CHALMERS
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# Applied AI: Management Frameworks for Internal Virtual Assistant Implementation

Master's thesis in Technology Management and Economics

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Division of Science, Technology and Society

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SUMMARY
A holistic view of organizational trade-offs relating to virtual assistant technology. Taking the perspective of user, development, and the overall strategic goals of the organization, the study is grounded in a theoretical framework spanning areas of technology, management, and development.

# Acknowledgements

We want to thank Essity and all the people involved who have been very engaged in our thesis from day one. Throughout the project we received all the support we needed which enabled for a dynamic process where different methodologies could be used for the study.

We would also like to thank our supervisor Erik Bohlin for constantly bringing constructive feedback and new ideas that enriched the writing process.

# Abstract

The purpose of this study was to discuss what organizational trade-offs are involved in successfully implementing internal virtual assistant technology. This was performed mainly through a case study at a global health and hygiene company, Essity, which involved an online survey with their employees. Beyond the online survey the data gathering was comprised of comparative interviews with development teams at Essity and two other large organizations, one interview with a VP at Essity and a broad literature study. From the data, three major areas are discussed. These are centralization versus decentralization of bot structure, organizational structural challenges, and user adoption. The study did not aim to provide concrete implementation recommendations, but rather to shed light on and discuss the organizational trade-offs involved in the implementation.

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# List of abbreviations

AI - Artificial Intelligence
ANN - Artificial Neural Networks
EVA - Essity Virtual Assistant
IoT - Internet of Things
ISO - International Organization for Standardization
IT - Information Technology
NLP - Natural Language Processing
TAM - Technology Acceptance Model
VP - Vice President

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# 1. Introduction

Digitalization and rapid advances in Artificial Intelligence technology is changing business and industries of today and is having a large impact of society as a whole. One application of AI is virtual assistants, chatbots that can provide Q&A-type responses (Question and answers), as well as other tasks. Organizations are beginning to explore how virtual assistant technology can improve their organization, both through internal and external uses of the tool. As the technology is still in its early phases but undergoing rapid improvements, it is important for organizations to be proactive in adopting the technology to remain competitive. The implementation of virtual assistant technology, and of digitalization efforts in general, cannot be viewed as isolated IT-projects. They impact organizations as a whole, and departments that have traditionally been more isolated are now required to work closer together (Iansiti Et. al, 2020). Beyond the technical development, these efforts also require a focus on aspects such as strategic steering, change management and active user engagement. To facilitate a strong development process, the organizational structure surrounding the implementation play an essential part. There are certain organizational trade-offs that can be made to support the virtual assistant implementation, and these are the focus of this report.

## 1.1 Background

This section explores three key questions that provides context to the rest of the report and presents the case study.

### 1.1.1 Why develop internal virtual assistants?

At the center of implementation is the fundamental question of why to develop virtual assistants in the first place. In order to best answer this inquiry multiple perspectives should be taken since there are multiple layers as to why the technology will be important and is worthwhile pursuing. This report and the research performed for it have attempted to approach the subject from three perspectives. One is the strategic perspective which takes into account the innovation aspects and the changes that are happening due to industry 4.0 and the rapid development of technology and its capacities on the global scene. The next perspective considered is that from a developer standpoint which includes areas such as value creation, technical limitations, and managerial aspects etc. The third perspective considered was that of the user. This includes their perception of the technology and the perceived usefulness they see in it. From the strategic perspective, being on the forefront of the industry 4.0 wave of technology can be considered very important for organizations that have the opportunity and the means to do so. As technology enables more and more innovative solutions the global market is becoming increasingly more dynamic.

This means that the technical standard of the inner processes of an organization will increasingly have to be benchmarked to not just current competitors in the market they are in but also potential future ones. This could be new actors entering the market, such as big tech companies investing heavily in automatizing and optimizing their business processes which has developed a service that is in direct competition. It could also be that new technology or innovation enables a company to enter a new market, in which they will be facing competitors who might have invested heavily in internal AI processes. In either of these scenarios, being on board for the fast-paced developments in universal technical infrastructure can be tied to better chances of a long-time survival and growth for the company and the industry. From a developer and user perspective the technology can help to automate mundane tasks and potentially free up people to perform more stimulating and creative tasks. Concerns can also arise here from users regarding the looming threat of them losing their jobs as the technology matures. Another common concern is data privacy due to the potentially intrusive capabilities of the technology.

### 1.1.2 Outsourcing

The decision of whether to develop in-house software or outsource the development is another central aspect of virtual assistant implementation. There are several bot platform services which today are commonplace in large organizations which are investing in AI technology. In deciding the platform of where to develop the bot, a major factor beside the characteristics of the technology itself is how to make it fit with the rest of the IT-infrastructure of the organization. The three companies interviewed for this report were all using the Microsoft Azure Bot Framework. They all had a strong relationship with Microsoft and were running a multitude of Microsoft's other services. Using the Microsoft bot framework allowed for a more seamless integration with these services. Another important aspect was that the framework was considered to be relatively user-friendly and not "code-heavy" on the user side, allowing non-IT personnel to manage content.

There are also possibilities of using multiple platforms and tailoring a "custom made" framework. Here, functionalities that are particularly strong within each different framework are sewed together and create application areas that further suits the particular needs of the specific organization. Since the technology is complex and has many layers in its structure and integration, it is rare to see organizations create their own bot framework from scratch. Typically, at least parts are outsourced to companies specialized in offering these parts.

### 1.1.3 Internal versus external bots

The scope of this report is for internal implementation of virtual assistant technology, focusing on the organizational trade-offs involved. To understand many of the

aspects discussed in this report, external implementation also needs to be addressed since it is heavily related. It can likely be assumed that few companies will opt to only do an internal implementation and completely stray away from any external initiatives. The more probable scenario is that there will be a spectrum of to what degree the technology is used for internal or external purposes, without there being a direct tradeoff between the two. Once a company has achieved the competency required as well as the infrastructure to efficiently work with the technology, there is little reason to arbitrarily limit the development to either internal or external use. This is due to the fact that there is not much in the nature of the technology that differs between the two application areas.

If deciding whether to focus on internal or external implementation, one of the reasons to begin with internal implementation is that it offers a platform to experiment on and build expertise within. This may be a beneficial learning experience which might lead to development of greater quality-external bots before presenting a bot toward an external customer. If the end goal is to produce external bots of high quality, initially focusing efforts on internal development might be the slower and steadier way to do it, that ultimately reaches the goal faster. Many of the beginner traps and pitfalls involved in the implementation can be encountered in internal development, preventing potential defects from being a part of customer-facing products. Some of these challenges are also non-technical and of a more managerial nature, which is why it is important to consider organizational trade-offs in order for implementation to be successful. While there still is room for growth and maturation of the technology, it is already in a stage where it could potentially deliver great value if installed in the right places and the right team structure is in place to facilitate it. This emphasizes the need for an understanding of the organizational structure that can accommodate this.

### 1.1.4 Case study

Three companies developing virtual assistant technology were involved in the data gathering for this report, and interviews were conducted with the development teams of each company. For one of them, Essity, a larger case study was made to investigate the user perspective of the technology. Essity is a global leading health and hygiene company active in over 150 countries. They have 50,000 employees across the globe, from different cultural backgrounds and speaking a multitude of languages. Due to their size they are an organization that is in a good position to experiment with modern AI technology, as solutions and applications of the technology can scale across the organization. One AI initiative they are undertaking is the development of an internal virtual assistant using Microsoft Azure Bot Framework. The virtual assistant is called EVA, which is an acronym for Essity Virtual Assistant. The development is performed by a cross-departmental

collaboration between IT and Business Process Automation, which is a branch of their Global Business Services unit.

## 1.2 Aim and purpose

Due to the broad-spanning fields surrounding the implementation of virtual assistant technology, the aim of this study has been to create a comprehensive picture of what is required to achieve a successful implementation. The aim has therefore been to discuss the high-level organizational factors affecting the implementation and provide a discussion regarding the trade-offs involved. To portray these trade-offs holistically, the discussion is grounded in the technological, developmental, user adoption, and strategic elements of the virtual assistant technology.

The research question for this report is the following:

*What are the organizational trade-offs that are involved in successfully implementing internal virtual assistant technology?*

## 1.3 Scope of research

The study covers a broad spectrum of topics to provide a holistic understanding of the organizational trade-offs surrounding the implementation of virtual assistant technology, with a focus on internal implementation. The research involved a broad-spanning literature study, an online user survey, a comparative study between developer teams at three large organizations within different industries, and a high-level strategy interview on the importance of working with AI technology.

The literature study starts with a technological chapter which provides an overview of AI technology in general and of virtual assistant technology in particular. It continues with managerial topics surrounding the implementation such as change management and technology adoption, followed by a chapter on topics relating more to the actual development of the assistant. The study did not cover any of these areas in great depth, as it aimed to provide a high-level discussion of aspects involved in virtual assistant implementation.

## 1.4 Report structure

The report starts with an introduction that lays out information relevant for understanding the topics of this report and the case study. The theoretical framework spans three areas, technology, management, and development, to provide a broad perspective on virtual assistant technology implementation. The methodology chapter describes the data gathering methods used in the study. In the analysis and

results chapter, the data accumulated from these methods is analyzed. With a foundation in the insights derived from the analysis and results together with the theoretical framework, a discussion surrounding the research question is presented. The report ends with recommendations for future work and a conclusion chapter.

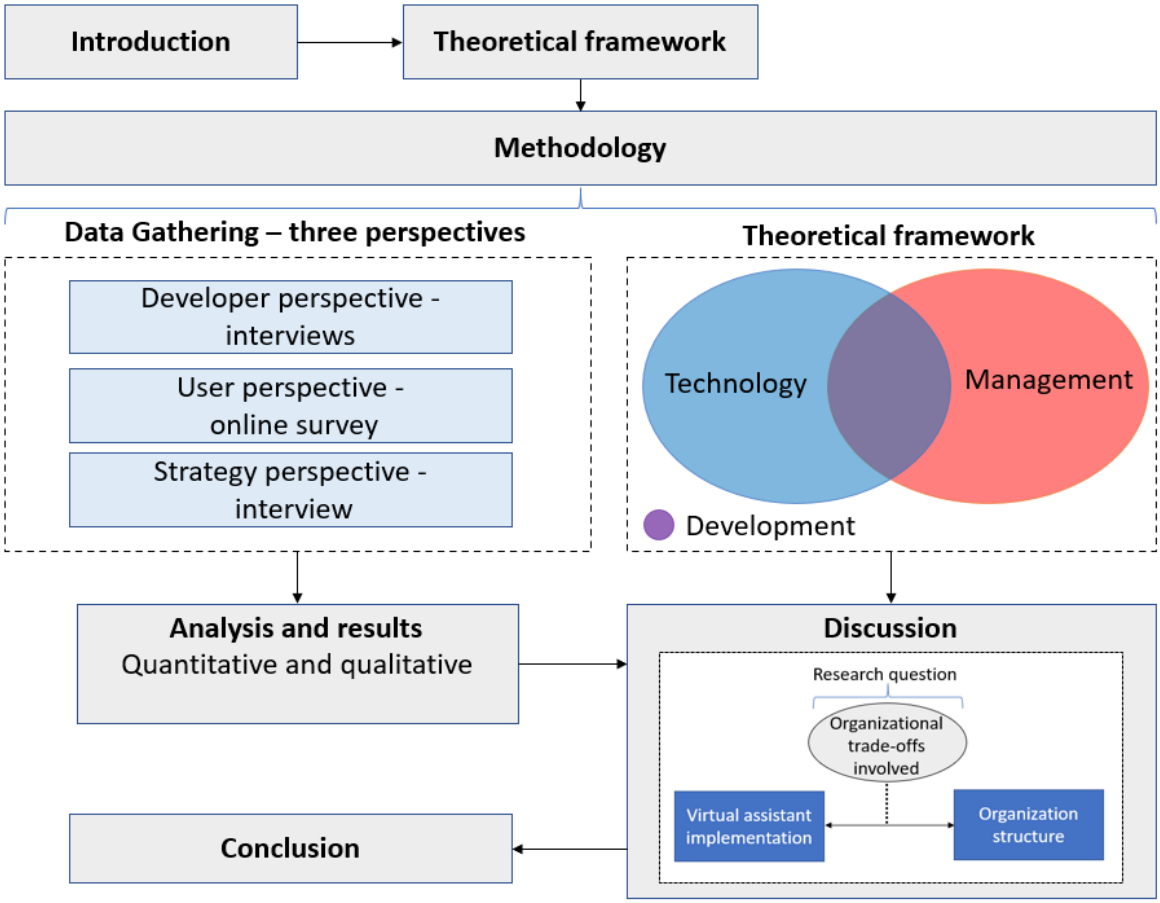


*Figure 1 Overview of the report structure.*

# 2. Theoretical framework

With the goal of portraying a holistic image of the implementation of virtual assistants, the literature study encompasses a broad range of fields. To paint an overview of the research that has been made as part of this report, it has been divided up in three sections as can be seen in Figure 2. These sections are technology, management, and development. The technology section lays out the important details regarding the technical infrastructure surrounding virtual assistants that are necessary to understand the big picture of the development. This is both on a more general abstraction level, but also on a more detail-oriented level providing information required to achieve a sufficient understanding of the case study of this research. The management section covers the higher-level topics concerning the organizational aspects and business goals associated with the development and implementation of virtual assistants. The development section can be viewed as the overlap between the technology and the management parts. In this section, software quality relating to virtual assistants as well as the agile development process and internal marketing will be discussed. At the end of the chapter, a summarizing section is presented which ties together the topics covered in relation to the research question.

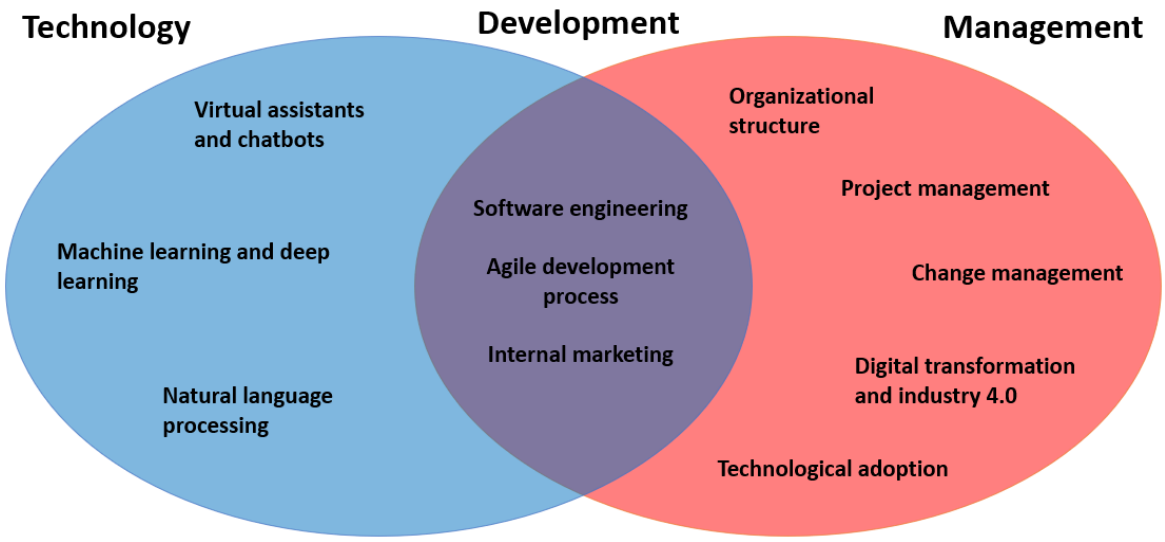


*Figure 2 Overview over the theoretical topics for this study.*

## 2.1 Technology

This section provides a brief overview of the technical areas surrounding virtual assistant technology.

### 2.1.1 Virtual assistants and machine learning

Virtual assistant technology, or chatbot technology, is a subset of Artificial Intelligence and a maturing field with increasing capabilities, causing organizations around the world to invest in its development. Internal virtual assistants are a case of this technology and it is targeting an organization's employees with the intention of being an aid to their work. This can come in various forms such as raising helpdesk tickets, onboarding, and knowledge management. As the infrastructure of the technology that the virtual assistants utilize to provide its services matures, the potential use cases for virtual assistant technology will increase. External virtual assistants are intended for the end customers of an organization as opposed to the employees of that organization. These are typically used in customer service for use cases such as handling customer complaints or for online shopping (Skowron et al., 2019).

Virtual assistants are mainly powered through the AI technology of Machine Learning as well as the field of Natural Language Processing, described in the next section. Machine learning is a subset of artificial intelligence that concerns the statistical models and algorithms that a computer system utilizes to perform specific tasks without direct instructions. NLP has benefited greatly from advances in this field as the breakdown of semantics leads to vast sets of data. Deep learning arose as a new area of research in 2006 and is a subfield of Machine Learning. Deep Learning builds on the idea that the machine learns through a process of going through a layer structure (Nene, 2017). This is typically in the form of an artificial neural network (ANN). There are various forms of ANN models as different models are more or less beneficial depending on the purpose. The basic ANN structure is mainly inspired by the biological neural networks that operates in the human brain. Simplified, the brain learns through a network of nodes, neurons, which are composed of synapses connected through axons that transmits electrical impulses through the network. Depending on the strength of the synaptic connections the processing ability of each neuron can be increased. When incoming signals reaches a neuron either an inhibitory effect can be produced which can stop the signal from firing further or an excitatory effect which promotes an impulse generation and the electrical impulse is passed along. Artificial neural networks build on this structure with nodes representing the neurons and the connection between them represents the synapses. In each layer, the output of the previous level is the input of the next level (Kurney, 1997). This allows for powerful processing capabilities which paired up with NLP allows virtual assistants to increasingly sophistically interpret natural language and learn to better respond to users (Nene, 2017).

### 2.1.2 Natural language processing

Natural language processing (NLP) can roughly be described as a cross-disciplinary field of information engineering, artificial intelligence, computer science and linguistics. Its aim is to allow computers to be able to interpret and communicate with humans in natural language, that is the language of the user as opposed to more traditional computer syntax that people are typically required to learn in other to "communicate" with computers (Nene, 2017). This allows for a better user experience where the computer and by extension the chatbot meets and talks to the user on their terms instead of requiring a high knowledge threshold before being able to offer concrete value to them. NLP is generally said to have started in the 1950s by computer scientist such as Alan Turing. However as with many other artificial intelligence technologies it has been on standstill throughout the "artificial intelligence winter" and has only recently started to get an upswing and traction. This is mainly due to advances in machine learning technology and more specifically its subfield of deep learning. Vast neural networks and hidden layer technologies allows for the complex interpretation that linguistics requires in order to interpret and put together meaningful sentences. Linguistics is an especially complicated field since it must account for multiple layers of context and meaning when taking in output in form of written text. The same word can have multiple meanings and connotations based on the context that it appears in. This requires the computer to sophistically interpret the input and through repeated training be able to respond accordingly to the text that it is given (Liddy, 2001). This can become a problem when there is a large amount of content that the NLP needs to process. It can become error prone when there is a huge array of intents that it needs to match a user's message to. To mitigate this, one possible solution is to break up the software into several smaller instances which are specialized to handle one particular domain of requests.

Since most of academia and computer science is historically and currently performed in English settings and language this has resulted in that the English language is also the human language that has become the most evolved NLP language, even though other languages are also being developed by computer scientist across the globe. However, since different languages and their linguistic families are typically very different from each other in terms of grammar and sentence structure NLP advances done in the English language is not necessarily easily portable to other languages (Liddy, 2001). For this reason, NLP services such as those offered by Microsoft's Azure Cognitive Services are instead using text translation technology to translate the input into and output from the English NLP back to the user if they are interacting with the virtual assistant in a language other than English.

## 2.2 Management

This section explores managerial aspects relating to virtual assistant technology implementation.

### 2.2.1 Digital transformation and industry 4.0

Since the industrial revolution, the development of new technologies has repeatedly transformed and evolved industries. For companies to remain competitive and relevant they need to be constantly prepared to change the way they operate. There are a multitude of challenges related to the emergence of new technologies, such as identifying a potential technology as beneficial and potentially revolutionary and making the decision to act upon it.

Industries have moved through several paradigm shifts, or phases of rapid innovation. The most recent shift has involved a movement toward digitalization of processes and industries as well as the introduction of “intelligent products” that through sensors and communication systems themselves can influence their manufacturing processes. This new phase puts increasing demands on more rapid innovation cycles, decentralized organizational structures, and a higher degree of flexibility, among other variables (Lasi et al., 2014).

### 2.2.2 Organizational structure in the age of digitalization

Hitt and Brynjolfsson (1997) discusses the relationship between internal firm organizational structure and IT, expressing that the organizational structure must be matched to its IT capabilities to be successful. Firms that are extensive users of IT tend to adopt an increasingly decentralized authority structure and approach to teamwork. Since the start of the information age, companies have to an increasing degree moved towards a decentralized structure that puts knowledge and competence at the core of their organization. Companies that embrace and value IT typically also values to a larger degree expertise and human capital.

Schwer and Hitz (2018) further emphasize the importance for traditional hierarchical organizational structures to change when industries are moving into the age of digitalization. Organizations are becoming increasingly complex and need to quickly adapt to a more rapidly changing environment. In order to be equipped for this acceleration, new adaptations to the organization is required. The organizational design affects the organizational boundaries, which in turn influences its ability to sense and embrace business opportunities. Furthermore, a culture that embraces change and that constantly monitors its environment for fluctuations is able to adjust

accordingly. This requires a shift toward an organization that works with clearer goals and more flexible roles.

Having a too hierarchical business environment can make the decision-making process lengthy and is not suitable for the digitized way of working. One form of organizing organizations that is more suited for digitalization is a Holacracy. In a Holacracy, management is decentralized and there are no fixed job titles. Roles are flexible and constantly changing depending on projects. The teams are self-organized, and the organizational structure is continuously updated and revised every month, according to Schwer and Hitz, (2018).

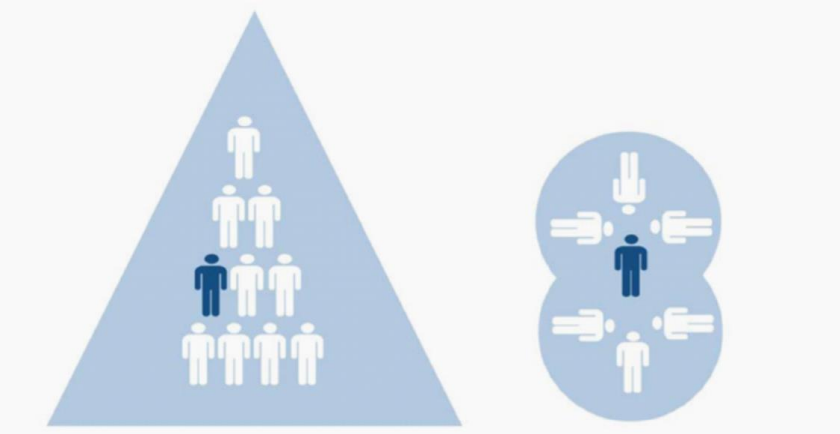

*Figure 3 Hierarchy vs Holacracy, Schwer and Hitz (2018).*

Bernstein et. al (2016) maintains that it is important for organizations to find the right amount of self-management. For industries requiring rapid adaptations to their environments, a holacratic way of working may be beneficial through its quick decision-making process. If reliability is a more important factor than adaptability for an organization, Holacracy may be less suitable. The authors predict that although few organizations will move into a full Holacracy in the years to come, it is highly likely that many will adopt some form of self-management to capitalize on its benefits.

For large corporations, it is difficult to simply abolish the established hierarchical organizational structures and immediately start moving into a Holacracy. According to Kotter (2014), organizations can maintain a form of hierarchical structure and still remain competitive in the age of digitalization. He proposes a hybrid solution, where the hierarchy is still present but where a network structure have been incorporated into it. The network fills the role of fast-moving entrepreneurial companies, and the hierarchichy enables for the organization to be more ealisly run. This structure allows for the flexibility necessary for digitalization projects whilst still allowing many of the existing processes of the company to continue, without major organizational restructuring necessary. Kotter (2014) maintains that firms of the twenty-first century will require an evolution toward entirely new organizational structures that allow for

companies to maintain long term success, and that it is important for companies to themselves understand which organizational form best fits their organization.

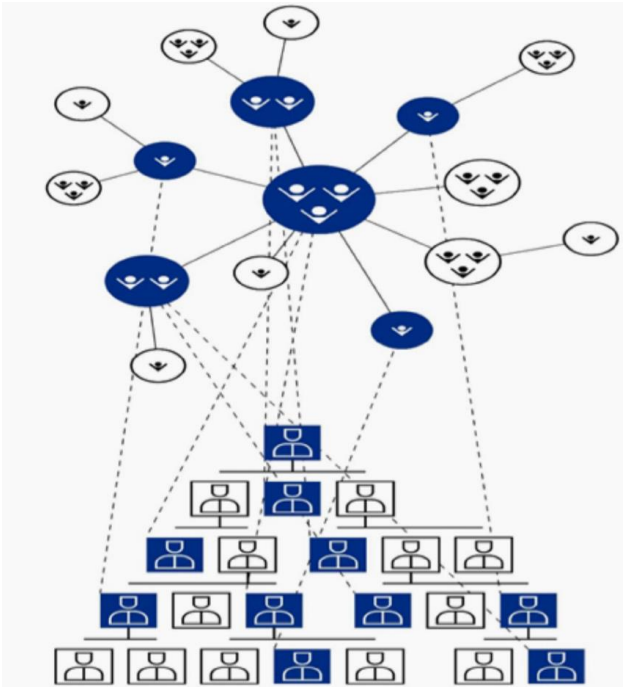

*Figure 4. The Dual Operating, Kotter (2014).*

## 2.2.3 Impact of AI on industry

Artificial Intelligence is rapidly changing the way that organizations are operating. Embracing this change is crucial in order to remain successful and to gain, or maintain, a competitive advantage in today's increasingly digitalized industrial landscape. AI technology can save money through automation of current activities but can also create value through enabling completely new activities that were not previously possible (Ransbotham et al., 2017).

There has been, according to Ajdovec et al. (2017), a lack of research into how the impact of industry 4.0 will affect management and business strategies, but there seem to be consensus that it will likely lead to big changes of current business models. Focusing, and investing, in AI technology and knowledge capital will be of increasing relevance within the years to come, as costs can be saved through automation. AI can also aid in strategic decisions, as more data can be processed and analyzed than has previously been possible.

The AI driven model is not limited to the traditional business models that run on scale, scope, and learning, but can instead be scaled to a much higher degree and to a larger scope with rapid opportunities for innovation. Industry boundaries are becoming increasingly blurred as the traditional recommendation to executives of "sticking to the business you know" no longer holds. Companies that are not leveraging the full array of data across broader networks are increasingly positioning themselves at a disadvantage (Iansiti et al., 2020).

In a 2017 study conducted by the Boston Consulting Group, over 3000 business executives were surveyed regarding the role of AI in their organization. It was found that there is a large gap between the ambition of AI and the actual implementation of it. Whilst 85% of respondents believed AI technology would enable them to gain a competitive advantage, only 20% had to some extent incorporated the technology to their organization or product offerings. As the technology is maturing and advancing, only 14% of the executives who had implemented AI technology believed it was currently providing large value to the organization. However, 63% believed that it would within a five-year period (Ransbotham et. al, 2017). The survey categorizes the companies studied into four categories depending on the level of current efforts, and adoption, of AI technology. The authors named these categories Pioneers, Investigators, Experimenters, and Passives.

**Pioneers** (19%): The leading edge of companies making AI a part of their business. They both understand AI technology and have implemented it within their organization. These organizations tend to acquire AI knowledge through training and hiring, as opposed to acquiring it externally, as is the case with Passives.

**Investigators** (32%): Companies that see and understand the need for AI, but have not yet made any comprehensive implementation of it into their business.

**Experimenters** (13%): Companies that are “learning by doing”, experimenting with AI technology without a deep understanding of it.

**Passives** (36%): Companies with no understanding or current development of AI.

A 2019 McKinsey study discuss that in order for AI initiatives to become successful within an organization, it is necessary that they are not viewed as isolated projects but should rather be seen as a core part of every aspect of an organization. Out of the thousands of executives from various industries interviewed, it was shown that only 8% were actively engaging in core practices that foster widespread adoption of AI within their organization (Fountaine et al., 2019).

### 2.2.4 Organizing for AI

With the growing prevalence of AI within industry, business models need to be reconsidered and a new architecture of the organization, which has data and analytics at its core, needs to be developed. Moving towards digitalized and AI driven business models require tremendous reorganization efforts within the organization, as traditional departmental boundaries becomes blurred and disintegrate due to the need for increased interconnectedness between traditionally separated organizational units. To create a "digital spine" that is at the core of the business entails that traditionally isolated departments will be required to be reworked, which entails substantial organizational efforts (Iansiti Et. al, 2020).

Aside from the technological challenges involved with acquiring and developing AI technology, there are several managerial challenges. For implementation efforts of AI technologies to become successful, managers need to familiarize themselves with the functional and “basic” processes of AI technology in order to develop an intuitive understanding of it. It will also require major organizational efforts on behalf of management to coordinate implementation of AI technology and there is a need to have internal competencies in the field (Ransbotham et al., 2017). Director of research at Microsoft, Eric Horovitz, maintain that although the tools for developing AI are becoming easier and easier to use and are made available as finished products for organizations to license, it is still critical that experts within AI are present within organizations, as cited in Ransbotham et al., (2017).

Fountaine et al. (2019) discuss the many barriers toward implementing AI initiatives. Some are fairly universal across organizations, such as the fear of employees becoming obsolete in the face of AI. Others are unique to each organization and may be related to specific cultures, structures, or attitudes. In order for the entire organization to understand the reason and urgency for AI efforts, it is necessary that a compelling vision is constructed to ensure that everyone is onboard and have an understanding on why the changes are being conducted and how it will affect the organization. It is highlighted that it is important that organizations spend at least as much on efforts on the adoption of the technology as on the technology itself. 90% of the organizations who had engaged in successful scaling of AI initiatives had spent more on adoption-fascilitating activities such as training or communication than on analytics (Fountaine et al., 2019).

The combined AI-initiatives of an organization could take the form of a "Hub-and-Spoke"-structure. In this structure, the strategic decisions and project initiatives are held centrally in the hub. The execution and relating activities such as tracking, training, and reorganizing are taking place in the spokes or somewhere in the grey area between the two. There are different approaches concerning what is the best way of allocating AI capabilities along the hub and spokes within an organization as it varies upon the specifics of the organization (Fountaine et al., 2019).

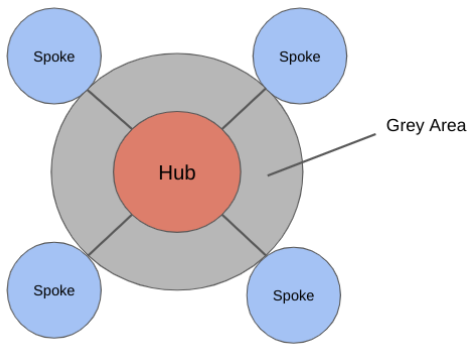


*Figure 5 Hub-and-Spoke model*

Organizations that are successful in implementing digitalization initiatives spend large amounts of effort training and educating staff across all divisions of the organization. They further ensure that leaders and management are acting as role models and are leading with a good example in order to inspire and motivate employees. They are also active in tracking the adoption and in providing incentives for the change. The authors also highlight common reasons for failing to implement a change initiative. These include a lack of big picture understanding of how initiatives fit in to the organization at large, and misjudgment or misallocation of in-house capabilities (Fountaine et al., 2019).

### 2.2.5 Impact of AI on the working life of the employee

It was found in the 2017 Boston Consulting Group study, that there was not a prevailing fear that AI would take over existing jobs or lead to mass unemployment. There was rather a belief that AI would take over some of the more repetitive tasks and free employees up to work on other, more creative and stimulating tasks. Whilst there is still uncertainty regarding to what extent AI will affect the workplaces of today, there seem to be a consensus that it will produce a change to some degree and that there will be a period where human-machine interactions need to be figured out. This includes how humans and machines will coexist in terms of work coordination, communication, and other critical factors (Ransbotham, 2017).

Based on how technological change has affected the cost of conducting certain tasks in the past, Agrawal et al. (2017) discuss which tasks are most likely to be affected by the rise of AI. The cost of prediction, through analysis of large amounts of information, has decreased drastically. Predictions that require no value judgement are easier to automate through AI than those requiring careful case-to-case judgements. As for instance is the case within medicine, machine learning technology can help improve diagnostics, but the final judgement for action still depends upon human judgement. Statistical analysis and other repetitive tasks will likely be automated at the same time as human interactions and ethical judgments will become increasingly important aspects for managers to handle. Accordingly, managerial approaches will likely shift from being mainly prediction-driven toward becoming judgement-driven (Agrawal et al., 2017).

### 2.2.6 Bot structure in business

When applying virtual assistants and chatbots into the organization it is important for the implementing company to have a well thought out and defined bot strategy that guides their decision making. At the core of such a strategy lies the decision making regarding the degree of centralization or decentralization of the bot structure. A

centralized solution would for example be one large bot instance which serves multiple purposes all-in-one. A more decentralized solution would instead be several specialized bots each serving a particular purpose. Understanding the intricacies and best practicies of the technology, companies can make more well informed decisions relating to the deployment of their bot strategy. Failure to do so may result in a waste of business resources as well as general confusion of the user base and lacking performance of the technology (Baker, 2019). In general, it is important to avoid poorly performing solutions as well as solutions that overlap. The platform that an organization sets up for its chatbots should be one tailored to best support the intended users. Whether the users of the technology are end customers or internal employees is an important factor to consider when making these decisions (Skowron et al., 2019).

### 2.2.7 Project management

Projects are becoming an increasingly large part of today's organizations, as the traditional manufacturing economy is giving way to a more service-based landscape. Many organizations' business models focus solely on projects, which for example is the case within some IT sectors where the entire value creation of the organization stem from projects (Maylor, 2010).

Projects are defined as being unique, temporary, and focused, in that they aim to deliver a specific result that has not been done before within a certain timeframe. Projects have a low degree of volume and high degree of variability compared to processes. Consequently, the management strategy towards these differ accordingly. Traditional management focuses around a defined set of tasks within a fixed organizational structure. Responsibilities are located within a specific business function, arranged around a limited set of variables and targets, and the goal is optimization. Project management differ in that the tasks are constantly changing and that responsibilities are located cross-functionally, spanning across the traditional divisions of an organization. The lines of authority are fuzzy, and the focus is aimed toward innovation rather than toward operations. Project management have an inherent degree of uncertainty and change, and there is not a set and predictable outcome of projects (Maylor, 2010).

### 2.2.8 Change management

Change management can be viewed as the process of continuously monitoring and adjusting different aspects of an organization, such as its structure and direction, in relation to fluctuating needs of internal and external customers. Being able to accomodate for organizational change is a crucial part of being able to remain competitive as a business within a rapidly changing industrial environment,

and having a plan for how to deal with change can be seen as a nessecity for an organization to survive (Tondem, 2005).

Tondem (2005) argues that while there is a general consensus within academia that managing change is an important and necessary aspect for organizations to remain competitive, the approaches taken by various studies are often contradictory to each other and there does not to exist a clear convergence regarding how change is most effectively managed. He further emphasizes the lack of empirical research in change management projects, indicating that it is a field of study that requires more research. According to Balogun and Hope Hailey (2004), change projects have a failure rate of around 70%, indicating that the understanding and strategy surrounding change management is lacking and that there is large room for improvement.

Kotter (1995) provides a framework consisting of 8 critical steps when managing change projects in an organization. He describes that a key mistake managers make are to view the change project as an isolated event rather than as a continuous process. Managers often try to rush the process and skip steps within it, resulting in failure. He describes how a successful change project is initiated through an initial realization that change is necessary. Engaged managers and leaders are brought aboard early in the process to drive the change. After a belief in the ideas underlying the change project is established within management, a compelling vision is formed and communicated throughout the organization and the entire workforce related to the process. For the change project to be successful, employees need to be empowered to act upon the vision, and as the change project proceeds it is necessary to create short-term wins and further to consolidate these into a permanent culture shift (Kotter, 1995).

Palmisano (2004) describes that in leading change when “business is good” it can sometimes be difficult to commit people to change. The necessity for change may not be apparent when everything is seemingly going well, as opposed to if a business was in a crisis. In order to drive change when business is going well, the author recommends shifting from a “control-and-command” form of management to a “value-based” form of management, where employees are encouraged through hopes of growth and possibilities that can result from the change.

Edmondson (2003) describe some of the challenges involved with implementing new innovative technologies, and how people involved in implementation efforts can have a different view of the technology’s benefits and challenges. She describes these views as “cognitive frames” that are made up of beliefs or assumptions about a given situation. These are shared and spread among social systems where people collectively influence and reinforce each other’s frames and engage in a mutual social construction of reality. Kegan and Lahey (2001) argue that a large reason for why employees are resistant to change is due to “competing commitments”,

subconscious drives or goals that are not in line with the change that is being proposed. To make change possible, it is necessary to uncover and understand these competing commitments. Re-evaluating and bringing the cognitive frames described by Edmondson (2003) and competing commitments described by Kegan and Lahey (2001) into awareness can aid the process toward successful technological implementation. Mental models and attitudes toward change can be seen as an obstacle to succesfully implementing a change initiative, and by removing these obstacles there is  a higher likelyhood of success (Kotter, 1995).

### 2.2.9 Technology adoption

The adoption of new technologies depends on a multitude of factors. Below, three frameworks have been presented to provide nuance to the adoption process. The TOE model provides a high-level view of the large-scale factors affecting technology adoption. The Diffusion of Innovations-model describes how innovations spread through a social system. The TAM-model describes the variables influencing adoption from the standpoint of the individual.

**Technology-Organization-Environment (TOE)**

Tornatzky and Fleischer (1990) paints a high-level view of how the technological, organizational, and environmental contexts influence the adoption of a new technology within an organization, see Figure 6. The technological context refers both to technologies that have been implemented within the organization as well as existing technologies outside the organizational boundaries. The characteristics and availability of technology sets limits upon possibilities and directions of technological innovation. The organizational context involves aspects such as the size of the firm, the amount of resource slack, communication processes, leadership engagement, and degree of decentralization of the organization. The environmental context involves aspects such as the competitor situation, regulations, market structure, and industry size. When considering adoption of a new innovation, all three perspectives need to be taken into account to give a broad view of the innovation landscape.

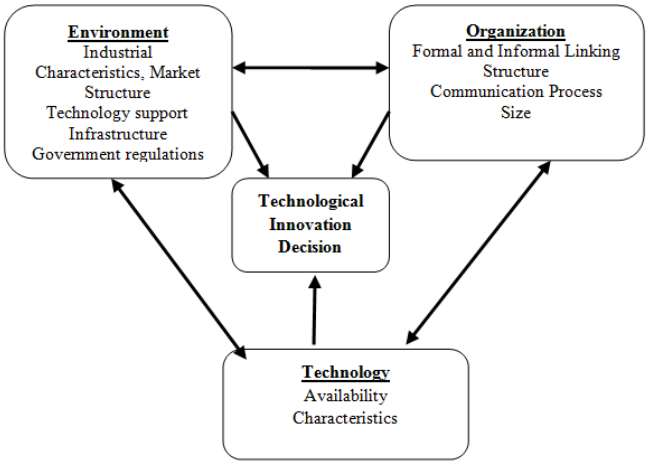


*Figure 6. TOE framework. The Processes of Technological Innovation, Tornatsky and Fleischer (1990). Image taken from Researchgate.net.*

## Diffusion of Innovations

Rogers (1995) describe the process of how new ideas spread within a social system, a process which he refers to as Diffusion of Innovations. He describes four essential components of the diffusion of innovations; the innovation itself, how it is being communicated, through which channels it is communicated, and the time it takes to communicate it throughout the channels. After awareness of the innovation has been established, there are several attributes of the innovation that affects the likelihood of adoption. The attributes that affect the adoption of an innovation are:

**Relative advantage** - The degree to which an innovation is a better solution for their problem than the current solution.

**Compatibility** - A measure of how much an innovation aligns with the existing values, needs, and experiences of adopters. The more the innovation is in line with the user's expectations, the larger the chance of adoption.

**Complexity** - If the innovation is considered difficult to understand or use, the rate of adoption is lower.

**Trialability** - The more a user can experiment with the innovation before choosing to adopt, the larger the chance of adoption.

**Observability** - The more visible the effects of an innovation is by other members of a social system, the larger the change of adoption.

In Rogers' (1995) model, the diffusion process follows an S-curve and the users adopting the technology are categorized into five adopter categories depending on

where they fall on the curve. The five categories consist of Innovators, Early adopters, Early majority, Late majority, and Laggards.

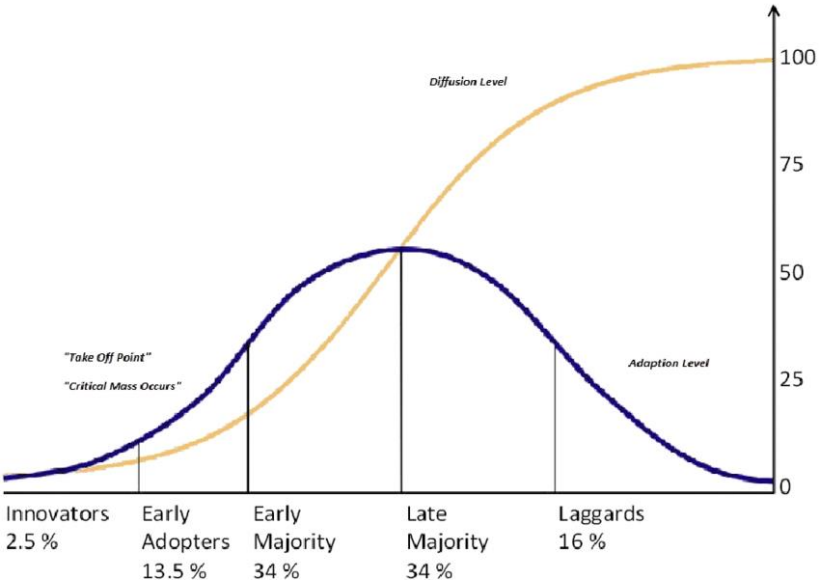


*Figure 7. Diffusion of Innovations. Diffusion of Innovations, Rogers (1995). Image taken from Researchgate.net.*

Innovators are actively seeking out new ideas. They have a broad spanning network and information intake and are comfortable with uncertainty. They are the first to adopt the innovation in their local social system and require a low amount of time for adoption due to openness to new ideas and substantial technological understanding. Early adopters are the second category of users to adopt after the innovators. They often act as opinion leaders that influence the following user categories to adopt the technology. The two majority categories rely on first seeing others use the technology before they feel comfortable using it. The last category, Laggards, are the most reluctant to change and are the last to adopt the new technology (Rogers, 1995).

### Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was initially introduced by Davis et al. (1989) and aims to explain what factors affects how a new technology is accepted and used. The actual usage of the technology is dependent upon the user's behavioral intention to use the system, which in turn relies upon the attitude the user has towards the technology. The attitude is in turn shaped by the factor of perceived usefulness, which is the degree to which the user believes that the technology in question will aid their work tasks, as well as the factor of perceived ease-of-use, which is the degree to which the technology is effortless and free from hurdles to use. Various other external factors, such as those with a cultural or personal nature, also plays a role in shaping the attitude and, ultimately, the actual acceptance and usage of the system.

By involving users early in the implementation process, for instance through showing them early prototypes or demos of the final product, perceived usefulness and perceived ease of use can be measured. User impressions of early versions of a technology are highly correlated with the final acceptance of the technology. In this manner, feedback regarding user experience can be provided to the development team, and costly and timely investments in technologies that ultimately will have a lacking acceptance-rate can be avoided (Davis et al., 1989).

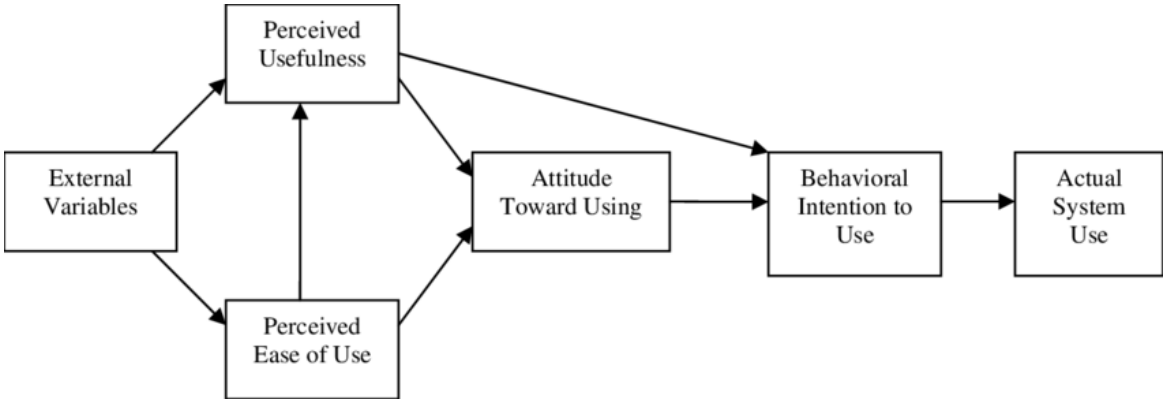


*Figure 8. Technology acceptance model (TAM). User Acceptance of Computer Technology: A comparison of two theoretical models, Davis et al. (1989). Image taken from Researchgate.net.*

TAM has however mostly been studied within settings where adoption is completely voluntary. Research done by Brown et al. (2002) seem to suggest that the adoption process may differ for settings where adoption is mandatory. Here, an individual is required to adopt the technology due to their position or in order to keep their job. They find that the attitude toward using the technology is largely unrelated to the behavioral intention to use it since members of the social system will use the technology regardless of their attitude toward it.

**Comparison of models**

The three models are approaching technology adoption from different angles. Whilst they capture slightly different aspects of the process, there is a large overlap between them. The TOE-model describes the high-level landscape of factors involved with technology adoption. The TAM-model describes factors that influence adoption of a technology from a user perspective. The Diffusion of Innovations model describe how the innovation spreads through a social system across time. The diffusion process depends on all three aspects of the TOE-model. The nature of the technology itself, as well as the inter- and intra-organizational communication channels, affects the rate at which the innovation diffuses. The TAM model is mainly focused around the technology dimension of the TOE-model. However, the environmental and organizational factors of the TOE-model further influences attitude and behavioral intention, as well as final use of adoption. The factors of

relative advantage and compatibility of the Diffusion of Innovation model relates to the factor of perceived usefulness of the TAM-model, and complexity is related to perceived ease of use. Trialability and observability can be seen as additional variables affecting the attitude and behavioral intention to use the technology.

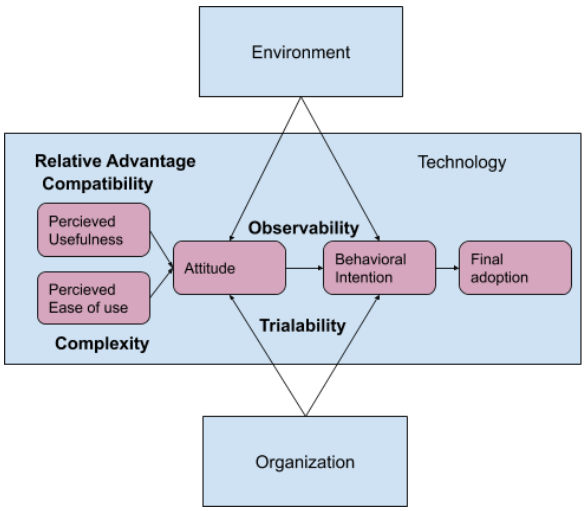


*Figure 9 A combination of the three adoption frameworks, with TAM located within the technology dimension of the TOE framework, and the five factors influencing adoption from the Diffusion of Innovation model in bold.*

## 2.2.10 Expectation management

Borup et al. (2006) discuss how initial expectations of potential users regarding technology impacts adoption, and is a key factor for understanding technological change. Expectations spreads between groups and communities and acts as a link between the technological and the social spheres surrounding innovation. Expectations can be seen as present representations of future capabilities and situations and as a guiding force in the adoption of technologies across social systems. Clear communication surrounding what a technology can and cannot do can act as a means of reducing the degree to which unreasonable expectations based on inaccurate grounds are made (Borup et al., 2006).

The Gartner consultancy ‘hype cycle’ illustrates how expectations of a technology shifts as the technology matures. The expectations are the highest during the early phases of a technology and peak shortly after the technology is triggered. After the initial peak, there is a rapid plummet as the initial expectations fail to be fulfilled. The expectations then progress in a moderate development. Companies can leverage the hype cycle as a tool when deciding how to position themselves when considering the adoption of new technologies (Gartner, 2020).

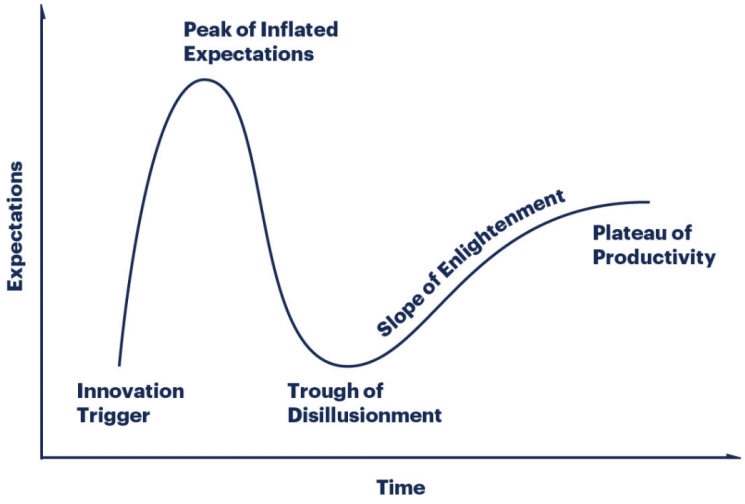


*Figure 10. The Gartner consultancy 'hype cycle'. Gartner (2020).*

## 2.3 Development

In order to have a strong development process it is important to keep a good balance between the technical and organizational side of the implementation, considering the limited resources that the organizations has granted the development of the virtual assistant. Professional knowledge both in software engineering and computer science is required at the same time as it is also important to have a solid understanding of the target users and which business goals to pursue when building out the software. Even simple functionalities and capabilities of the virtual assistant can require large amounts of manual labor from the development team. It thus becomes crucial that the team is a multidisciplinary team which has a foot in both sides of the development.

User involvement, as is also the case with other design projects, is of great importance. When creating a virtual assistant which is supposed to assist workers in the organization, understanding their needs and pains is crucial when it comes to prioritization. However, this is easier said than done as it can be difficult to correctly predict what functionalities will be value adding before they are out in production. At that point, the resources have already been spent and it might be the case that the functionality developed was a miscalculation in terms of actual usage by the user base. This leads to a chicken-and-egg situation where a well performing virtual assistant requires a strong and active user base, and in order to have a strong and active user base for the virtual assistant a well performing virtual assistant is required. This leads to a development process which benefits from an Agile and iterative approach where the development is executed in sprints and an infrastructure to support feedback and transparency towards the user base is set in place (Meyer, 2011).

## 2.3.1 Software engineering – quality characteristics

From an academic perspective on the software quality, there are a number of quality characteristics relevant to understand product quality defined by ISO 25010:2011, see Figure 11. These are performance efficiency, maintainability, portability, compatibility, security, usability, reliability, and functional suitability (ISO/IEC 25010, 2011). These characteristics has been defined with the aim of being as complete as possible and have little to no overlap between each other. In the case of a bot framework, quality can be approached by viewing it through these lenses.

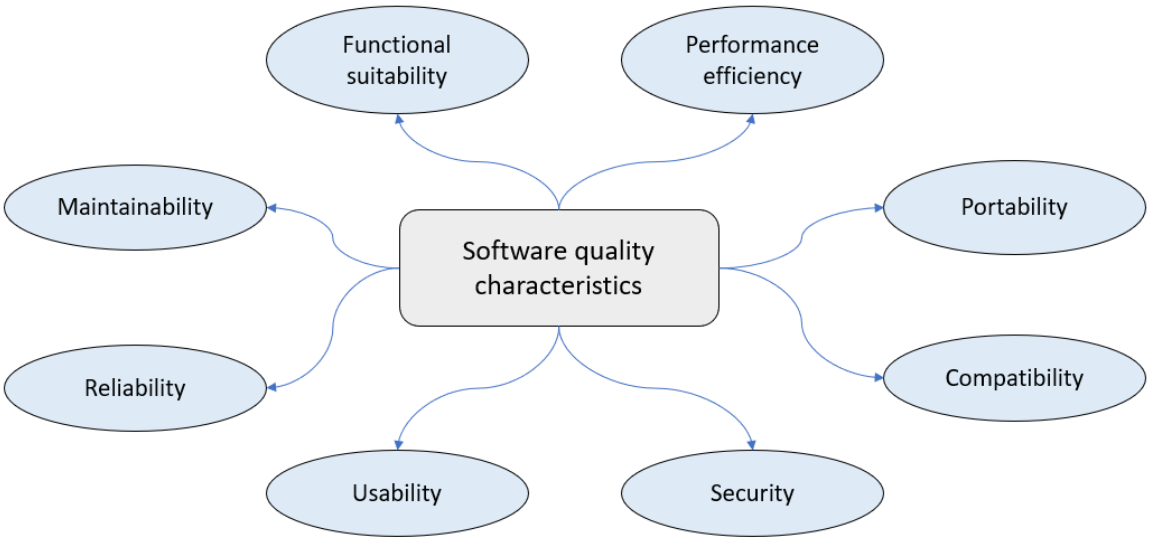


*Figure 11 Overview over software quality characteristics as defined by ISO 25010:2011.*

Functional suitability refers to the degree the product meets stated and implied needs when used under specified conditions. When the expected functionality of the bot framework has been made clear, this characteristic can be measured by investigating the performance of the product in the terms of functional completeness, functional correctness, and functional appropriateness. Maintainability entails that the product can be easily modified by its maintainers, the development team. This characteristic is broken down into the following aspects: modularity, reusability, analyzability, modifiability, testability (ISO/IEC 25010, 2011). In a fast-paced development process with changing requirements, this characteristic can be viewed as being of importance to the development of a virtual assistant software.

The quality characteristics portability and compatibility address how easily migrated the software is between hardware and software environments respectively. Interoperability, how well the software can interact with other software, is a sub-characteristic of compatibility and is crucial within the context of a large organization with many in-house software created by different teams and in different programming

languages at different points in time (ISO/IEC 25010, 2011). Since the scope of a virtual assistant at the time of the writing of this report is largely undefined, this entails that most current software and apps existing in organizations today are potential targets to be interacted with by the assistant. This could be either probing them for information or instigating a process handled by that particular software. This puts pressure on the interoperability of the virtual assistants, requiring it to be flexible in order to interact with a host of other products. This holds especially true to a centralized virtual assistant, where one integrated software architecture interacts with many other.

Reliability is another quality characteristic defined by ISO 25010 concerning the degree to which a software performs specific functions under specified conditions for a specified period of time. This encompasses aspects such as availability, maturity, fault tolerance and recoverability. This quality facet is of high importance for any software, and virtual assistants can not be said to be an exception. For a virtual assistant to become a trusted tool which an employer feels comfortable turning to with inquiries and tasks, various forms of downtimes should both be kept down in amount and impact. This can be measured in availability of the bot in a certain time frame, for example the percentage of hours the assistant was unavailable on a monthly basis. This discussion regarding the benefits of reliability also ties into the importance of the characteristic of performance efficiency. Performance efficiency addresses the performance of the software product relative to the amount of resources used under stated conditions. The subfields of performance efficiency are time behavior, resource utilization, and capacity (ISO/IEC 25010, 2011). Similar to how downtime of the product can deter users, slow computing and lag in the interaction is also something that should be avoided. This holds true both from a user perspective and a developer perspective. The user will experience the slow computation of the different tasks that they try to get accomplished via the virtual assistant, holding them up in their work. The developers will instead on the back-end experience how the virtual assistant consumes large quantities of data capacity and processing power to perform its tasks. Both factors should optimally be kept at a low level in order to leverage a high-performance efficiency.

Security is another quality characteristic which as well is critical to the quality of software products. Security encompasses the sub-characteristics of integrity, confidentiality, non-repudiation, accountability, and authenticity. Data protection is a factor that is covered by the security characteristic, and is a very important factor in contemporary society with its many cyber security and GDPR laws. Through usage of a virtual assistant, the user is providing the software with their personal data in form of transcripts of the conversation that they have with the assistant. This is potentially sensitive data which can be used towards inferring and exploiting personal details about the user if used unethically. In order to ensure that the data is not exploited in an unwanted way, the integrity and confidentiality of the software product must be kept to a high standard. Likewise, non-repudiation, accountability

and authenticity covers that only the people responsible have access to the sensitive data and that it is possible to trace whomever modifies or takes actions within the software environment (ISO/IEC 25010, 2011).

The final quality characteristic of the eight laid out by ISO 25010 is usability. Usability refers to that the product can be used by the specified users with satisfaction in a specified context of use (ISO/IEC 25010, 2011). In the context of a virtual assistant this becomes a large characteristic as the intended functionalities can vary greatly from each other. This entails that it is challenging to ensure a high standard of satisfaction for all use cases as they might have to be quality ensured on a feature by feature basis.

### 2.3.2 Agile software development

The Agile software development process is one of the most common approaches to software development today. It was ideated in 2001 through the “Agile Manifesto”, a compendium of ideas co-created by a score of accomplished software engineers. As opposed to a single development method it can be viewed more as a general philosophy which various full-fledged methods applies to different degree (Meyer, 2011). Agile builds on an iterative based development process which is adapted to an ever-changing environment of requirements and technical capacities. Historically, software projects have been notoriously hard to plan out. Traditional project management approaches such as the Waterfall software development method has been unreliable as they struggle to account for the unforeseen problems that arise with software projects. One of the strengths of the Agile approach is that allows for a more dynamic process, accounting for unforeseen problems that might arise during the development process (Meyer, 2011). This aspect makes it well suited for a software like virtual assistants where there is still a lot of unknown variables to account for due to its novelty and the subsequent shortage of research and best practices within the field.

### 2.3.3 Internal marketing, promotion, and communication

With a more rapidly changing and complex industrial landscape, internal communication has become an increasingly important part of business practices. Quirke (2008) discusses how internal communication plays an important role in ensuring that employees understand and are aligned with the larger change efforts of the organization. When considering internal marketing and promotion efforts of change initiatives it needs to be rooted in context of the big picture reasons for why the change is necessary. In failing to communicate the broader reasons for why change is necessary, employees may not be motivated to embrace and actively engage with change efforts. The author suggests that communication can occur on

different levels. Executives can provide the high-level context and vision of the change initiative. Business units can communicate the challenges and day-to-day implications and current issues facing the unit. Finally, project owners of a change project can communicate how the change project can assist in solving these challenges and issues (Quirke 2008). Actively working to communicate the need for change is also a crucial step in Kotter's (1995) model for successfully managing change projects. Similarly, the effectiveness of communication networks greatly influences the rate of diffusion of innovations within a social system according to Rogers (1995).

## 2.4 Theoretical framework summary

The literature study was divided up in three parts: technology, management, and development. All of these and their associated topics were included in order to portray the different layers of the research question posed for this report. Figure 12 illustrates how the topics covered in the theoretical framework connects to the research question.

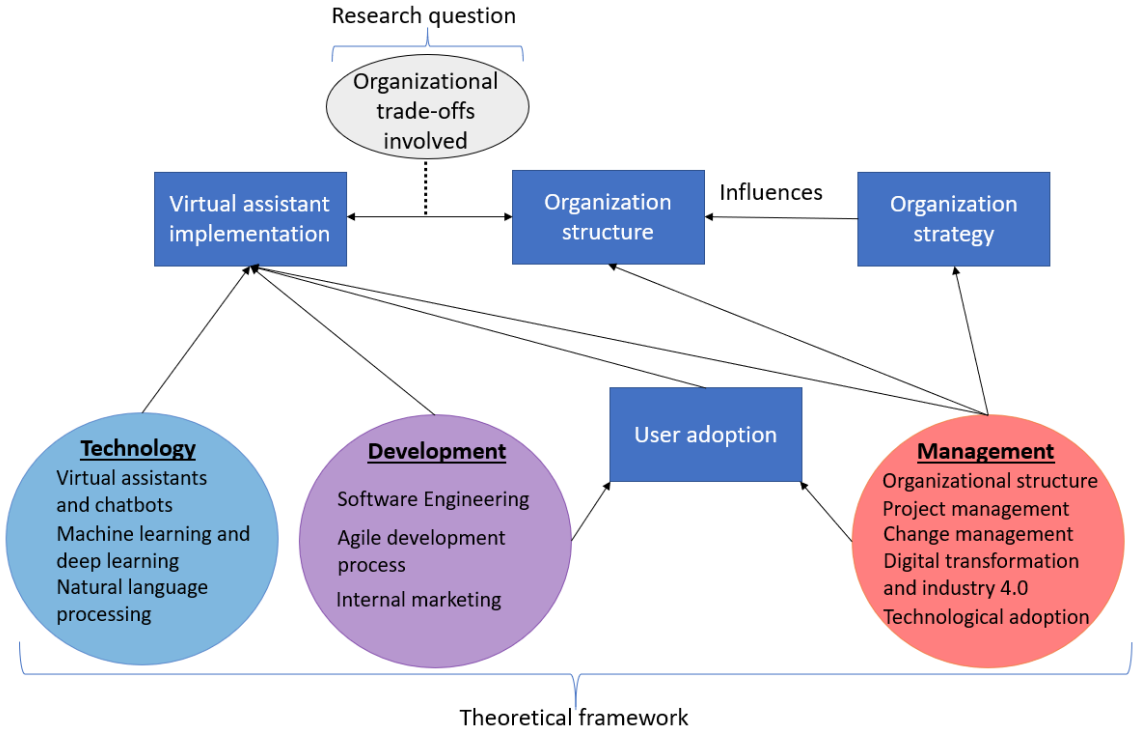


*Figure 12 Interrelation between the three sections of the literature study with the research question and the variables used in the discussion.*

All literature study categories in this report, technology, development, and management, helped leverage an understanding of virtual assistant implementation. The management category also leveraged understanding of organization structure and organization strategy. Connecting the topics of virtual assistant implementation and organization structure was the foundation for starting to identify the organizational trade-offs that are involved in successfully implementing the technology.

The interrelation between the different parts of the theoretical framework for the context of this report is visualized in Figure 13. It can be viewed as a causality chain starting from technology and ending in development, with management being connected in between. The capabilities and limitations of virtual assistant technology helps to inform which areas of development are focused on. Similarly, the technology section also puts some fields of the management section into perspective. The relevant management frameworks brought up in this research also influences aspects of the development. Through this structure, the technology section attempts to ground the discussion in a technical backbone where the nature and limitations of the technology can help to shed light on aspects and challenges in the management and the development. An example of this is understanding how NLP functions. The inherent complexity of stacking all the content of an organization, which may be vast, within one bot, has technical consequences in form of ensuring quality. This connects to the managerial discussion regarding the organization's bot structure strategy, as an argument in favor of having a more decentralized structure. The management fields regarding change management and user adoption holds relevance for the Agile development process in terms of user involvement and enabling streams for feedback. This holds true especially in the virtual assistant context, where there is still little in terms of established standards and best practices in development of the technology, emphasizing the benefit of streams of feedback.

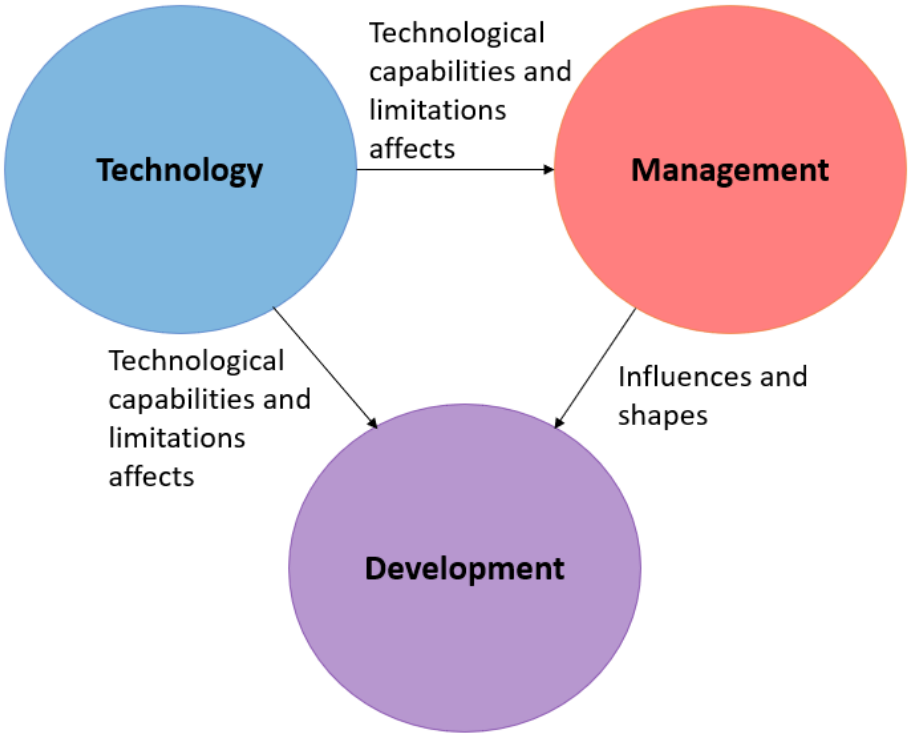


*Figure 13 Interrelation between the three sections of the literature study in the context of this report.*

# 3. Methodology

This chapter provides a description of the design and research methods used in this report.

## 3.1 Project time schedule

This study was spanning over 20 weeks and consisted of four main phases. These phases were planning and preparation, data gathering, data analysis and report writing, and presentation and opposition. When these phases took place in scope of the duration of the study can be viewed in Figure 14 which presents a Gantt chart of the activities. The different activities and their time spans relating to the project are displayed in the chart. The main phases are displayed in dark blue and the activities that they consist of in light blue. Efforts were made to have the data gathering phase being concluded in good time, leaving ample space for analysis and report writing to take place. The activity of data gathering that took the longest time was the literature study. This was due to the broad scope of the research question and the fact that the other data gatherings methods revealed new facets of information which required a continuous revision and expansion of the literature study.

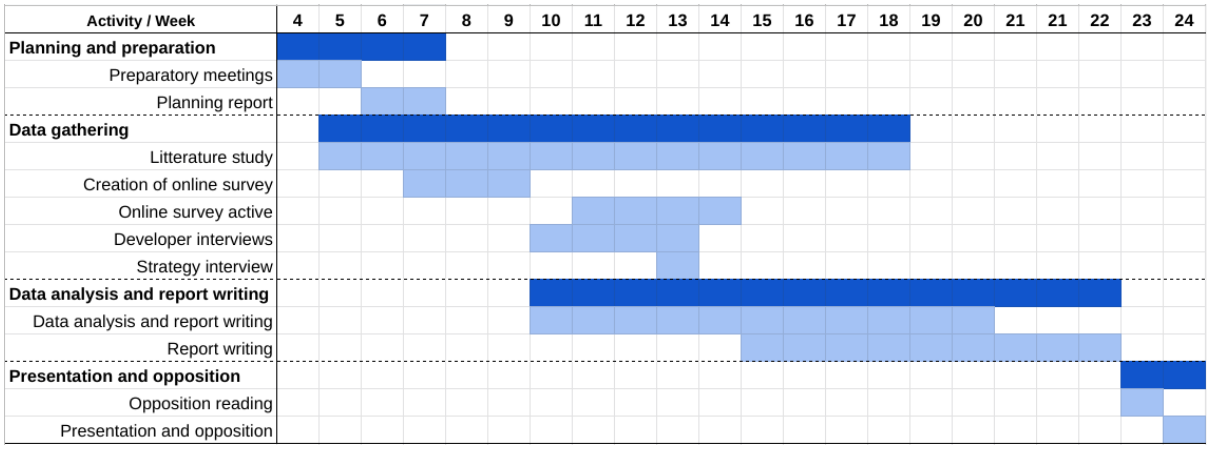


*Figure 14 Gantt chart illustrating the timeframe for the different activities undertaken as part of the study.*

## 3.2 Literature study

A literature study was conducted spanning areas of research within both management and technology. It was categorized in three parts: technology, management, and development. The study aimed to support the data gathered from the case study through comparison with previous findings within the various fields. Due to the open-ended and exploratory nature of the study, the literature study is spanning a broad scope of topics to support the holistic view the study aims to present. The topics were connected together to leverage a holistic understanding of virtual assistant implementation, as well as how it connects to organizational

structure and strategy. Through this wide study, the research question regarding organizational trade-offs involved in virtual assistant implementation was approached from multiple perspectives.

## 3.3 Interviews

Interviews were held as part of the research for the data gathering for the development perspective and the strategy perspective. The interviews were all conducted through virtual meetings.

### 3.3.1 Interviews with developers

To get a broad picture of the processes and challenges involved in implementing successful virtual assistant technology from a development standpoint, a comparative study between three large organizations was conducted. The three organizations were Essity, SAS and X which are all large corporations in different industry sectors. This enabled for a more nuanced picture that showed similarities and differences between the organizations and their efforts to develop virtual assistant technology. The interviews were held through video calls and lasted for one hour each. The subjects interviewed were managers in charge of the development process of virtual assistant technologies. This ensured that they were in the right position to bring insights into the nature of the development process at their organization.

There was a framework of questions established for the interviews in order for a comparative analysis between the companies to be possible. However, as the working process at the different organizations was unknown, the interviews were carried out in a semi-structured and exploratory manner. If an area appeared especially interesting or relevant to the study, there could be follow-up questions that were not part of the initial template. The questions were formulated to gain an understanding of the broad picture of the current efforts in developing virtual assistant technology. They were aimed toward understanding why they had chosen to develop virtual assistant technology in the first place. Of interest was also how they structured their work internally within IT and across organizational categories, where they found value and use cases for the technology, how the technology was approached by the users, how and why they chose to work with the platforms they were working with, and how they evaluated the quality of the assistants.

The audio of the interviews was recorded and later transcribed to ensure that all details of the interview was captured. A comparison between the different approaches from the companies was carried out and summarized within a framework (Table 1, in the Analysis and Results chapter). There is a limitation in that the sample size of three organizations, while giving a large scope of data and the

ability to perform a comparative study, might be missing key elements and insights regarding the development of the technology that may have been found if a larger number of organizations had been investigated. The limited timespan of the interviews and the broad scope of the study caused the focus of the interviews to be more on managerial aspects, rather than on a detailed analysis of how the particular technical aspects differed between the development processes. Technical details were however discussed to some extent.

### 3.3.2 Interview with upper management

One perspective investigated within the scope of the study was the innovation and industry 4.0 aspect of virtual assistant technology. The perspective is aimed toward gaining insight into where the technology fits into the larger whole of the industry landscapes of the future, and why it is important to put effort into developing virtual assistants. This perspective was covered by an interview with a VP at Essity, and served as an example of a case study where AI technology is being developed and is a part of corporate strategy.

The interview was conducted through a video conference call and followed a set of questions divided into two part. The first part focused on AI technology in general and the second parts focused on virtual assistant technology specifically. The aim was to gain an understanding into why Essity had chosen efforts into focusing on AI initiatives in the first place and how they saw value being derived from it. It was discussed from an innovation and strategy point of view investigating how the technology would affect the future of Essity and organizations at large. For virtual assistant technology, the larger vision of how the technology could assist employees within the workplace was discussed. This included the potential of when the technology had matured and a good fit for the organizational capabilities had been found.

## 3.4 User study

Users were interviewed through an online survey that was created with the software Microsoft Forms and was made available for Essity employees at the Gothenburg office, resulting in a sample size of 1100 employees from a wide variety of departments, out of which 143 responded to the survey. The survey was accessible through different channels such as the company's internal webpage and promotion articles. It was available for four weeks, from early March 2020 to the beginning of April 2020. The survey was created in close collaboration with the virtual assistant team at Essity.

## 3.4.1 Development and description of online survey

The online survey was created with the software Microsoft Forms which was made available through Essity's Microsoft package. It was designed in close collaboration with the virtual assistant team at Essity who helped to formulate the questions and provide valuable insight. This guided the formulation of the questions as well as the interpretation of the results. For example, responses could include internal Essity abbreviations or words that have a certain meaning within the Essity context. This insider knowledge was crucial in both the creation of the survey as well as the interpretation of its results.

The survey consisted of a total of 29 questions, however it included multiple branches meaning that each participant would only answer a portion of the questions depending on what they answered. In total there were 8 different branches, see Figure 15 for a flowchart of the branch structure. Out of the 29 questions in the survey only 9 questions were answered by all the participants while the other 20 questions were part of the various branches of the survey and therefore only answered by a subset of the whole sample that participated in the survey.

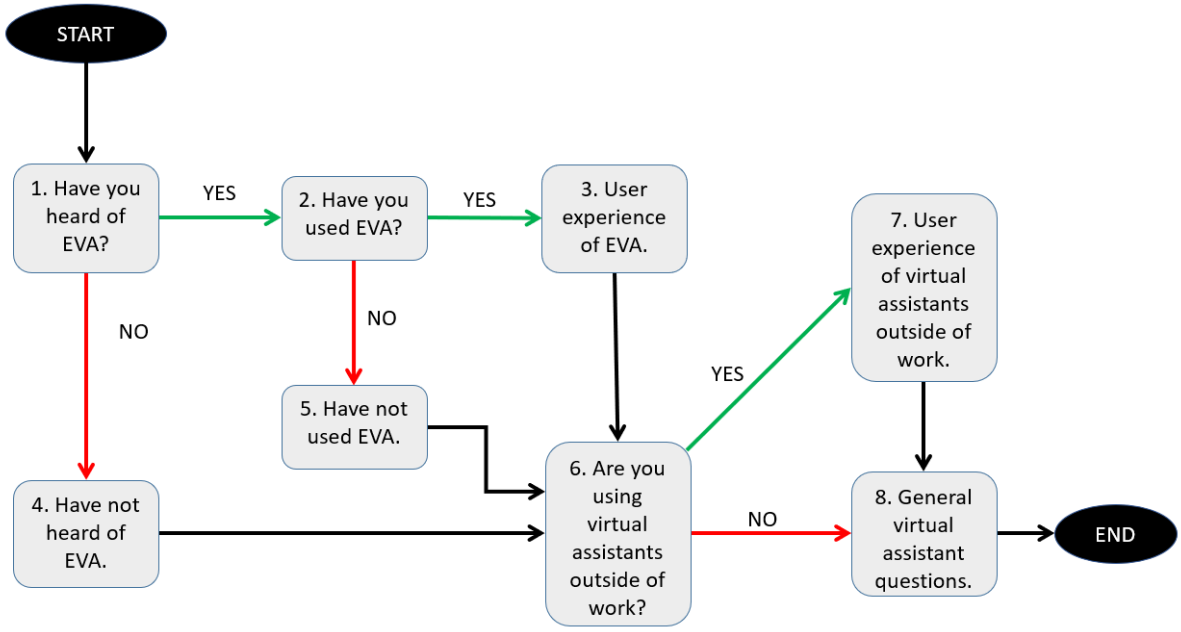


*Figure 15 Flowchart of the branches of the online survey.*

The survey was designed to be completed in 5-10 minutes to make it easy for employees to contribute. The branch structure allowed for participation to be quick while also customizing the content depending on the participants answers, thus not displaying irrelevant questions to the participant. The first section of the survey was questions specifically regarding EVA. Depending whether the user had used EVA, only knew of EVA or did neither know of nor had used EVA, the questions asked

would be accommodated to this. A question regarding potential future capabilities was asked on all branches. Beyond this question there were a few segments that were always included no matter how the questions were answered. The first of these segments were section 1, which included introductory questions about which department and business unit within Essity the respondent belonged to and if they knew of EVA. Depending on the answer to the EVA question they would be forwarded to corresponding sections. After this branching, all paths converged to a question of whether the participant is using virtual assistant technology outside of work i.e. services such as Siri, Alexa, Google Home. If the participant answered yes to this question, they would be asked several follow-up questions regarding their usage of virtual assistant technology outside of work. If they answered no, they would be sent to the final section which asked general questions about the future of AI in the workplace.

The format of the questions varied throughout the survey. Many questions were in the form of single or multiple-choice questions. These types of questions allowed for the results to be quantifiable and turned into graphs. Beyond these choice-based questions, several questions were in written text format in order to allow the participant to elaborate on their answer. In section 3, user experience of EVA, Net Promoter Score was used as a foundation for the user to rate their experience. Net Promoter Score uses a range from 0-10 to rate a user's experience. A score of 0-6 is considered detractors which are not satisfied with the product. 7-8 are passives. 9-10 are promoters which are likely to spread awareness of the product by word of mouth. The final Net Promoter Score is calculated by taking the percentage of 9-10 subtracted by the percentage of 0-6 (Rogers et al., 2015). In the final section, general virtual assistant questions, Likert scales were used to assess the participants emotional state toward AI in the workplace. Likert scales are generally used to measure opinions, beliefs, and attitudes in order to get a sense of the user's perspective. The participant is given several statements and is asked to indicate whether they agree or disagree with the sentiment. The typical interval has 5 slots which range from "strongly disagree", "disagree", "neutral", "agree" and "strongly agree" (Rogers et al., 2015). This format was used for the Likert-scale questions in this survey.

### 3.4.2 Motivation for online survey

Initially the interviews with the user were planned to be carried out face-to-face in a semi-structured format. A set of questions would be the same for all subjects, with both open ended and questions that would lead to quantitative results. However, after discussion with the development team at Essity, the decision was made that it would be more beneficial to conduct an online survey that would be completed anonymously by the users. This had several benefits.

Firstly, the anonymity of the survey was more in line with the anonymity of the usage of the virtual assistant. It was of less importance to track individual answers, but the

focus was rather to derive what the general opinions were on the various questions, i.e. the abstractions of all completed surveys.

Secondly, through an online survey it is possible to reach more users in a shorter time span. If the interviews were to be conducted face-to-face it would for practical reasons result in fewer participants and likely only include participants that was easier to come into contact with. The quantity of performed interviews were also a strong factor to perform an online survey. The survey was aiming to represent the opinions of Essity employees in general, and the organization has close to 50,000 employees worldwide. Therefore, in order to achieve interview results that could aspire to provide generalizable insights, having a large amount of people participating was considered to be favorable over the depth of each particular interview. Furthermore, the virtual assistant is supposed to be of use to all employees across all departments and functions of the company. Through an online survey, the threshold for allowing employees was diminished and no coordination efforts were required, since it could be completed at the will of the user at a time that suited them.

Finally, marketing and communication of the survey was simplified by having it online. It was made available on the main internal company web page along with promotion material in the form of a short video presentation and accompanying articles. The alternative cost in effort of this when compared to conducting a series of face-to-face interviews cannot be understated. Face-to-face interviews requires more of the participant in terms of time investment and planning out when it would be a good time to have the interview. Practically, it would require a more targeted effort by the interview team to get participants. This would entail that decisions would have to be made regarding which departments to reach out to which in turn would introduce bias in the sampling of interview subjects. A non-mandatory, but highly encouraged, online survey easily accessible to all employees paves way for a more randomized and more generalizable sample.

### 3.4.3 Drawbacks and challenges with the online survey

The main trade-off brought about by abandoning the initial format of face-to-face interviews were the depth of each interview and the ability to ask follow-up questions. If interesting responses were given to certain questions in a face-to-face format, valuable information could potentially have been derived by probing further on the topic by asking follow-up questions. Furthermore, information regarding the users attitudes toward the technology communicated through for instance body language or tone of voice was also missed as a result of using an online survey as opposed to interviews. However, due to the reasons mentioned in the previous section of this report, it became clear that the benefits of an unsupervised online

survey would outweigh the depth that could have been gained from a face-to-face format. Ultimately, the results are aimed to be generalizable and as such the quantity of responses and the diversity in the participants were deemed preferable to a smaller sample with higher quality.

While the online survey allowed numerous employees to be reached, the fact that it was limited to Essity's Gothenburg office can be anticipated to have affected the results. Even though the Gothenburg office is a large office that hosts various different departments it might still not be able to paint the complete picture. The main reason for this is that a large portion of Essity's employees are working in factories and in shifts and the Gothenburg office is mainly composed of office workers. The virtual assistant is intended to support these manufacturing employees as well as the office workers. This could result in a skewed sample as the online survey was supposed to represent the general population of users which includes all employees of Essity. Beyond the fact that mainly office workers participated, the fact that all employees participating were located at the Gothenburg office might also add certain locational and cultural biases, impacting the results.

## 3.5 Data analysis and methodology

The data gathering performed as part of the research for this report consisted of both qualitative and quantitative data. The literature study, development interviews, and strategy interview produced qualitative data. The online survey produced both quantitative and qualitative data, accumulated through the responses to the questions of the survey. Through analysis and comparison of the data gathered from the case studies, alongside with findings and insights gathered from the literature study, patterns were found that suggested areas that were seen as being of particular importance relating successful virtual assistant implementation. The study did not aim to provide any definite recommendations or implementation plan, but rather to discuss the challenges surrounding successful implementation of virtual assistant technology, and to identify organizational trade-offs involved in accommodating it.

The data analysis of the online survey varied depending on the format of the question at hand. Graphs were created for the single-choice questions and the multiple-choice questions. These were in pie chart format for the single-choice questions and bar chart format for the multiple-choice questions. Furthermore, charts were created to express the results of the Net Promoter Score questions as well as the Likert-scale questions. Microsoft Forms allowed for an Excel sheet containing all questions and all answers to be downloaded. This Excel sheet was utilized to analyze and categorize the qualitative data accumulated from the free-text answers. For each free text question analyzed, the answers given were read through and categories that connected similar answers was created. This was done in order to

group the responses and turn the qualitative data into quantitative data as well by deriving the frequency of each of the categories. Some responses were multi-layered in which case it was identified as belonging to multiple categories. The drawback with this approach, a drawback that is inherent when analyzing qualitative data, is that the categories that were formed are to a certain extent arbitrary and that the way they are ideated can be influenced by biases of the person setting up the analytic framework (Rogers et al., 2015). This also holds true for how the responses are identified as belonging to one of these categories which also runs the risks of being a somewhat arbitrary process. Interaction effects were also studied for parts of the survey to generate more depth to the results by examining how variables in the population affected the results.

In the case of the developer interviews, a chart highlighting the main aspects of discussion was created, presenting the differences between the companies involved. The categorization of these aspects was in some cases made from direct questions asked to all the subjects, and in other cases made subjectively based off information that emerged throughout the interviews. The aspects could then be used to benchmark the different development process and achieve an overview of differences within companies approach on each aspect. Each area was analyzed and discussed individually to shed light on the different approaches the interviewed development teams were taking on that particular area.

The strategy interview was analyzed through considering Essity's unique situation as an organization and how it is approaching digitalization and the virtual assistant technology. The analysis for this was done in light of the research that had been made on the relevant topics in the literature study for organization, digitalization, and strategy.

# 4. Analysis and results

This section provides an analysis of the three sets of data gathered in this study.

## 4.1 Developer perspective

For the different development teams interviewed, there were some differences in how they were currently working with virtual assistant technology, but there were also many patterns of convergence. Below is a comparison between the developers' perspectives from the organizations, categorized into different areas that were considered relevant. All companies interviewed were using the Microsoft Azure Bot Framework in their development and were all using variations of an Agile software development approach.

| **Area** | **Essity** | **SAS** | **X** |
|---|---|---|---|
| **Departmental structure in bot development** | IT and Business Services | Innovation lab proves concept, IT develops | IT department specifically for internal use cases |
| **Challenges in cross-departmental work** | Fuzzy department lines, project responsibility, technical know-how | Project responsibility | Centralization versus decentralization of digitization efforts |
| **Opportunities in cross-departmental work** | More efficiency and better quality of responses | New use cases | Better quality dialogue responses |
| **Centralization of bots** | Decentralized | Centralized | Centralized when similar use case |
| **Internal versus external bot** | Internal for learning, external for value | External | Internal, potentially external in future |
| **Broad and general versus narrow and deep bots** | Narrow and deep | Narrow and deep | Depends on use case |
| **Current use cases** | Raise tickets, answer questions | Travel assistant, FAQ | Meeting room booking |
| **Feedback** | Make it easy for users | Power users | Make it easy for users |

| | | | |
|---|---|---|---|
| **User expectations** | Hype with new technology | Sometimes unreasonably high | Internal users positive and excited |

*Table 1 Comparative analysis of different development areas.*

### 4.1.1 Departmental structure and project responsibility

When considering working with virtual assistant technology, and with digitalization projects in general, one challenging area that emerged was regarding how the work was divided between departments. As was discussed by Iansiti et al. (2020), a general trend with digitalization projects are that organizations are being forced to re-evaluate their existing organizational structure. There is a need to put more emphasis on cross-departmental collaborations, a view that was shared by all three companies interviewed.

Whilst the organizational structure and cross-departmental work differed between the organizations interviewed, what was agreed upon was that there were fuzzy lines between IT and the different business units and that more work could be done in terms of establishing guidelines for responsibility and ownership of projects. All companies agreed that the content creation of the virtual assistants, such as the questions and answers, should be owned by the different business units involved and that IT would be responsible for aspects such as the functionality, back-end infrastructure, and data security of the assistant. Essity had two departments primarily involved in the development of the virtual assistant, where the IT department provided the back-end infrastructure of the assistant and a business services team provided the content and user interface. They maintained however that the division of ownership between the two departments were intertwined and that it would be valuable to investigate if the two departments should rather act as one. SAS had a unit called Innovation Lab designated toward developing and evaluating new potential technologies. This was where the virtual assistant technology was being ideated and the proof of concept was formed. After the concept had been proven and deemed valuable it was handed over to an IT development team that further fostered the development and implementation, working alongside business units required for managing the involved content. X had a team specifically dedicated toward developing internal virtual assistants. This team was separated from teams that were working on customer facing virtual assistant technology.

There was also a challenge regarding the complexity of the platform, where it may be difficult for non-IT personnel to create content within the virtual assistant if the interface was too “code-heavy” and required high amounts of IT-skills. On the other hand, if IT was managing all of the content creation, it would lead to long waiting

times and bottle necks from the business unit-side. This in turn could prevent IT-personnel from spending more time on architectural and technical tasks. Essity describes how it is a delicate balance between making sure that IT is handling all aspects that cannot be handled by the business units, while still giving enough responsibility toward the business units as to not slow down processes.

One potential opportunity arising from a closer working relationship between IT and other business units when developing the virtual assistant would be that it enabled new use cases to be uncovered. This is due to the fact that the people who were closer to the customers and various business processes would be in a position to provide insights that would not arise if the project was solely developed by IT.

### 4.1.2 One bot versus many bots

Using a single bot would provide ease of use, ease of access and a single point of entry from the standpoint of the user. A drawback with using a single bot spanning a broad range of areas is that it increases the difficulty of predicting the correct utterances and providing an accurate answer to the question. This can reduce the perceived usefulness of the technology and potentially lowering the final rate of adoption, as discussed by Davis et al. (1989). Using multiple bots would solve the problem of utterance confusion, misunderstandings in interpreting the meaning of a phrase submitted to the bot, by covering only a single area designated for responding to specific type of questions. Drawbacks that were identified with this approach was however that it may result in a situation where the employee would first need to locate the correct bot before asking the question and thus making the process more complicated.

Essity were still uncertain regarding the best way of tackling this issue and mentioned that it may to some degree be beneficial for each business unit to have their own bot, if they have identified a need for it. SAS would rather have one bot as a point of entry for their assistants, increasing simplicity and avoiding the issue of the user first having to “locate the right bot” before asking their question. X was approaching the question in a manner of “bundling together” similar use cases in one bot framework, and if the cases differed too much they would be treated separately.

All organizations agreed that the point of entry from the user standpoint should be simple and straightforward, whereas the back-end architecture could consist of a more complicated network of interconnected bots. One solution could be to have a “delegation bot” that served as the user-facing bot and that would redirect the user toward the appropriate bot. Through this approach it may be possible to draw the benefits of narrow and deep bots, such as avoiding the potential confusions of utterances between areas, whilst retaining the simplicity from the user of a single point of entry.

### 4.1.3 Internally versus externally facing virtual assistants

Another area of importance was whether to focus on developing internally or externally facing assistants, or both. All companies could see potential value in both internal and externally facing virtual assistants, although SAS and Essity considered the main value from the assistants as to be derived from the external use cases. SAS had two externally facing virtual assistants, one of which they perceived as being of particular value due to its narrow and specific characteristics and its ability to provide highly accurate and useful information to the customer within a narrow set of questions. SAS was considering developing a “low-maintenance” internal virtual assistant to be able to conduct a broad range of tasks that does not require a large development and maintenance effort, since they viewed the main value of the virtual assistants to be found externally, and is where the effort should be spent. Essity was focusing efforts on developing a virtual assistant in an internal environment as a “testing ground” in order to develop competence within the technology. However, they did not yet see any major efficiency improvements or potential cost savings arising through internal usage. They were looking to eventually shift focus toward externally facing assistants since it was seen as having the potential for generating the most value. X had a separate department focusing on customer facing virtual assistants that were part of the products, and the team contacted in this study was working solely with internal use cases. However, they stated that in the future these assistants could potentially be integrated with resellers and other partner organizations.

### 4.1.4 Identifying value and use cases

SAS had identified the main value as being found in externally facing “narrow and deep” bots that would be able to perform with a high degree of quality and accuracy within a narrow scope. They described how they have created a bot tasked with answering FAQ-questions, and could see value in a customer service bot that could act as a first layer of customer support and provide an additional channel of communication from the customer standpoint. They further describe how virtual assistant technology can create entirely new value possibilities that were not previously possible, which was the case with their travel assistant. Essity saw the main form of value as being created externally, for instance as a first layer of customer support that could offload pressure from customer support personnel. They could however see potential value from using internal virtual assistants, such as for instance locating information in the company portal. They maintained that it was a challenge finding the sweet-spot, and that it required experimentation and trial-and-error. X had already found value with their internal virtual assistant through tasks such as meeting-room booking and could find other potential value creating use

cases such as locating expertise, and finding the desks of people within the building. Another ambition for virtual assistants was toward knowledge management and Question-and-answer type application areas. This functionality could potentially benefit a wide variety of business units within the organization.

### 4.1.5 User expectations

SAS had found that the users of the technology often had unreasonable expectations of what the technology could do, and underestimated the amount of manual effort that went into building the virtual assistants. When the users hear about progress that has been made within certain AI technologies, they may immediately expect it to be available to them and relating to their working tasks. This seemed to apply to new technologies in general. Essity drew a parallel to when apps were just emerging as a technology, at which point everyone wanted an app for their work tasks before having identified a clear use case.

X described how people within their organization had a positive outlook and were generally excited for the technology and what it could do for them. They also highlight that employees have a different set of needs compared to the end customers. The employees are viewing the bot as another tool within their toolbox, using it to solve specific problems. Using a “mock-up” or a demo version of the assistant to get an early perspective upon the user’s perception and expectation of the technology can help guide future development and increase the likleyhood that functionalities that will be appreciated by the users is being developed. SAS mentioned that through using narrow and deep bots, it can be clearly specified to the user what the bot is and is not capable of doing, setting more realistic expectations on functionality.

### 4.1.6 Feedback mechanism

X describe how feedback is very valuable when developing virtual assistants but stresses that it is important that the process is simple since the user typically does not have time to provide detailed feedback. They are using a starring system as a measure of the quality of the responses of the assistant. SAS describe how they have greatly benefited from feedback of “power users”, users that are highly engaged in the technology and provide detailed feedback. This feedback has then in turn resulted in new functionalities and additions to the technology.

### 4.1.7 Long-term vision for the technology

All three companies were still in the process of experimenting with new use cases. X had started seeing some value in internal use and SAS in external. However, all

companies saw more potential value being derived a few years down the line when the technology has grown stronger and more competence and organizational fit for the technology has been found. In this sense, they saw that the amount of resources and effort that were put into the technology today would prove valuable a few years down the line. All three companies believed that internal virtual assistants would be a part of every large organization of the future. However, they were of the opinion was that it was still uncertain what form this would take. This included aspects such as what type of tasks the virtual assistants would handle and what the degree of centralization of the bot structure would be.

## 4.2 User perspective – survey results

This section covers the results and analysis of the online survey that was created for this study.

### 4.2.1 Scope and analyzed questions

The online survey can be viewed as having two focus areas: one focusing on Essity's virtual assistant EVA and the other focusing on virtual assistants and AI in general. For this report, the decision was made to focus on the more generalizable questions as the aim was to discuss organizational factors. Out of the 29 questions asked, 9 were considered directly relevant to the report while the rest was left out. The 9 questions included can be viewed in Table 2. The questions left out were more closely connected to the EVA project and useful for Essity's progress on that project. In the appendix all questions can be viewed in Table 3, including the questions not analyzed as part of the research. As described in the methodology chapter, the survey was consisting of both single and multiple-choice questions as well as optional free-text questions. The single-choice and multiple-choice questions results were turned into graphs and the free-text question replies were compiled, categorized, and presented in charts. To read more about how the analysis was conducted, see section 3.5 in the methodology chapter.

| **Question** | **Format** | **Relevance** |
|---|---|---|
| Q1: Select your Business Unit | Single-choice | Investigates the diversity in the sample. |
| Q2: Specify your department | Free text | Investigates the diversity in the sample. |
| Q19: Do you use virtual assistant tools such as Siri, Alexa, Google Home etc. outside of work? | Single-choice | Investigates the interest in the technology from the |

| | | |
|---|---|---|
| | | user base. Also functions as a parameter. |
| Q23: What do you like about virtual assistants? | Free text | Relevant to user adoption. |
| Q24: What don't you like about virtual assistants? | Free text | Relevant to user adoption. |
| Q25: Do you believe that internal virtual assistants* will be a natural part of the work environments of the future? | Single-choice | Investigates optimism in technology, relevant to user adoption. |
| Q26: Are there any factors that might prevent you from using EVA? | Single-choice | Relevant to user adoption. |
| Q27: How do you feel about virtual assistants in the workplace? | Likert-scale | Relevant to user adoption. |
| Q28: How do you feel about virtual assistants in society at large? (Examples include ordering machines, fast check-out/cashier, mall information systems, telephone assistant) | Likert-scale | Relevant to user adoption. |

*Table 2 Online survey questions analyzed in the report.*

### 4.2.2 Analysis of generalizability and diversity of sample

Q1 and Q2 were included as these questions provided insight into the rigorousness of the sample and allowed for assertions as to which degree the results can be generalized to the whole population. In the case of Essity, this includes all their employees which form the user base of their internal virtual assistant technology. Q1 was a single-choice question which made it easily translatable into quantitative data. From the eight choices given of business units, the two options that stand out were *Global Brand, Innovation and Sustainability* and *Global Operational Services,* see Figure 16. From this question alone it was difficult to assess that the users participating had a sufficiently diverse background in order for the results to be generalizable. However, Q1 provided a good foundation with a single-choice alternative to mitigate potential difficulties of interpreting the free form format of Q2.

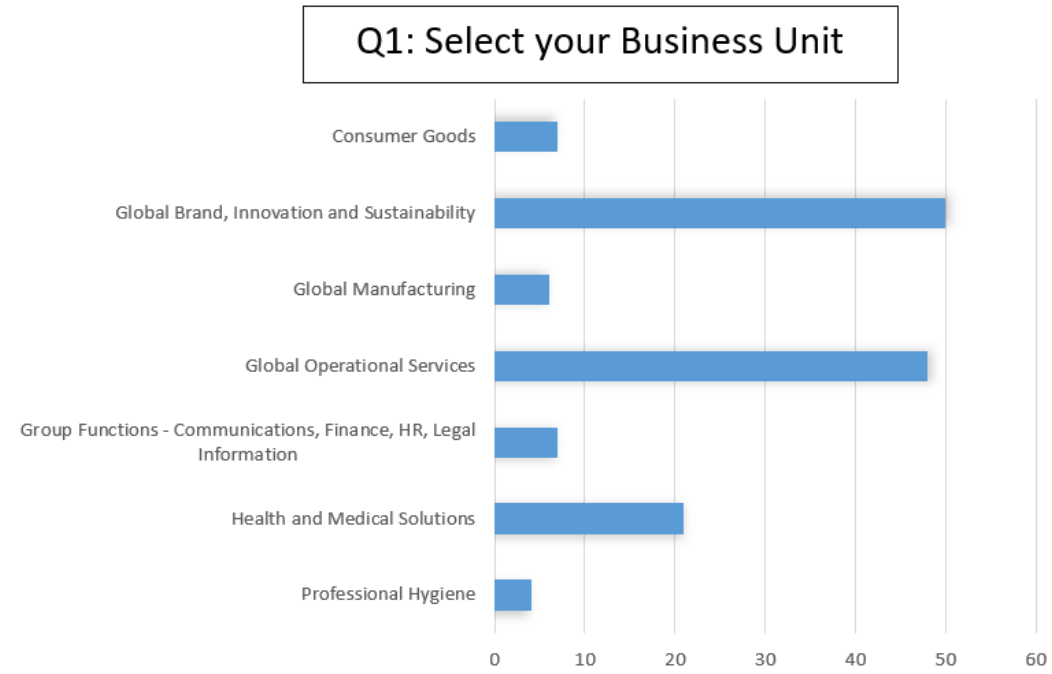


*Figure 16 Q1: Select your business unit. (Single-choice question with 8 options)*

Q2 was a free form question and thus provided qualitative data. Within the nature of the question, asking about the department of the participant, it was relatively easy to categorize the responses. The results of the qualitative analysis of Q2 can be seen in Figure 17. However, participants responded with varying detail; meaning that the participants have more diverse roles in the organizations than the responses seem to express. For example, the categories *Consumer Goods* and *Health & Medical Solutions* are large business units in which the respondents might have very different positions and responsibilities.

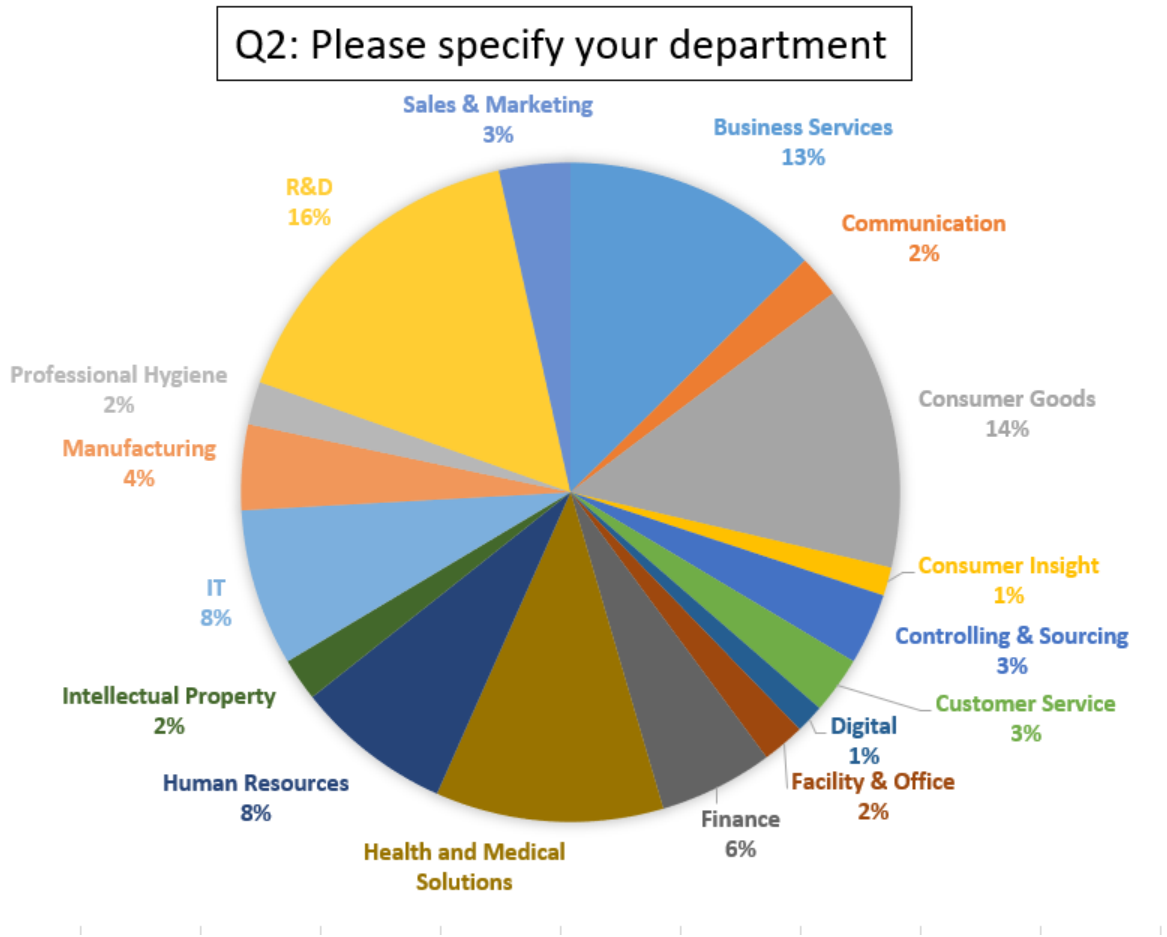


*Figure 17 Q2: Please specify your department. (Free form)*

From Figure 17 it can be seen that the participants stem from various functions within the organization indicating a potential generalizability of the results to the organization as a whole. However, the vast majority of the participants submitted responses indicating that they were office workers. This was of course expected since the survey was released for an office as opposed to a location which as a plant or a combined plant and office site. This means that whatever trends there might exist on both sides of the duality of office worker and factory worker will be missed with this survey, since it is almost entirely composed of office workers. This is a weakness within the survey as it causes the resulting data to be less generalizable to all employees of Essity. However, within the office worker sphere there definitely seems to be a diversity oft the sample. From this follows that the results discussed in the next sections can be considered to paint a somewhat resembling picture of what the office employees' perceptions are of the topics of interest for this report.

### 4.2.3 Analysis of questions relevant to user adoption

In this section, the survey questions directly relevant to the topics of this report will be discussed. One of the central factors of the report is user adoption, how willing

people are to adopt a new technology (Davis et al., 1989). The following survey question results will mainly be approached and analyzed from the lens of this factor. For the sake of continuity, the questions will be discussed here in the order in which they appeared within the survey. All questions included in this section were located within the last three parts of the survey branch structure. The flow structure of these branch parts can be seen in Figure 18. Q19, the only question in part 6, acted as a crossroads between people who had had experience with virtual assistants outside of work context and those who had not. The participants who answered yes to Q19 were directed to part 7 where they were asked more questions about their usage of virtual assistants outside of work. The participants who answered no or that "they didn't know what these were" to Q19 was sent directly to part 8 which revolved around general virtual assistant questions and AI at large. The participants that answered part 7 was also sent to part 8 once they were finished with part 7. This means that all participants answered the questions in part 6 and part 8, while only a subset answered the questions in part 7.

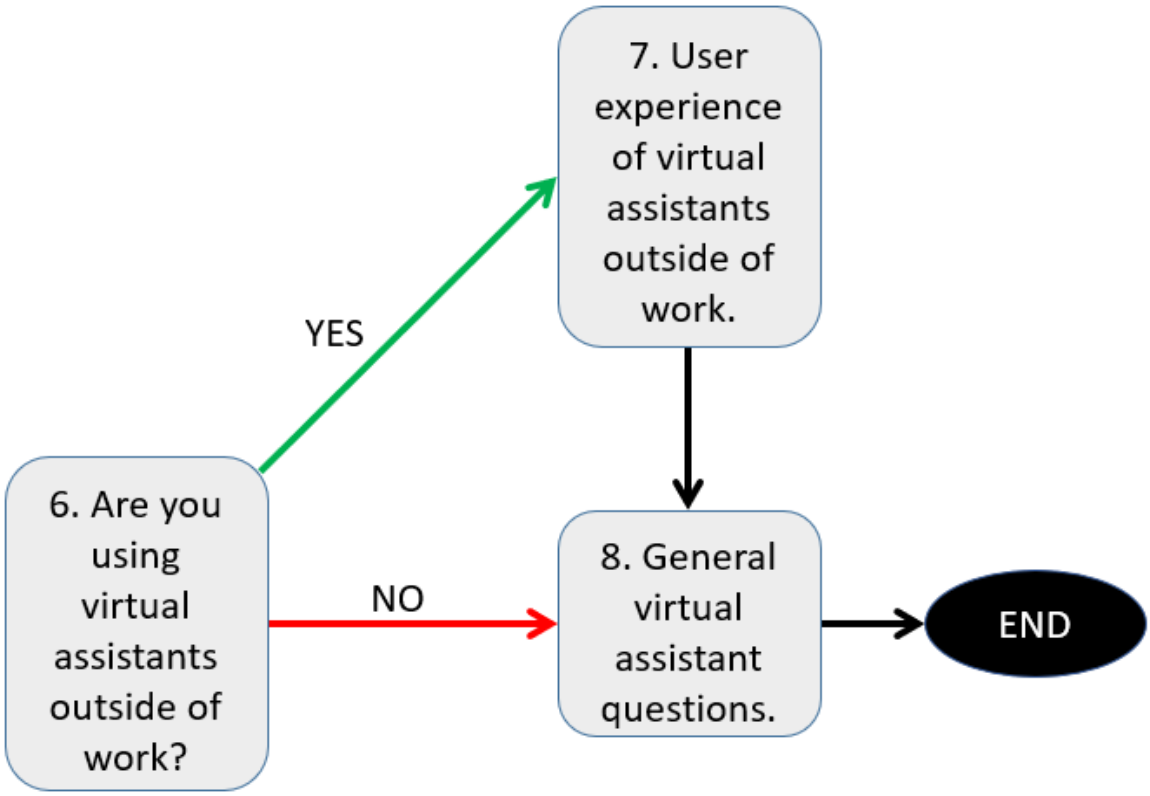


*Figure 18 The flow structure of the final three branches of the Microsoft Form survey.*

**Part 6: Are you using virtual assistants outside of work? (143 respondents)**

Q19 was the only question in this section. It asked if the participant were using virtual assistant tools such as Siri, Alexa, Google Home etc. outside of work. The results can be seen in Figure 19. This was a single choice question with three answers; "Yes", "No", "I don't know what these are". Most of the respondents, 79 people, submitted that they were not using these tools outside of work. The remaining 64 participants answered yes. Not a single participant answered, "I don't know what

these are". This point towards an awareness of the technology within the population of this study, which according to Rogers (1995) model of diffusion of innovation would indicate a potentially more rapid rate of adoption. About 45% of respondents replied that they had used the technology. While this is not a majority it is still a substantial part of the sample. Having experience with the technology in personal life leads to increased levels of the compatibility, observability, and trialability dimensions in the Diffusion of Innovation model proposed by Rogers (1995). This can potentially reduce barriers of using the technology in the work and increase adoption.

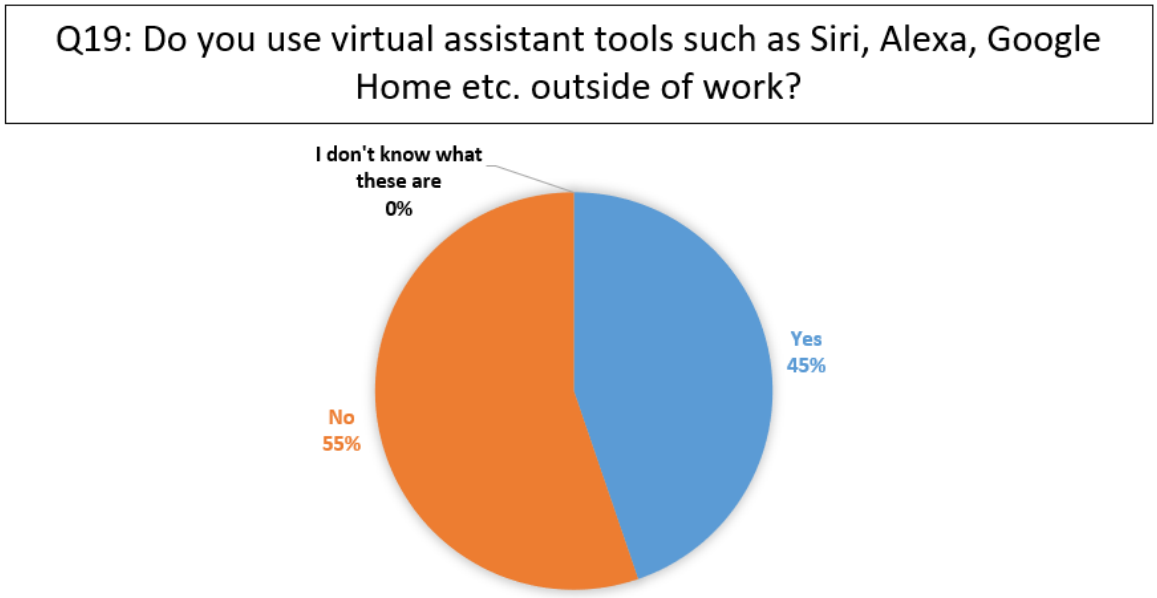


*Figure 19 Q19: Do you use virtual assistant tools such as Siri, Alexa, Google Home etc. outside of work? (Single-choice)*

**Part 7: User experience of virtual assistants outside of work. (64 respondents)**

Part 7 consisted of a number of questions, but for this report only two of these will be analyzed in depth, Q23 and Q24. Both questions revolved around people's perceptions of virtual assistants. Q23 asked what the participants liked about virtual assistants and Q24 asked what they did not like about them. There are a few things worth keeping in mind with the results from these two questions compared to many of the other questions analyzed in this survey. First is the fact that these questions had much fewer respondents since it was part of an branch that not all participants went through. Furthermore, both of these questions were non-mandatory, and participants were free to skip them if they did not want to answer them for whatever reason. However, the majority of the participants who were directed to part 7 responded to these non-mandatory questions, 55 out of 64 participants responded to Q23 (~86%) and 47 out of 64 participants responded to Q24 (~73%). Another important point to stress with these two questions is that they were both in free form format. This means that whatever answer the participants entered they were not primed to think of, at least not directly so as can be the case with single/multiple

choice questions. Due to this, it is of added interest that people wrote similar things, which is what the results revealed. By deriving the answers from connecting what people wrote unprompted, a more observational result could be achieved than if the users were selecting options from a beforehand defined assortment of factors. This of course also entails that the labels presented in the results of these two questions are to a degree arbitrary since they had to be interpreted. The challenges and weaknesses of this approach is discussed in more depth in the data analysis section, 3.5, of the methodology chapter in this report.

For Q23, concerning what participants liked about virtual assistants, a number of elements was expressed by the participants. A pie chart depicting these reasons and their proportion in relation to all reasons mentioned can be seen in Figure 20. Some participants entered only one thing they liked while others entered multiple reasons. From these, there were a couple of elements that stood out. The most mentioned element was that virtual assistants are fast and that they save time which composed 34% of the reasons the participants entered. The second most prominent reason, at 20%, was the ease of use of the virtual assistants. After this, multitasking/multiple means of interactions, was a recurring reason at 15%. Beyond this, the other reasons mentioned are interesting on their own merit. The standout reason people seem to appreciate virtual assistants is that the tools are fast, easy to use and flexible. What is not mentioned much or at all is quality or reliability. Only one respondent entered reliability as a reason for what they liked about virtual assistants. This can be juxtaposed to the results of Q24.

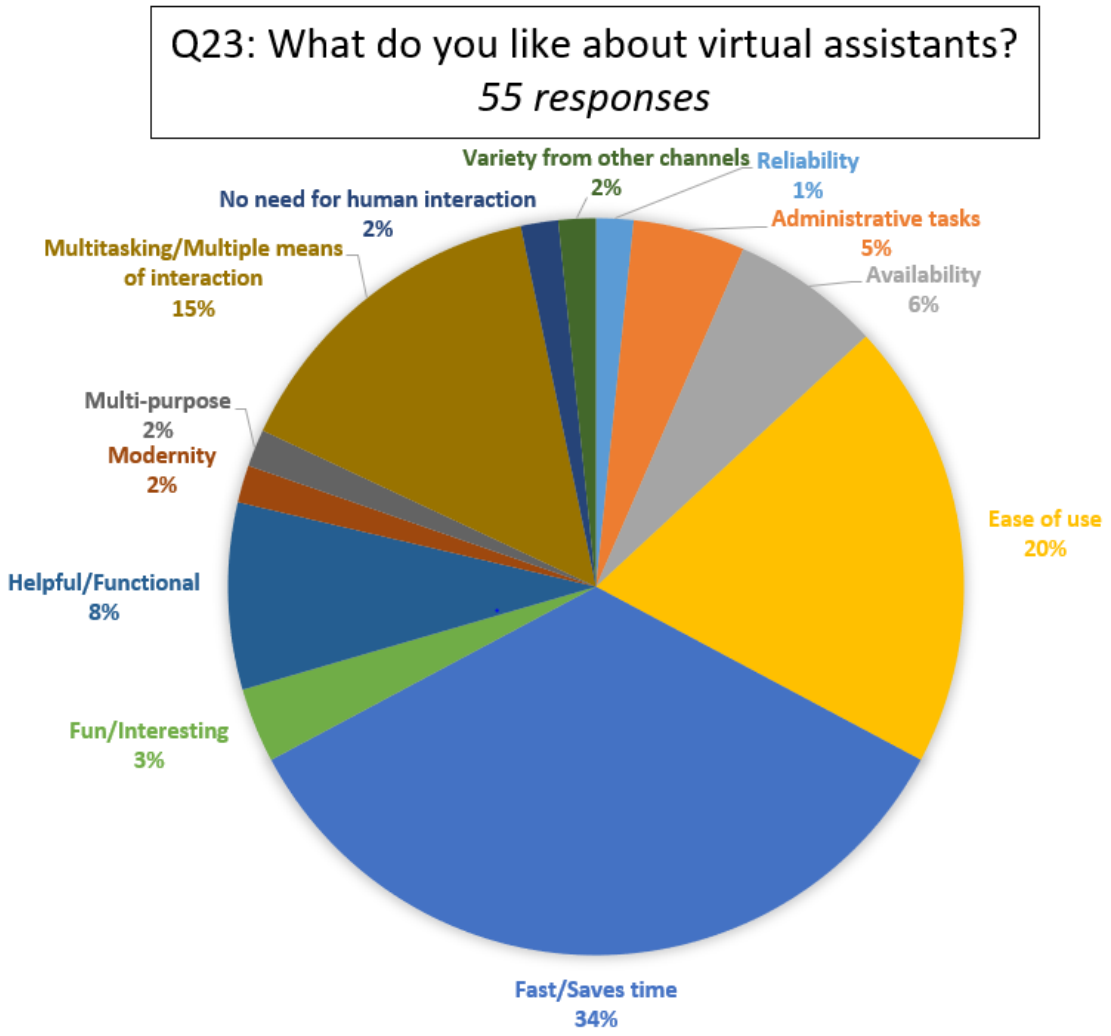


*Figure 20 Q23: What do you like about virtual assistants? (Free text)*

In Q24 participants were asked what they did not like about virtual assistants. The results can be viewed in Figure 21 where the pie chart displays the reasons people gave for disliking virtual assistants and their prominence of being mentioned. Here the most prominent reason is misunderstandings/strange answers, at 21%. This refers to that the virtual assistant either completely misunderstands the user's query or that it provided a strange unintelligible response which was not helpful. The second most prominent reason submitted was that the virtual assistants are unreliable (19%). This can point to many things but at its core it seems to display a perceived distrust of the system from the user as they are using the tool. This can impact the degree to which they feel certain that they are getting the correct information from the virtual assistant. This includes also the extent that they are comfortable using that information in other contexts without double checking with another source, for example a search engine. This can be especially detrimental for responses which has a longer feedback time, as for example when asking for general information. More immediate triggers such as asking the virtual assistant to perform an action also damaged trust in the system when the wrong action was

performed, but in these instances the feedback time is much shorter since the action happens immediately. The third reason, “Users have to be very concise in interaction” relates to the first and second reason, which was unreliability and misunderstandings/strange answers. Given that misunderstanding happens and that there is a distrust in the responses from the system, it puts pressure on the user when interacting with the tool. The user needs to be precise in how they interact with the virtual assistant in order to get the response that they are after. This is a common challenge for NLP fueled software and is an example of where the current limits of the technology impact the user experience of the tool (Liddy, 2001).

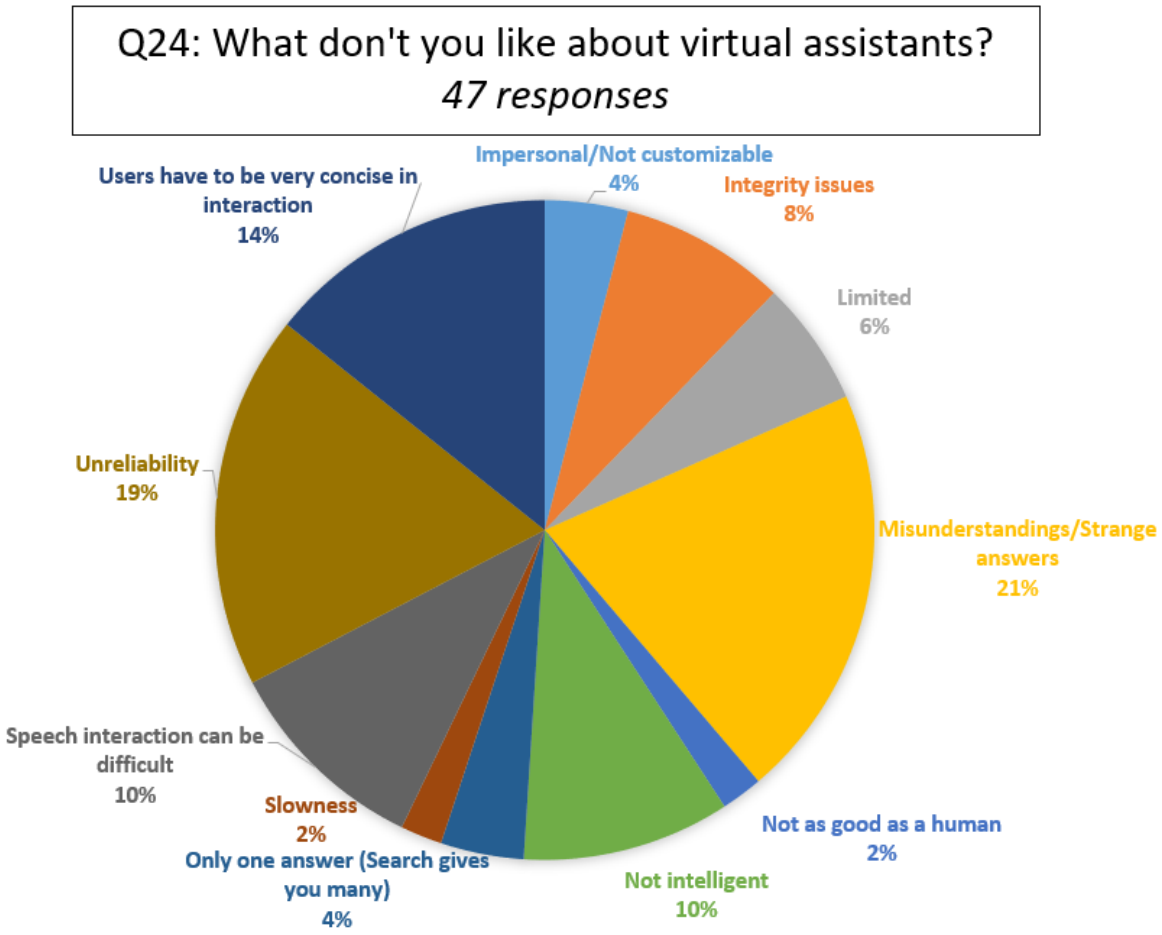


*Figure 21 Q24: What don’t you like about virtual assistants? (Free text)*

Connecting the results of Q24 back to Q23 there are some interesting observations that can be made. In general, people seem to find the tools time saving and easy to use. On the other hand, the main criticism of the technology in its current state seem to be a lack of quality in the answers.

**Part 8: General virtual assistant questions. (143 respondents)**

The final part of the survey, part 8, included several questions. Almost all of the questions in this part was considered relevant to include in this report. The questions included were questions 25-28. These questions focus on the greater picture,

attempting to capture the participants perception of the technology in a more general sense. This includes the technologies place in their life, business, and society. This part was a mandatory branch of the survey as all respondents were directed to it eventually, no matter how they had answered previous questions. This means that people in this part had varying experience of the technology.

Q25 was a mandatory question which asked the participants whether they believed that internal virtual assistants would be a natural part of the work environments of the future, see Figure 22. To this, roughly 96%, 137 out of 143, answered yes. The question was asked in a binary manner with the option for yes and no responses, leaving out any option to leave an uncertain response. This framing puts the participant in a bit of a pressured position where they must take a stand on the issue. This was done deliberately in order to get a clear image. The method has its drawback since it can display a more clear-cut picture of what is going on in a potentially much fuzzier reality. With this in mind, the results must still be considered to show that there is a trend towards that people are anticipating the technology to become of increasing relevance. This should not be confused with optimism in the technology. For instance, a participant can be expecting a top-down excitement in the technology, meaning that they expect that the technology will be pushed on them, no matter whether if it is net-value adding or not. The question does not capture the emotional relation the participants themselves feel towards the technology. To assess this more psychological aspect, Likert-scale was used for Q27 and Q28, which are discussed further down in this section. That being said, the results at this level of analysis alone should still be considered a health sign for how the technology will unfold. According to TAM, a positive perception of the technology could be considered an external variable as a social influence that will in time lead people to perceive usefulness and ease of use (Davis et al., 1989). As can be seen in the analysis of Q27 and Q28, the image formed by pairing the results of these three questions will portray an even further positive outlook for the acceptance of the technology.

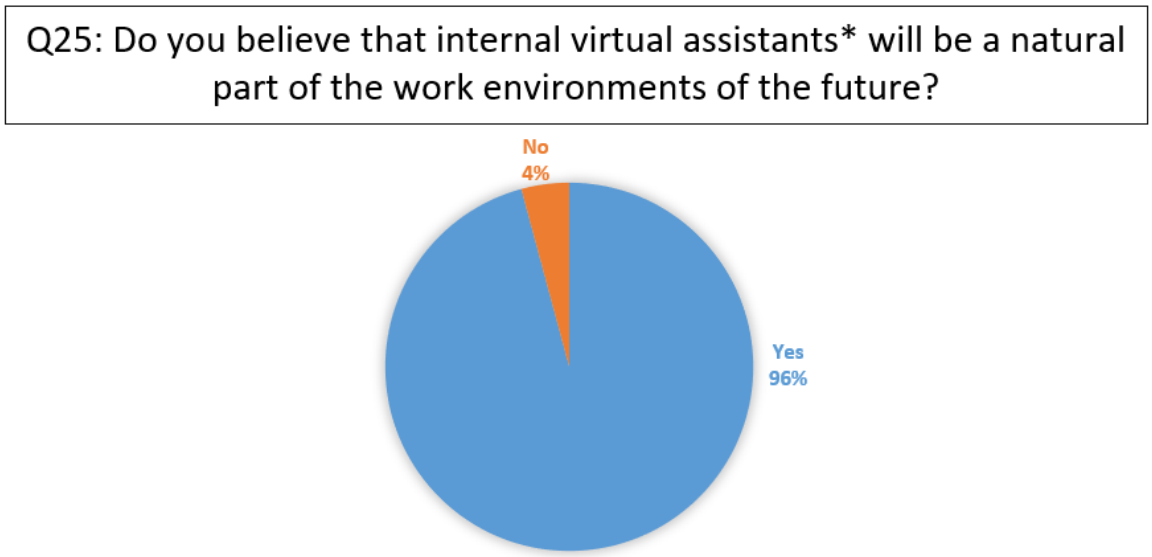


*Figure 22 Q25: Do you believe that internal virtual assistants* will be a natural part of the work environments of the future? (Single-choice)*

The next question in the survey, Q26, puts the focus back on Essity's current implementation of virtual assistant technology. The way this question is phrased however, is an attempt to make an inductive reasoning on factors that will make people hesitant towards the technology in general and not only in the case of EVA. The results of this question will be analyzed in two parts since the question can be viewed as having two distinct layers due to the free text format of the question. The first of these layers is whether the participant thought at all that there were factors prohibiting them from wanting to use EVA. Participants who entered one or multiple factors that might prevent them were considered as saying "Yes, there are factors", participants who explicitly wrote no was considered as "No, there are no factors" and participants who left the question unanswered was considered as blanks. The resulting pie chart from this level of analysis can be seen in Figure 23. In this figure, 57% of the participants expressed that there were factors that could prevent them from using the technology. Only 15% clearly expressed that they did not have any hindrances. 28% left the question blank. This points towards that a large amounts of users have strong expectations of the technology, both in the positive and/or negative sense, that might cause them to avoid technology whether these expectations are fulfilled or unfulfilled depending on the factor at hand. Factors such as these should be considered by development teams since they can potentially form the basis of whether a potential user will adopt the technology or not. What the factors were that the participants belonging to the "Yes, there are factors" entered in their answer to this question will be discussed in the second layer of the results.

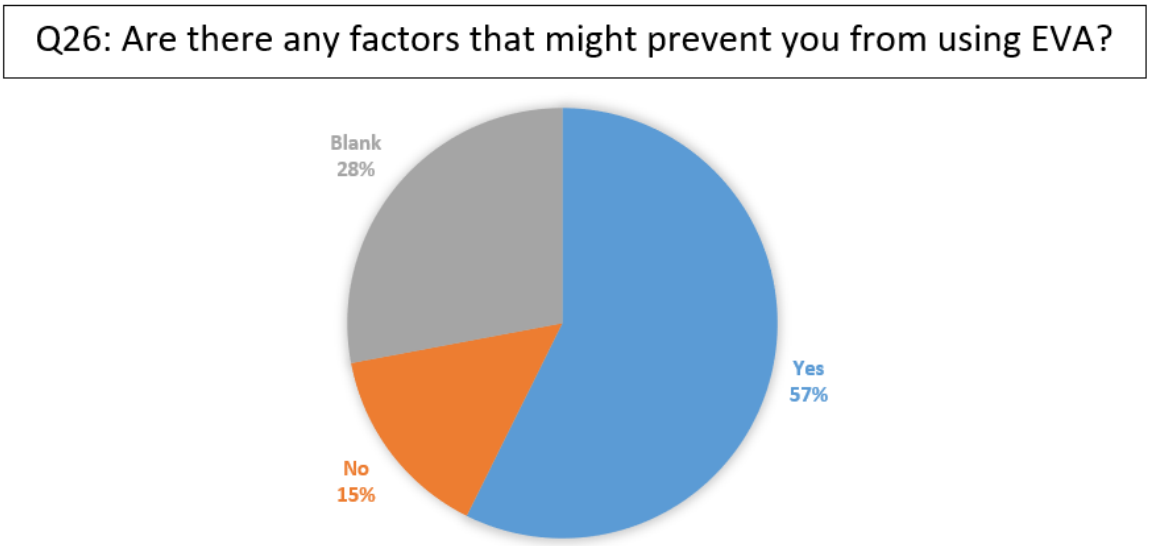


*Figure 23 Q26: Are there any factors that might prevent you from using EVA? (Free text, labeled as Yes/No/Blank)*

82 respondents out of the total of 143 answered with specific factors to Q26. Since they were entered in free text format they had to be interpreted and categorized in order to be expressed as quantifiable data. Several recurring factors emerged from studying the written responses and these formed the basis for a numerical assessment of different factor's prevalence. The challenges of this qualitative analysis technique are discussed in the methodology chapter of this report. The results from this analysis can be seen in Figure 24. As with the earlier free text questions, one participant could leave more than one factor. This means that the percentage in this context does not display the number of participants mentioning this, but instead how prominent a type of factor is in relation to all mentioned factors. Looking at the results, the most mentioned factor was unreliability/lack of quality at 25%. This rings true to the results of Q24 where the most disliked aspects of virtual assistant technology for the respondents where misunderstandings and unreliability. This is the standout factor in these results as it is then followed by a triad of factors around the 10-11% mark. These factors are "not helpful", "new habit", and integrity issues. "Not helpful" is the factor that is most similar to unreliability, but still a bit different in the sense that it does not necessarily involve a distrust in the accuracy of the technology but rather a disbelief in that the technology will be useful to them in a larger sense. The factor of it being a new habit can be considered to be of a different nature from the factors that deal with the direct quality of the tool. Successfully transitioning into new work habits can be considered an important part of the efforts required for change projects to be successful, as discussed by Kotter (1995). Integrity issues are also an important factor mentioned that can be expected to increase as the technology matures and gains popularity. In order to leverage the technology to its fullest and to provide value to the user base these factors should be considered when developing the technology.

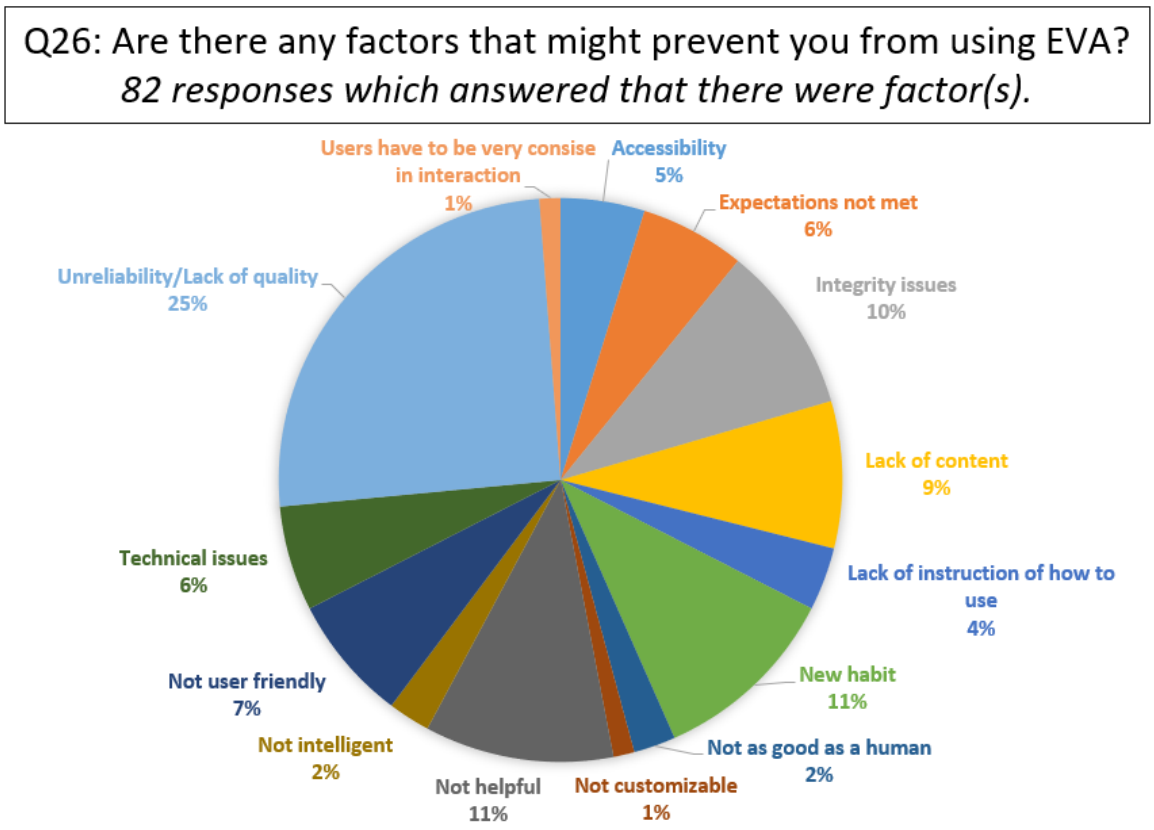


*Figure 24. Q26: Are there any factors that might prevent you from using EVA? (Free text, labeled by reason for the respondents who indicated there are factors that might prevent them.)*

Q27 and Q28 are using Likert-scale in order to assess the participants emotional attitude towards the technology. Both questions were designed to complement the detail-oriented questions in this survey with data of a more psychological nature in order to leverage a holistic picture of how the participants relate to virtual assistant technology. For these questions, the participants were asked to enter to what degree they resonated with four suggested emotions towards the technology. These emotions were excited, fearful, uncertain, and optimistic. In a simplified sense, they can be considered two positive emotions (excited, optimistic) and two negative emotions (uncertain, fearful). If the participant agreed more with the positive emotions than the negative emotions, it can be seen as a sign of optimism and interest in the technology. The opposite, agreeing more with the negative emotions would be considered a negative sign.

Q27 focuses on how the participants feel towards virtual assistants within the context of the workplace. In general, people seem to have a positive perception. For the positive emotions, excitement and optimism, participants tended to strongly agree, even though a large percentage were neutral. Only about 11% of the respondents reported that they disagree or strongly disagree with being excited and about 8% disagree or strongly disagree with being optimistic. See Figure 25 and Figure 26 for a breakdown of the results.

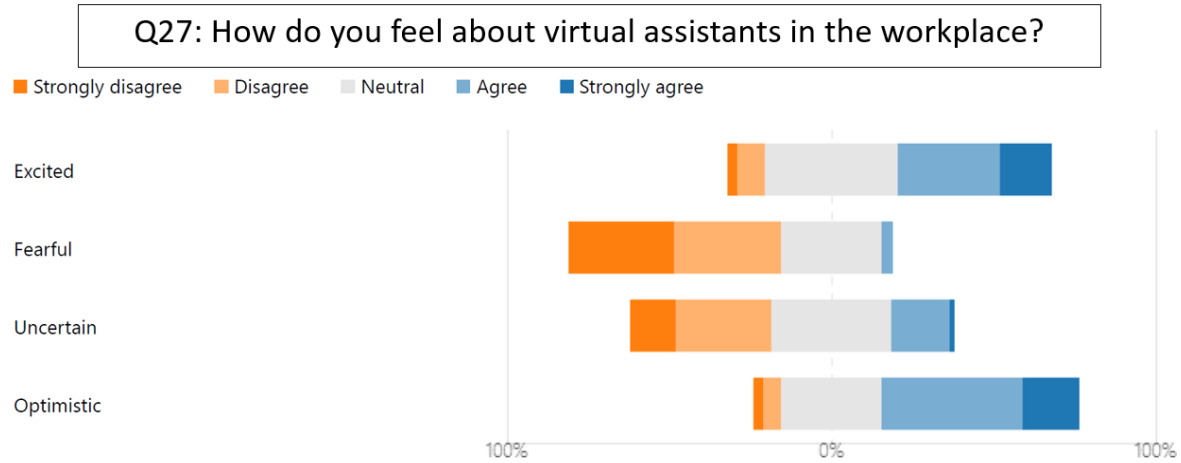


*Figure 25 Q27: How do you feel about virtual assistants in the workplace? (Likert-scale)*

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| **Excited** | 2.80 | 8.39 | 41.26 | 31.47 | 16.08 |
| **Fearful** | 32.87 | 32.87 | 30.77 | 3.50 | 0.00 |
| **Uncertain** | 13.99 | 29.37 | 37.06 | 18.18 | 1.40 |
| **Optimistic** | 2.80 | 5.59 | 30.77 | 43.36 | 17.48 |

*Figure 26 Q27 results in percentage.*

Q28 takes a larger perspective on the technology, asking the participants how they feel towards virtual assistants out in society in general. Similarly to the responses of Q27, the participants were mostly agreeing with the positive emotions and disagreeing with the negative emotions. While the results of the two questions are very similar, there are some interesting differences to be noticed. One of these differences is that on the emotion of optimism in the workplace context seems to be slightly more polarizing. More participants strongly disagree with optimism in the context of the workplace at the same time as more participants strongly agree with the postulated emotion. In Q27, the results had a more normal distribution with the responses centered around the mean. The comparison of the response regarding the emotion of being fearful between Q27 and Q28 holds another observation. More participants said that they were strongly disagreeing with being fearful in the context of the workplace than in the context of society at large. This can point towards that people hold certain fears towards the future prospects of what AI can do in a larger societal context, but that all of these fears are not necessarily carried over to what AI will do in the workplace. See Figure 27 and Figure 28 for a breakdown of the results.

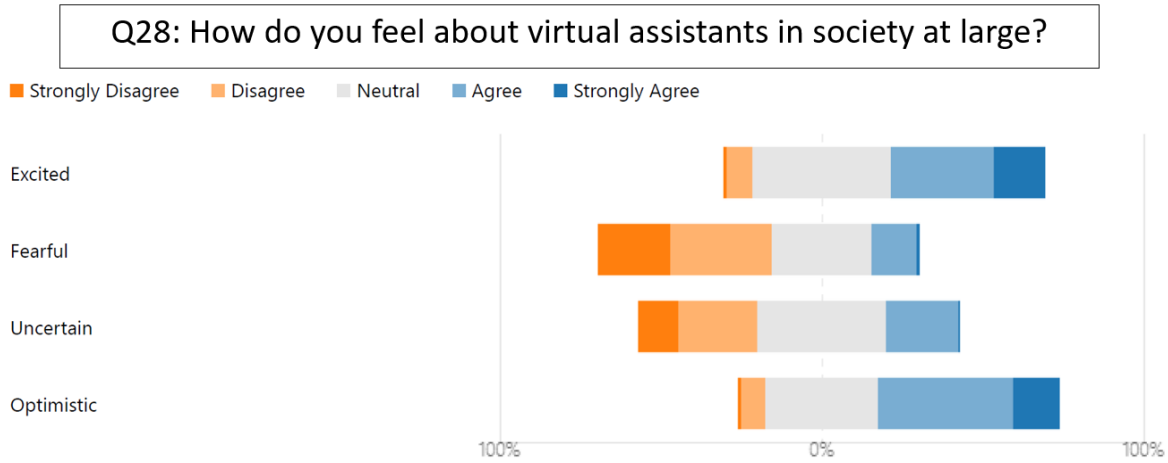


*Figure 27 Q28: How do you feel about virtual assistants in society at large? (Likert-scale)*

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| **Excited** | 0.70 | 8.39 | 42.66 | 32.17 | 16.08 |
| **Fearful** | 22.38 | 31.47 | 31.47 | 13.99 | 0.70 |
| **Uncertain** | 12.59 | 24.48 | 39.86 | 22.38 | 0.70 |
| **Optimistic** | 0.70 | 7.69 | 34.97 | 41.96 | 14.69 |

*Figure 28 Q28 results in percentage.*

## 4.2.4 Interaction effects

To derive further insights from the data produced by the survey, some interaction effects were studied by defining a parameter that divided the participants into two groups. Q19, “Do you use virtual assistant tools such as Siri, Alexa, Google Home etc. outside of work?”, was used to be this dividing parameter, forming two groups. These groups were participants who had used virtual assistant tools and participants who had not. This division was deemed to be interesting since it could point towards how people’s familiarity with the technology outside of work could affect their perception of AI within the workplace and their outlook of it in society at large. This section will look at question 25 to question 28 with the group as an independent variable. The two groups will in this section be referred to as group A, people who were using virtual assistant tools outside of work, and group B, people who were not using virtual assistant tools outside of work. In group A there are 64 participants and group B there are 79 participants. See Figure 29 for an overview of the results of Q19 which the group categorization is based on.

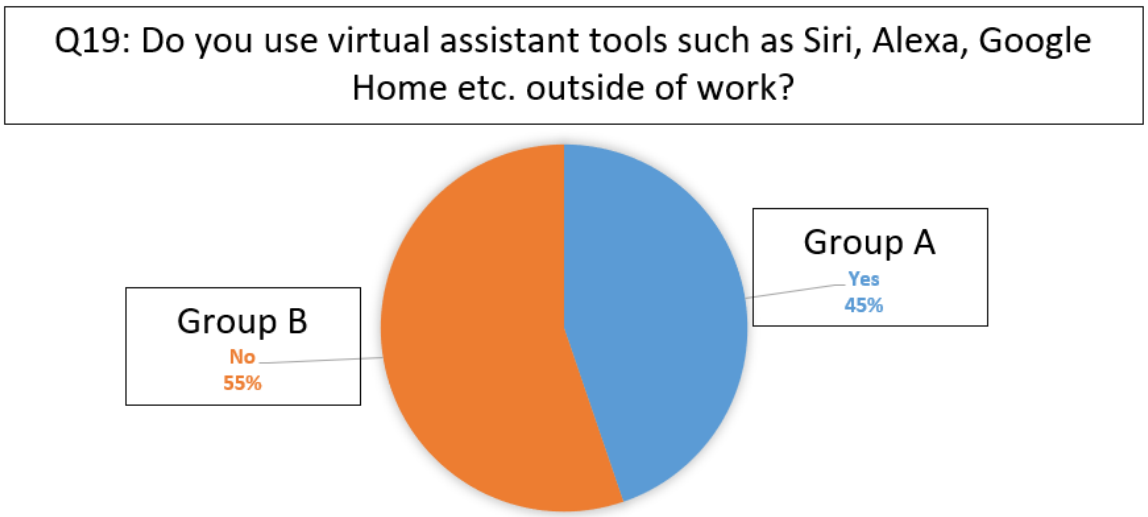


*Figure 29 Q19 distribution divided into two groups: group A (yes) and group B (no).*

For Q25 there was a slight difference in the response of the groups. Group B had a higher number of participants that thought that virtual assistants would not be a natural part of future work environments, 6% compared to the 2% of group A. See Figure 30 for an overview of the results.

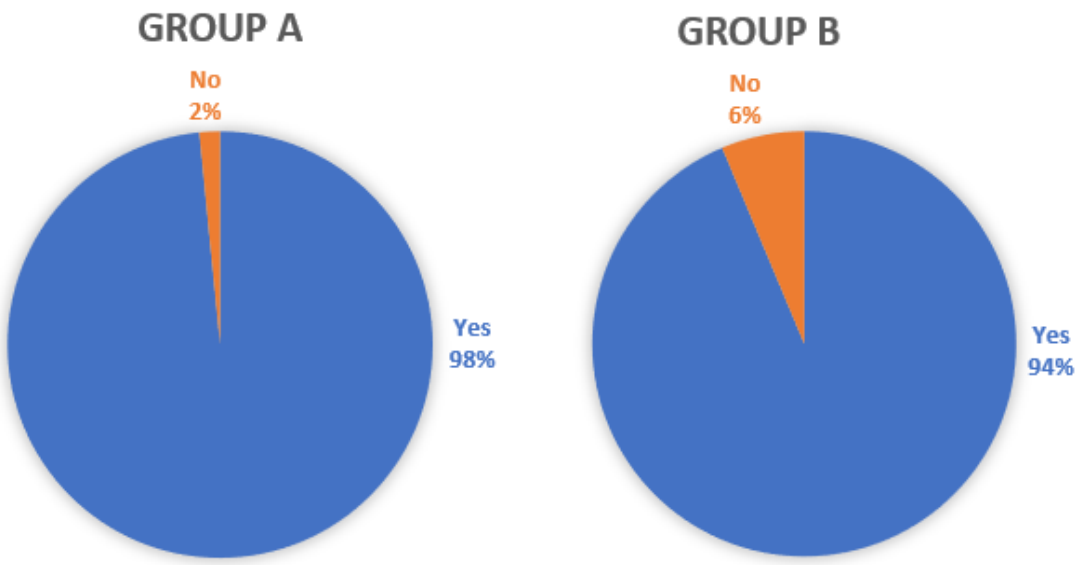


*Figure 30 Interaction effects for Q25: Do you believe that internal virtual assistants* will be a natural part of the work environments of the future? (Single choice)*

For Q26, regarding potential factors that could prevent a participant from using EVA, a larger percentage in group B responded that there were factors, as can be seen in Figure 31. In group B, 62% responded that there were factor(s), while 51% in group A said the same. The amount of participant that clearly stated that there were no factors were roughly the same in both groups, with a slightly higher percentage in group A. More participants in group A left the question blank which can be interpreted as a sign of that a blank response can be considered being neutral in the

question, which in the context of this question would gravitate more towards a “no, there are no factors” answer.

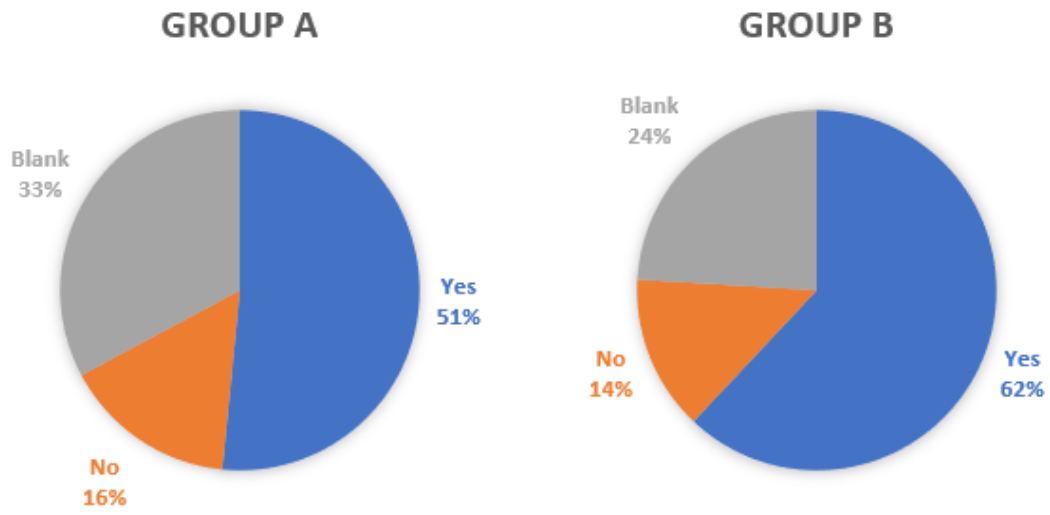


*Figure 31 Interaction effects for Q26: Are there any factors that might prevent you from using EVA? (Free text, labeled as Yes/No/Blank)*

To get an overview over what factors the two groups submitted as potentially prohibiting them from using EVA, two bar charts were created, Figure 32 and Figure 33. For both groups, unreliability and lack of quality was given as the most prominent factor. After this factor, the groups diverge. Group A lists low accessibility, lack of content, and new habit as the next factors. By the same token, group B lists not helpful, integrity issues and new habit. From these results it seems that group A is more concerned with factors that has to do with the convenience (low accessibility) and functionality (lack of content) of the tool. On the other hand, group B seems to have more fundamental concerns regarding the technology. The factor of “not helpful” seems to display a lack of faith in that the tool will be of use to them. Similarly, integrity issues can be viewed as being a concerning factor of a more structural nature. While integrity issues appeared in the results of group A as well, it was not as prevalent of a concern as it was for group B. While the causality is not clear, it could point towards that an exposure to the technology outside of work makes people less concerned about the issues of data privacy within the work sphere. It could however also be the reverse, that people who are less concerned about data privacy gravitate towards using virtual assistants in their personal life to a larger extent than people who are more concerned about data privacy. In both scenarios, the observation is interesting as it can be of help to management to understand why some users are more willing to adopt the technology while others are not.

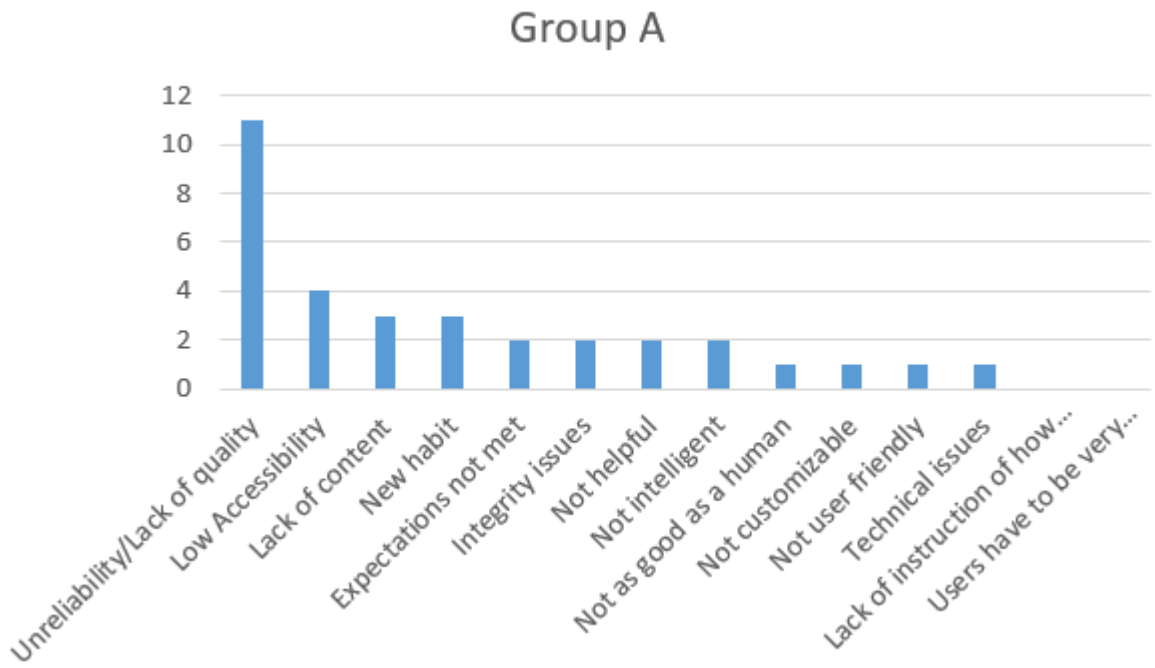


*Figure 32 Interaction effects Q26: Are there any factors that might prevent you from using EVA? (Free text, labeled by reason for the respondents who indicated there are factors that might prevent them.)*

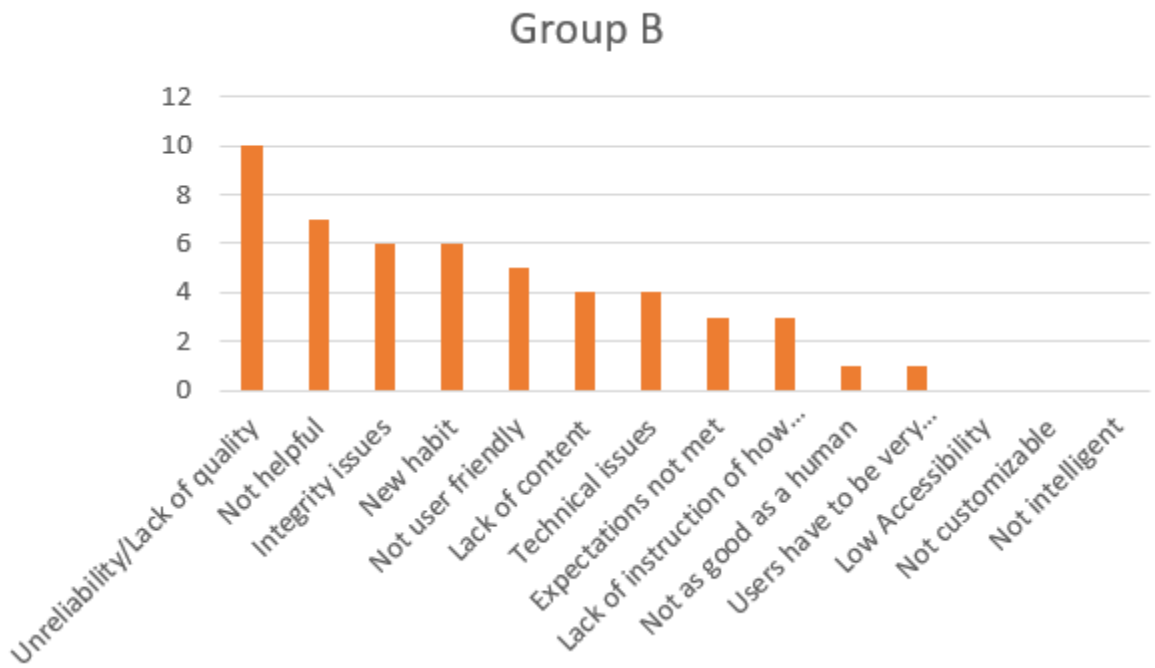


*Figure 33 Interaction effects Q26: Are there any factors that might prevent you from using EVA? (Free text, labeled by reason for the respondents who indicated there are factors that might prevent them.)*

In the comparison of the two Likert-scales questions for each group there were some variety depending on the participants previous experience with virtual assistants. For Q27, concerning virtual assistants in the work environment, group A tended to agree more with the positive emotions than group B. Agreeing in this sense includes both the percentage that said that they strongly agree and the ones that said that they agree. 61% agreed with feeling excitement in group A while 36% agreed with

excitement in group B. Similarly, 69% agreed with optimism in group A while in group B, 54% agreed. For the negative emotions, the results were more similar. However, for the emotion of uncertainty 25% of participants in group B agreed with being uncertain while only 12% of the participants in group A said the same. See Figure 34 for a breakdown of the results.

| | Group | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| Excited | A | 3.13 | 4.69 | 31.25 | 39.06 | 21.88 |
| Excited | B | 2.53 | 11.39 | 49.37 | 25.32 | 11.39 |
| Fearful | A | 31.25 | 35.94 | 29.69 | 3.13 | 0.00 |
| Fearful | B | 34.18 | 30.38 | 31.65 | 3.80 | 0.00 |
| Uncertain | A | 15.63 | 37.50 | 34.38 | 10.94 | 1.56 |
| Uncertain | B | 12.66 | 22.78 | 39.24 | 24.05 | 1.27 |
| Optimistic | A | 0.00 | 7.81 | 23.44 | 42.19 | 26.56 |
| Optimistic | B | 5.06 | 3.80 | 36.71 | 44.30 | 10.13 |

*Figure 34 Interaction effects Q27, results in percentage: Are there any factors that might prevent you from using EVA? (Free text, labeled by reason for the respondents who indicated there are factors that might prevent them.)*

For Q28, regarding virtual assistants in society at large, the results were similar to Q27 in that group A to a larger extent agreed with the positive emotions comparatively with group B. See Figure 35 for a breakdown of the results. For excitement, 67% agreed in group A while only 33% agreed in group B. For optimism, 69% agreed in group A while 47% agreed in group B. For disagreement with the positive emotions, the results were more polarized in Q28 than Q27. 13% of group B disagreed with excitement and 14% of group B disagreed with optimism. For disagreement with the same emotions for group A the percentages were ~5% and ~1.5% respectively.

These results further points towards that employees that are using virtual assistant technology outside of work generally have a more positive outlook on the technology and its future benefits. Interestingly, the disagreement with the positive emotions were larger for group A in the results of Q27, ~8% for excitement and ~8% for optimism. This indicates that given that group A is more positive towards the technology in general, they are a bit less positive about the technology within the workplace. This can also be somewhat seen in the percentage of agreement with the emotion of excitement for group A which is lower for virtual assistants within the workplace than it is in society at large, 61% for the workplace and 67% for society at large. For optimism, the percentage were roughly the same for group A for both Q27 and Q28 at 69%.

| | Group | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| **Excited** | **A** | 0.00 | 4.69 | 28.13 | 42.19 | 25.00 |
| **Excited** | **B** | 1.27 | 11.39 | 54.43 | 24.05 | 8.86 |
| **Fearful** | **A** | 20.31 | 37.50 | 29.69 | 12.50 | 0.00 |
| **Fearful** | **B** | 24.05 | 26.58 | 32.91 | 15.19 | 1.27 |
| **Uncertain** | **A** | 14.06 | 29.69 | 39.06 | 17.19 | 0.00 |
| **Uncertain** | **B** | 11.39 | 20.25 | 40.51 | 26.58 | 1.27 |
| **Optimistic** | **A** | 0.00 | 1.56 | 29.69 | 45.31 | 23.44 |
| **Optimistic** | **B** | 1.27 | 12.66 | 39.24 | 39.24 | 7.59 |

*Figure 35 Interaction effects Q28, results in percentage: Are there any factors that might prevent you from using EVA? (Free text, labeled by reason for the respondents who indicated there are factors that might prevent them.)*

From the interaction effects results for the Likert-scale questions it is clear that group A had overall a more positive outlook on virtual assistant technology. On each question that were compared between the two groups, group A had a more favorable perception of the technology. This also held true for the Likert-scale questions were group A generally were more positive regarding virtual assistants, both within the workplace and in society at large.

## 4.3 Strategy perspective

The strategy perspective aimed to explore the larger reasons of why Essity is putting effort into developing AI and virtual assistant technology. It was based on an interview with a VP at Essity.

### 4.3.1 AI technology in general

Essity started focusing on AI initiatives partly from internal reasons where benefits could be seen with some initial use cases that arose through working with consultants. However, the main reason was based on external factors and that actors within the larger industrial ecosystem started giving importance to the technology. Reports were also increasingly starting to show the benefits of the technology and of how it could be applied to a wide variety of business use cases, driving sales and enabling Essity to grab new market shares. Organizations started using the technology around 2017, but the real benefit and potential value of the technology became clear during the year of 2019. From the business executives surveyed in the study conducted by Ransbotham (2017), most believed that AI technology would have a large impact on their business, but the majority did not currently have an AI strategy in place. This puts organizations that are proactive in embracing the technology at a competitive advantage (Ransbotham et al., 2017).

**Competitive Advantage**

AI technology has a wide scope of possibilities to drive revenue within business. It can for instance help predict customer behavior and give recommendations of complementary products and goods. The more developed the technology is, and the more accurately it can predict behavior, the more value it can create. It also has the potential to generate cost savings through automation and increased efficiencies of internal- and cross-organizational processes. As most organizations are embracing the technology, there are many risks involved with not being part of the changing trend toward adoption. For a large organization like Essity this is especially problematic since it requires timely and extensive efforts to change how the company operates.

The development of digitalization efforts have a high degree of scalability. Initial efforts, although costly, can generate large value over time and it is easier to expand and include new functionalities once the initial infrastructure is in place. By being a late starter in embracing the technology, there is a risk they might lag behind and lose market shares due to the more powerful analytics and prediction methods of the competitors. As the interconnectedness between organizations and industries increase, it is of growing important to be keeping up with the standards of the industry to remain relevant within the network. Being on the cutting edge of the technology can put companies in the position of becoming industry leaders, setting the benchmark for others and leading the technological development. A proactive mindset and early efforts invested in the technology may give rise to new innovation and breakthroughs earlier than competitors, allowing for increased opportunities to grab market shares.

**New market opportunities**

Another risk of not developing and adopting the technology is that one may not be able to compete in markets that previously did not exist, markets that were only made possible through innovations in AI technology. By being proactive in approaching and developing AI technology and becoming industry leaders, organizations may further be in the position to create new innovative solutions which may themselves result in new market opportunities.

One area where Essity could see large amounts of value is through Internet of Things- technology that could be integrated with existing products and services. An app could for instance be offered for free to their customer and partners that generate value through efficiencies in their schedule, made possible through increased amounts of data gathered through sensors integrated within Essity's products. Essity would in turn gain value through an automated ordering function built into the app. Solutions like these can be applied across organizational boundaries in many directions and can give rise to a co-creation of value. It also

gives rise to entirely new possibilities for collaboration with actors that were not previously possible. Through the increasing amounts of data that is being gathered, an higher degree of sophistication of these systems and models will arise that can in turn generate even more value. More advanced sensors can also be integrated with existing products and give rise to more complex solutions. With these new technologies arising, a powerful analytical ecosystem is emerging where synergistic effects can be achieved by pairing it up with virtual assistant technology.

**Organizing for AI**

Essity is to an increasing degree building their organization to be able to accommodate for digitalization projects, in forms such as process management, automation, and process mining. The opportunities are vast, but it requires a high degree of effort to implement digitalization projects on a global scale in a large multinational organization. It is, according to the interviewee, not only a matter of simply having a good and creative idea and then rolling it out. Being successful in implementation entails getting hundreds or thousands of individuals across the globe to work in novel ways, which requires extensive and timely efforts. It is a slow-moving process when it comes to large organizations and a reason for why it is of great importance to be early in adopting the technology.

## 4.3.2 Virtual assistant technology

**Virtual assistants for the individual employee**

The vision for how virtual assistants could be used within the organization could fill many of the roles of a traditional assistant, as well as an array of tasks not previously possible. It could be the first action of the workday for an employee, where the assistant is toggled and is then able to provide prioritizations of urgent tasks that are in need of completion. This could be based off the specific work description, project statuses, and other information relevant to the individual. It could further be used for tasks such as meeting booking, and a wide variety of other administrative tasks. This could free up time for the individual to work on tasks that are more directly value adding. In this way the virtual assistant acts as an aid to the entire working process of the individual. This in turn generates more overall resources for the organization through cost savings and efficiencies, as well as to a potential increased rate of innovation, since the employees can spend their time focusing on more creative endeavors.

**Virtual assistants for the organization**

The interviewee believed that virtual assistants would be a natural part of the internal environments of organizations in the years to come, and that all companies would to

some degree have virtual assistants as an integrated part within their processes and ways of working. As is the case with AI technology in general, by not focusing efforts on developing the technology the company may miss out on strategically important benefits that may result from the use of the technology.

On the organizational level, the assistant could be built in with existing services and tools and act as a “harmonizing force” within the organization. It could be used as an aid to identify and orchestrate larger tasks that need to be completed and overall supporting structure for work. It can also be used for locating and gathering large amounts of information that would be time consuming to find manually. The virtual assistant can from a management perspective also be seen as a tool for steering the organization. As the technology matures and a more conversational interaction is made possible, strategic decisions can be run through the assistant which then provides feedback and guidance. For example, if a proposal of strategic action can be submitted to the assistant, it could then reply with a question in the form of “are you sure you want to do this action, have you taken factors X, Y and Z into consideration?”. As the assistants become more powerful and able to process larger amounts of data, the variety and complexity of areas it can provide assistance and insight into will increase. This may ultimately result in it becoming a powerful asset in making strategic decisions.

**AI collaborations**

AI collaborations in Sweden were considered important, since there are no individual companies with as much resources as large American companies. It is, according to the interviewee, important with some form of collaboration network in order for Sweden to not lag behind when it comes to AI initiatives. Collaboration networks can be of high strategic importance since it allows for greater amounts of resources to be focused toward shared goals, insights, and innovation. In this way, the progress of one organization within their specific industry context can then be applied across the entire collaboration network.

# 5. Discussion

Two areas, user adoption and centralization versus decentralization of bot structure, has been considered to be of particular relevance when attempting to successfully implement internal virtual assistant technology. These areas help to shed light on the organizational trade-offs involved. The two areas are presented below in separate sections and serve as a basis for discussing areas of challenges and opportunities of different organizational structures. The areas build on- and affect one another. In order to understand the full picture, they should be seen as parts of a larger whole and can be thought of as the ecosystem of internal virtual assistant implementation. See Figure 36 for an overview of the areas and how they interrelate.

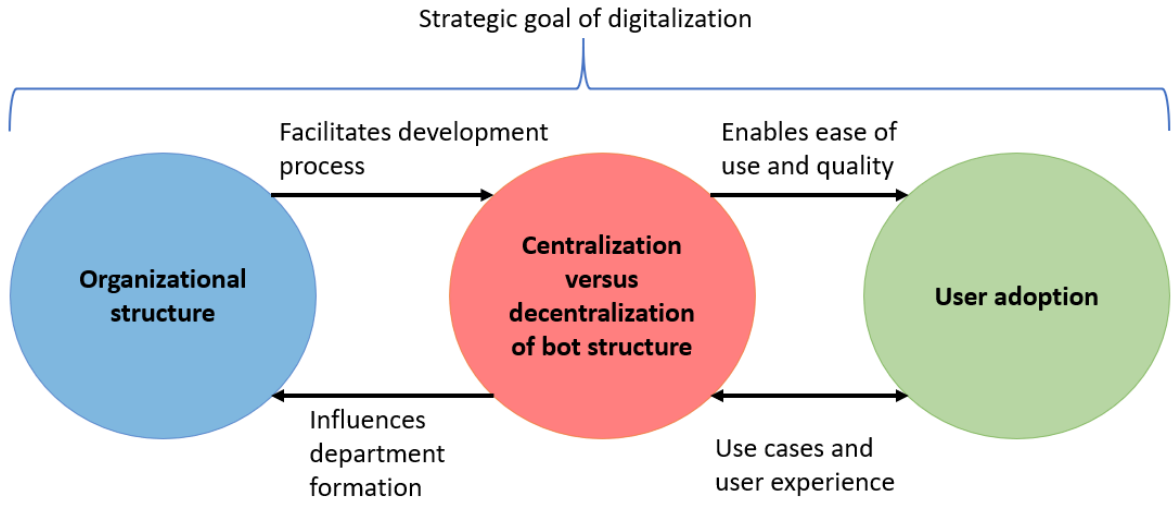


*Figure 36 Connecting model of the discussion areas.*

Given that the strategic vision for the organization is set for digitalization and that the initiative of virtual assistant development is part of the portfolio of technologies in the digitalization, the above connection between organizational structure and delivery of the product has been visualized in order to express how they interrelate. The causality of how the factors influence one another can be viewed in different directions depending on through which factors it is approached from. The organizational structure can to varying degrees facilitate the development depending on which bot structure the organization is chosing to focus on. In this sense, the decision for bot structure can potentially also influence decision making in how to set up the organization structure. Connections between the bot structure and user adoption are also laid out in the figure. An informed plan in bot structure can be a tool to deliver ease of use as well as quality in the product to the users. How this is best done can be seen as a back and forth between the users' needs and the use cases that the virtual assistant can provide. The factors, and the connections between the factors, are discussed in further detail in the following sections.

## 5.1 User adoption

Naturally, for the technology to provide value it needs a user base that can benefit from it. With virtual assistant technology being new and still fairly unexplored, the development process benefits from having a constant stream of user feedback. Building out virtual assistants, even when it comes to relatively small features, can require a large time investment and effort from the development team. This stresses the need for that the features that are being built out are features that will be used and provide value to the user base. In order for a feedback system to be put in place and aid the development process in early critical stages, it may be required that users adopt and use the technology even when it is not technically finished or complete in content. For this to happen, a certain faith in the technology from the user base is beneficial. This entails a perception that the technology eventually will bring value to them as employees and to the organization as a whole.

From the results of the online survey that was part of the research for this report, this seemed to generally be the case. The great majority of participants, roughly 96%, indicated that they expected virtual assistant technology to become a natural part of the work environments of the future. From the Likert-scales questions that were asked, that attempted to measure the emotional attitudes toward the technology, the majority indicated that they agreed more with the positive emotions and less with the negative emotions in how they viewed the technology. To the degree that these results are generalizable, it does show a general interest in the technology which can help to facilitate its development.

The results also showed that participants who had more experience with the technology in their personal life, using the technology outside of work, were more positive and willing to adopt. This points towards that this group of users might be the most important demographic to target the development efforts towards, since this might be where the early adopters can be found that can offer crucial feedback which can then steer the development in the right direction. Early adopters can act as opinion leaders and influence the general adoption of the technology company wide. This is particularly the case if these opinion leaders are spread out within the organization which would allow for a more broad spanning diffusion process, as discussed by Rogers (1995). The Agile software development method is a format that can allow the product development approach to be routinely realigned with the potential user input that will come up as the technology is being implemented.

Beyond this more big picture attitude aspect of the user adoption of the technology, there are factors inherent to the technology that causes people to be hesitant to start using it. As part of the research conducted for this report, factors that were potential hindrances for people to adopt the technology was investigated. Among these were concerns about integrity issues, lack of quality, and of forming new habits around

using the technology. From a software quality perspective, ensuring the software quality characteristic of security is important in order to handle concerns that users will have regarding integrity (ISO/IEC 25010, 2011). Giving attention to factors such as confidentiality, non-repudiation, accountability, and authenticity can help leveraging a trust in that the virtual assistant will not use the conversation data for any other reason than assisting the user. The quality characteristics of reliability and usability ties together with the concern of lack of quality. One of the main strengths of a virtual assistant is its 24/7 readiness to provide assistance and answers to questions. Ensuring that this functions from a technical perspective and that it has enough use cases to make it compelling for the user to turn to are both factors that could increase trust in the tool and lead to a higher rate of adoption. The mode of interaction is also an aspect that could facilitate user adoption, as different users may prefer different interaction formats. This might help users in forming new habits around the tool when it can be more customized to their preferred means of interaction. The software quality characteristics portability and compatibility can be important to focus on in order to leverage this. Allowing for different hardware solutions, as well as interactions between different software, can be viewed as important in order to provide multiple ways of accessing and interacting with the tool.

For virtual assistants, people might have a perception and mental images of what AI can and cannot do. This can instill expectations towards the tool, and users might be disappointed when these expectations are not met. Users may have expectations of the technology, or the amount of efforts required for the technology to fulfill a certain purpose, which differ from what is actually the case. For this reason, it is important have a clear communication of technological capabilities and limitations toward employees and that expectations are managed properly. To this also follows to what degree the development team can influence their potential users' perception of the technology. Showing an early demo version of the technology to the user can be a useful method of gathering early feedback to the development process. It can also function as a way to in an early stage set proper expectations of technological capabilities of the tool.

In order for new technologies and new ways of working to become permanent changes, it is required that large amounts of effort are spent on the change process itself. This involves instilling in users a need for change and an understanding of how the technology can aid their work. It also includes communicating how the change process will occur, as discussed by Kotter (1995). Potential obstacles for adoption should be identified and the aim should be to neutralize and remove these when possible. As described by Fountaine et al. (2019), most organizations that have been successful in digitalization initiatives have spent more than half of their project budgets on adoption-fostering activities. This indicates the value of actively working toward generating an environment where users are inclined to adopt the technology. Expectations move through different phases and according to the Gartner 'hype cycle' (Gartner, 2020) the expectations are the highest in the initial phases of a

technology. Accurate and clear communication regarding what the technology can and cannot do can moderate the initial spike of expectations and can be a powerful tool during the adoption process.

Due to the fact that the virtual assistant will be used within the organizational environment, it can not be seen as an entirely voluntary process to adopt. There may be tasks that an employee can choose to get accomplished without using the virtual assistant. However, other tasks that are critical to an employees work description might potentially only be carried out through use of the virtual assistant. In this case, the user will be required to adopt the technology, which will leverage the diffusion of the technology. For the functionalities that can be performed manually or through other methods, user adoption may be voluntary. In this case the adoption will rely on whether the individual's impression is that conducting the task through the assistant is the better option.

## 5.2 Centralized versus decentralized bot structure

From a strategy perspective of how virtual assistant technology can best be utilized by an organization, there are a number of decisions that needs to be made. Among these is the decision regarding the bot architecture. Will there be a centralized bot structure with a single bot, or a more decentralized structure with isolated bots acting independently from each other? There are multiple ways to set the bot structure up, which can be gravitating towards either a more centralized layout or a more decentralized one. The centralization of bot structure can be viewed as being a spectrum with one of the ends being full-centralization, one bot for all use cases, and the other end being heavy decentralization, with many isolated and specialized bots. In this spectrum it is then also possible to have a hybrid strategy i.e. being positioned somewhere in between. Once a strategy is in place and has been implemented it may be costly and time intensive to then switch to a very different setup. At this point the competencies and technical infrastructure required for developing the technology have likely matured, but there are still great technical challenges in making major changes to an existing architecture. This emphasizes the value of making an informed decision when deciding on a bot strategy.

One way of executing a centralized bot structure is to have a structure where there is one bot which handles all use cases. This is more aching towards the traditional view of what a virtual assistant is, one entity that the user turns to for all their inquiries. This is similar to how most smart phones work today, where for example Apple has the Siri software and Android has Google Now. A decentralized bot structure entails having a number of separated instances of virtual assistants. These virtual assistants would then be specialized within a narrow domain. This format makes it easier for

the NLP to run accurately since having several more specialized domains vastly diminishes the number of QnA pairs the bot needs to process when interacting with a user. A hybrid between centralization and decentralization of the bot structure can be achieved by having a delegation bot. The delegation bot identifies what the user needs assistance with and then directs the user to the specialized bot that handles that particular area of request.

Where to position the efforts and initiatives on this spectrum will be different for each organization depending on the industry as well as the business goals that are set for the technology. One argument for a more centralized structure is the ease of use and accessibility of the technology that it can potentially offer users. With one single-point of entry to the internal virtual assistant solution, it can make it easier to communicate and provide a lower threshold for users to start using the technology. Arguments in favor of a decentralized bot structure includes both technical and more developmental ones. As mentioned above there is limitations within how NLP functions which makes it challenging to localize all content that an organization wants to include within one bot. Too much content increases the possibility that there will be errors in the quality of the accuracy of the responses of the bot. A developmental argument for a decentralized structure is that it allows for a more dynamic development where no unnecessary “one-size fits all” measure are taken. Specialized bots can be implemented exactly where they are needed for exactly the purposes they are intended to serve. There is also an argument grounded in user adoption for a decentralized bot structure. Having a decentralized bot structure with "narrow and deep" bots that are domain specific and have a high level of performance on a limited set of tasks can help in matching the users’ expectations better.

Both bot structure strategies are potential paths to take and depending on the situation a company is in, one or the other might be a better fit. As mentioned, the bot structure strategy should be seen as being on a spectrum between centralization and decentralization as opposed to a binary choice between the two. Hybrid solutions are possible, for example the single-point of entry benefit of a centralized structure could also be achieved by a decentralized structure interwoven with a delegation bot. The delegation bot can then serve as a common first location for the users to interact with the bot structure.

## 5.3 Organizational structural challenges

One recurring challenge with digitalization initiatives is the complications that can arise from a traditional organizational structure when trying to accommodate digitalization projects. Brynjolfsson (1997) highlighted the importance of ensuring that the organizational structure is matched toward the IT capabilities of a firm, and that a decentralized organizational structure is more suited for IT-intensive firms.

Iansiti et al. (2020) expand upon this notion and discuss how the traditional division of organizational branches and the paradigm that created it is not suited for the fuzziness in ownership that is introduced by the new wave of digitalization.

For the development of virtual assistants, the challenges of working across departmental boundaries was brought up by the development teams of all three companies interviewed for this report. Typically, the IT branch of an organization has the technical knowledge to conduct the development of the technical infrastructure and coding that powers the virtual assistants. At the same time, it is usually employees at more business-oriented organs of the organization that are better positioned to identify potential use cases and know which content would be the most useful to add to the bot. This entails prioritizing use cases from a potential vast array of possible ones that have been floated.

Since the technology is fairly new, there is yet clear best practices established regarding how to develop and work with it (Skowron et al., 2019). This also holds true for established practices for how to solve fuzziness in ownership between departments and how to divide workload within the traditional organizational structure. All three companies interviewed were to some degree experiencing blurred lines between the business units involved in the development. The traditional division has been for IT to be able to focus on coding and software architectural aspects of the development, while the various business units involved are responsible for their units' content. If this worked optimally, it would allow for a dynamic process where the business units would not have to wait for IT in order to update or change their content. This division of responsibility would benefit from being facilitated by a good user interface for the non-IT business units. This would then allow for the bots' content to be managed by users that does not have advanced technical knowledge. A close working relationship between IT and the separate business units involved was deemed important for this to be facilitated. Furthermore, this close relationship is also important in order to identify and prioritizing new use cases for the bot. Without a good shared understanding of the product and its technical challenges between the IT and the business side, miscommunication and confusion can arise.

These things are however easier said than done, and the companies interviewed was expressing this cross-department collaboration as a challenging aspect of the development. Sometimes it might be necessary to restructure or merge parts of two departments to co-locate expertise and increase synergy. As discussed by Fountaine et al. (2019), when organizations are moving into the age of digitalization it is necessary to have data and analytics at the core of the entire organization and create a "digital spine" that serve as the backbone of the organization. This may require some restructuring of the traditionally separated department structures. Fountaine et al. (2019) proposed a “Hub-and-Spoke”-structure that can serve as a clearer way of determining project responsibility between departments. Through this format, projects can be owned centrally by a hub and executed by the different

functions of the spokes. IT-personnel is then located in the grey area between these, and can flexibly assist in projects where their expertise is needed at the time.

Traditional hierarchical organizational structures with a centralized chain of approval are not suited to accommodate for digitalization projects due to their inflexibility and lengthy approval processes. The nature of digitalization projects is rapidly changing, and for an organization to be able to evolve alongside its environment, the organizational structure need to be able to accommodate for the fluctuating needs of the environment. Schwer and Hitz (2018) discuss a decentralized form of management called Holacracy. This more fluid organizational structure may be better suited to accommodate for digitalization projects and AI initiatives. This could be suited for the development of virtual assistants since they involve, and require, coordination between multiple traditionally isolated departments of an organization. Through a Holacracy, the competencies needed for different parts of the project are more readily available and decision-making processes are made faster. It may be difficult for large organizations with many existing organizational structures to quickly change their structure into a pure Holacracy. Kotter (2014) proposes a hybrid solution where hierarchical structures can still be maintained, and a network structure existing alongside the hierarchy could fill the role of accommodating for flexible changes required for digitalization. This may allow for existing operations and processes to be able to continue to run without major restructuring efforts required relating to the operations and processes.

## 5.4 Organization structure and bot structure

What departmental structure that will best help to facilitate the virtual assistant implementation will also to some degree depend on what bot structure strategy a company has chosen. With a centralized bot structure, efforts can be more concentrated, at least on the technical side. With a decentralized bot structure, a more distributed development is required. In this case, individual departments have to assume more ownership and responsibility for the chatbot instance that is fulfilling their purpose. This entails that technical expertise might have to be widespread within the organization, allowing for the multiple chatbots to be developed independently. A traditional organizational structure with a more isolated IT branch is likely to be able to deliver the centralized bot structure since the efforts can be directed into one unitary, albeit large, project. However, the decentralized bot structure might prove more difficult for the traditional organizational structure to deliver. The distributed development can be difficult to accommodate for, taking into account the sum of all cross-department coordination required for each specialized bot developed.

If the organizational structure has been adapted to better facilitate digitalization initiatives, this can allow the organization to have a stronger foundation for adopting

either of the two bot structure strategies. Precisely how an organization can go about adjusting itself for digitalization initiatives can vary greatly depending on pains and needs for the company. Some companies may be not be able to quickly arrange themselves toward a more decentralized structure in line with the Holacracy discussed by Schwer and Hitz (2018). In this case it may be more suitable to develop bots within a network structure as presented by Kotter (2014). This would allow for a customized solution that matches an organization's specific needs. There are also various structures that can be set in place to put individual's expertise to scale, so that they can support many of the initiatives. For example, this can be accommodated through bot platforms and standardized bot templates (Skowron et al., 2019). Different formats of outsourcing can also be a workaround solution in overcoming potential weaknesses that exists in the organizational structure.

In Figure 37 the relationship between the organizational structure and its ability to deliver on the two different bot structure strategies has been visualized to express an overview of their connection. While bot implementation can be considered to be difficult in general, the research of this report points towards that it is the traditional organizational structure attempting to deliver a decentralized bot structure that is the most difficult. There are also reasons for why a decentralized bot structure is preferable over a centralized one, as mentioned in section 5.2. This entails that in order to do a successful implementation of internal virtual assistants, a shift needs to happen in the organizational structure towards a structure designed for facilitating digitalization initiatives. There is of course many reasons for why it is advantageous to have an organizational structure like this beyond virtual assistant implementation. Other fourth wave technologies like IoT etc. also benefits from a modernized organizational structure which can distribute IT competency more easily across the organization. Holacracy, as described by Schwer and Hitz (2018), is one example of such a structure. Embracing a structure like this can prepare companies for future digitalization projects, spanning beyond virtual assistant implementation.

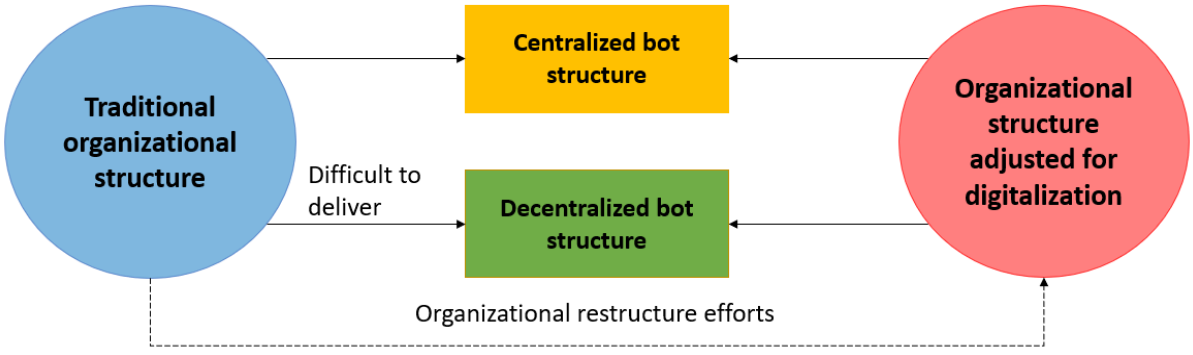


*Figure 37 Interrelation between organizational structure and centralization versus. decentralization of bot structure.*

The relationships illustrated in Figure 37 can also be viewed as a 2x2 matrix with the two axes being organizational structure and bot structure. This has been portrayed in Figure 38. Here the different combinations of centralized and decentralized

organization structure are paired up with centralized and decentralized bot structure. For each combination, the key points brought up in this discussion chapter is laid out. The points have been arranged in two categories, “Technology & Development” and “Organization” to clarify what can be seen as technical considerations and what can be seen as more organizational considerations. The points that can be viewed as directly negative aspects of a combination has been marked with red color for clarity. The figure also assumes that organizations have a traditional centralized structure if they have not yet undergone an organizational reform, potentially for facilitating digitalization. This means that a benefit of the centralized organizational structure is that it does not require the often cost and effort intensive steps involved with organizational restructuring.

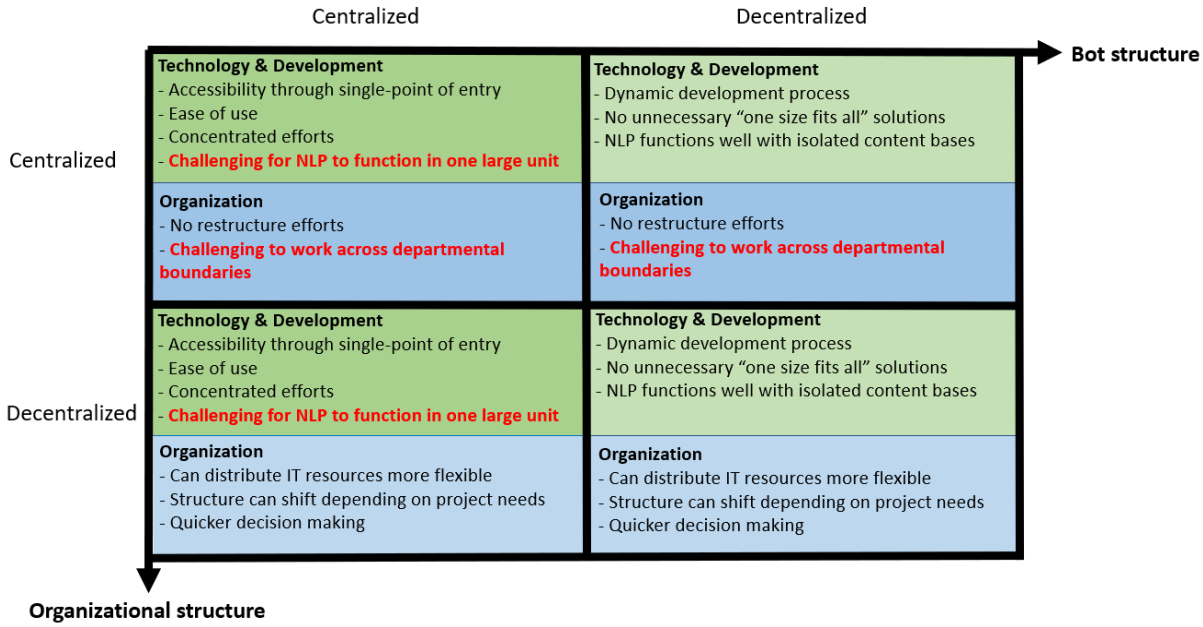


*Figure 38 A 2x2 matrix depicting the different combinations of centralized and decentralized organization structure with centralized and decentralized bot structure.*

This way of portraying the different combinations between organization structure and bot structure highlights the strength of the decentralized organization structure in combination with the decentralized bot structure. This being said, achieving a decentralized organizational structure can require a lot of effort. This entails that decision making concerning whether it is worthwhile to pursue a decentralized organization structure for the purpose of delivering a successful virtual assistant implementation should be in accordance with the strategic goals for the organization. Virtual assistants are a promising field of technology, but on its own it is unlikely that it will bring enough value to justify major organizational changes just to accommodate for it. However, as part of a larger digitalization strategy the organizational structure and its relation to virtual assistant implementation can be valuable information in order to best facilitate the development. Figure 38 paints a somewhat simplistic picture by dividing centralization and decentralization of the two structures in a binary manner. For both organization structure and bot structure the degree of centralization or decentralization can be thought of as a spectrum. This

means that there can be hybrid solutions between the extremes, as described in section 5.2 regarding bot structure. Depending on the unique situation and circumstances an organization find themselves in, there may be more or less suitable places along these spectrums to position the organizational strategy and structure in.

## 5.5 Summary of discussion

The aim of this study was not to outline concrete implementation step recommendations for virtual assistant technology, but rather to provide a discussion of the organizational trade-offs involved in implementation. This included understanding critical aspects surrounding the implementation of the technology and to capture the complexities involved with the development. It is a sprawling topic that connects to many different fields within technology, management, as well as to topics of a more sociological and philosophical nature. Due to the broad scope of the study, the possibility of depth within each area has been limited. With a more extensive study with larger amount of research, a broader and more complete picture of virtual assistant technology implementation may have been painted. For instance, interviews with users could have been conducted in addition to the survey, which may have resulted in a more nuanced picture from the user perspective. If leadership from all participating organizations had been interviewed, it could also have resulted in insights as to how the different organizations approached the technology strategically. As such, the above discussed areas are likely limited in their ability to portray a full sense of what it entails to develop the technology. Through a study spanning different use cases and aspects in more depth, more areas of importance may have been discovered. In the future work section below, examples of such topics are touched upon. Due to the novelty of the of the technology and the constantly changing socio-technical landscape, parts of what has been discussed can be expected to change in the years to come as the technology and organizations' ways of working with it matures. This will bring along entirely new challenges, and at the same time give rise to new opportunities.

# 6. Conclusion

Artificial Intelligence technology and its application in business is a novel field that is rapidly developing and is expected to have a large impact across industries in the years to come. To remain competitive, organizations are forced to adopt and develop this technology, as well as preparing themselves for the organizational and cultural changes this entails.

This study aimed to provide a discussion regarding the organizational trade-offs relating to internal virtual assistant implementation, which served as a specific case of the larger topic of implementing AI technology in general. This was achieved through a case study at Essity, a global health and hygiene company. The data gathering consisted of four parts: a survey to capture the user-side of the technology, a comparative study between Essity and two other organizations to gain insight into the development processes, a high-level strategy interview to understand the underlying reasons for putting efforts into developing the technology, and a broad-spanning literature study covering the areas of technology, management and development.

The discussion illustrated how organizational structure relates to the bot structure that is being implemented. This was connected to user adoption, which can be viewed as a health sign of how well the implementation is being executed. With a foundation in these concepts, the research question regarding organizational trade-offs involved in virtual assistant development was addressed.

From the research conducted for this report, the arguments that were found were mainly in favor of a decentralized bot structure. This being said, a case could still be made for a centralized bot structure depending on the situation the organization is in. Similarly, a decentralized organizational structure was also identified as being preferable when developing virtual assistant technology, as well as for other potential digitalization projects. The combination of a decentralized bot structure and a decentralized organization structure was identified as being the most efficient in implementing internal virtual assistant technology. The key benefit of this combination is a dynamic development process with the ability for quick decision making. However, there are many factors to consider when adopting these structures since it can be costly and time intensive to achieve these organizational layouts. One of these factors is the strategic vision which preferably should include the virtual assistant development as a component of a larger digitalization strategy in order for the undertaking to be justified.

Virtual assistant technology will continue to evolve within the years to come, and organizational efforts to implement and adopt the technology in the present will likely prove valuable a few years down the line. Due to the limited scope of this study, the areas of implementation focused on in the report is not the complete picture and has

not been attempted to be presented as such. The changing nature of society and the technology also entails that new key areas will arise. Consequently, what is considered to be the most critical aspects of development is open to change in the years to come as the technology matures. As these changes takes place, the approach to organizational structure that is most appropriate to accommodate for them while likely also be subject to change.

## 6.1 Future work

Beyond the areas that were the focus of this study, there are more factors that have been touched upon to some degree but which are worth exploring in more depth. Among these are ethical issues surrounding the technology. Concerns about integrity violations and intrusions on data privacy are prevalent in peoples' perception of the technology. As the technology moves toward an increasingly tailored version customized to the unique users' needs and preferences, it will be fueled by more thorough insights and analytics into the behavior of the user. This data, and the insights that can be gained through analyzing it, can be used for other purposes than was initially communicated to the user. This might potentially be harmful for the individual as, for example, corporations may use it for targeted marketing and similar initiatives. Considerations relating to ethical grey zones of virtual assistant technology are not disappearing, but can instead be expected to grow in relevance. To have a long-term sustainable bot strategy, it is likely necessary to have a clear approach and understanding of the ethical concerns surrounding the technology and its use.

Another interesting factor is how chatbots and virtual assistants can function as an organizational alignment tool, communicating company vision and values. It can furthermore foster individuals' adaptation to the company culture that the organization is striving towards. In this sense, the technology can work as a harmonizing force which connects the individual to the organization at large. This potential capability of the technology can also be a target of ethical concerns, relating to the amount of top-down influence an organization has. For a sustainable longevity of corporations, it maybe necessary to have a sufficient grasp of these concerns.

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# 8. Appendix

## 8.1 Appendix A - online survey questions

| Question | Format | Branch |
|---|---|---|
| Q1: Select your Business Unit | Single-choice | Part 1 |
| Q2: Specify your department | Free text | Part 1 |
| Q3: Have you heard of EVA (Essity Virtual Assistant)? | Single-choice | Part 1 |
| Q4: How did you first hear about EVA? | Single-choice | Part 2 |
| Q5: Have you used EVA (Essity Virtual Assistant)? | Single-choice | Part 2 |
| Q6: How was your experience of using EVA? | Net Promoter Score | Part 3 |
| Q7: How likely are you to recommend EVA to a colleague? | Net Promoter Score | Part 3 |
| Q8: What have you used EVA for so far? | Multiple-choice | Part 3 |
| Q9: EVA is under constant development. Which of these capabilities would you like EVA to have in the future? | Multiple-choice | Part 3 |
| Q10: Are there any other capabilities that you would like to see in EVA? | Free text | Part 3 |
| Q11: Is it of importance for you to be able to communicate with EVA through speech as opposed to written text messages? | Single-choice | Part 3 |
| Q12: If both options were available, would you prefer to interact with EVA through text or through speech? | Single-choice | Part 3 |
| Q13: Do you see any areas of improvement for EVA? | Free text | Part 3 |
| Q14: EVA is under constant development. Which of these capabilities would you like EVA to have in the future? | Multiple-choice | Part 4 |

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| Q15: Are there any other functionalities you would like to see in EVA? | Free text | Part 4 |
| Q16: Is there a reason why you haven't used EVA? | Free text | Part 5 |
| Q17: EVA is under constant development. Would any of these capabilities make you more interested in using EVA in the future? | Multiple-choice | Part 5 |
| Q18: Are there any other functionalities you would like to see in EVA? | Free text | Part 5 |
| Q19: Do you use virtual assistant tools such as Siri, Alexa, Google Home etc. outside of work? | Single-choice | Part 6 |
| Q20: How often do you use it? | Single-choice | Part 7 |
| Q21: What do you mainly use virtual assistants for? | Free text | Part 7 |
| Q22: Do you prefer to use virtual assistants through text or speech interaction? | Single-choice | Part 7 |
| Q23: What do you like about virtual assistants? | Free text | Part 7 |
| Q24: What don't you like about virtual assistants? | Free text | Part 7 |
| Q25: Do you believe that internal virtual assistants* will be a natural part of the work environments of the future? | Single-choice | Part 8 |
| Q26: Are there any factors that might prevent you from using EVA? | Single-choice | Part 8 |
| Q27: How do you feel about virtual assistants in the workplace? | Likert-scale | Part 8 |
| Q28: How do you feel about virtual assistants in society at large? (Examples include ordering machines, fast check-out/cashier, mall information systems, telephone assistant) | Likert-scale | Part 8 |
| Q29: Is there anything you would like to add about virtual assistants in the workplace? | Free text | Part 8 |

*Table 3 Depicts all the questions of the online survey.*

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