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**IMPROVING EMPLOYEE ENGAGEMENT WITH THE HELP
OF ENGY CHATBOT**

Master's thesis

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Supervisor: Tarmo Koppel, PhD

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I hereby declare that I have compiled the thesis independently
and all works, important standpoints and data by other authors
have been properly referenced and the same paper
has not been previously presented for grading.

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ABSTRACT

Employee engagement is considered one of the important topics in the area of managing people. Majority of the companies pay special attention to the well-being of their employees. However, employee engagement rate remains on a relatively low level which leads to the accompanying profit and turnover losses for the companies and high staff turnover.

This study focuses on developing an Engy chatbot solution to improve employee-supervisor one-on-one meeting effectiveness and therefore affect employee engagement. The aim of the study is to answer the main research question on how effective is chatbot in preparing for employee-supervisor one-on-one meeting. And additional research question is what impact has prepared employee report on one-on-one meeting effectiveness.

For this work the author decided to use action research to understand the cause and effect of the build solution on one-on-one meetings and therefore impact on employee engagement. Author has built an Engy menu/button based chatbot (Engy name comes from word engagement) with conversation imitation. After the test author used quantitative method to collect data from participants. After that Microsoft excel was used to structure the data and IBM SPSS Analytics software for data analysis.

Engy chatbot is effective in collecting information before the meeting. However, when implementing the chatbot in the organization, the age of the employees should be considered as older generations are less satisfied interacting with a chatbot (for age group 0-40y the mean general satisfaction is 4.54 and for 41-66y is 3.96). Managers reported that it is easy to read Engy report and found suggestions in the discussion section of the report useful. Additionally, it is easy to follow during the meeting and the majority confirmed that the report made their one-on-one meeting more effective.

These findings provide an opportunity to look at the problem with employee engagement from a different angle using chatbot technology in organisation's employee engagement strategy.

Keywords: Employee engagement, one-on-one meeting, chatbot, artificial intelligence

INTRODUCTION

Employee engagement is one of the most debated topics in a new era of managing people. Almost every company is actively trying to increase it through different activities, however it remains on a critically low level of 41% in Europe in 2020 as shown in Figure 1. Moreover, 39% of employees are disengaged and 20% are actively disengaged. Loyalty and ownership are displayed by an engaged employee who is able to unleash their full potential. They will, for example, take on work without being asked because they want to and believe that their extra effort will benefit their company. Employees that aren't engaged are divided into two groups. Employees who are disengaged are "passive" and will not put out maximum effort in the workplace. Employees who are actively disengaged are those that are unsatisfied with their jobs and are less efficient (Peakon ... 2020). On a Global scale during last year employee engagement decreased by 2 points from 22 in 2020 to 20 points in 2021. What caused the global economy loss of \$8.1 trillion according to Gallup estimation (Gallup ... 2021).

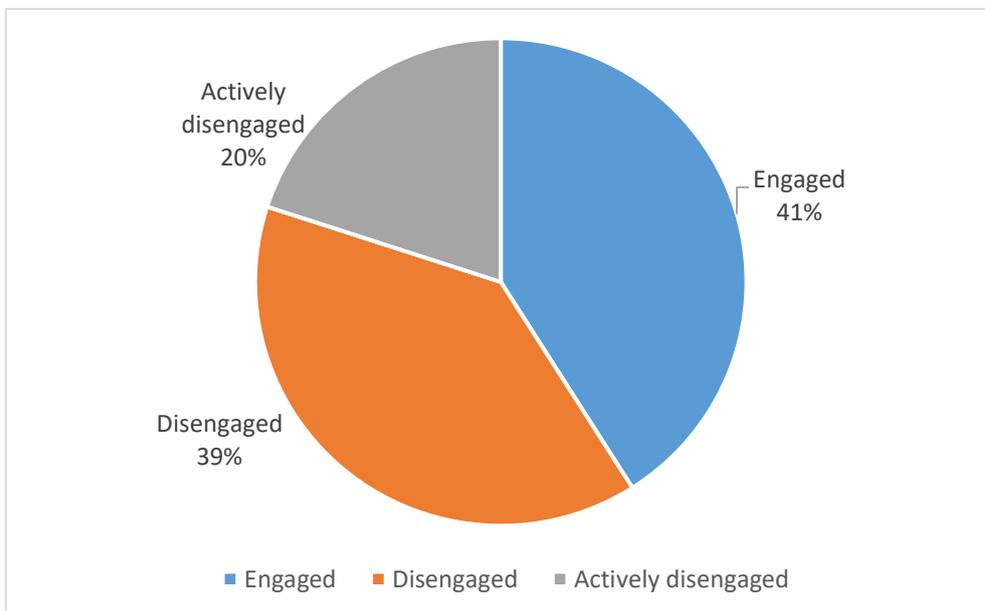


Figure 1. Global Employee Engagement in 2020.

Source: Compiled by author and based on Global Employee Engagement Data 2020 report, Peakon (2020)

Engaged employees are more likely to stay with the organisation and they feel stronger bond with the organisation’s mission and purpose however employees who are actively disengaged have the opposite effect. Disengaged employees are more likely to steal from the company, have a negative effect on their colleagues, miss workdays and lose customers. The more disconnected an employee feels, the more ready he or she is to change the job. If only 37% of engaged employees are looking for jobs or watching opportunities, then disengaged or actively disengaged are doing the same 56% and 73% respectively (Gallup ... 2017).

In 2015 Harvard Business Review posted an article “Engaging Your Employees Is Good, but Don’t Stop There” written by Eric Garton and Michael Mankins, where based on their research engaged employees are 44% more productive than satisfied and twice as more productive than dissatisfied (see Figure 2). Inspired employees are way more productive than others with 225% of outcome. Overall, the engaged employee is more productive and more likely to stay in the company investing their time and efforts, than disengaged. As a result, this affects organisation turnover and profit (Garton, Mankins 2015).

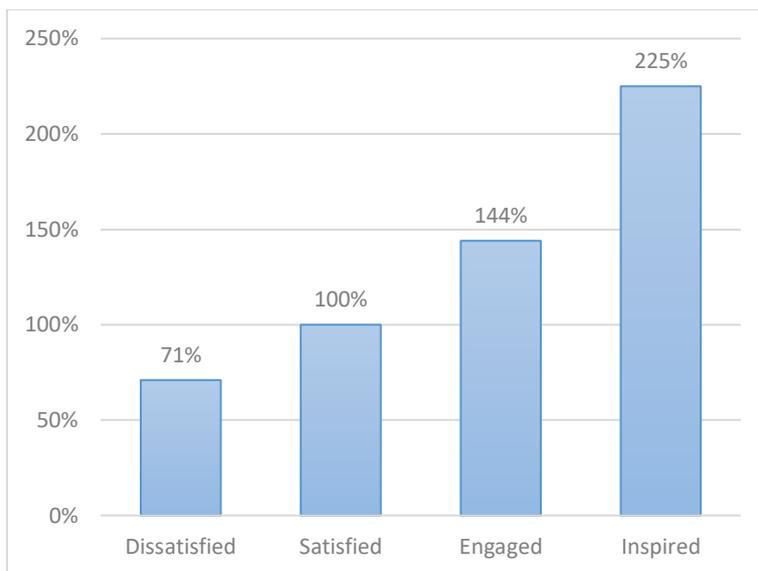


Figure 2. Productive output (in percentage)
Source: Bain & Company and EIU Research, 2015

According to the HDR Engagement report only 2% of respondents rate their ability to engage the workforce very effectively, 74% are effective in the same task, 15% neutral and 9% are not very effective. Majority of the respondents use employee engagement data for understanding the business health as a whole (57%), improving collaboration across teams (46%), aligning

organisational purpose/workforce values (44%), improving career development and training opportunities (42%), However, minority answered that data is used for improving productivity (32%), identifying talent areas at risk of existing company (23%), ensuring sufficient investment in culture initiatives (30%) and measuring the value of your current rewards/incentive programme (30%) (Moriarty 2020).

The problem of this master thesis is the low employee engagement level. This paper aims to build and test the Engy chatbot solution to improve one-on-one meetings effectiveness as part of the employee engagement strategy.

As a result of this work main research questions was formed to assess how effective is chatbot in preparing for employee-supervisor one-on-one meetings? Additional research question was formed to understand what impact has prepared employee report on one-on-one meeting effectiveness?

Research is based on a test of build solution and quantitative data collection method. The test author has built an Engy chatbot solution to collect information from employees before the one-on-one meeting and a quantitative method is used to collect feedback from participants to assess the quality of the made solution and its effect on one-on-one meeting effectiveness.

This paper consists of three main chapters: Literature review, Methodology and Data, Research results review.

In the literature review chapter the author went through five main topics in connection with this work. At the beginning the author paid attention to what employee engagement is, then what affects it and therefore highlighted an important aspect of one-on-one meeting as part of employee engagement strategy. To support this work idea to use chatbot the author also reviewed artificial intelligence and chatbots related literature.

In the second chapter the author explains the reason behind choosing action research and how it is supported by quantitative data collection. Additionally, there is a detailed explanation of the build Engy chatbot solution, questionnaires description and timeline of the research including Engy development.

Third chapter covers results of the research based on the collected data. First of all, it presents respondent's profile overview, then statistical analysis of received data and therefore assess impact

of the Engy chatbot solution from managers point of views. At the end of the chapter is a summary of the findings and further development proposal.

1. LITERATURE REVIEW

This study is focused on implementation of a chatbot in an employee engagement process and mainly improving one-on-one meetings effectiveness in order to affect employee engagement level. In this chapter the author reviews literature related to employee engagement, factors affecting it and one-on-one meeting as part of employee engagement strategy. Therefore the author reviews artificial intelligence and chatbots related literature.

1.1. Employee engagement

The definition of employee engagement offered by Kevin Kruse states: “Basically, employee engagement is the emotional commitment that we have to our organization and the organization’s goals. When we’re engaged, when we’re emotionally committed, it means we’re going to give discretionary effort. We’re going to go the extra mile. That’s the secret sauce. That’s why engagement is so important and so powerful. When we are engaged, we give discretionary effort.” The most important that engagement is about emotional state in other words feelings (Kruse 2015).

David Long a VP of Assessment at DecisionWise in his early 2021 webinar defined an employee engagement as follows: “Employee engagement is a state of mind for an employee where they are willing to bring more of themselves into work every day with them (more their creativity, their time, their talent).” And this definition is more describing a byproduct of the employee engagement practices, when an employee is really engaged at work. What makes an employee engaged? David Long also explained this part in the webinar and gave five basic elements which lead from just satisfied employees towards engaged which is called “Engagement MAGIC” (see Figure 3): Meaning, Autonomy, Growth, Impact, Connection. Meaning means that people could find a sense of purpose beyond the task they are doing. Autonomy is about a sense of trust and lack of micromanagement, so they can do their work with the trust from the organisation that they will be successful in doing that. Growth is that employees feel making progress on a day-to-day basis both professionally and personally. Impact is feeling valuable and receiving recognition for the contribution they are making to the organisation. Connection is about how they feel as they belong

here. As an employee engagement could not be built with knowing only some elements, then David explained from where it comes and what the company should have before it occurs. The first thing is a company culture which consists of values, norms, beliefs, understandings in other words “The way we do things around here”. Then comes employee experience (EX) which equals the sum of perceptions employees have about their interactions with the organisation and that is to say “The impact of the culture on the employees”. When we have these two components, then the result of them forms employee engagement, an emotional state where we feel passionate, energetic and committed towards our work which could be defined as “The employees’ emotional response to the employee experience” (Long 2021).



Figure 3. Engagement Magic
Source: Long (2021)

Employees are looking for more purpose in their work than in their personal lives. This indicates that businesses should seek to provide greater meaning to their employees' work lives by determining what matters and is significant to them. There is a link between employee engagement and business success, and increased employee engagement leads to increased corporate profitability. Individuals' personal happiness with their work environment and being a part of their organization is linked to emotional aspects. Employees that are engaged are more likely to have a strong emotional attachment to their company. An organization's attrition and recruitment costs can be reduced with better control of engagement drivers. As a result, businesses should prioritize employee engagement by addressing their various demands through interventions in job design, challenging tasks, autonomy and freedom, career planning, and job enrichment (Ruban 2018).

Employee engagement is the most crucial component to keep people motivated, enthusiastic, and fully immersed in their work. It is not only aids in keeping employees satisfied and motivated to

give their all and go the extra mile to improve the organization's performance, but it is also intertwined with other positive performance outcomes such as increased productivity, profitability, customer satisfaction, and loyalty, as well as lower employee turnover and absenteeism (Tanwar 2017).

Employees that are engaged are excited about their work and are frequently fully absorbed in it. The outcome will be better ways of doing things, showing creativity and innovation in a fresh way. Employees' levels of engagement can act as a catalyst for them to engage in more innovative work practices. Employees' intentions to stay with a company might be influenced by an employer's level of engagement. Employees who are engaged are more likely to feel loyal to their company and are less willing to leave. People who intend to stay with the company for a long time are likely to do well in their allocated jobs (Gull et al. 2020).

Engaged employees are more productive and produce better quality results. Moreover, they are loyal and more customer-centric. Additionally they are happy, stable, better performers, having a better home life and show less absenteeism. On the other side, companies with high level employee engagement are more profitable, have higher stock prices and higher sales. In addition, there are 70% fewer industrial accidents occurring in better-engaged workplaces. Furthermore, engaged employees have low obesity risk, are less likely to be sick on a regular basis, will consume healthy food, and will exercise more regularly (Gagandeep, Kewal 2019).

1.2. Factors affecting employee engagement

Probably, the most important factor is a manager or in other words a leader. If a company has a leader, who cares about their employees' success, personal life, takes interest in them as people, cares about how they feel and supports health and wellbeing, then eventually employees are going to give more back to the company. It is essential, that manager has an ability to build strong relationships with employees, build strong team interaction and lead in a person-centered way (Kofman 2018).

According to John Doer's book "Measure What Matters", the main drivers of employee engagement is in OKR and CFR, where OKR is objectives and key results and CFR is conversation, feedback and recognition. The main idea, that clear openly communicated goals (OKR) are crucial for the employees to keep focus in the right place (Doer 2018). One-on-one

meetings are made to have a way of a conversation with the employees, where both could talk about problems and exchange information. In the same way talking about specific problems and situations, the manager teaches the subordinate his skills and know-how. Feedback is also one of the important aspects and it should be given and asked from the subordinates on a regular basis. This will help employees adjust their behaviour and it gives understanding on how he or she is doing. Feedback to the manager will give an overview of how he is performing his tasks and what could be adjusted. Employee recognition should be frequent and attainable. Even saying “Thank you” to your employees has the power of changing their attitude towards you and the company (Groove 1995).

Martins and Nienaber in their work and research used six dimensions as the main factors affecting employee engagement: organisational strategy and implementation, team commitment, organisational satisfaction, effectiveness of managerial tasks, organisational commitment, team orientation. According to the research results, employee engagement rate declines from top down according to company hierarchy, where top management has the highest job grade and first row employees the lowest (Martins, Nienaber 2018). The same trend comes from Quantum Workplace 2020 report, that employees who are higher in the organisational hierarchy have higher engagement levels about 19%, than individual contributors. And organisations up to 250 employees have 23% more highly engaged employees compared with the largest organisations (Workplace ... 2020).

According to Anitha J. research “Determinants of employee engagement and their impact on employee performance” there are main factors affecting employee engagement: working environment and team and co-worker relationship. Moreover, there are more components of an engaged employee: training and career, compensation, policies and procedures, wellbeing; nevertheless the physical environment and relationship with the people at the company are the most important factors (Anitha 2013).

In order to effectively engage employees ten strategies could be followed. First, employee engagement should start from day one, where the employee gives general and job-specific orientation. Secondly, it requires top management commitment through establishing clear mission, vision and values. Then with clear and consistent dialogue establish two-way communication, where employee feels confident to speak up. Fourth criteria is to give employees opportunities for development and advancement. Next component is to give them everything they need to do their

jobs. Therefore empower them with the appropriate trainings increasing their knowledge and skills. In all that process of development feedback plays a crucial role where conducting regular surveys could help to collect data measuring employee engagement. Another important factor is to build financial and nonfinancial incentives systems to give employees recognition and praise for their efforts. Then companies should promote a strong work culture where activities of the managers are aligned with the company's values and goals. And last point is to focus on high-performing employees in order to reduce turnover of the core employees (Markos, Sridevi 2010).

A leader's emotional intelligence is one of the factors that affects employee engagement. Recent study has shown that leaders with higher emotional intelligence can improve staff productivity, customer happiness, and organisational loyalty more effectively than those with lower emotional intelligence (Veshne, Munshi 2020).

Because supervisors are seen as representatives of the company, employees' attitudes and behaviors can be positively influenced when they sense a high degree of support from their bosses, which indicates organizational support. A supportive culture that supports open connections results in a favorable shift in employee performance, which leads to employee engagement, proving the social exchange theory. With a supportive organizational culture, supervisory assistance has a major impact on employee engagement. Management must make concerted efforts to improve the organization's communication networks. Employees should be encouraged to offer important inputs and raise concerns without fear of being ignored or questioned through two-way communication (Odai et al. 2021).

Moreover, employee engagement depends on many variables and research has shown that equal employee opportunities, personal influence, nature of career, development opportunity, employee recognition, workplace challenge, supervisor behaviour, ethics and integrity, job empowerment have positive relationship with work engagement. This study emphasized the importance of workplace challenges in motivating employees to be more involved with their company (Bayad, Govand 2021).

1.3. One-on-one meetings as part of employee engagement strategy

Employees who meet one-on-one with their manager on a regular basis are more than twice engaged at work. The more managers converse with their staff, the more involved their workers

become. Millennials have a higher demand for feedback than previous generations (Adkins, Rigon 2016). Internal communication efforts to create trust with employees can benefit both employees and the company. Employees who are more involved, trust their supervisor and the company, and are thus more empowered are more likely to establish customer relations on the company's behalf. Internal communication that is more effective can increase employee engagement. Relationship between manager and employee plays a main role in employee engagement (Mishra et al. 2014). Effective one-on-one meetings could develop trust between team members and managers, align everyone's tasks, share business information privately, provide mentoring and feedback, and get a gut check. This meeting is meant to be honest and direct with each other in a safe environment. One-on-ones are also a possibility for employees to communicate upstream privately and the most rewarding part of the meeting is when both parties exchange knowledge and learn from each other in other words provide coaching. Moreover, during the session there is the possibility to look backwards and forward additionally to a review of current tasks (Schindler 2016).

The relationship between supervisor and organization elicited emotions, demonstrating that the two variables have a strong fit. The immediate supervisor, on the other hand, is the primary emotional driver in the workplace. Employee reactions to direct managers account for 84 percent of how employees feel about their company. The immediate supervisor elicits a divisive emotional reaction. Managers that instill good feelings in their employees create a greater sense of contentment. When they make employees feel inspired, enthusiastic, happy, and excited, they obtain the highest satisfaction scores. Employees' satisfaction ratings are lower than usual when direct managers elicit unpleasant emotions in them. Employees who feel insulted, angered, or irritated by their direct managers have the lowest levels of satisfaction. Satisfaction with a direct supervisor affects the overall level of satisfaction with the organization, which is linked to engagement (Dale ... 2017).

There are three main skills that differentiate great managers from average: coaching, feedback, and productivity. These skills are useful for one-on-one meetings. Consistent one-on-ones are the leaders, one of the greatest resources in managing people. Frequent (weekly) one-on-one resulting in a higher employee engagement. Rare meetings (once in a month) lead to less engagement, than having no one-on-ones at all. There is a three main factors why one-on-ones affecting employee engagement: trust via the mere-exposure effect (simply seeing one another faces leads to greater trust and liking), accountability via progress reporting (checkpoint to celebrate progress and overcome obstacles) and agility via short feedback loops (accelerates learning and improves

productivity). And as a result engaged teams have 20% higher sales, 21% higher profitability, 40% fewer quality defects, 41% lower absenteeism, 24% less turnover in high-turnover companies and 59% less turnover in low-turnover companies (Luna, Renninger 2021).

Keys to effective one-on-ones could be summarized in the ten main points (see Table 1): purpose, relationship, onboarding, frequency, sharing context, homework, thinking and acting alike, holistic view, providing feedback, continuous improvement. The description of every point is shown in the table below (Cagan, Jones 2021).

Table 1. Keys to effective one-on-one meetings

Keys to effective one-on-ones	Description
Purpose	The purpose of the one-on-one is to help your subordinate to develop and improve.
Relationship	Every relationship depends on trust. Your employee must understand and think that his or her management is truly committed to assisting him or her in realizing their greatest potential.
Onboarding	There is a necessary and crucial onboarding time during which the individual gets the requisite skills and expertise to get up to speed.
Frequency	One-on-one should be not less than 30 minutes and once per week.
Sharing context	Ensuring that you subordinate is aware of the company's aim and goals for the year.
Homework	Employee should be encouraged to do the homework and learn about company's product and services.
Thinking and acting alike	Coaching is primarily concerned with assisting the employee in developing the ability to think and act like a strong person.
Holistic view	Keeps you aware of what activities and issues are taking place in multiple teams, and you may be the first to notice a problem brewing or duplication taking place.
Providing feedback	The biggest source of value you bring as a manager is honest, constructive feedback. Feedback should be given as frequently as possible and as soon as possible.
Continuous improvement	How many individuals they've helped gain promotions, move on to serve on increasingly important products, become company leaders, or even start their own businesses is how leaders gauge their success.

Source: Cagan, Jones (2021), table compiled by author

1.4. Artificial Intelligence and its applications

There is no doubt that Artificial Intelligence (AI) has become a part of almost every industry in the World. From simple chat robots on the website to self-driving cars. According to John

McCarthy: “AI is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable“ (McCarthy 2007).

Margaret Boden defined AI as: “Artificial intelligence seeks to make computers do the sorts of things that minds can do“ (Boden 2016). Complementing it with an explanation, that human mind quality of reasoning is an “intelligent” activity and vision for example is not. However both involve psychological skills (perception, association, prediction, planning, motor control).

Recently Hussein Abbass proposed two definitions of AI. The first one: “AI is the automation of cognition”. And the second: “Artificial Intelligence is social and cognitive phenomena that enable a machine to socially integrate with a society to perform competitive tasks requiring cognitive processes and communicate with other entities in society by exchanging messages with high information content and shorter representations“ (Abbass 2021).

As in every definition of AI could be found limitations, then according to Ben Lorica and Mike Loukides it is impossible to define it because we really do not understand human intelligence. And advancement in AI will help us to define what human intelligence is not than what AI is (Lorica, Loukides 2016).

As there is no common definition of the AI, then it is easier to understand its purpose through the prism of understanding why we need it. The one goal is to develop machines that can do things as well as humans or even better. And another goal is to understand this kind of behaviour whether it occurs in machines or in humans or other animals (Nilsson 1998).

AI has a broad use across industries and in business it could be useful in such tasks like: detecting fraud, customer service filter (answering customer questions, offering products, immediate gratification, etc), user data abstraction (automate meetings, product failure predictions, customer service refinement, etc), predicting area failures (machinery repair cycles, nonoptimal production, customer patterns, website security hole, etc), massive monitoring (production output, worker health, sales versus market trends, etc), financing risks analysis, talent acquisition and human resource, business regulation, autoresponders, customer behaviour prediction, digital customer acquisition tool and more. One of the disciplines of AI is chatbots, which found a use in different applications like: helping customers to find the right products, make simple changes with billing,

providing remedies to complaints, personalizing attention, reducing customer service workloads, solving easy IT issues, handling customer retention (Mather 2018).

Artificial intelligence should be considered to be used detailing these nine technologies: natural language generation (NLG), speech recognition, virtual or augmented reality, AI-optimized hardware, decision management, deep learning platforms, robotic process automation, text analytics and natural language processing (NLP), and visual recognition. To develop natural language generation tasks, artificial intelligence, particularly deep learning systems, is used to generate text from computer data. The purpose of speech recognition is to translate human language into a format that can be used by computers. Virtual reality is a computer-generated simulation of a three-dimensional environment that may be interacted with as if it were real. AI-optimized hardware comes into sight by the requirement for improved hardware acceleration in order to scale beyond present data and model sizes. Decision management is a mature technology that assists with or performs automated decision making across a wide range of enterprise applications. Deep learning platforms are utilized in research where big data sets are employed to help pattern recognition and categorization. To assist effective corporate operations, robotic process automation employs software and algorithms to automate human action. Natural language processing makes use of and supports text analytics by using statistical and machine learning approaches to aid in the comprehension of phrase structure and meaning, sentiment, and purpose. Visual recognition uses deep learning with a large number of methods (Huimin et al. 2018).

Artificial intelligence has a number of advantages, including the ability to complete tasks faster than humans, the ability to complete stressful and complex work quickly, the ability to complete difficult work in a short period of time, the ability to perform multiple functions at once, a high success rate, and fewer errors. More efficiency in a short time, less space and size, long-term and complex scenario calculations, and discovering unknown items such as outer space are all goals. However, there are some drawbacks to consider: it can be misused, resulting in mass destruction; program mismatch, which occurs when the command is not followed; human jobs are harmed; creativity is dependent on programmers; it lacks the human touch; younger generations become lazy; it requires a lot of time and money; and technological dependence is increased (Khanzode, Sarode 2020).

Artificial intelligence could be classified into seven groups: slender AI, super AI, theory of mind, general AI, relative machines, limited memory and self aware AI. All these types of artificial intelligence are presented in Table 2 below with explanations of every type (Ghanekar 2021).

Table 2. Classification of artificial intelligence

Type	Description
Slender	For a few of specific errands, AI is unmistakably used. These frameworks are changed for certain tasks and are unable to make decisions on their own.
Super AI	When AI outperforms human intelligence, it will carry out all of the tasks in a far more efficient manner than people who use intellectual qualities.
Theory of mind	AI capable of acting and communicating emotions in the same way as humans.
General AI	AI that can search through and investigate a person's problems
Relative machines	The ability of AI to respond to various simulations is similar to that of the human mind. These AI do not perform memory-based activities.
Limited memory	Information repositioning limits these uses of expertise for deciding on current selections in AI with limited memory.
Self aware AI	Individuals' thoughts and feelings can be gathered by AI, which can then act appropriately.

Source: Ghanekar (2021), table compiled by author

1.5. Chatbots as conversational agents

“The classic definition of a chatbot is a computer program that processes natural-language input from a user and generates smart and relative responses that are then sent back to the user.” Currently chatbots use rules-driven engines or are powered by artificial intelligence. Chatbots could be used in a variety of cases and also in different message apps like Facebook Messenger, Slack, Skype, Microsoft Teams. All chatbots are based on similar technology to voice assistants and the only difference is that voice assistants convert speech to text (Khan, Das 2017).

Architecture of a chatbot or voice assistant is shown in the Figure 4. The conversation manager is the most important component of a conversational interface. This module manages the conversation's flow. User utterances are translated into semantic representations, which include

user intents and parameters, via the natural language understanding module (slots and entities). This module may need to be pre-trained to recognize a set of user intents related to the conversational tasks at hand that the developer has established. A speech recognition module that can transcribe speech into text before feeding it into the natural language understanding module is required for voice-enabled interfaces that take user speech inputs. On the other hand, a speech synthesizer (or text-to-speech engine) module that translates the system's text response into speech is required. The backend modules will interface with the conversational manager. It can be a database or an online data source accessed to answer a user's question (for example, a TV schedule) or an online service that executes a user's command (for example, booking a ticket). The channel is where the chatbot and the user interact (Janarthanam 2017).

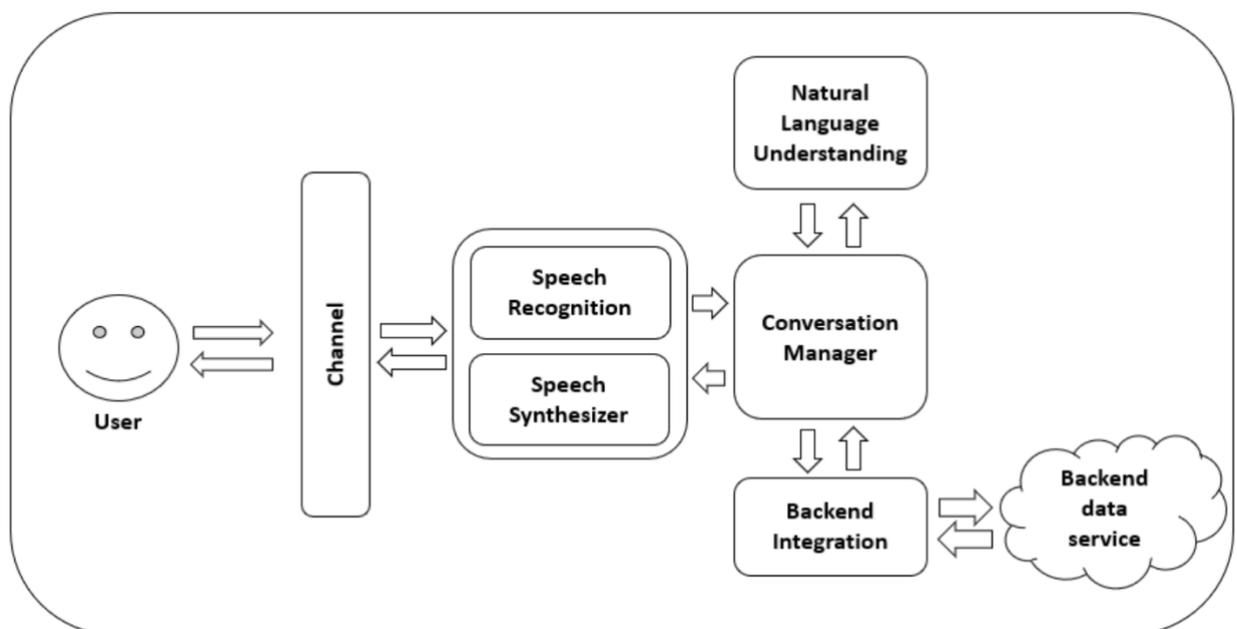


Figure 4. Architecture of a conversational user interface

Source: Hands-On Chatbots and Conversational UI Development, Janarthanam (2017)

Many chatbots offer menu-based interactions, where conversations are predicted by a pre pre-built model providing options to choose from and these are limited (Batish 2018). Nonetheless, in a 2019 election in the United States, a simple voter mobilization treatment chatbot (Resisbot) that reminded users to vote and provided information about polling sites and hours raised turnout by 1.8 percentage points (Mann 2021).

The concern that people feel less confident or comfortable communicating with chatbots was diminished in a 2015 study, where they compared human-human and human-chatbot conversations. As a result, conversation with chatbot contained fewer words per message 4.29

compared to human-human conversation 7.95. On the other hand, human-chatbot interaction consisted of more than twice the messages (49.58 vs 23.03), which made the quantity of words per conversation 219.95 compared to 190.42 in human-human conversation. Nevertheless, people employ more words, longer words, and positive emotion words when communicating with other people than with chatbots (Hill et al. 2015).

There are three main types of chatbots as shown on Figure 5: menu/button based, keyword recognition-based and contextual chatbots. The menu/button based is the most commonly used and the simplest chatbots on the market today. Keyword recognition-based chatbots recognize specific keywords to produce desired results. These types of chatbots use artificial intelligence and customized keywords lists, which helps to determine response to the user. Contextual chatbots are the most advanced bots in the market. They use machine learning and artificial intelligence technologies to understand the intent of the user. Contextual bot learns and grows with a growing number of interactions with it. The quality of user experience based on chatbot type is shown on the Figure 5 below (Gupta et al. 2020).

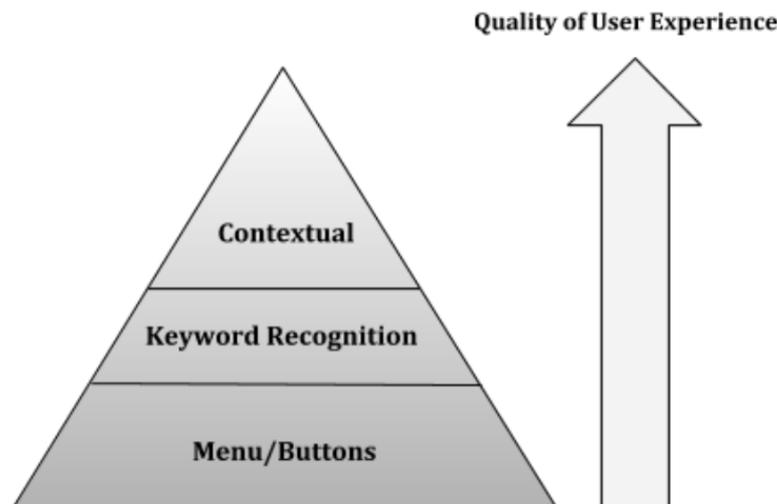


Figure 5. Preference of chatbots
Source: IJERT-Introduction to AI Chatbots. Gupta et al. (2020)

According to technical complexity, chatbots could be classified into three groups: simple chatbots, smart chatbots and hybrid chatbots. Simple chatbot asks questions with predetermined replies, and the end-user must select an option repeatedly until the user receives the required response to the

query. Smart chatbots are AI-enabled and capable of deciphering the language, emotion, and intent that the user wishes to communicate. Hybrid chatbots are the combination of simple and smart chatbots (Pattanshetti 2021). Overall chatbots could be classified by different parameters as shown in Table 3: the knowledge domain, the service provided, the goals, the input processing and response generation method, the human-aid, and the build method. For more details see table below (Adamopoulou, Moussiades 2020).

Table 3. Chatbots classification

Classification	Subclass	Description
Knowledge domain	open domain	Chatbots could keep conversation about general topics and respond appropriately
	closed domain	Chatbots are focused on a particular topic and may not response to a general questions
Service provided	interpersonal	Chatbots operate in the communication area and deliver services such as restaurant booking, flight booking, and FAQ bots.
	intrapersonal	Chatbots can be found on the user's own domain such as chat apps like Messenger, Slack, and Whatsapp. These bots are companions to the user.
	inter-agent	Inter-chatbot communication. As an example Alexa-Cortana integration.
Goals	informative	Chatbots are created to give users information that has been previously stored or is available from a fixed source, like FAQ chatbots.
	chat-based/ conversational	Chatbots converse with users as if they were real people, and their purpose is to answer accurately to the sentence they are given.
	task-based	Chatbots that perform a certain purpose, such as booking a flight or assisting someone.
Input processing and response generation method	rule-based model	They select a system response based on a specified set of rules based on identifying the lexical form of the input text rather than developing new text answers.
	retrieval-based model	Before applying the matching strategy to response selection, the chatbot receives several response choices from an index.
	generative model	Machine learning algorithms and deep learning techniques are used in chatbots to make them more human-like.
Human-aid	Human-Aided	At least one part of a chatbot is powered by human computation. As a result it slows down the process and less requests could be processed due to human limitations.
Build method	Open-source platform	Provide the possibility for the chatbot creator to interfere in most aspects of implementation.
	Closed platform	Act as black boxes in most cases, which might be a big drawback depending on the project requirements.

Source: Adamopoulou, Moussiades (2020), table compiled by author

2. METHODS AND DATA

As employee engagement is lacking and only few managers are doing activities towards improving employee engagement, then in this work the author is suggesting to look at the problem from a different angle. If there are two main factors: work environment and relationship, and obviously physical working space could be created using interior designers and some finances, then what comes to the relationships is more complicated and could not be bought. If a manager should take care of every employee professional success, personal life, coach them, help to solve problems, take interest in them as people, how they feel and supports health and wellbeing; and at the same time manage department or lead a company, then it is obvious manager would have not enough time to collect so much information, then discuss it and maintain every detail in the memory for the next one-on-one meeting. As the one-on-one meeting with subordinates is a recurring activity and discussion topics are the same, then there is a possibility to make these meetings more productive and meaningful by getting prepared before the meeting.

Previous research shows that chatbots were used in a variety of situations. For example, assessing employees mental health (Hungerbuehler et al. 2021), in human resource hiring processes (Tadvi et al. 2020), in customer brand engagement (Harinder et al. 2021) etc.

2.1. Methods

As this work is based on building and testing solutions, therefore observing and measuring the outcome of it, then it is obvious that the author has chosen positivism as a research philosophy. Based on the choice of the research philosophy and aim of the work the inductive research type was chosen.

For this work the author decided to use action research (Igwenagu 2016) to understand the cause and effect of the build solution on one-on-one meetings and therefore impact on employee engagement. Author has built an Engy menu/button based chatbot (Engy name comes from word engagement) with conversation imitation. Primary goal was to collect information from employees before one-on-one meetings with their direct manager. As the goal of the research was to improve the quality of the one-on-one meetings and therefore affect employee engagement, the overall idea was to use artificial intelligence to analyse answers and compile reports with suggestions and

overview for the manager before the meeting, which he or she could use in the meeting. As the author's personal knowledge and experience to build a proper contextual chatbot was limited to the author's abilities, the author decided to play a role of the artificial intelligence and compile reports by himself.

In the action research participated two different groups and research took in total two months, where after the testing period every participant answered questionnaires during 10 days. Even that fact, that test and data collection took more than two months does not make this study longitudinal but on the contrary cross-sectional, as variables received only once in a time.

For the sampling strategy the author has chosen non-probability sampling. The Engy chatbot experiment was conducted in one of the Baltic divisions of Luminor Bank with a employee-manager group of 22 people and in Helmes AS employee-manager team of 7 people. The criteria for choosing the companies was agreed with this master thesis supervisor and dictated by the language of the built solution. Then there was a need to choose an international company with English as the internal communication language.

After the Engy chatbot experiment was done the author collected data from employees and managers on their thoughts about the built solution. For this author compiled two separate questionnaires for managers and employees. Questionnaire for employees consisted of 19 Likert scale 5 level based questions and one open question regarding the used solution. Questionnaire for managers consisted of 9 Likert scale 5 level based questions and one open question regarding the used solution.

For data collection the author used Google Forms web platform. After all answers were received, the author exported it in a CSV file and therefore imported it to Microsoft Excel for further structuring. Data analysis was made in IBM SPSS Statistics software (version: 28.0.1.0 (142)). Mainly author mainly calculated Cronbach's alpha to check data reliability, Pearson's correlation to see linear relationship between two variables, independent samples Student's t-test to compare the means of two independent groups and ANOVA to understand how different groups respond.

Due to newness and creative approach in solving the problem, the author has not found suitable previous research on which to base this work. Therefore for building the Engy chatbot and questionnaires the author used different sources to create a suitable basis for the research.

2.2. Overview of the build solution

The most difficult part of this work was to build the solution which will work and will be useful for both parties: managers and employees. Engy chatbot was built as a minimum viable product (MVP) which could be used as a basis for establishing a startup and changing the way in managing employee engagement. It is a tool which helps managers to become better and more effective in working with their employees.

First step in building chatbot Engy was to choose the right platform and the author has reviewed and tested some of them and the author's decision fell on a solution from company HELLO UMI S.L. with their Landbot.io platform. This platform is easy to use and free of charge version gives enough functionality to build worthy solution.

As there are not so many quality questions to ask before one-on-one meetings and most of the resources give some tips on how to run successful one-on-one meetings, then it was hard to find the right questions for chatbot conversation. The author has found two main resources on which he based chatbot conversation. One of them hypercontext.com (Hypercontext ...) and second getlighthouse.com (Lighthouse ...).

During chatbot development the author has built and tested six different scenarios. The last solution includes all the comments and suggestions from friends, colleagues and relatives. In this work the author would not cover the development part in detail with all the comments as it is not relevant information.

The final version of Engy chatbot could be found as an external link in Annex 3. External links. You can go through conversation with Engy to better understand the solution.

Structure of Engy conversation was simple and you could see it on the Figure 6. Some of the questions were offering to choose an answer and depending on the answer it could redirect the conversation. As simple button chatbot were used for this test then all questions and possible additional questions were prepared inside chatbot before the conversation. As all of these questions could be asked in the meeting directly speaking with a subordinate, the main value of the chatbot, that these questions will be definitely asked after being analysed and if possible then compared to previous answers. After that manager receives full report with suggestions and could easily follow it during the meeting. Full size png picture could be found in the Annex 3. External links.

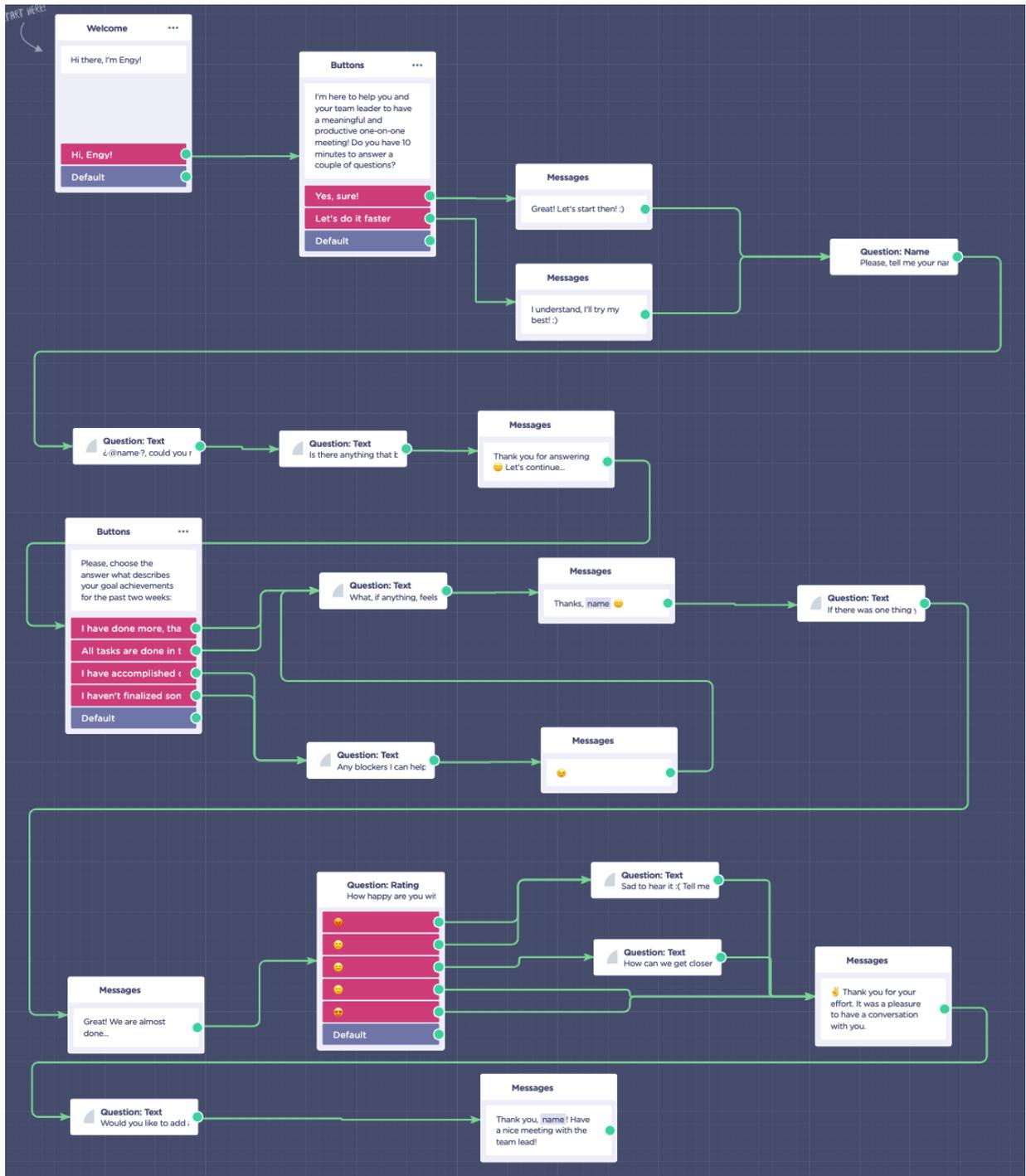


Figure 6. Engy chatbot conversation structure

Source: Compiled by author

As the author mentioned earlier he used a couple of resources to build Engy chatbot conversation and here the author lists questions asked by Engy to collect information before the meeting:

- Could you name one thing that you were excited about in the past two weeks?

- Is there anything that bothers you in the past two weeks?
- Please, choose the answer what describes your goal achievements for the past two weeks:
 - I have done more, than planned :)
 - All tasks are done in time
 - I have accomplished only important things
 - I haven't finalized some of the tasks
- Any blockers I can help remove?
- What, if anything, feels harder than it should be in your day to day work?
- If there was one thing your manager could do differently to help you more, what would it be?
- How happy are you with your work-life balance? – answers with emojis
- Would you like to add any topic for a discussion? If you have one, then it would be good to mention it here, as your team leader will have time to prepare for a discussion.

All questions were adapted for the conversation and tested thoroughly by author several times before the experiment. Structure of every conversation was the same and mainly there were open questions with possibility to write and answer. Some of the questions were with a choice of answers and depending on what employee chose Engy would redirect the conversation and ask additional questions.

After receiving the answers, in order to have maximum value for the managers, the author compiled a report about every employee with suggestions for a discussion. This is the most difficult part as it requires knowledge and experience in leading one-on-one meetings and understanding the intent of the employee with minimum information. In reports compilation the author used all experience he gained throughout the years as a team lead and knowledge from the books and articles he read. Example of the report you could find in APPENDICES (Appendix 1. Engy report).

For better understanding of Engy chatbot solution test the author compiled flowchart as shown on Figure 7. As it is seen on the chart, the author initiated the test delivering a chatbot link to the manager (in some cases to the contact person in the organisation), therefore the manager delivered the chatbot link one day before the one-on-one meeting to the employees. During the day employees had had a conversation with Engy chatbot and answered the questions. After the conversation was done at the evening before the meeting reports about every employee were compiled and delivered by the author to the manager or contact person inside the organisation. Next day the manager reviewed the report and prepared for the one-on-one meeting with the employee. When meeting time came, then employee and manager met and supervisor followed the Engy report structure during the meeting.

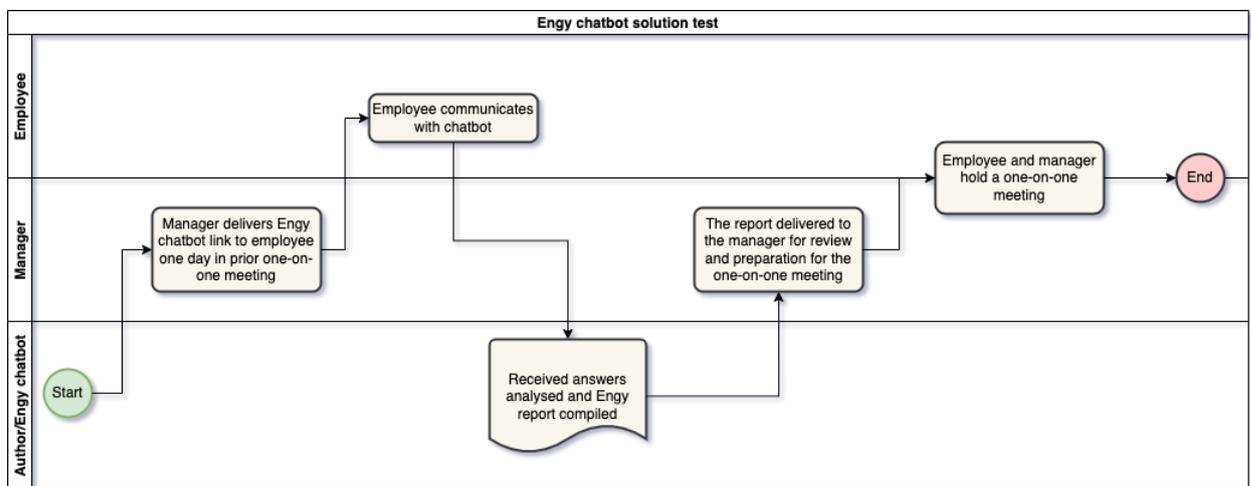


Figure 7. Engy chatbot solution flowchart
Source: Compiled by author

2.2.1. Engy report structure

During the test of Engy chatbot solution, separate report was compiled about every employee. Structure of the report was easy and included questions asked by Engy chatbot during the conversation and answers to them. It is followed by a “Discussion” section with the author's personal comments on where to put attention and what to ask additionally. Engy report is a good overview of the conversation between employee and chatbot. In this chapter examples from different reports are presented and one full report could be found in Appendix 1. Engy report.

Other reports would not be shared as they contain sensitive information provided by employees. Names in a report were changed for security reasons.

For example, in Figure 8 one of the employees shared what he was excited about during past weeks and in a “Discussion” section the author informs the manager why this question is important as it creates positive energy at the beginning of the meeting. The author suggested discussing it in more detail to better understand the employee's excitement and then to motivate the employee to be open in the future. Also it is crucial to thank him for sharing sensitive information.

The image shows a screenshot of an Engy report with three distinct sections, each enclosed in a rounded rectangular box. The top box has an orange border and contains a question. The middle box has a green border and contains an answer. The bottom box has a blue border and contains a discussion section.

Q: Could you name one thing that you were excited about in the past two weeks?

A: **Technical conversation with Vaiko.**

Discussion:
This is the starting point of your meeting where you create positive energy. That is a great that Jaan finds excitement in cooperation with colleagues. You could ask what they discussed and share his excitement. Thank him for sharing this. Also, you could reach Vaiko and thank him for his professionalism.

Figure 8. Example of Engy report. Question 1
Source: Compiled by author

After positive energy is created it is time to discuss some negative things. Engy’s second question was about things that bothers the employee. In Figure 9 is an example of the second question, answer and suggestions. This time the employee pointed out an uncomfortable topic to discuss salary and the author suggested only collecting information for the future conversation and decision making.

Q: Is there anything that bothers you in the past two weeks?

A: I'm feeling that I'm a bit underpaid.

Discussion:
You could discuss it here or at the end of the meeting (see last topic)
 Thank Jaan for pointing it out. Conversation about the money is always uncomfortable. Ask him why he feels underpaid, and he thinks is fair salary for the job he is doing? As Engy don't know your internal processes and salaries, then I suggest collecting information for the further salary increase conversation.

Figure 9. Example of Engy report. Question 2
 Source: Compiled by author

Third question in Figure 10 was with answers to choose from and depending on the choice Engy could proceed further or ask additional questions. If an employee answers that he or she has done more than planned or all tasks are done in time, then Engy will proceed to the next question. When choosing the other two answers (I have accomplished only important tasks or I have not finalized some of the tasks), then the chatbot will ask additional questions on how the manager could help to remove blockers. In the “Discussion” section the author had similar suggestions in every report as it is important to every employee to understand their contribution through accomplished tasks and therefore receive feedback from their manager. Then it was suggested to discuss what the subordinate is planning for the next week or two weeks and to set priorities for every task together.

Q: Please, choose the answer what describes your goal achievements for the past two weeks

I have done more than planned 😊

All tasks are done in time

I have accomplished only important things

I haven't finalized some of the tasks

Discussion:
 Ask Jaan to highlight the most important achievements from his point of view. Thank him for the effort and give your feedback! **Feedback is important!**
 Discuss how you could help him with unfinished tasks and what he is planning for the next (two) week(s). Set together priority for every task.

Figure 10. Example of Engy report. Question 3
 Source: Compiled by author

If an employee gave a positive answer for the previous question, then Engy would proceed to the next one where will be asked about things that feel harder than usual as shown in Figure 11. As this kind of information is also sensitive and requires trust, it was always suggested thanking employees for sharing it and discussing it to better understand the problem to find a solution

The screenshot shows a chatbot interface with three distinct sections. The top section is a question box with a yellow border containing the text: "Q: What, if anything, feels harder than it should be in your day to day work?". The middle section is an answer box with a green border containing the text: "A: Waking up in the morning". The bottom section is a discussion box with a blue border containing the text: "Discussion Thank Vaiko for sharing a sensitive information. Here you need to learn more about the problem as there could be different reasons. Is it dark mornings or he is having high level of stress or depression? Try to figure out where is the problem and discuss how you could help him."

Figure 11. Example of Engy report. Question 4
Source: Compiled by author

As Engy chatbot solution is not only about employees, the author added the next question in Figure 12 for managers to receive feedback. In the discussion section the author mainly pointed out what employee answer could mean and suggested to thank him or her for the feedback.

The screenshot shows a chatbot interface with three distinct sections. The top section is a question box with a yellow border containing the text: "Q: If there was one thing your manager could do differently to help you more, what would it be?". The middle section is an answer box with a green border containing the text: "A: my manager does everything to support me". The bottom section is a discussion box with a blue border containing the text: "Discussion This topic is meant to receive feedback and your employee expectations from you. It seems, that Olga receives enough of your attention and help. Thank her for the feedback!"

Figure 12. Example of Engy report. Question 5
Source: Compiled by author

Next question in Figure 13 was meant to assess employee work-life balance and depending on the answer Engy chatbot could follow the normal path or ask an additional question. If an employee

answers with positive emojis, then Engy will move forward and if with one of the three negative emojis then additional question will be asked.

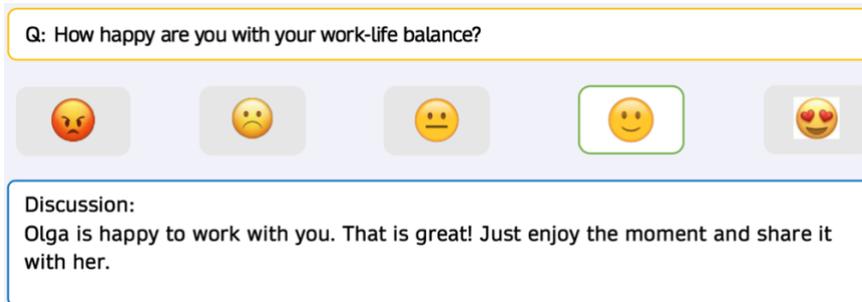


Figure 13 Example of Engy report. Question 6
Source: Compiled by author

At the end of the conversation Engy thanks the respondent for the pleasurable conversation and offers to add some topics to be discussed in a one-on-one meeting with his or her manager. Example is shown in Figure 14. This question gives the manager the possibility to prepare himself or herself before the meeting and therefore to have more productive conversation.

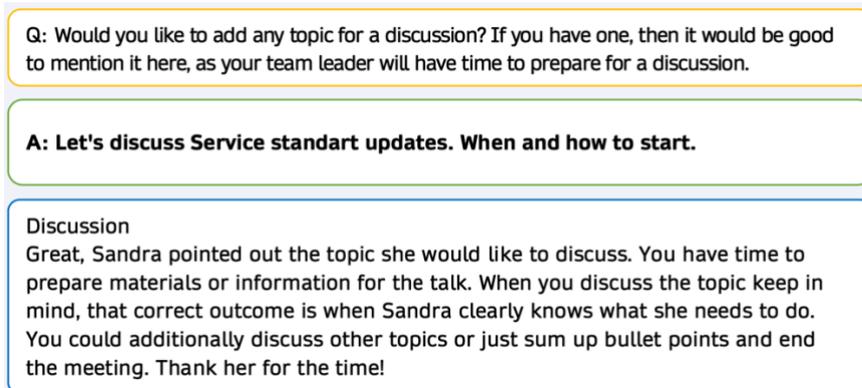


Figure 14 Example of Engy report. Question 7
Source: Compiled by author

When managers went through all topics with an employee, then they could discuss some additional topics or just to sum up bullet points and end the meeting.

2.3. Questionnaires

The author mentioned before that there is no perfect foundation to base their research on and it took time to find the right dimensions in order to measure effectiveness of the one-on-one meetings

and usefulness of Engy chatbot with reports. For this purpose the author has built two questionnaires for the managers and employees separately.

Questionnaire for employees was meant to measure one-on-one meeting efficacy and collect opinions about using Engy chatbot. Questionnaires were divided into seven sections: general questions, five dimensions of effective one-on-one meeting: 1) certainty, 2) autonomy, 3) meaning, 4) progress, 5) social inclusion; and Engy chatbot questions.

In order to measure Engy chatbot effectiveness are used five dimensions of effective one-on-one meeting (see Table 4). Certainty is important for our brains, because uncertainty releases the hormone cortisol, which causes a fight-or-flight state. When employees don't know what is expected from them and what to prioritize, then they waste time on looking for answers and making poor decisions. Autonomy is a buffer for stress. When you have the right amount of choice and control, then negative stress turns into eustress. When you have an unlimited amount of control and choice, then uncertainty and stress kicks in. The goal of autonomy is to balance control and amount of choice on the right level. Meaning is important to help employees to connect work to concepts that matter to them, therefore it increases engagement, satisfaction, and productivity. Progress tracking is important for employees to receive bursts of dopamine, which leads to more engagement, which fuels more progress, which leads to more dopamine. Social inclusion is being part of something. At work being excluded hurts and being included improves commitment, time-to-performance, resilience, and employee retention (Luna, Renninger 2021). Additionally Engy chatbot solution was assessed using 4 questions with Likert scale and one open text question. Moreover, to compile the right questions the author used additional resources (Indeed ... 2021, Fellow.app ... 2021). All questions were rephrased and adapted for the research purpose.

Questionnaire for managers was meant to collect feedback from managers who used Engy reports before and during one-on-one meetings. Questionnaire is divided into five sections: general questions, general question about Engy report, using Engy report during one-on-one meetings, learning from Engy report and open question about Engy solution. To understand the overall effect on the one-on-one meetings questionnaire is meant to measure three dimensions: overall expression about Engy report, how report affects meeting productivity and structure, and learning process using report. When compiling the questionnaire the author used resources related to product feedback collection as these questions were more about product and its usefulness (Stemler 2021).

Table 4. Five dimensions of effective one-on-one meeting

Dimension	Description	Number of questions
Certainty	Employee clearly knows what expected from him and what to prioritize	3
Autonomy	Right amount of choice and control in employee hands	3
Meaning	Help employees to connect work to concepts that matters to them	3
Progress	Tracking progress is important to receive bursts of dopamine	3
Social inclusion	Being part of something	3

Source: Luna, Renninger (2021), compiled by author

2.4. Timeline of the research

After the decision was made to use chatbot as part of the solution to improve employee engagement in May of 2021 the author started looking at how to bring it to live. During long conversations with the supervisor and extensive research on chatbot solutions and how it works the author completely decided on what will be built. In August 2021 author narrowed use of chatbot to only one-on-one meetings and started building the solution. During the next two months the author built and tested six different versions of Engy chatbot and the last one was the most successful. Probably, building a minimum viable product from idea to solution took around 3 months. The most difficult part is to structure a conversation that would engage users until the end of the conversation. At the beginning of November the author finally agreed on the place where Engy will be tested and 9th of November test started. As there were not enough participants in the Luminor, then it was decided to run additional tests in Helmes. During the next three weeks every day the author was receiving answers and every evening compiled Engy reports. Testing in Luminor ended at the end of November and then during one week answers for questionnaires were collected. Test in Helmes was conducted in December and ended with data collection on 29th of December. When all answers were received it took time to structure and analyse it.

3. RESULTS

In this chapter the author introduces analysis of the data and research outcomes. Data was collected using online questionnaires platform Google Forms with a quantitative method. Data was analysed using SPSS Analytics software and all calculations were done in this software. For creating visual graphs, the author used Microsoft Excel. Raw data file and SPSS Analytics calculations output could be found in Appendix 3. External links.

3.1. Sample

Online survey was delivered by email to every participant through a contact person inside the organisation. As the experiment was conducted in two different organisations and the number of chatbot users is known, the author can conclude that response rate is 100%. In total, 25 answers from Luminor and Helmes employees who used chatbot Engy and 4 answers from their managers (Luminor – 3, Helmes – 1).

According to the results of the questionnaires amongst Luminor employees, the majority were 25-40 years old (64,0%). 16,0% were 41-56 years old, 12,0% were 0-25 years old and 8,0% in the 57-66 age group. By gender, the number of respondents was predominantly women with 72,0% and men was only 28,0% (see Table 5).

Table 5. Sample description, employees

	n	(%)
Age groups		
0-24 years old	3	12,0
25-40 years old	16	64,0
41-56 years old	4	16,0
57-66 years old	2	8,0
Gender		
Female	18	72,0
Male	7	28,0
Company		
Luminor	19	76,0
Helmes	6	24,0

Source: Compiled by author

Amongst managers there were 3 respondents in the age group 25-40 and 1 was 41-56 years old. From a gender perspective there were 2 men and 2 female managers (see Table 6).

Table 6. Sample description, managers

	n	(%)
Age groups		
0-24 years old	0	0
25-40 years old	3	75,0
41-56 years old	1	25,0
57-66 years old	0	0
Gender		
Female	2	50,0
Male	2	50,0
Company		
Luminor	3	75,0
Helmes	1	25,0

Source: Compiled by author

3.2. Data reliability analysis

For the data reliability check the author used IBM SPSS software to calculate Cronbach's alpha. Reliability analysis for employees' answers were done in two steps. At first all 19 variables (questions) together and after that were calculated means for every dimension and reliability analysis was done for all dimensions together.

In the first reliability test results where all 19 variables were tested Cronbach's alpha (α) is 0.758 which means that collected data has a good and acceptable quality and could be used for further analysis.

On the other hand, when means for all dimensions were calculated and reliability test was done again, then results slightly changed. The result of Cronbach's alpha calculations decreased by 0.005 points ($\alpha = 0.753$), however, it remained on a good and acceptable level for further analysis.

Additionally, item-total statistics in Table 7 were reviewed in order to understand how every dimension is correlated with overall dimensions. We see in the table, that corrected item-total correlation coefficient for one-on-one meeting dimensions are higher than 0.3 and only for the Engy chatbot dimension it is lower than 0.3. It could be explained that this dimension has a different number of questions, and those questions were not related to one-on-one meetings.

Conventional logic advises removing Engy chatbot dimension from the further analysis to have more reliable data, but in this case $\alpha = 0.753$ on a good and acceptable level, therefore no data will be removed.

Table 7. Item-total statistics for six studied dimensions

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Certainty dimension	22.8	2.6	0.503	0.448	0.714
Autonomy Dimension	23.1	2.8	0.387	0.322	0.745
Meaning Dimension	22.6	2.7	0.621	0.600	0.693
Progress dimension	22.9	2.3	0.629	0.504	0.675
Social inclusion dimension	22.7	2.3	0.839	0.745	0.628
Engy chatbot dimension	23.1	3.1	0.135	0.107	0.815

Source: Author's calculations

Answers received from the managers were also tested for reliability and due to the small number of participants (4 managers) Cronbach's alpha is negative ($\alpha = -0.201$) and this data set could be not used for further statistical analysis and will be reviewed separately.

3.3. Student's t-test

The independent samples Student's t-test was conducted to compare the means of two independent groups (employees). In could be found means for all dimensions per age group, gender and the company.

Table 8 could be found means for all dimensions per age group, gender and the company.

Table 8. Satisfaction score (1 to 5) of effective one-on-one meeting and Engy chatbot as assessed by employees (mean values of subgroups)

The assessment of five dimensions of effective one-on-one meeting by age group showed no statistical significance, where for certainty dimension $t(23) = -1.19, p = 0.25$, autonomy $t(23) = -0.08, p = 0.94$, meaning $t(23) = -0.56, p = 0.58$, progress $t(23) = -0.62, p = 0.54$, social inclusion $t(23) = -0.94, p = 0.36$. However, the mean scores for Engy chatbot dimension are statistically significantly different $t(23) = 2.67, p = 0.01$. This could indicate that the older generation was less satisfied or felt uncomfortable when having conversation with the chatbot.

Dimension	Age group		Gender		Company	
	0-40 yrs	41-66 yrs	male	female	Luminor	Helmes
Certainty	4.56	4.83	4.67	4.61	4.68	4.44
Autonomy	4.32	4.33	4.24	4.35	4.32	4.33
Meaning	4.79	4.89	5.00	4.74	4.77	4.94
Progress	4.51	4.67	4.71	4.48	4.56	4.50
Social Inclusion	4.70	4.89	4.91	4.69	4.74	4.78
Engy chatbot effectiveness	4.54	3.96	4.68	4.29	4.36	4.54

Source: Author's calculations

When assessed by gender, then there was not a significant difference in all six dimensions. In certainty dimension $t(23) = 0.25, p = 0.81$, autonomy $t(23) = -0.53, p = 0.60$, meaning $t(23) = 1.61, p = 0.12$, progress $t(23) = 0.98, p = 0.34$, social inclusion $t(23) = 1.18, p = 0.25$, Engy chatbot(23) = 1.74, $p = 0.10$.

Similar to gender, assessment by company has not shown any significant difference for all six dimensions. In certainty dimension $t(23) = 1.04, p = 0.31$, autonomy $t(23) = -.08, p = 0.94$, meaning $t(23) = -0.99, p = 0.34$, progress $t(23) = 0.24, p = 0.81$, social inclusion $t(23) = -0.20, p = 0.84$, Engy chatbot(23) = -0.76, $p = 0.46$.

3.4. Pearson's correlation

To analyse correlation as well as direction of the relationship between variables Pearson's correlation coefficient were calculated and results are presented in Table 9. When analysing results author proceeded from the following parameters: 0.90 to 1.00 (-0.90 to -1.00) is very high positive

(negative) correlation; 0.70 to 0.90 (-0.70 to -0.90) is high positive (negative) correlation; 0.50 to 0.70 (-0.50 to -0.70) is moderate positive (negative) correlation; 0.30 to 0.50 (-0.30 to -0.50) is low positive (negative) correlation; 0.00 to 0.30 (-0.00 to -0.30) is negligible correlation.

Table 9. Pearson’s correlation coefficients between all variables: age group, gender, company, five dimensions of effective meeting, Engy chatbot (N=25).

		AG	G	C	CD	AD	MD	PD	SD	ED
AG	<i>r</i>	1								
	<i>p</i>									
G	<i>r</i>	0.350	1							
	<i>p</i>	0.086								
C	<i>r</i>	-0.316	-0.484*	1						
	<i>p</i>	0.124	0.014							
CD	<i>r</i>	0.240	-0.052	-0.212	1					
	<i>p</i>	0.248	0.807	0.310						
AD	<i>r</i>	0.016	0.109	0.016	0.155	1				
	<i>p</i>	0.939	0.602	0.939	0.459					
MD	<i>r</i>	0.116	-0.318	0.201	0.535**	0.246	1			
	<i>p</i>	0.581	0.121	0.335	0.006	0.237				
PD	<i>r</i>	0.129	-0.200	-0.050	0.402*	0.412*	0.625**	1		
	<i>p</i>	0.540	0.339	0.812	0.046	0.041	<0.001			
SD	<i>r</i>	0.193	-0.238	0.042	0.637**	0.489*	0.714**	0.659**	1	
	<i>p</i>	0.355	0.252	0.841	<0.001	0.013	<0.001	<0.001		
ED	<i>r</i>	-0.487*	-0.341	0.156	0.092	0.092	0.007	0.092	0.227	1
	<i>p</i>	0.014	0.096	0.456	0.662	0.660	0.973	0.661	0.274	

Source: Author’s calculations

Notes: * Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

AG – age group; G – gender; C – company; CD – certainty dimension; AD – autonomy dimension; MD – meaning dimension; PD – progress dimension; SD – social inclusion dimension; ED – Engy chatbot dimension.

The social inclusion dimension has moderate or high positive correlation with all four dimensions of effective one-on-one meeting. The most significant relationship is between social inclusion and meaning dimensions. As the social inclusion dimension measured how the employee was engaged and how he or she enjoyed the one-on-one meeting then it could be concluded that employee engagement has direct dependence from all four other dimensions.

Besides there is a moderate positive correlation between certainty and meaning dimensions. It means that clarity at work increases trust and employee confidence. However, certainty and

progress dimensions have low positive correlation. It could be interpreted as clarity at work has a low impact on employee outcome. Similar correlation coefficient has autonomy and progress dimensions. When a manager provides balance between freedom and direction to his or her employee it has a positive impact on the outcome.

There is a moderate positive correlation between meaning and progress dimensions. It means that trustful relationships and employee confidence is important for employees to be productive at work.

As it is seen in the Table 9 age group, gender and company have positive and negative correlations with all dimensions, however those correlations are not statistically significant except age group and Engy chatbot variables. It could mean that the older the user is, the more difficult it is for him to communicate with the chatbot.

3.5. One way ANOVA

A one-way analysis of variance (ANOVA) was calculated for all six dimensions as independent variables in relation to age group, gender and the company where the employee is working as the dependent variables. Due to high p levels ($p > 0.05$) there is no statistically significant difference between five dimensions of effective one-on-one meeting and age group or gender or company. However, results of the ANOVA showed a significant difference between age groups on Engy chatbot dimension scores; $F(1,23) = 7.14, p = 0.014$. In an 0-40 years old age group ($n = 19, M = 4.54, SD = 0.48$) respondents showed higher scores on average than the 41-66 years old group ($n = 6, M = 3.96, SD = 0.40$). Conclusion could be made that the younger group was more satisfied interacting with chatbot than the older age group. As the author has dependent variables with fewer than three groups, then post-hoc analysis could not be done. Results of the ANOVA calculations are located on the author's server and a link to the file could be found in Appendix 3. External links.

3.6. One-on-one meeting effectiveness

In this section results are presented on how Engy reports impacted the outcome of the one-on-one meetings from managers point of view. It is based on three dimensions: 1) overall expression about

Engy report, 2) how report affects meeting productivity and structure, and 3) learning process using report. For every dimension there was three questions to assess the impact. Due to the small sample size the results were assessed using content analysis. At the end of the chapter test answers from managers and employees are analysed.

In overall expression about Engy report section (see Figure 15) all managers reported that it was easy to read Engy report. However, only half of respondents found suggestions in discussion section of the report very useful and other half reported that it was useful enough. As the aim of the report was to improve the effectiveness of the meeting, one of the parameters is time spent on preparation, where opinions are divided. One respondent said that they spent less time on preparation and another spent more, however two of the managers gave neutral answer as time spent on preparation has not changed.

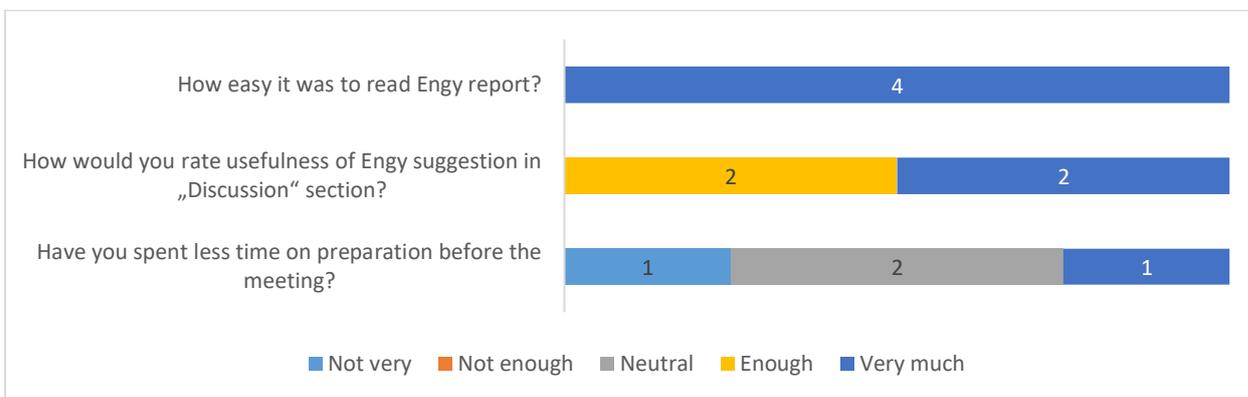


Figure 15. Overall expression about Engy report
Source: Compiled by author

In the next section about using the report during the one-on-one meeting (see Figure 16) two managers responded that it was easy to follow Engy report, however others found it easy enough to follow. Nevertheless, all respondents confirmed that Engy report was very useful during the meeting. To the question of the impact on one-on-one meeting productivity three managers reported that it made their meeting more productive, however one manager gave a neutral answer as nothing has changed.

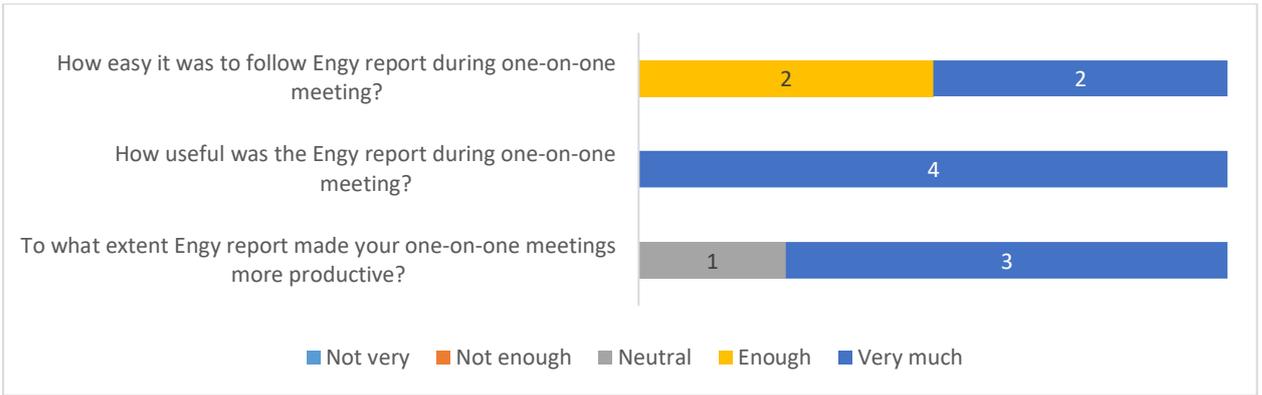


Figure 16. Using report during one-on-one meeting
 Source: Compiled by author

In the learning dimension (see Figure 17) one of the managers fully agreed that there were new things to learn about his or her employees. Besides, two respondents responded that Engy report helped them enough to learn something new about their subordinates, however one respondent said that there was not enough new to learn. One manager gave a neutral answer about learning something new from the report to make their one-on-one meetings better and two reported that they found at least something and one manager totally agreed that there was something to learn. All managers reported that they would use that kind of solution in the future to have better prepared one-on-one meetings.

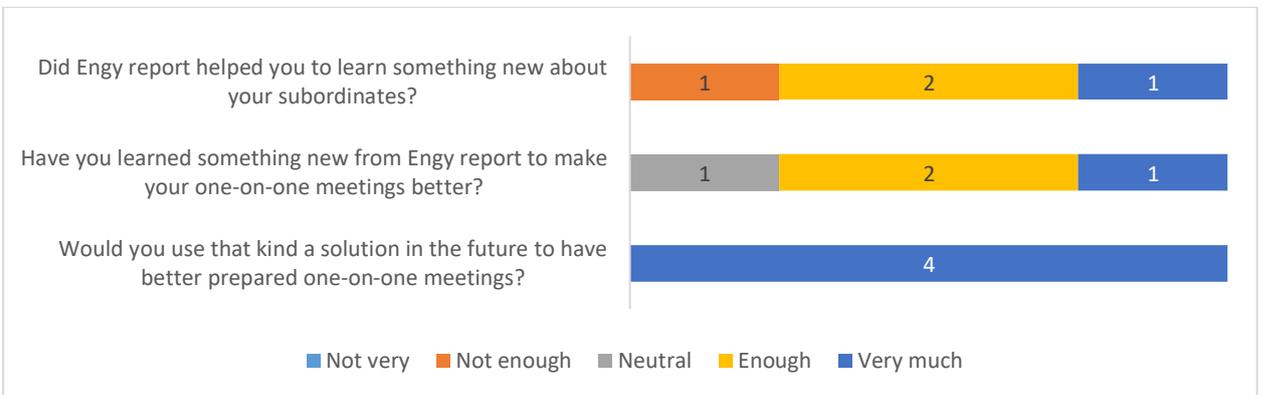


Figure 17. Learning something new from Engy report
 Source: Compiled by author

In the open question section every manager left their comments. Overall impression is positive. They stated that the report had clear structure and guidance, it was easy to use, interactive tool for self-reflection, nicely targeted questions for both work related topics and work & life balance, and liked suggestions on where to put focus. On the other hand, Engy needs to be improved and some

of the managers suggested using more scales, less writing and a chance to see previous answers. Someone said that he would use that kind of solution less often and maybe once a month.

The same open question was answered by the employees regarding Engy chatbot. Overall feedback is positive and in the Table 10 below could be found employees comments on Engy chatbot. Table is divided into two columns with positive feedback as strengths on the left and things that could be improved as weaknesses on the right.

Table 10. Summary of employee feedback on Engy chatbot

Strengths	Weaknesses
<ul style="list-style-type: none"> • Overall idea is good • Manager could be ready for topics that employee would like to discuss • It was easy to fill • It did not take long • It is a good way to reflect on the past week before going into the meeting • Idea of Engy chatbot is good • Engy helps "frame" conversation with manger • Its easy, fun and constructive warm-up for one-on-one meeting • I liked opportunity to self-reflection and better preparation • It was useful to be prepared before one-on-one meetings 	<ul style="list-style-type: none"> • It would be nice to receive the meeting minutes for subordinate also (short report for the employee) • It was hard to define being excited about smth. I would suggest using being happy instead of excited. • Maybe there could be fewer questions • Questions should be revised

Source: Compiled by author and based on respondents answers

3.7. Summary

In this chapter the author outlines the findings of the research and answers for the research questions. The main research question was how effective is a chatbot in preparing for an employee-

supervisor one-on-one meeting. An additional question was to what extent a prepared and structured report could improve one-on-one effectiveness.

Answer to the main research question could be formed from employee answers regarding Engy chatbot solution and managers questionnaire results. When assessing Engy chatbot employees scored mean (M) = 4.4 on average which means that chatbot was good in collecting information before the meeting. However, there were found differences between the age groups where 0-40 years old had higher scores than 41-66 years old (M = 4.54 and M = 3.96 respectively). Additionally, all managers reported that it was easy to read Engy report. However, only half of managers found suggestions in discussion section of the report very useful and other half reported that it was useful enough. As the aim of the solution was to improve the effectiveness of the one-on-one meeting, one of the parameters is time spent on preparation, where opinions are divided. One supervisor said that he or she spent less time on preparation and another spent more, moreover two of the managers gave neutral answer as time spent on preparation has not changed. In addition, employees reported in answers for open question, that they liked the opportunity of self-reflection, better preparation before the meeting, that it was easy to answer, and it does not take much time. Here author can conclude, that Engy chatbot was effective in preparing for employee-supervisor one-on-one meeting.

Additional research question answer is describing a byproduct after the one-on-one meeting. According to the results of employees responses in five dimensions of effective one-on-one meeting: author could conclude, that Engy chatbot and Engy report were useful and improved effectiveness of the one-on-one meetings. This conclusion comes from the high scores in all five dimensions of effective one-on-one meeting: 1) certainty (M = 4.63 , standard deviation (SD) = 0.49), 2) autonomy (M = 4.32 , SD = 0.48), 3) meaning (M = 4.81 , SD = 0.37), 4) progress (M = 4.55 , SD = 0.54) and 5) social inclusion (M = 4.75 , SD = 0.42). However, it does not clearly give an overview, that these parameters were improved with the help of Engy chatbot as there is no comparison data in the same companies. On the other hand, answer is supported by the managers responses where they stated that Engy report was easy to read and it had useful suggestions. Additionally, it was easy to follow during the meeting and the majority confirmed that the report made their one-on-one meeting more productive. Furthermore, all managers reported, that they will use that kind a solution in the future to have better prepared one-on-one meetings.

CONCLUSION

The aim of this paper was to build and test Engy chatbot solution with the help of which to improve one-on-one meetings effectiveness and therefore affect employee engagement as relationship between manager and employee plays a main role in it.

Results of the research have shown that Engy chatbot solution had an overall positive impact on one-on-one meetings. Interactions with bot were appreciated by employees, and managers found employee reports useful in the meeting.

The main research question on how effective is chatbot in preparing for employee-supervisor one-on-one meeting was addressed by descriptive statistics, ANOVA, Student's t-test, Pearson's correlation, and content analysis for managers response due to small sample size. Engy chatbot was good in collecting information before the meeting. However, when implementing the chatbot in the organisation, the age of the employees should be taken into account as older generations are less satisfied talking to a chatbot (for age group 0-40y the mean general satisfaction is 4.54 and for 41-66y is 3.96). Managers reported that it was easy to read Engy report and found suggestions in the discussion section of the report useful. As the aim of the report was to improve the effectiveness of the meeting, one of the parameters is time spent on preparation, where opinions are divided. Here it could be concluded that time spent on preparation has not changed as answers are divided. In addition, employees said about Engy chatbot, that they liked the opportunity of self-reflection, better preparation before the meeting, that it was easy to answer and it did not take much time. Here the author can conclude that Engy chatbot was effective in preparing for employee-supervisor one-on-one meeting.

Additional research question on what impact has prepared employee report on one-on-one meeting effectiveness have been also answered. According to the results of employees' responses in five dimensions of effective one-on-one meeting, the author could conclude that Engy chatbot and Engy report were useful and improved effectiveness of one-on-one meetings. This conclusion is supported by high scores in all five dimensions: 1) certainty ($M = 4.63$, $SD = 0.49$), 2) autonomy ($M = 4.32$, $SD = 0.48$), 3) meaning ($M = 4.81$, $SD = 0.37$), 4) progress ($M = 4.55$, $SD = 0.54$)

and 5) social inclusion ($M = 4.75$, $SD = 0.42$). From Pearson's correlation coefficients analysis author found, that all five dimensions of effective one-on-one meeting have positive correlations with each other and social inclusion has high or moderate correlation with all other four dimensions. It means, that employee engagement in the meeting depends on the certainty, autonomy, meaning and progress dimension scores. On the other hand, answer is supported by the managers' responses where they reported that Engy report was easy to read and it had useful suggestions. Additionally, it was easy to follow during the meeting and the majority confirmed that the report made their one-on-one meeting more productive. Furthermore, all managers reported that they would use that kind of solution in the future to have better prepared one-on-one meetings.

Engy chatbot solution met set expectations and positively affected one-on-one meetings effectiveness. Almost all participants were satisfied with the solution and would be interested to use that kind of novelty in the future.

However, the solution is not ideal and has limitations. Mainly it could not support live conversation with the user as it is built as a primitive menu/button chatbot and was tested in a short period of time. Nevertheless, the outcome of this work could be used as a basis for building AI-powered conversational chatbot with automated reporting module. With the help of artificial intelligence it is possible to fully integrate chatbot into an organisation's internal communication platform as Microsoft Teams or Skype and give bot access to the internal calendars. Therefore chatbot could become independent and contact employees at the right time before one-on-one meetings. Moreover, the chatbot could be improved and cooperate with all parties in the company. For example, it could contact a manager before the conversation with an employee and clarify what manager would like to discuss additionally with their subordinate. It will help to adjust conversation accordingly. Additionally, bot could ask for meeting minutes after the meeting and analyse it. Nevertheless, further development could be more broad and cover more employee engagement aspects.

Engy chatbot was designed to affect one-on-one meetings effectiveness and due to limitations of this research option it should be investigated more deeply. The first test of this type of chatbot can be deemed successful, and the author sees an opportunity to build a proper conversational AI-powered chatbot and test it with a larger group of people and in different organizations. It would help to receive more comprehensive data for analysis and future improvements.

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APPENDICES

Appendix 1. Engy chatbot report example



Hi! Here is the report for your one-on-one meeting with Jane.

Start one-on-one meeting with simple warming questions:

- How are you feeling?
- What is on your mind?

Q: Could you name one thing that you were excited about in the past two weeks?

A: **I was excited that our customers can now use Google Pay.**

Discussion:

That is the starting point of your meeting where you create positive energy. Take time to understand what exactly made her excited about product launch.

Q: Is there anything that bothers you in the past two weeks?

A: **That there are still many flaws in the Internet bank.**

Discussion:

That must be frustrating. Ask Jane questions to get to the core of the problem. When you both know where the issue is, then it could be solved. Focus on the solution, not the problem.

Q: Please, choose the answer what describes your goal achievements for the past two weeks

I have done more than planned 😊

All tasks are done in time

I have accomplished only important things

I haven't finalized some of the tasks

Discussion:

Ask Jane to highlight the most important achievements from her point of view. Thank her for the effort and give your **feedback! Feedback is important!** Discuss what she is planning for the next two weeks. Set together priority for every task.



Q: What, if anything, feels harder than it should be in your day to day work?

A: Nothing

Discussion

Great. You could ask questions to clarify is it just past weeks have not felt harder, or it is longer period. Maybe Jane is ready for a promotion, or she is ready to take on some new responsibilities? We grow when we face challenges!

Q: If there was one thing your manager could do differently to help you more, what would it be?

A: I think she is doing her best to help me if anything is needed.

Discussion

This topic is meant to receive feedback and your employee expectations from you. It seems, that Jane receives enough of your attention and help. Thank her for the feedback!

Q: How happy are you with your work-life balance?



Discussion

Jane is very happy. That is great! Couldn't be better. Just enjoy the moment and share it with her.



Q: Would you like to add any topic for a discussion? If you have one, then it would be good to mention it here, as your team leader will have time to prepare for a discussion.

A: Maybe my possibilities to go studying but I need to look into it myself before.

Discussion

Learning is great. Discuss studying possibilities together to evaluate couple of directions. Hopefully it would help Laura to find suitable courses or studying programs. Here is important to understand where Jane is going in a long term, her goals, therefore learning process should support this path.

Appendix 2. Questionnaires

Questionnaire for employees who used Engy chatbot based on Likert scale 5 level:

1. General Questions

- a. What is your age?
- b. What is your gender?

2. Certainty

- a. Did one-on-one discussions give you clearly stated and executable meeting action items?
- b. Did you feel your manager sets clear direction that aligns with the organisation's strategy?
- c. How satisfied are you with how much certainty you have at work?

3. Autonomy

- a. Did the one-on-one meeting give you what you need to solve problems that were present before the meeting?
- b. Did you feel a bit micromanaged in some areas? Would you like more freedom or more direction from your manager?

4. Meaning

- a. Did you receive constructive and helpful feedback from your manager?
- b. Did one-on-one meeting make you feel excited about and/or confident in your upcoming work?
- c. Rate the level of trust between you and your manager in the one-on-one meeting.

5. Progress

- a. Did the actions of your manager inspire growth and development in you?
- b. Did the one-on-one meeting make you feel satisfied with how much progress you make at work?

- c. Is there anything that blocking you or getting in your way of making progress after the meeting?
6. Social inclusion
- a. Did you feel engaged at one-on-one meeting?
 - b. Did you enjoy the one-on-one meeting with your manager?
 - c. Did you find your managers style of leading the one-on-one meeting interesting and compelling?
7. Chatbot questions based on customers feedback questionnaire
- a. How would you rate your overall satisfaction iterating with Engy chatbot?
 - b. To what extent would you agree with the following: It was easy to chat with Engy?
 - c. Questions Engy asked were easy to understand.
 - d. I struggled answering some of the questions.
8. Open question:
- a. Here you can write your thoughts about Engy chatbot. You can tell what you liked about it and what could be improved. How you liked the overall idea using a chatbot to prepare for the one-on-one meetings? Do you see future in that kind a solutions? etc.

Questionnaire for managers who used Engy reports based on Likert scale 5 level:

1. General Questions
- a. What is your age?
 - b. What is you gender?
2. General question about Engy report
- a. How easy it was to read Engy report?
 - b. How would you rate usefulness of Engy suggestion in „Discussion“ section?
 - c. Have you spent less time on preparation before the meeting?

3. Using report during one-on-one meeting
 - a. How easy it was to follow Engy report during one-on-one meeting?
 - b. How useful was the Engy report during one-on-one meeting?
 - c. To what extent Engy report made your one-on-one meetings more productive?
4. Learning something new
 - a. Did Engy report helped you to learn something new about your subordinates?
 - b. Have you learned something new from Engy report to make your one-on-one meetings better?
 - c. Would you use that kind a solution in the future to have better prepared one-on-one meetings?
5. Open question
 - a. Here you can write your thoughts about Engy solution. You can tell what you liked about it and what could be improved. How you liked the overall idea using a chatbot to prepare for the one-on-one meetings? Do you see future in that kind a solutions? etc

Appendix 3. External links

Link 1: SPSS output. Data reliability, Student's t-test, Pearson's correlation, ANOVA calculations

https://docs.google.com/document/d/158Cw2z6T_eTU1eK-IG7fWA8o_rPT_OcR/edit?usp=sharing&oid=116576368169502292356&rtpof=true&sd=true

Link 2: Engy chatbot link for testing

<https://chats.landbot.io/v3/H-985504-2DB54RDKXK7VFJZ0/index.html>

Link 3: Structured raw data

https://docs.google.com/spreadsheets/d/1t0eWuiB47s_BFMC-TNeU9k-qGXgGvkJd/edit?usp=sharing&oid=116576368169502292356&rtpof=true&sd=true

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