All that due to possibly the customer not really understanding all of the questions, especially if it was in English or in a other language that's not the spoken language...

Interviewer: Kind of off-topic, but if there's something that comes to mind, of course, feel free to say it out loud.

Interviewee: Yea, I'll say it later if something comes to mind...

Interviewer: Okay and so... have you had any previous experience with, or have you had the chance to use AI in previous workplaces or on free time? How has it been a part of your daily life?

Interviewee: Hmm... well... I have not really. Could AI be classified as calling into a switch which is going to state the correct options to choose in order to put you through to the correct people?

Interviewer: Not really... no.

Interviewee: Okay so then I've had no previous experience with AI.

Interviewer: Okay so have you ever, for example used chatbots and the like? Have you ever used them?

Interviewee: Well yea, I actually have used them, but I haven't really been very happy with the outcome of those bots.

Interviewer: Okay so... what has been... what has been the reason for the negative picture of chatbots?

Interviewee: ... Well... Maybe it's because I haven't been able to properly write out everything or something and due to that nothing was done. For example, like a bank or something or a stores online site. I haven't really been given then answer I was looking for... And I still had to call the customer service line itself.

Interviewer: Okay so the chatbot hasn't been able to understand the customer that well, or you've written out the needed details wrongly or?

Interviewee: Or maybe there was no option to choose from...

Interviewer: Okay, so, in general and as more of a ending question, what comes to mind, what's your initial feeling about AI in general?

Interviewee: ... It really kind of depends on where it'll be used. Like... Like if emergency services would use it, it could help, like when diagnosing, it could help the doctor in like asking the patients information or in technical support uses. However, figuring out where it could be used and where it should be used, it makes me worried.

Interviewer: If you were to think of a role that it definitely shouldn't be used for, what would it be and why?

Interviewee: ... Hmm... I... military uses, like killer armies and such. Developing systems where AI is the one deciding what's right and wrong. It's something that really worries me.

Interviewer: Okay, and what makes that scenario scary?

Interviewee: ... Because when it has made the decision, there's nothing that can be done to influence that decision. A person will still be able to think about the action. AI will just execute the action according to instructions and that's it.

Interviewer: Okay... so thank you for everything, our time limits is getting close, so would you happen to have anything to ask?

Interviewee: Not really, I wasn't totally prepared on what you'd be asking me. Haven't really had the time think about what's going to be asked. This was an interesting discussion and made me think of the topic as well. So this whole thing will be a part of your thesis?

Interviewer: Yea, I'll write everything on paper and translate it in order to go through it in the official thesis part. I'll be switching off the recording now.

Appendix 1. Interview 2

Interviewer: Alright, so point of the interview is to create a qualitative research paper based on using Artificial Intelligence in Tech Support tasks and that this is a thesis that's being written in English, albeit this this does not require you speaking in English and that it'll be translating the discussions from Finnish to English. The estimated time this will take will be about half an hour. Are you okay if I record this and possibly use in it the future if need be?

Interviewee: Yes.

Interviewer: Okay, yes, so the reason for recording will be so that it can be transcribed at a later stage in case you were wondering. All of what is being discussed will remain totally anonymous.

Interviewee: Okay.

Interviewer: When I say... when I mention of Artificial Intelligence what kind of thoughts does that bring to your mind?

Interviewee: ... The first thing that comes to mind is Skynet and our proprietary software, as in like Skynet from the terminator franchise comes to mind thanks to childhood and then proprietary software in question due to the reason that we have a supportive AI tool for problem diagnostics.

Interviewer: And as AI immediately reminds you of Skynet, would you see the system as the worse version, as in controlling everything or the better version in a way that it'd there to help like the proprietary software used?

Interviewee: I'd see it more of as a supporting program/entity.

Interviewer: Good, so no nukes and that stuff?

Interviewee: No, no nukes.

Interviewer: Wonderful, continuing as we're using AI in our work, what do you think about the software in use?

Interviewee: It's a bit clumsy, I do want to add that I think it does help when it comes to integrating newer employees into the atmosphere of the workplace and increases the learning process as well as adds to positive reinforcement of the new employees as they'll

be able to get the problem solved within their first action plan (AP). The negative said of the said software is that it's rather slow to use, so it may lend it as more of a hassle for old employees as it just slows them down which in return isn't really enticing the usage of the AI software. So, to conclude, teaching new employees, it's a good tool for it, but, at least as of now, I see it... It's more of a hassle for the key employees who would rather just move along with their skillsets and knowledge of the issues.

Interviewer: As you mention that it's more of a speedbump, what part(s) of the program really slow it down?

Interviewee: Well... It asks kind of questions and PD that can't be asked from the customer to diagnose remotely. Another thing is that it's a separate tool from our main piece of ticketing software, so their questions aren't present when opening the ticket. The ticket needs to be opened before any PD can be inserted into the AI software.

Interviewer: Yea, and when we are talking about the software used, how would you make the program better than it already is?

Interviewee: First off... I'd integrate the whole program into the main ticketing system so that it would be separate. Of course, it may slow the main software down, but I'd see it as the best solution available as of now, so that it'd be integrated into the ticketing software opposed to being its own piece of software... And I'd remove certain PD steps that the customer isn't able to do, like removing the LCD cable from the system board and reattaching it as it would void the warranty. Also, it really isn't within customers skillset so it's not sensible to go asking for them to do that.

Interviewer: Have you heard of any applications that might resemble or work better in Tech Support than the software that we're using? And... And how do the applications differ from the program that we're using?

Interviewee: I haven't heard of any... I unfortunately do not know enough about potential substitutes.

Interviewer: Okay, so, what's the good and the bad regarding the software that we're using?

Interviewee: Well... the good is, well updates that have come are for example, in step-by-step PD, you can modify the later steps to achieve a new outcome. You don't have to start from the beginning again.

Interviewee: Was it the good and the bad?

Interviewer: Yea, the good and the bad.

Interviewee: Well... the good is that new employees can use it as a supportive tool for increasing their knowledge. They'll also learn to be critical regarding solutions and steps as now all of the steps that it spews out are 100% accurate, so they'll learn to think for themselves, hopefully... someday.

Interviewee: As for the bad, the program is very slow to use and from time to time, there are some very weird PD steps as well as out-of-date tests like with Windows 7, even though the support for it has ended ages ago. These kind of useless/out of date information should we removed completely... and there are a low of steps... well... there are a lot of opportunities for misunderstanding as there are so many different steps or options and when you're trying to find the right one, or the closest to, well... it may confuse an employee.

Interviewer: So would one of the ways you'd make the software better be eliminating overly long drop downs and lists of options and menus, or is there something you'd like to add so that it'd help you?

Interviewee: ... Well, I don't see a need for... well, if the program wouldn't require a ticket number it'd make my life a lot easier. So like you'd fill in the info into the PD tool immediately when a customer initiates the support call opposed to having to open a ticket and only then start the PD process inside of the support tool... and... so that it you write down a certain component, the system may start offering a completely different part. It needs to recognize certain error codes that clearly indicate a hard drive, the software will somehow start going on about memory, which is super annoying and that you'll have to use extra time to try and circumvent the system to get to your desired solution.

Interviewer: Yes... so how would you see the role of AI in current and future tech support positions?

Interviewee: ... Well, a colleague mentioned that when this was being started that the tool is there to essentially take our jobs. At the moment I see it as a supportive tool to help us, but in the future, it may replace some parts or our entire positions. So, it may replace some jobs or people.

Interviewer: When you mention that it'll replace some jobs, what would be some parts of the tech support landscape that it probably wouldn't be able to replace?

Interviewee: It wouldn't be able to replace onsite and personal contact with customer as people are still appreciating being able to talk to an actual human opposed to a machine so that's one. Another thing is, well it'll probably go into the same category as the previous, but it isn't able to replace empathy that's required in some situations.

Interviewer: Mhm... so have you, by far, seen the situation regarding onsite support itself, would it be something that'll probably stay as is? So will physical contact be replaced or will it stay as-is.

Interviewee: That I don't see being replaceable, at least in the upcoming years.

Interviewer: Okay and when we're talking about a hypothetical ticket regarding my machine not working, how long would a process like this take when AI is in a bigger role and what would be require for it to take a bigger portion?

Interviewee: Hmm... a machine not working is such an ambiguous thing, AI probably isn't able to process something like that too far. Tech support probably wouldn't be able to do anything to it either, but at least they could ask the person more information. Well, AI would probably be able to ask some required questions for it to proceed... But it is replacing an employee in PD process, it'd say it'll take at least 10-15 years.

Interviewer: Okay so, how would AI be used to help the ticket opening process?

Interviewee: Well, if the customer is able to answer the simple questions, like what's wrong with the machine, it could probably open a ticket after collecting all the necessary information, it'd definitely help processes. Doing that through chat would be one way and that it'll also guide the customer in some of the more common issues and if need be, help with opening the ticket. With that, it'd help us eliminate the more useless tickets where the AI would've been able to solve the issue for the customer or open a ticket for the customer/tech support. The part of the support center would still have would be the processing and ordering parts for it.

Interviewer: So you'd see as AI taking more L1 level and/or L1,5 positions and the jobs that remain would either be moved up this giving a new workplace for a hired person or some would lose their jobs?

Interviewee: Well, in the future yes, but at the moment the AI will only be able to handle L0 and probably not even that really without any input. I don't see it doing L1-L1.5 at least in the upcoming years.

Interviewer: And if you were to choose one thing the AI system would have to increase in, what would it be?

Interviewee: With the proprietary tool or AI in general?

Interviewer: ... With this AI tool that we're using.

Interviewee: Well... I think I already answered this one, but not requiring ticket number when processing with PD in the beginning so that you'd be able to proceed with only the serial number so that you'd be able to create it together with the customer. To add, when writing as certain component into the PD field the machine would realize that we're interested in the aforementioned part and not a totally different one.

Interviewer: Yes, and kind of going back to the previous one, you mentioned potentially connecting the AI tool into our ticketing system, would you see that as helping the process via integrating two systems into one?

Interviewee: Well, if it were to be integrated into the ticket system, I'd see it as helping the usage, everyone would remember to use it as well as with the internal learning, it'd also learn faster as it'd be necessary to use, thus feeding it more data. On top of that, as a matter of a fact... what was I saying...

Interviewer: You were saying...

Interviewee: Could you repeat the question?

Interviewer: Connecting the AI tool into our ticketing system, would you see that as helping the process via integrating two systems into one, would this be something would help?

You were discussing that.

Interviewee: Yes, it would definitely help, of course it may require more time to open a support ticket so it would require more time, so with someone more experienced, they could be able to open the ticket faster and process it compared the newly integrated system by pinpointing what the problem is with the customers explanation... that way having to will in the required PD after/during the ticket opening process, it would slow it down.

With new employees, it would help as they wouldn't have to open dozens of sites and support tools at the same time. So... it would also help with everyone remembering to use it and thus probably making the tool learn faster and become better in the long run.

Interviewer: Yes, so moving to more widespread part, do you have any previous experience with using AI in work or free time?

Interviewee: I don't have any.

Interviewer: So, nothing, no experience in the likes of Siri nor chatbots and the like as they're technically under the umbrella of AI?

Interviewee: Well, nothing from chatbots as I rarely contact companies via them. I don't have an iPhone so no Siri either. What I have used was google assistant, but only for like setting alarms and speech-to-text. I wouldn't count it as AI.

Interviewer: Okay, so when we're getting closer to ending this, I'd like to return to common AI. What do you think about AI, what do you think about it?

Interviewee: Well, increases in... It's basically a part of the future in a more simplified form, so work and other things like that will be created with AI in mind together with wanting to save using humans, that way people will be able to focus on more relevant and pressing issues, as AI is handling more simple things.

Interviewer: Okay, so does anything come to mind that we haven't spoken about that you'd like to add to this discussion?

Interviewee: No. Nothing comes to mind.

Interviewer: Okay, I'll end the recording here, so thank you for the help and if anything comes up, please be in contact.

Interviewee: Sounds good.

Appendix 1. Interview 3

Interviewer: Alrighty so... Yea, the reason for the interview is a qualitative research project regarding Artificial Intelligence in Tech Support... and this is for a thesis and it'll be done in English, but all of the discussions will be translated... I'll translate it at a later stage into English as it simply eases the interview stages.

Interviewer: The interview will take approximately half an hour and I of course have to ask; Do I have your permission to record this whole thing for possible further use in related assignments and projects?

Interviewee: Yes.

Interviewer: So again, the reason for recording is so that this can be transcribed at a later stage and so forth. The discussion will remain totally anonymous. No names and such will be mentioned.

Interviewee: Okay, sounds good.

Interviewer: Alright, so. So, to warm up, I'll ask you... When I mention the word Artificial Intelligence, what thoughts does that bring up?

Interviewee: Ummh... Well, the first thing that comes to mind is our proprietary software and the usage of said software in our... in our tech support and I see it as a positive thing as long as it's used correctly.

Interviewer: Mhmm... okay... so, when you mentioned it being used correctly, would you happen to have a certain kind of a scenario where, or a situation where it has been used the wrong way?

Interviewee: Hmm... well... In my opinion you have to be very careful and attentive when guiding the AI tool as it's the most critical phase of the project and that... I know that many people have participated in training said software to teach Finnish to it and I don't know how well that's been done. Unfortunately, I can't comment on that itself as I do not know. As for our department, when we've been using said software, I see that things like training the tool could've been done better.

Interviewer: Okay yes, so continuing forward... so when we're talking about said proprietary software, what do you think about this tool specifically?

Interviewee: ... All of my information is more second-hand information, as I don't use it, but I've heard is that regarding work, it needs to be implemented as a part of the normal applications so that you wouldn't have to use yet another tool to do one's work. Ho I understand is that it's, it's should be connected to the main ticket opening and operating tool that's being used in the support center. My second worry is, like previously mentioned, the training of the tool hasn't been organized/created well, or that it doesn't really work how it's supposed to work.

Interviewer: Okay, of course. Connecting to this , in order for it to be integrated, do you have any other thoughts, ideas and the like that you'd add-to or make better from your point-of-view?

Interviewee: So, like as I don't use it, I can't give you exact things, but I've understood that as it's created afterwards it's acting up a bit and that it'd require the older system to be revamped or updated to accommodate this AI system so that they can work together and not separately. As they're separate now, it's making the seamless use of said tools rather difficult. So had it been implemented when the support tool was implemented, It'd probably be working better nowadays.

Interviewer: Yea, of course. Talking about applications, do you have, or have heard of, applications that could be used, or are being used for tech support that could be of assistance. Also, how do they differ?

Interviewee: Ummh... I haven't used. No experience regarding AI except for support site related aid where it does work pretty well. For tech support, no clue. The main supplier is changing platforms so I'm excited to see how it'll change or differ to what they've been using previously Interested in seeing it integration and the like have been kept at a more crucial position. As of now, no experience regarding other tools.

Interviewer: Okay and when you mention using the web integrated tool compared to the AI software, how do they seem to differ? Positive or negative.

Interviewee: The integrated part works a lot more seamlessly by supporting you at the background by searching for articles, links based on what you're trying to search. Compared to aforementioned software being a separate entity.

Interviewer: Mm... of course, talking about software, what do you see as the good and the bad regarding the proprietary AI tool?

Interviewee: The good is that it helps solving issues that are more rule based, like a certain error code leads to certain issue that can be fixed with certain steps, opposed to more difficult issues, it may suggest you repairs and tips, but as there are fewer cases of those, one would need to be more careful on what it's suggesting. So basically, it's good to have a tool like this helping. The bad is that training the tool is based on what's being inserted into it and that there's no 'go back loop', like if a machine has been repaired, but it's not solving the issue and the machine has been sent to the repair center, it'd need to request feedback on what actually solved the issue if it notices that the initial PD (problem determination) did not help. Basically, it needs to check the logs regarding a certain machine for it to gain more insight. Now it's basically all on the support center and my fear is that the tool can be taught wrong.

Interviewer: So basically, from your point-of-view plenty of issues are caused by these being two separate applications and that it'd probably can be mitigated by combining both

and having them read data from each other opposed to just trust what's being inserted.

Interviewee: Yea, that is right. When people are inserting the data, there can always be a risk that someone is trying to me malicious and teaches it wrongfully.

Interviewer: Yea, teaches it wrong or teaches it in their personal way of solving issues that can differ from the norm.

Interviewee: Exactly. Exactly, it needs to have more data inserted that's based on proven problem determinations and what solved those issues.

Interviewer: Yea, for sure, it'd definitely ease the usage.

Interviewer: And continuing with AI, how do you see the role of AI in current and possibly future tech support jobs. How does it work now and how will it work in the future?

Interviewee: Well, the aforementioned proprietary software does help us quite a lot at this moment when it comes to analyzing the problem at hand and in figuring out tips and tricks that the customer may do for the PD that was provided. That being said, a lot of automatic analysis is being done which is good as there is a whole mountain worth of data to go through at some points in order to get the correct info out. This will probably get better as time goes due to more usage and It's a good thing as long as the data that it provides is correct.

Interviewer: Mhm... And in the positions of the future, how do you see the role change if we were to, let's say go a couple to 5-10 years into the future?

Interviewee: Hmm... Well, probably the automatic analysis will increase and strengthen. Automatic problem analysis so, as there's more AI involved and less human contact in analyzing. I do think that the human should be the one making the last call to confirm that the data given by the system is indeed correct. That's something that can be done... Also, the day-to-day use will get easier like in the support center the other system that'll possibly be implemented may already work better compared to what we're using.

Interviewer: Very possible. Very possible...

Interviewee: It'll basically become more of an invisible tool that'll work in the background opposed to being very much front and center.

Interviewer: Yea, that's the secret. When parts are combined into one it'll lessen the burden and, in many cases, make things smoother. Time will tell.

Interviewer: And when we're talking about, connecting this to the future, let's say that Artificial Intelligence will take our jobs, especially the ones that can be automated more easily like lower-level tech support positions, what do you think about this?

Interviewee: Well... it'll definitely lower the amount as well as change the role of the support center. However, it'll also mean that the people will have to focus even more on the more problematic cases... And the customer service side of things. The AI system can and will give you answers from its vast datasets that if you were to go through, it'd take

forever... It'll do it very easily. Will it call a customer and keep them notified about what's going on? I don't think so. It'll be important that we'll focus on good customer service and ensuring that the data received from the customer is correct, as if it's wrong, of course the AI will be wrong. To conclude, this will highlight... the importance of customer service and how all of this will be taken care of.

Interviewer: Yes... And if we were to think about a situation that person X calls and says my machine doesn't start, and well... we're let's say five years in the future, how long would you see a process of this kind taking and what would it require for it to happen, compared to current day?

Interviewee: Well... Hmm... I haven't really thought about this, but... probably when opening a support ticket, possibly already at that point it'll be double checked that the information from the customer is already absolutely correct in order for us to properly analyze all of the issues and that way it'll make opening ticket even more automatic.

Interviewer: And when we're talking about opening a ticket, in the future the system would be in a bigger role... well, let's say that opening a ticket takes about an hour, how long would it take if AI would play a bigger role?

Interviewee: Well... It'll definitely make the process a lot faster compared to current processes... The time it takes to process the ticket forward will definitely become faster, but the challenge that I mentioned previously still remains, as in, how to get the customer to give the correct information. This is something that needs to be focused on so that the customer is doing ticket together with the support in order to minimize callbacks and other issues... We had this previous call where HDMI ports didn't work, and that PD was created based on that. Later it was figured out that there never was any issue with the HDMI ports, so the AI should or would check in the background that is what the customer is telling possible, is the machine configured like the customer is telling. Another example is that memory is broken, the machine would check what memory sticks the machine has, and all that. Basically, checking the data and making sure it matches so that we may avoid these more useless mistakes also based on previous cases. This is what the AI would help on a lot.

Interviewer: Well, so the system would basically double check and act as more of a guard and inform if something like this has occurred previously so that if it isn't mentioned previously, it'd be now. That way it'd make the process a lot faster. Interviewee: Yes, correct.

Interviewer: Okay perfect. Now that we're talking more about the human side of this, like phone support and onsite support and other things that require more human contact, how do you see these kinds of positions changing in the future?

Interviewee: I definitely see, basing it on customer retention and customer satisfaction, that it's very important. How customer is talked to and informed during the call, but also, they need to be kept up to date on delays and other issues when they occur, that something we can make better, there's a lot of improvement. In these kind of spots AI could help. I hope we're not at a point where the AI would start calling as a human should do that. Notifications and the like could be handles by the system automatically. Also, making sure the data is correct in other forms as well like with chatbots so that it's creating more automated answers based of what's being given to the system, of course after asking all the necessary data as it's frustrating if you have to repeatedly type in the same exact questions and datasets. The system would also check that all the necessary information has been given to the customer so that they are in the know of what's next so that they'll be happy. I see AI being able to help us with that.

Interviewer: So, you see phone and other jobs that require human contact as being relevant in the future compared to letting machines do it?

Interviewee: Yes, exactly. I want it to be there supporting, like a normal support agent would, thus being invisible to the customer. Standardized messages can be a bit so-andso and they may not appreciate constant spam and that they do appreciate more personal messages. That's why I'd hope that the human contact remains with the humans in the future as well.

Interviewer: Yes and if we were to think that the current levels being L1-L1.5, would they move up, L1's moving up when the AI is taking the more clear cut, more mundane tasks and that at a later stage, it'd add the human back to the process if for some reason the machine would be unable to process it? Would this be how you'd see it?

Interviewee: Yes, that's exactly how I'd see it happening. We need to have levels correlating to people's skillsets, like the first couple are done by one entity and if issue persists, it'd be moved to another more skilled person. We need more technically skilled people even on the front lines so that it would be solved without going up the chain. There shouldn't be a need for L1, L1.5 and so forth, but that there would just be people with different skillsets and knowhow handing different parts together with a connecting to the lab people that have the capacity to do further diagnosis in situations that we can't solve.

Interviewer: For sure, for sure. As we get closer, has your opinion changed? What do you think about AI?

Interviewee: It's a good tool, but we need to be careful with it. It's important how we teach the tool and how we use it. Will it be a part of... well... I hope the machine won't cut off... That it's a part of a working arsenal of tools opposed to being a handicap. We need to figure out a good way of using it that suits all.

Interviewer: I'm glad to hear that the viewpoint is positive.

Interviewee: Yea, of course. AI is good as long as it's taught and programmed well.

Interviewer: Exactly, anyways, do you have any other questions that I forgot to ask or anything that you would like to mention?

Interviewee: Not really, I haven't really thought about AI before knowing of this discussion, so I did realize that it's already an important part. Didn't really think about the importance of it before this whole thing as it's a quiet piece of program and already all over. I'm very positive about it altogether, of course there are hiccups with our program, but I hope the direction is upwards and that it'll get better.

Interviewer: In due time, of course. It'll learn as time goes. I'll be closing the recording now, so thank you very much. If you have any other questions, go for it. Thank you.

Appendix 1. Interview 4

Interviewer: Alrighty so, the reason for this interview is a qualitative research into using artificial intelligence in tech support. The thesis itself will be done in English, so I'll be translating this discussion into English, the estimated length of the interview itself will be about half an hour and of course, at this point, I have to ask that do I have your permission to use this audio in my thesis and transcribe it, as well as possible use this in future research?

Interviewee: Well, depends on the kind of use for this audio. Only to transcribe?

Interviewer: Yes, it'll only be transcribed. Everything will of course remain anonymous.

Interviewee: Yea, okay, then you have my permission.

Interviewer: And of course, all of this is totally anonymous and will remain that way.

Interviewer: Okay so let's start it with this, when I mention artificial intelligence (AI), what kind of thoughts does that bring up?

Interviewee: Ohh... Algorithms... mathematical... well, let's say mathematical inspection regarding the relevance of things and their likelihood.

Interviewer: Perfect and if, let's say we're talking about AI in our current field of work, what kind of thoughts does that in itself bring up?

Interviewee: Well, the implementation in a societal level on how much it can be used to save time and years off of peoples work. Presumably, it'll be provably beneficial for a company, I'd say that's the most interesting part about it. As for our work, the issues we run into are very simple, except the times that they aren't... When something like that happens, questions come up on how useful and how measurable the usability and ease-of-use actually is.

Interviewer: Yea, okay. Kind of continuing the topic, what do you think about the proprietary software that we're using?

Interviewee: ... Ohh, the base of said application is a very well-known piece of software that is in a very favorable light in terms of how it works, however, the use I've had out of the main piece of AI has been a major success partly, or fully thanks to quality data, or in some cases 'so-and-so' data, but the provability of the data at hand has been more measurable and surer than the data that we're accessing to. To add, I thought that the main software had a very high level of natural language processing (NLP) in terms of having the ability of understanding different tags like moods, feelings and the like sorted from the input. In some cases it seems to be the case, but in our field of work, the software isn't able to find relevant tags or words, or may not have the ability of translating it. Even if all of the data is being simplified the program may not be able to completely understand what's being typed.

Interviewer: Yes and thank you. Talking about the program that we're using; how would you make the application better?

Interviewee: Obviously there's a certain database structure in use in the background which is used for the program to fetch data and interpret it, but it doesn't seem to be able to take advantage of all of the previously created tools that could help. Basically, the program only works via certain keywords that it locates from the problem description (PD) and tries to apply that to a specific component. With that, it's not able to use all of the available data and thus, may not be able to learn as fast as it could in other circumstances. Also, the ability of only giving feedback on how well the program understood the issues and such isn't that useful. Technically this isn't even truly AI, at least in some parts, but it's mainly just following a hierarchical tree and fetching keywords from there, it doesn't automatically add to said tree, but it seems that someone has to manually input said answers. The AI part itself seems to only be a kind of a façade for a customer as it calculates and measures the relevance of what the end result ended up as. Negative feedback itself may not even tell if it got the right PD and found the correct issue, but could be the case where the end user isn't satisfied of what they got as a result and in that way a difference in how the machine thinks and how a end-user wants to proceed may come up.

Interviewer: So basically, you mentioned that the program looks like AI without really being one exactly. If you were given the lead, how would you change it?

Interviewee: More openness regarding what you're giving feedback for, what it affects, how is this hierarchical structure done and so that it'd also open more about what's going in the background with the main piece of software and how it works. How do these two things connect, how does this keyword translate into different tags by the system. In

general, what kind of options are given, there should be a system that gives a chance to understand the problem better. Of course, in that situation an issue arises, mainly who has the time to do such work. Who has enough time to properly describe said problem into the program, let alone having someone who understands the entire context on what is the topic and or context. The thing that comes up here is that a well-working AI should/will be able to translate the words themselves. Also, there should be a kind of a relevance score on who knows how it works may have more weight put on their points and the data they type in. Basically, a back-propagation system so that it will have goals that take longer where it'll try and increase the score itself on how AI is rated. Also, checking the correctness on what actually worked, what fixed and what caused.

Interviewer: So, would you see this kind of an application being a tech support tool, or would be the one taking care of the I0 to I1, call entry and the like assignments.

Interviewee: Yes definitely. Of course, one needs to keep in mind that users may input wrong or faulty data. The system should sort what's actually useful and what's just empty air. Basically, something that would give assistance on how to update ones drivers, and other kinds of very menial and easy-to-do, things as they would close out so many potential issues as it would eliminate users not doing anything to solve the problem themselves.

Interviewer: Yes and regarding these AI applications, are do you have any knowledge, or have you had a chance to use any other applications that could do same kind of a job as the proprietary software that we're using?

Interviewee: Hmm... Well... Kind of, I'd say. I haven't really done it too much except like picture recognition. I've only used applications that revolve around NLP and keyword recognition, but then again, the same kind of principles do apply there... There's a lot of room for growth and development as it seems very tree hierarchical system that doesn't really even have a working keyword recognition.

Interviewer: Okay and kind of... well, kind of, what has been the good and the bad so far with our application?

Interviewee: ... Well... I personally... The software in use helps people who may not have as much knowledge in this subject as I do, as my personal solution has been better time and time again and sometimes it even gives a solution that I'm aiming for based on the final solution, but as it's necessary to use, even in clear-as-day cases where one would already know that, for example, keyboard needs to be changed and it was diagnosed by a trusted technician. The issue is that the software has no option to select that a trained professional has diagnosed it already, but it doesn't help as the program follow a certain hierarchical pattern.

Interviewer: So basically, you'd add more paths that one can follow and select as a way of improving it?

Interviewee: Yes. Exactly. It needs to be able to understand more complex structures where people have different sets of knowledge as their background, who to trust, these kinds of things should be added. They do increase the complexity of it, that's obvious.

Interviewer: Okay, perfect. When I ask you, how do you see the role of AI in current and future technical support jobs? How do things change?

Interviewee: Well, it'll definitely change by implementing a certain surface point on that it could diagnose issues itself and access existing logs to compare issues and results. At that point, it'll be a question whether the machine is able to access the hardware itself that it requires, if that's achieved together with the Ability of reading and understanding pre-existing data, so that it'd see the relevance of same kind of issues, so in that kind of case there may not be a need for a technical chat option as it'd take care of that in itself, that way it'd remotely diagnose. These kinds of apps do exist, and the role of a human may be removed from the equation in many, but not all issues, obviously. There are customers, salespeople, and others there is a need for a point where a human is helping another human.

Interviewer: Yes, so you'd see it, kind of going back to what was said previously, is that normal agents may either be moved up for tougher issues and that the AI tool would handle the day-to-day, easy to solve issues.

Interviewee: Yes. Exactly this.

Interviewer: Okay and how would you see a situation where the caller doesn't want to interact with machines and only wants to talk to a human? How would things that require onsite and human contact work in that scenario?

Interviewee: Of course, there needs to be options for that as long as there are contractual obligations to provide that kind of support. As long as there are bots and other tools that aren't intelligent enough to do everything, like the tool we use could screw things up if everything was on its shoulders... there needs to be an option to choose. There will obviously be people who prefer that, but if people aren't willing to pay for that, unless it's very high-level... at this point I see that people are needed in the future as well due to some issues being extremely complex. Especially when there's a need to recognize something else than technical knowledge.

Interviewer: Perfect, when we're talking about... well, more in the view of AI taking our jobs, what do you think about this? Will it happen?

Interviewee: It's already in effect, it'll surely take some... well, at this point there's still a lot more room for improvement, like with our program. A skillful support agent will in almost every case solve the issue better, an agent is able to circumvent the system to achieve the desired outcome. It may help as the system realizes what helps in what situation, as long as the answer is good. If systems develops like I mentioned before, I'd see systems

being able to take over certain positions and jobs. Like previously mentioned, the more difficult and demanding issues will probably remain with humans, at least in monitoring. There's a possibility that it'll improve and take those over as well, but that's more of a society related discussion on how much do we want to enable this, how will people react. Basically, a lot of jobs would be lost/changed resulting in a flashback on societal level.

Interviewer: Yea, of course, support systems will be there hopefully and so on. However, as it's not a point...

Interviewee: Well yea, it's however a major factor in the background so it can't be disregarded. It's a unknown factor as of now.

Interviewer: And then if we're talking about a normal support process, how long does it take now and how long will it take in the future?

Interviewee: There will be a lot more variation as the system will be able to ask relevant question to achieve a desired outcome. In a complex situation, like where deeper settings, aside from bios-uefi, are changed, it may take a while, but it may achieve a very good outcome. There are situations where it'll be faster than now if its able to solve the issue within the first couple of question without having a need to finish the pre-registered set of questions. Assumed that the system will develop, like it's obviously will.

Interviewer: Yes and moving on, when we're talking about... what kind of experience do you have using AI in either work or free time?

Interviewee: Yes, I'd taken the basics from like how tensor counting works, I've had the chance of testing something myself due to having some hardware that enables that regarding quantumization. Matlab and so forth. I do know how, to an extent, how it works on algorithm level, well, how neural networks work as they're very, very interesting. How they work, I do know a decent amount of a theory level, I've also had the chance to studying how companies use them and what kind of tools we may have in the future.

Interviewer: Perfect and... what do you think about AI in general.

Interviewee: Well... the question itself is massive and the scope is huge, a question that comes up is... what's reality like, how do we view and question in, what kind of entities are we... what kind of entities are we creating. What is AI, what is knowledge, what is selfknowledge and knowledge regarding our surroundings. What is making decisions.... What is... well, probability calculation is a good way of gaining insight on what's what. AI... AI check for differences and delivers an final answer and in the end, it may start looking like AGI (Artificial General Intelligence) where a human is probably trying to achieve a system that's able to solve very complex things. It's also silicone based when we're carbon-based lifeform. At least as of now. AI is based on transistors and us humans and our brains are not transistors. What kind of entity a transistor-based entity will be, that is able to affect itself, when will ai gain self-knowledge or will it happen? What does it

mean and is it relevant? Those are good questions and when will AI become different; these are some things that quickly do come to mind.

Interviewer: For sure, and reaching the end, do you have anything that I have not asked about regarding AI in Tech Support, that you think should be asked?

Interviewee: Well, I think everything that's relevant from my side has been brought out, the good sides and what's the challenge. Nothing comes to mind that was left out.

Interviewer: Okay so nothing comes to mind, no questions or anything?

Interviewee: This is pretty much it, I spoke quickly fast as I thought I would've had more things to say, but it seems like it isn't the case.

Interviewer: All's good. I'll stop the recording, so thank you very much for your time.