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An improved Internal-communication system to find responsible person easily.

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Abstract

English:

Internal communication is vital to a successful company. The connection that occurs between the employees directly affects the company's overall productivity. Many businesses are concentrating on how to engage their external public like customers, investors, media, analysts best, and community members. As a result, the connection between their most important constituency, employees, often goes ignored.

Especially nowadays, most companies have more than one office, or they are structured as Activity-based working (ABW), which means no one has fixed sitting. A study between two companies says that ABW reduces face-to-face interactions (60% and 56%) and increases e-mail traffic and online connections (22% and 50%) one of the interesting reason was that the employees have found other ways of communicating with their fellow workers, rather than having chat in front of a large audience. It likely results that the employees especially new ones don't know all people, and they can't figure out who is responsible for which work and if a problem occurs with whom they should be in touch (Ethan Bernstein, 2018). The absence of physical communication and online connections make employees spend more time and energy to find the right person or solution, and it causes struggling at work or having no clue what to do in their daily jobs. To prove it a survey was carried out aiming at the German-speaking employees and based on the research and survey, a standard list of their needs was created, which any software should at least contain, and a prototype on the Rocket-Chat platform was created. As a result, we noticed that employees are wasting time trying to reach a responsible person for their problems, especially by using email or chat as a communication system (53% of employees should wait more than 3 hours to receive an answer to their first email and 89% for chat)

Deutsch:

Basierend auf Interviews mit internen Kommunikationsexperten ist die interne Kommunikation für ein erfolgreiches Unternehmen von entscheidender Bedeutung. Die Verbindung zwischen den Mitarbeitern wirkt sich direkt auf die Gesamtproduktivität des Unternehmens aus. Viele Unternehmen konzentrieren sich darauf, wie sie ihre externe Öffentlichkeit am besten

einbeziehen können: Kunden, Investoren, Medien, Analysten und Community-Mitglieder. Infolgedessen wird die Verbindung zwischen ihrem wichtigsten Kreis, den Mitarbeitern, häufig ignoriert.

Heutzutage haben die meisten Unternehmen mehr als ein Büro oder sie sind als aktivitätsbasiertes Arbeiten (Activity-based working ABW) strukturiert, was bedeutet, dass niemand einen fixen Sitzplatz hat. Eine Studie zwischen zwei Unternehmen besagt, dass ABW die persönlichen Interaktionen reduziert (60% und 56%) und den E-Mail-Verkehr und die Online-Verbindungen (22% und 50%) erhöht. Einer der interessanten Gründe war, dass die Mitarbeiter andere gefunden haben Möglichkeiten, mit ihren Kollegen zu kommunizieren, anstatt sich vor einem großen Publikum zu unterhalten. Dies führt wahrscheinlich dazu, dass die Mitarbeiter, insbesondere die neuen, nicht alle Personen kennen und nicht herausfinden können, wer für welche Arbeit verantwortlich ist und ob ein Problem auftritt, mit dem sie in Kontakt treten sollten (Ethan Bernstein, 2018)

Das Fehlen physischer Kommunikation und Online-Verbindungen führt dazu, dass Mitarbeiter mehr Zeit und Energie aufwenden, um die richtige Person oder Lösung zu finden. Dies führt dazu, dass sie bei der Arbeit Probleme haben oder keine Ahnung haben, was sie in ihrer täglichen Arbeit tun sollen. Es wurde eine Umfrage durchgeführt, die sich an die deutschsprachigen Mitarbeiter richtete. Basierend auf der Studie wurde eine Standardliste ihrer Anforderungen erstellt, die jede Software mindestens enthalten sollte, und ein Prototyp auf der Rocket-Chat-Plattform wurde erstellt.

As a result, we noticed that employees are wasting time trying to reach a responsible person for their problems, especially by using email or chat as a communication system (53% of employees should wait more than 3 hours to receive an answer to their first email and 89% for chat)

Acknowledgments

I would like to express my sincere gratitude to my advisor M.Sc Daniel Kienböck for the continuous support of my bachelor study and research for his patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor and mentor for my bachelor study. Besides my advisor, I would like to thank my friends, who help me to run the essay and their consultation.

Last but not least, I would like to thank my girlfriend for supporting me during my research.

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Introduction

Current research (i didn't get it what do you mean with "example of such") deals with deficiency of communication support system in structured organizational companies which are trying to boost work efficiency in business by using software instead of writing an e-mail or making calls.

The primary motivation to choose this topic was the enormous complaints of employees in different companies, which brought this idea to get deep through this topic and researching about the fundamental problems and gathering some information which leads to the best solution.

The growing use of Social Media in private life has changed the way people interact and exchange data. It has aroused expectations of employees concerning the use of similar software features in their workplace. Some companies have been developing software for this purpose, but there is still some deficiency in their applications.

As attested by the IRESS Model (stands for "Identification of Requirements for Enterprise Social Software (ESS)" and was created for the development of social software solutions), "Communication Software support" is one of the crucial subjects which can make the communication between departments easier (Johannes H.Glitsch, 2017). Companies have several options and types of communication systems. In the following are some of them:

. Newsletters

. Webcast

. Conferences

. Internal Social network

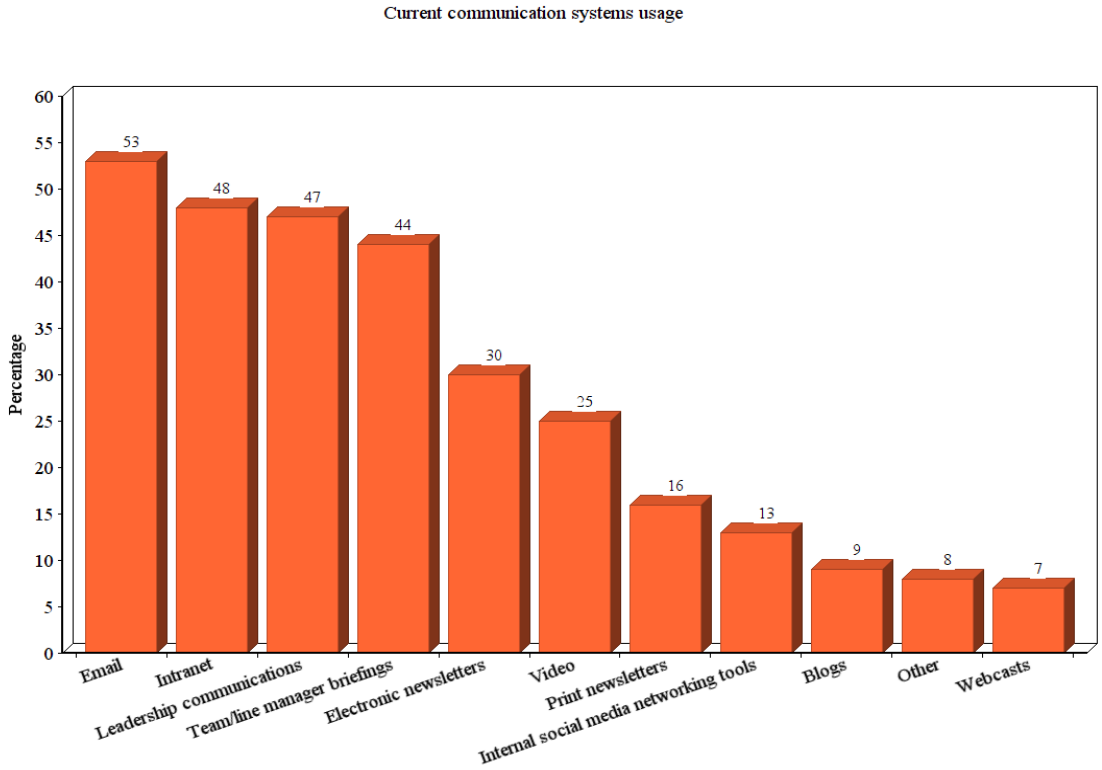
. Mobile Apps

. Chat software

. Forums

. Blogs

The following diagram shows the usage of different types of current communication systems in 2014 (Hathi, 2014). As it shows, still E-mail has priority, and internal social networking is in the eighth place, which the primary concern of this paper is finding a solution to boost this element to a higher position. (Hathi, 2014)



Based on diagram interpretation, the target group is the companies with ABW offices or with multiple offices in various locations that use a chat or e-mail system for communications between their employees or either which use the low quality internal social networking, which their main problem is difficulty in communicating and finding the responsible person to express all their needs.

In this thesis, we conduct a study at various companies and carry out a survey in a selected company to find out the current situation of the communication systems and their weaknesses like the time-consuming and Complexity to reach a responsible person for a problem. The outcome of the study is examined, and, in the end, the solutions are presented.

First chapter: State of art

To confirm their research and have a better vision about the situation, we also lead through a survey between 28 employees of companies with Clean Desk policy.

Clean Desk Policy is the issue that, although its massive benefits, also caused some side effects. We need to go through the precise definition of the Clean Desk policy at the beginning of this topic.

Desk sharing is one of the structures of a flexible working environment. Nowadays, these kinds of company- Structure are observed in many companies to provide an additional possibility of supporting mobile and flexible work, which has their advantages and disadvantages. This is often referred to as the terms of non-territorial office or flexible office. In these office structures, employees do not have their own, permanently assigned workplace, but instead look for an individual or team workplaces, as is the case with Brose. Therefore, this should not only support rapid company growth since new jobs do not always have to be created for new employees but also makes it easier to integrate the freelancers or the flexible team.

In addition to the data technology basis of being able to log in at every workstation, the so-called clean desk policy is an essential requirement. The employees clean up the workplace after leaving (it has to be agreed when the workplace is considered to be left, x hour, in the evening, etc.) so that other employees can use it. Also, it prevents the employees from providing needless printed papers, which is against the misuse of forest resources.

Paper production requires large amounts of cellulosic fiber, whereas the world's forested lands and croplands have a finite capacity to supply such resources. To deal with likely future pressure on forest resources, as well as to hold down costs of materials, the paper industry will need to implement several concurrent strategies. (Hubbe, 2014)

One of the other reasons why ABW is getting more popular is because of the space efficiency. ABW-offices are often designed for less people than number of employees. The problem with many of today's activity-based work offices is that it is not suitable for every type of work environment and its needs. The reason is lack of communication during the design process. That can lead into less information about the working environment for the architect. (Törnvall

Marcus, 2019) (i found this article from BA of two students, who are studying in another university, is it ok that i used this as a reference ?)

However, the clean desk policy is not the only aspect of desk sharing. For security motives, many companies, e.g., Citibank or Hugo Boss, have preceded the Clean-Desk system, and it also helps to assure that confidential company data is protected from external parties, such as customers who come to the office for meetings or cleaning staff. (Zinser, 2017)

With more state, national, and international companies operating on organizational structures involving virtual teams, where people work together as members of a team but are working from different locations, ABW or clean desk can magnify the work experience with communication technologies being incorporated into the office area. These include more possibilities for teleconferencing and video conferencing to enable the teams to operate efficiently. (Hedge, 2017)

Rather than communicating from a fixed desktop telephone, ABW requires the telephone systems to operate the computer processes or to utilize mobile telephone technologies. The opportunities to interact as a virtual team can happen at multiple work locations through the introduction of the new telephone systems. There are groups of workers who have specific access requirements for their work environment. (Hedge, 2017)

Finally, it is essential to provide systems for controlling the interruption of colleagues. Some organizations use visual cues to indicate when they are busy, such as small busy flags on the desk. There are mixed views over such techniques, but if a team likes the idea, it is worth incorporating it into the office etiquette. A similar option is to use personal computer presence symbols, such as Microsoft Lync or Cisco Unified Presence, which can be set to "busy" or "available," so that the colleagues refer to the status set by a person before approaching them, or they would ping an instant message to see if they are free. Another visual "do not disturb" cue often used is headphones. (Hedge, 2017)

There are some experiences from other researches about this topic:

After asking more than 1400 corporators to name the specific kind of problem that they have, about 96% cite a lack of collaboration or ineffective communications. (STEIN, 2012)

Also, based on the study dealing with Swedish traffic management, working in an ABW

office in comparison to fix-offices decreased satisfaction after relocation in the intervention group, compared with the control group. It shows about 30% dissatisfaction with communication (Total 863 persons) because of communication problems and complexity. (Annu Haapakangas, 2019)

For better understanding of the problems, we will ask some employees to answer some questions as a survey. The purpose of this survey is to find out the problems of employees in real situations and to find out their difficulties during work concerning communication. We will see what communication methods they have been using and what their expectations are. After that, we analyze the inputs and create a summary based on scientifically available information. We will name the possible solutions.

Although there are already some software that helps Mid-size and Big-size companies to set up their internal communication-system and help them to solve their problems**,** but in some of them, we can see the lack of information or details about employees' problems or how an employee can find a responsible person or the information of the introduced person, for example, their roles, responsibility, position, and availability.

Method

This paper is based on a quantitative approach. In the following, the reasons for choosing this method will be explained.

Quantitative approaches

Most quantitative analysis in the social sciences involves reducing people to numbers; most qualitative analysis involves reducing people to words. because a lot of analysis these days, qualitative and quantitative, involves visualization of data: not just looking for patterns in data, but showing the patterns as maps, networks, and matrices. (Bernard, 2011) Quantitative researches are Relatively easier to analyze, and data can be very consistent, precise and reliable.

Quantitative approaches serve to relate to positivism and try to gather descriptive data based on facts. Scientific techniques are used to collect quantified measurements and conclusions obtained from the evaluation of the outcomes in the light of the theory and literature. It is necessary to guarantee that the subject material of the research is both perceived well by the

researcher and is defined precisely. Otherwise, the variables cannot be measured correctly and compromise the analyses and findings. (Richard F. Fellows, 2015)

To confirm all research and have a better vision about the situation, we lead through a survey between 28 employees of Erste-bank.

Second chapter: Methods

Survey

As we mentioned in the previous sections, we design questions and provide them to some of the company's employees who want to contribute to our survey process voluntarily.

The set of questions asked is as follows:

1. How long have you been working in your current company?
2. How old are you?
3. Has it ever happened to you to be asked or ask a question twice?
4. If you have any problem during the work to find a solution by asking a responsible person, how easy could you reach the right person?
5. For a newly entered employee, how easy is it to find Job-based connections to solve his/her problems or ask questions?

6. To answer your problems as quickly as possible, which method do you currently use at work?

7. How often do you use this method in Average per day?

8. On average, how long does it take from occurring the problem to solving it?

9. How satisfied are you with your current method? From 1-10

10. If there is a possibility of improving one of the communications methods, which will solve the problems as quickly as possible, which one would you prefer??

The design of the questions is based on the following criteria, which we would like to analyze.

- We are going to see if there is a relation between the years that people have been working in a company (experience) and the ease of finding a responsible person. Moreover, and compare it to new employees.

  (“the sample per group must be large enough” which “stichprobe” do you mean?)

- We will see in the first step what methods the user uses to find their solutions and whether they are currently useful. We will also measure how long this process will take.
- In the end, we will ask about their preferences and their ideas about future apps to make their search more comfortable and more useful.

According to the survey results, several diagrams have been obtained, which can be analyzed clearly.

Process modeling (Survey Process : this part is about all the processes not just the survey process)

Before beginning to explain this project's process, it is essential to know why our prototype is a convenient system to support the employees in the company, in the case of communication and problem-solving. At the beginning of the project, it was not clear whether the staff ever had wasted time during communication, or if so, how much? and we did not know much about their preferences, that was all a speculation. It can happen in all day work-life that the people have to explain the duplicated question, which in some cases is time-consuming.
On the other hand, in some scenarios, they have some answers that were not helpful enough, so they have to ask other people to get a solution. Sometimes there is some small question in which the employees do not want to bother themselves or their colleagues to take their time. Alternatively, in some cases, a little clue can lead the employees to continue their work without wasting time. Still, the problem is, they cannot find a responsible person because either this person is not working at the time or there is no responsible person at all for this matter or maybe to receiving the answer they have to wait until this person is back from the vacation.

According to communication matter in problem-solving, there are lots of dissatisfactions finding a responsible person to discuss the befallen problem, could be a tough job. The employee must contact a person; he or she refers him to another person, so the entry of a loop becomes inconclusive with no result.
In some cases, some people change their position or even their job. The other employees are not informed, so it would be difficult for them to find a new responsible person.

Given the existing problems, the proposed solution is to prepare a prototype responsible for solving all these problems and boost the efficiency of the communications rate between employees.
This prototype is designed to be automatically upgraded with more and more employee's activity. That means as the people more contribute and work with this system, it gets more inputs and has more information to pass by the next time the other person, who wants to use this prototype.

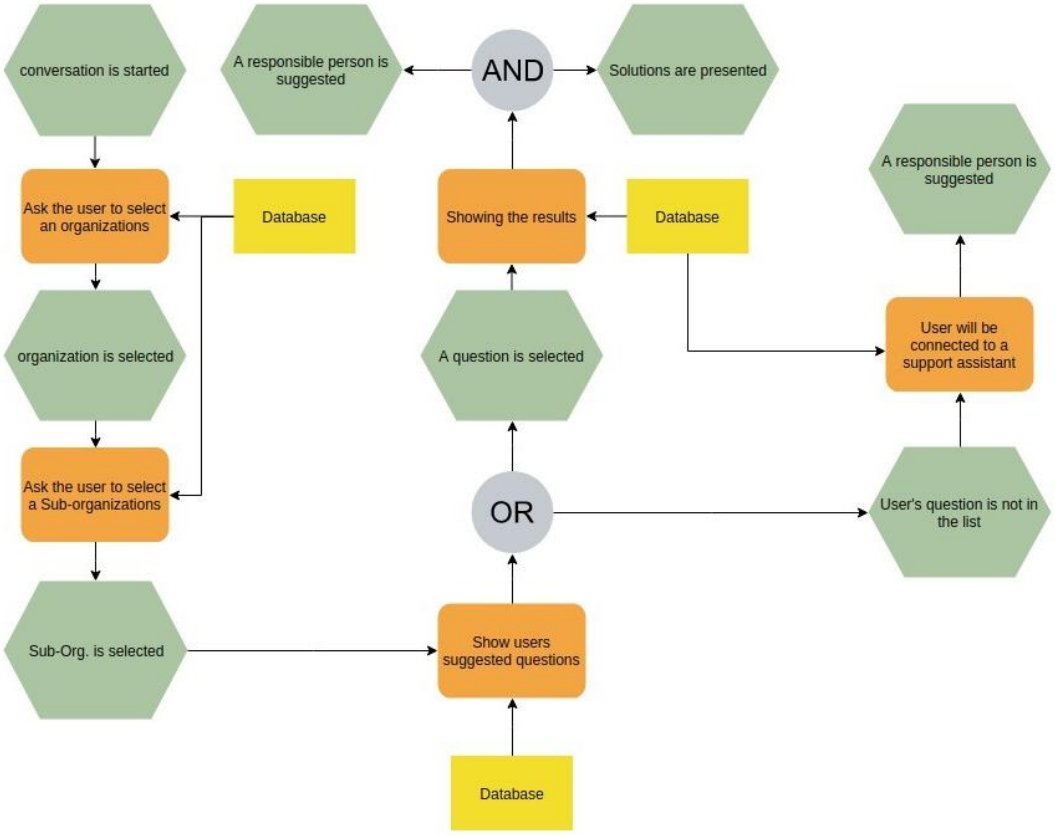
It is capable of saving the results of the occurred questions by taking an allowance from the questioner. The saved question will be next time provided to the people who have the same question. If the problem was not solved or in a case that the issue never had already asked and there is no provided solution, the application guides the user to the right person who fits the problem. When the user has received the answer and the answer was correct, the application stores the question and the answer in its database for later use.

The prototype also has this ability to store information of the people who are responsible for some matters or are specialists in some fields. It helps to find the best and quickest way to connect the questioner to an appropriate specialist. (i have already added too many images, I'm not sure if i should add more here)
As acceleration is an important aspect, it is essential to know one of the critical functions of this prototype. At the beginning of the Proto-process, the user will be asked to choose an organization; in the provided options, it is essential to select the right group because, in the next level, the user will be led to choose a sub-group for this organization. For instance, the employee wants to have the codes which are used for the customers in Holding company. The mentioned customer is an American company with LLC legality. In this case, as a head-Group, the Holding will be chosen, then the country (America) as the first sub-group and then

the legality as the second sub-group. The more accurate and detailed the information, the faster the response will be.

In the following, there are provided the process modelings with "EPC" (Zimmermann, 1998) to show the detailed steps in the prototype. After that, there is an explanation provided for the database.

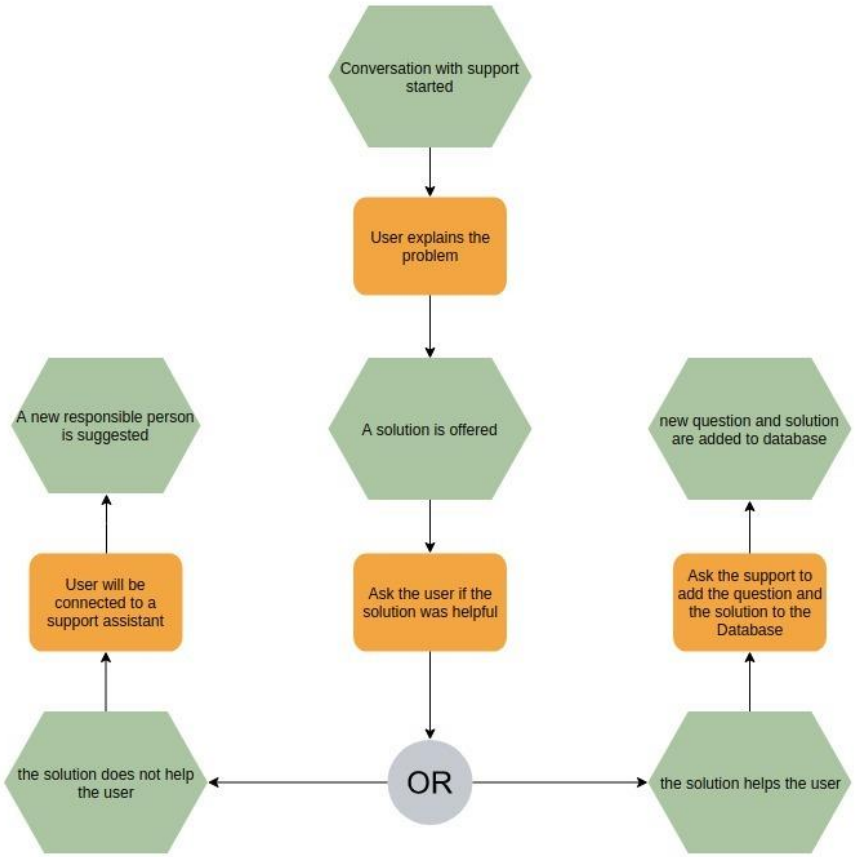
Process1:



1. The process begins when a user Opens the Chat application.
2. Before the user types anything, the application suggests the related organization in which the problem comes.
3. Then the user has to select an appropriate organization.
4. In some cases, the organization contains sub-groups, which will be suggested in the application.
5. After the user chose the intended Organizational, there will be some typical questions provided by the App that some other users have already searched.
6. If it is a relevant subject, the user can choose one of those questions.
7. The result will be shown as the answer sheet and also information of responsible people who the user can be connected to have further questions or additional comments about the provided answer.

8. On the other hand, if the user did not find his intended question, the App suggests connecting to the support assistant, who will join the user to a responsible person, which we will observe in the following process.

Process 2:



1. After Process 1, the user is connected to a Responsible Person for the occurred problem; the user explains his problem.
2. A befitting solution will be provided. If the answer is not convenient,
3. The user will be connected to the support assistant again to find a new Responsible person.
4. If the solution was helpful for the user, he could permit the App to add the question with the achieved solution to the database.

5. Thus, a new question-answer form will be added to the App, which could be helpful for the other Colleagues.

Database

As mentioned in an example, it will be easier for a user to find the right person, if we split our organization into more sub-organizations. In this diagram and our prototype, we have only one sub-organization, for more options, we can add another column to our organization (as sub_org_ID) and remove the sub_organization table. But only to show the instructor of the prototype I have used two tables. In this case, we store just an e-mail and username from the employees in our database, and in the question table, we usually save all the questions and the solutions as text.

Discussion

.1 Results and explanations

According to the results of the survey, the following items are considered in the form of a diagram, so that the relationships between the data can be compared.

Experience-Difficulty relation

In this diagram (Figure 1), we would like to see the connection between years of experience in one company and the assessment of communication difficulties in the same company.

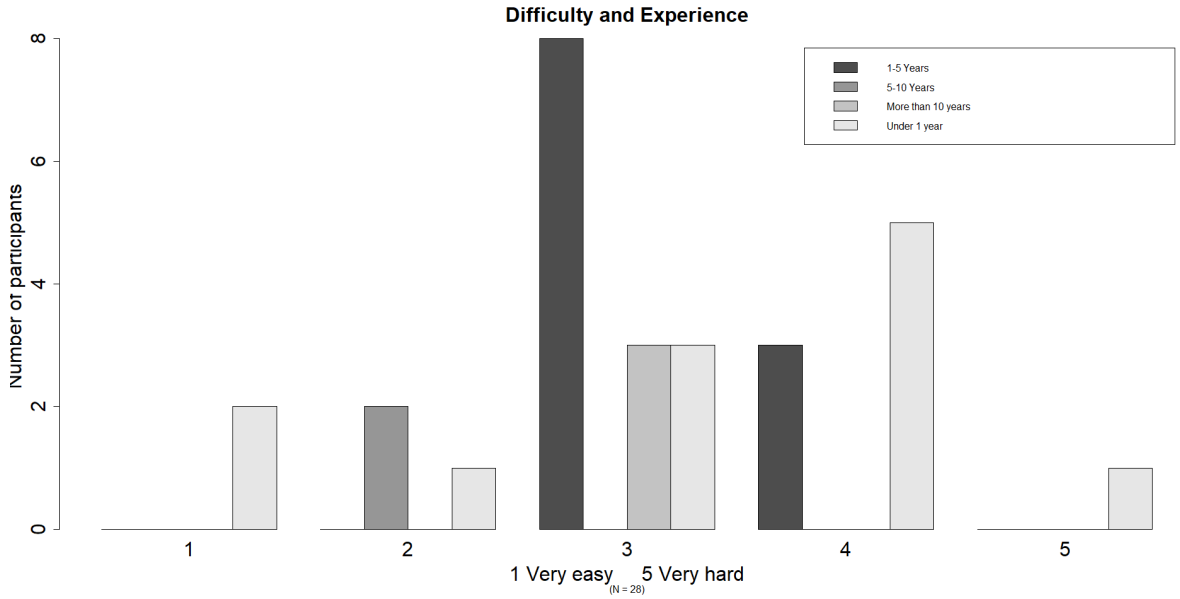


Figure 1

As shown in the diagram, the employees who have less Job experience in the company found it hard to find a responsible person. As shown in the figure, employees with less professional experience in the company found it challenging to find a responsible person. This is very clear because those who have been with a company for a long time have more connections and know more people. So they have a better chance of finding information than new employees.

	Difficulty					
Experience	1	2	3	4	5	Sum
1-5 Years	0	0	8	3	0	11
5-10 Years	0	2	0	0	0	2
More than 10 years	0	0	3	0	0	3
Under 1 year	2	1	3	5	1	12
Sum	2	3	14	8	1	28

Table 1

	Difficulty					
Experience	1	2	3	4	5	Sum
1-5 Years	0	0	29	11	0	39
5-10 Years	0	7	0	0	0	7
More than 10 years	0	0	11	0	0	11
Under 1 year	7	4	11	18	4	43
Sum	7	11	50	29	4	100

Table 2

This table shows that almost 80% of contributors (50% find it sometimes difficult and 29 % difficult) have had trouble finding a solution; it also shows that people with less experience have found it harder to find a solution.

Method – Satisfaction relation

The bar chart (Figure 2) illustrates the connection between the methods employees use in their company and the rate of satisfaction with these methods.

	Satisfaction					
Methods	1	2	3	4	5	Sum
Chat	0	1	7	0	0	8
E-mail	4	5	0	2	0	11
Face to face	1	0	0	2	3	6
Telephone	0	1	2	0	0	3
Sum	5	7	9	4	3	28

Table 3

	Satisfaction					
Methods	1	2	3	4	5	Sum
Chat	0	4	25	0	0	29
E-mail	14	18	0	7	0	39
Face to face	4	0	0	7	11	21
Telephone	0	4	7	0	0	11
Sum	18	25	32	14	11	100

Table 4

In the table of Satisfaction-method (table 4), it is clear that the number of Chat, E-Mail, and face to face users are somehow the same, (39% E-mail, 29% Chat, 21% Face to face). Still, face to face method state in the first place as the most satisfying method (3 persons totally satisfied, 2 persons satisfied), and then e-mail and chat with considering their distribution are anyhow the same in the second place.

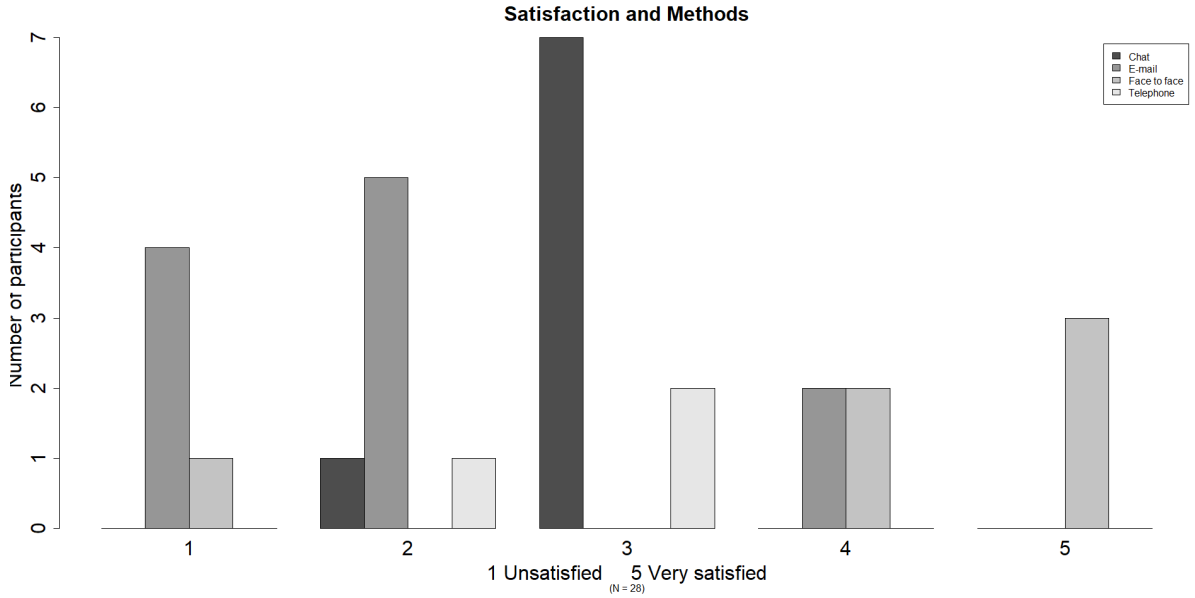


Figure 2

It can be seen that the number of users who are currently using Chat-system is in the second place (table 4) with 29%, and also their rate of satisfaction is in second place (25% gave it “3” and 4% “2” and no one selected 4 or 5) . That means the chat users are not so satisfied with the system operation.

Some people are using face to face methods, which are mostly satisfied with that. However, the problem with this form is, it is time-consuming.

As can be seen, the number of people who use E-mail service is, in general, the same as Chat lovers, but the distribution of satisfaction is not near to each other; it means some are satisfied, and some are not satisfied.

Methods	Time 0-1 h	1-3 h	3-8h	More than a working day	Sum
Chat	4	0	14	11	29
E-mail	0	7	14	7	39
Face to face	0	11	7	4	21
Telephone	0	4	0	7	11
Sum	4	21	11	36	29 100

Table 5

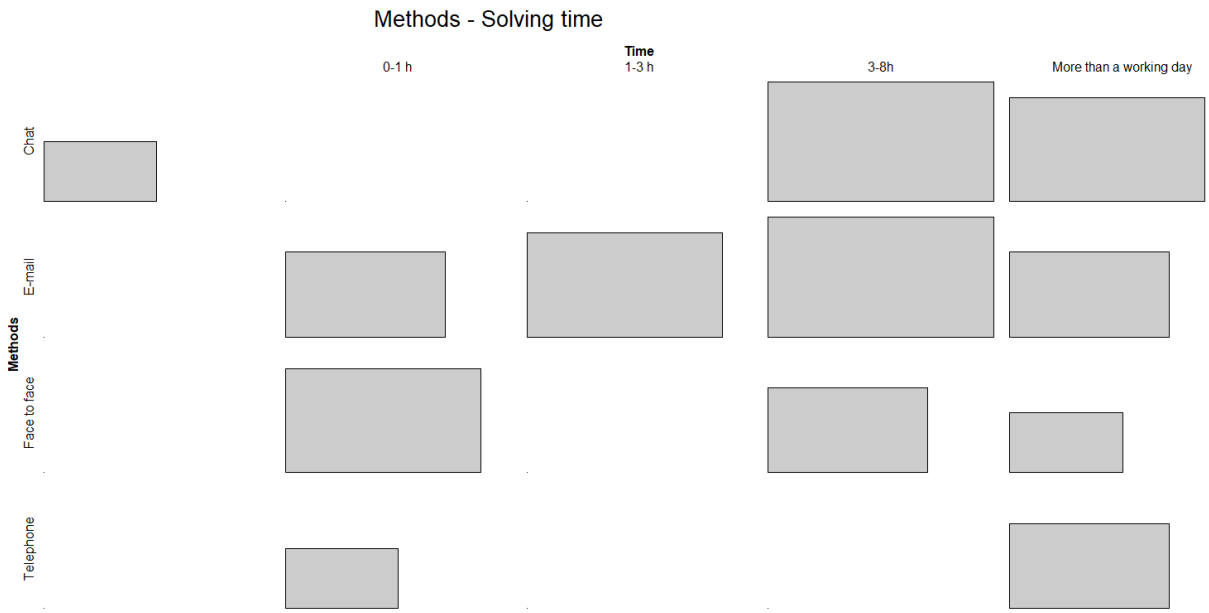


Figure 3

It was an interesting result that was not expected; The emails take time to be answered. and users using chat should wait the most to get their answers. (By looking at Dispersions in figure 3)

Why do people still use e-mail?

The advent of popular social media and further possibilities, however, has made e-mail less popular among younger people. Instead of sending short e-mails to each other, many are now sending short text messages or using messaging clients provided by chat platforms. However, this does not mean that e-mail is likely to be replaced any time soon. More people around the world use e-mail than social media platforms, and businesses are unlikely to turn to proprietary messaging platforms to replace it. Besides, companies can run their e-mail servers, allowing them to better archive messages and automatically filter messages that arrive.

After talking with some of the participants who are likely to use E-mails, one of the most important reasons that people use e-mail is to have evidence that shows the whole discussion. E-mail is known as legal evidence in which people can by occurring any problem refer. It is said to be a safe and secure system.

Solution-Satisfaction relation

In this section, we examine the relationship between the two charts. In the first chart, employees are asked if it is difficult to find a way to the solution, and they rate the ease of these criteria. In the second chart, the contributors evaluate the level of satisfaction from the current using method of communication.

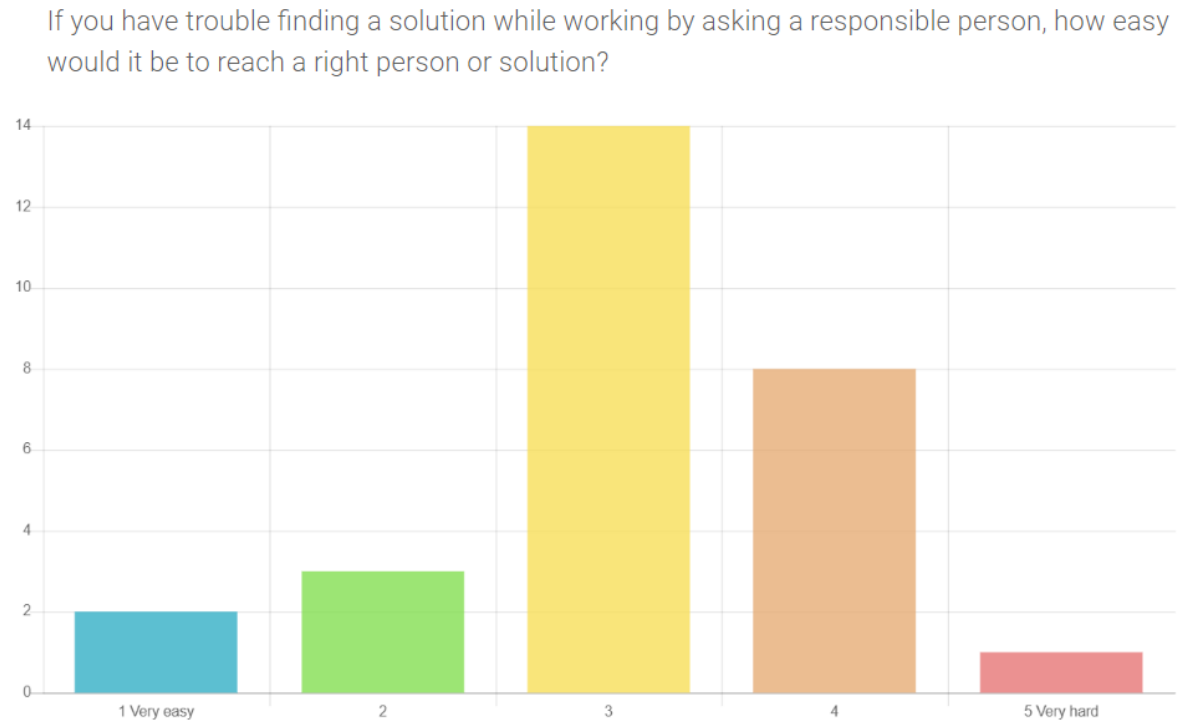


Figure 4

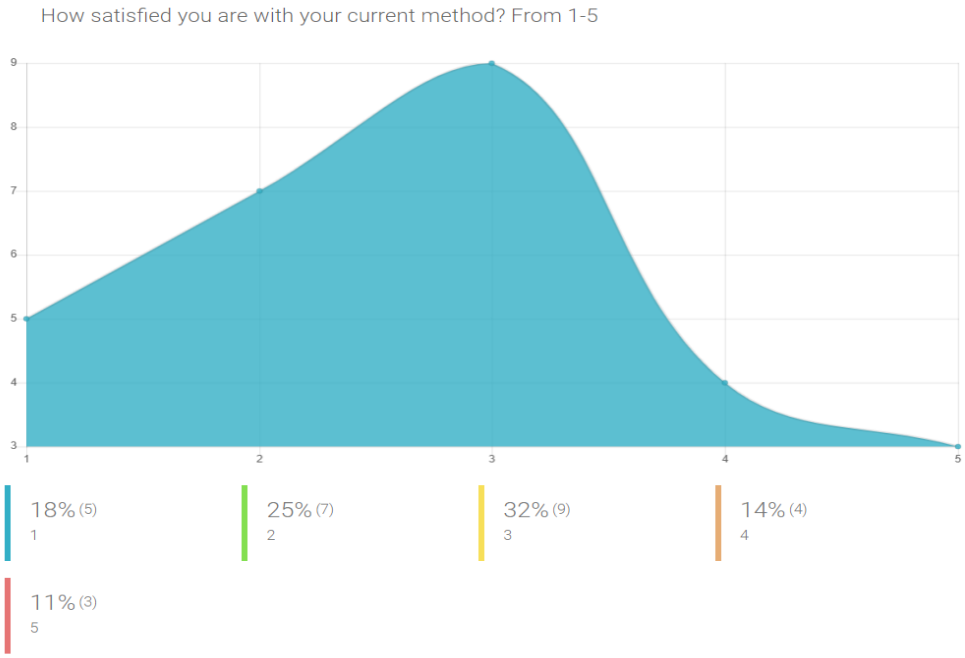


Figure 5

Here we can find a direct relationship between these two charts. For round 70% of the contributors, it is not easy finding a solution, and the average satisfaction rate about their current method is about 3.3 out of five, which is about 66%. We can find out from this comparison that the contributors are not satisfied with their current methods.

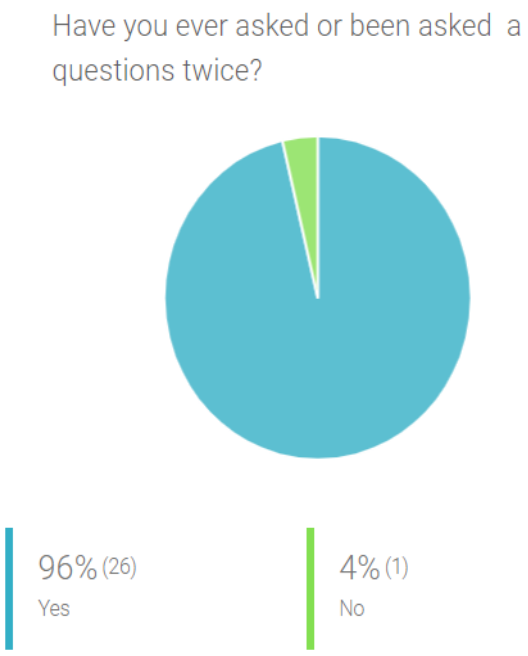


Figure 6

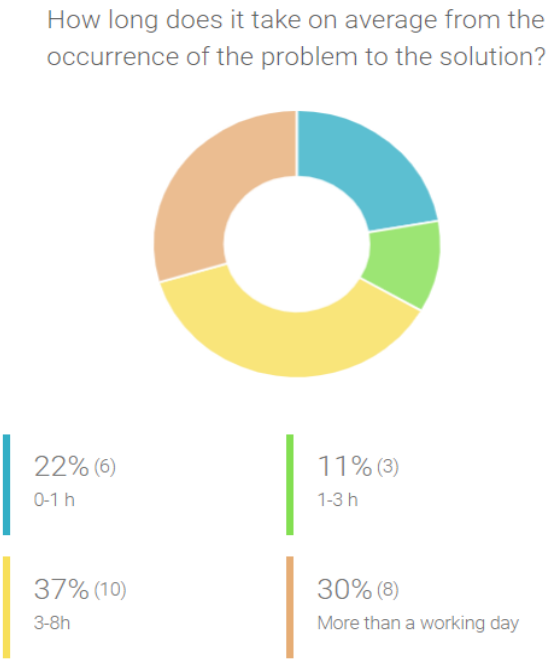


Figure 7

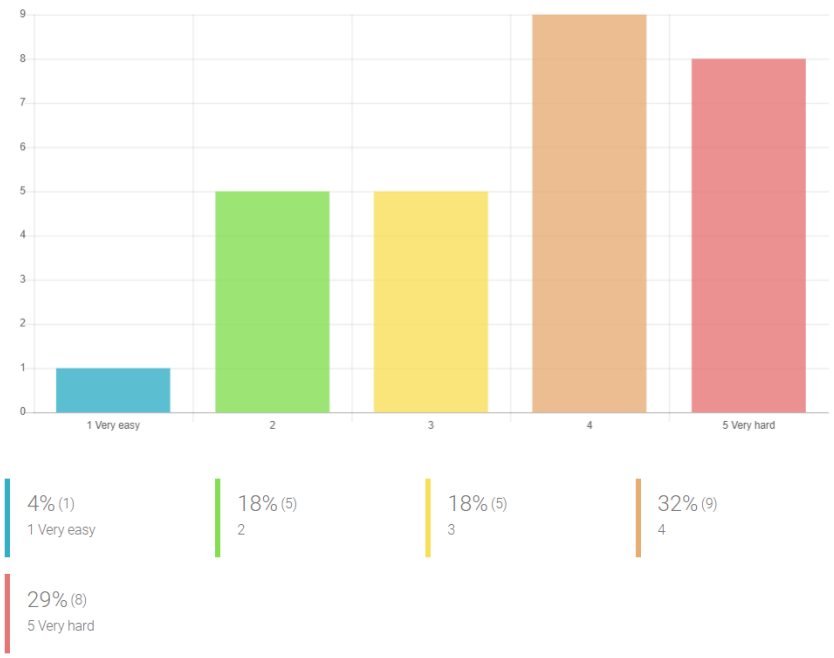


Figure 8

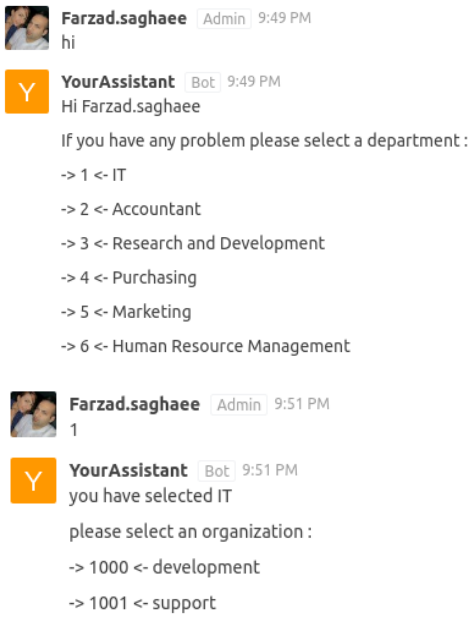
As the study shows, around 96% of the contributors asked or is asked a duplicate question. More than 30% of them said it takes more than a working-day to reach a solution and more than 61% found out that it is not easy for a newly employed people to reach the answers easily and quickly (32% “4” and 29% “5”).

By considering all these aspects, we can see that we need a system suitable for everyone in a company, the newly employed people should have benefited from our system as much as other employees. We have to consider providing a system that is not time-consuming, and the users can get the intended result as quickly and efficiently as possible. It has to be considered that it should not be a difference between the employees with higher network and relationship and the people with less networking.

.2 Explanation of the prototype

To design the prototype, we have tried to make it as simple as possible to create space for further adjustment because each company can have his data structure, and they may want to change it. The total concept of this prototype is making the process of question toward solution much more comfortable. First, we have done this with gathering all pieces of information such as contact information, company diagram, and besides them creating a database of all

frequent question because based on the survey I found out that all of the participants have had this experience to be asked or asked someone about a problem more than once.
For developing this prototype, we used Hubot. Hubot is an Open-source question and answer system based on Node.js, which we can use in various types of communication systems, in this case, we used it with Rocket-Chat which is an open-source chat system like Slack.
In this prototype, we implement a system to help users reach a qualified person as fast as possible by selecting multiple options. At first, the aim is to find the right department where the problem is related to by asking multiple questions. Moreover, after that system shows the user all stored questions specific to that department, it helps the user to find the solution in the fastest way and helps us to prevent any unnecessary contact. If the user could not solve his problem, we connected the user to the department's assistant. The assistant should determine who is more related to the question by his/her experience and field of the questions and unite the user to the responsible person. If the support person could not solve the problem, we do this segment again to find another person and so on. After the user got the solution, we save the problem and the result in our database for possible uses.
In the next pictures, you will find an example of our prototype from the first question to the saved answer. (Figure 9)



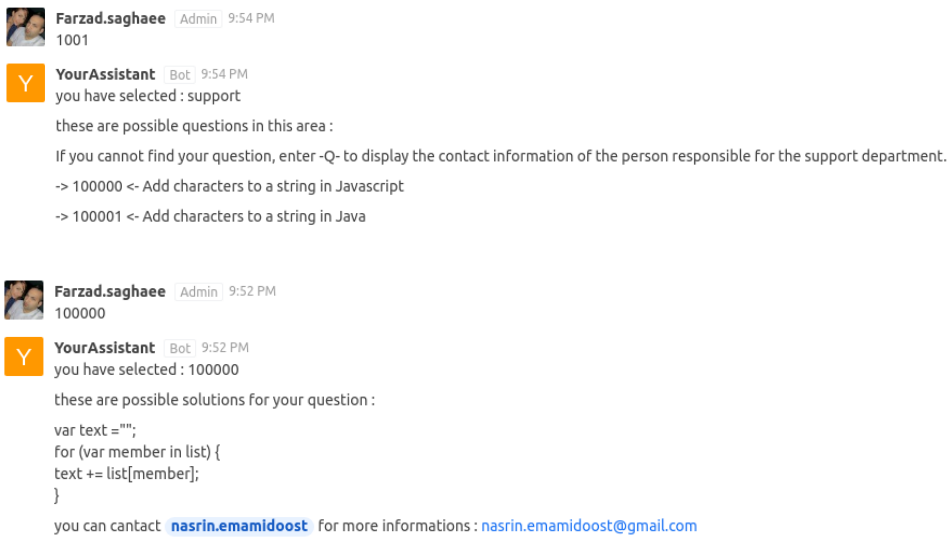


Figure 9

(should i add all screenshots of my prototype (all processes)?)

.3 Limitation of results

The advantages of a survey would be:

- Cost-effectiveness
- Online surveys can save time
- The ability to capture a more representative sample of a larger population

On the other hand, the disadvantages are:

- Need for incentives.
- Non-completion.
- Harder to get detail or explanation

Respondents could complete an online survey faster than if they participated in a group/personal meeting. Additionally, identifying a time that fits the interviewer and respondent's schedule can be a hassle. Online surveys allow for flexibility and can be accessed at a convenient time for the respondent, but Most survey respondents opt not to type out detailed, explanative responses. Because of this, open-ended questions are difficult to ask in a survey format. Instead, closed-ended "select all that apply" questions may be used to keep the respondent engaged and prevent a high drop-off rate. Unfortunately, this practice prevents respondents from using their natural language when answering questions.

As advantages of an in-depth survey, we can name:

- The ability to probe respondents.
- Candid Conversation
- Open-ended questions
- The ability to ask more questions
- A higher response rates

On the other hand, the disadvantages are:

- Requires a trained and experienced interviewer
- Time and cost
- Limited sample sizes

In this project, we used a small statistical sample that may have more Margin-errors (about 19%). To get an accurate result by selecting the survey, the analytical sample should contain more than 100 people to have less than 9.8% Margin-errors. (population size 10,000) (There is a formula for calculating these numbers. I'm not sure if I should refer to it here.)

.4 Highlight unexpected

One of the most unexpected results was the answer of the contributors to the question, what method they use currently, and if there would be the possibility of upgrade what they would prefer to use in the future (Question 10). Which it was out of expectation the Email choice was the same as Chat. And the face to face option was in the first place.

It can be understandable why people would like to have face-to-face communication to solve their problems because it would be a more trustable method. The probability of getting a correct answer is higher than the other ways. It is precisely like the comparison between research methods; the interview is always a more trustable method than the others like a survey. However, it is time-consuming, but the hope that people will contribute more to the discussion Is higher. In the face-to-face method, we can avoid any unclearness, and misunderstandings can be quickly resolved.

Earlier, we have brought this topic why is the E-Mail still a favorite platform for most of the employees. The advent of popular social media, however, has made E-Mail less popular among younger employees, table 6 shows that approximately 54% of our participants were between 25 and 35 years old and employees who prefer chat are about twice as many as employees who prefer emails. Instead of sending short emails to each other, many are now sending short text messages or using messaging clients provided by chat platforms. However, this

does not mean that E-Mail is likely to be replaced any time soon. More people around the world use E-Mail than social media platforms, and businesses are unlikely to turn to proprietary messaging platforms to replace it. Besides, companies can run their email servers, allowing them to better archive messages and automatically filter messages that arrive. We considered users of Notes Mail, the email segment of Lotus Notes. This client-server system has a graphical user interface with several standard functions, including the ability to compose, reply to, copy (cc), and blindly copy (bcc) messages for other users. Incoming unread messages are delivered to the inbox, where they appear in a different color than messages that the user "opened" and read. As soon as they are "open," they appear in the standard color. The system offers users the option of storing information: To do this, they create categories (corresponds to folders in other email systems) so that related messages can be saved and called up by category. There is no conversation threading of messages: Although replies generated with the reply option are displayed with re in the subject line, the system does not allow the user to display messages from a particular thread together automatically. However, users can view messages related to various other properties.

	Prefer				
Age	Chat	E-mail	Face to face	Telephone	Sum
25-35	21	11	18	4	54
35-50	4	7	7	0	18
Over 50	11	0	7	0	18
Under 25	0	11	0	0	11
Sum	36	29	32	4	100

Table 6

The sender can display date, size, or category, and the system also has a text search function: Email databases can be indexed in full text, so that keyword or Boolean queries are possible. There is no formal support or policy for archiving. (Sidner, 2018) Based on our understanding, email is a platform that cannot be replaced by our prototype completely, but partly in some cases.

(Habe ich in meiner Umfrage eine Frage gestellt, die nicht höflich war?)

Conclusion

This research aimed to identify the possible communication problems mostly in Clean desk companies or organizations, which has to have collaboration between departments that are not in the same areas. Also, this paper intended to determine the basis of the problems and the definition of the communications problem. In the next steps, we carried out a survey that was distributed among employees. It gave us a clear vision to compare reality with the hypotheses at the beginning of the research. The employee's preferences were taken up, and the idea of developing a prototype was expanded based on his needs.

In the beginning, all the employees' communication problems were raised based on research and personal ideas; At that time, it was argued that time was a key indicator for employees and was very important, It was also thought that other emerging apps have a slow function and waste time. In some cases, it was thought that the employees could not reach the best solution because it was not easy to find a specialist for a specific question. E-mail as a platform also meant an old system that had to be replaced by new platforms. After reviewing the results of the survey, this theory was rejected.

E-mail remains one of the most popular platforms on which employees continue to use based on their acceptable reasons. It offers some options that cannot be replaced by our prototype. In some cases, using E-mail instead of this particular prototype is a time-consuming problem.

In between, there was a common problem which said the employees have difficulty to find a person at the right time. The provided prototype will solve this problem in a way that the employees do not need to contact a person at the beginning of the process. The answer might have been concluded in the automatic answer sheet in the prototype because especially for newer employees most of the questions have already been asked and saved.

Therefore, here we can avoid duplicate questions. Any further questions or problems can lead the user to be connected to a responsible person, and if it were not sufficient, the user would be

directly connected to a support assistant who connects them to the likely right person. This process takes not so long and sometimes, even shorter than expected.

Appendix and indexes

These are some code examples from our prototype:

The Classes in our codes.

```
//#region Class
class organization {
constructor(id, name, address) {
this.orgid = id;
this.orgname = name;
this.orgaddress = address;
}}
class sub_organization {
constructor(id, name, address, org_id) {
this.suborgid = id;
this.org_id = org_id;
this.suborgname = name;
this.suborgaddress = address;
}}
class questionsclass {
constructor(id, question, solution, person_id, suborg_id) {
this.questions_id = id;
this.question = question;
this.solution = solution;
this.person_fid = person_id;
this.suborg_fid = suborg_id;
}}
class person {
constructor(id, email, user, sub_org_id) {
```

```
this.user_id = id;
this.email = email;
this.user = user;
this.sub_org_id = sub_org_id;
}}
////#endregion
```

Fill the properties from database.

```
// fill the Organizations

con.query("SELECT orgid,org_name,org_Address FROM organizations", function (err, result, fields) {
if (err) throw err;
var i;
for (i = 0; i < result.length; i++) {
x = new organization(result[i].orgid, result[i].org_name, result[i].org_Address);

organizations.push(x);
}});

// fill the Sub-organization

con.query("SELECT suborg_id,suborg_name,suborg_Address,org_id FROM sub_organizations", function (err, result, fields) {
if (err) throw err;
var i;
for (i = 0; i < result.length; i++) {
x = new sub_organization(result[i].suborg_id, result[i].suborg_name, result[i].suborg_Address, result[i].org_id);

suborganizations.push(x);
}});

// fill the questions

con.query("SELECT q_id,question,solution,person_fid,suborg_fid FROM ChatSystem.questions",
```

```
function (err, result, fields) {
if (err) throw err;
var i;
for (i = 0; i < result.length; i++) {
y = new questionsclass(result[i].q_id, result[i].question, result[i].solution, result[i].person_fid,
result[i].suborg_fid);


questionslist.push(y);
}});


// fill the persons
con.query("SELECT * FROM ChatSystem.person", function (err, result, fields) {
if (err) throw err;
var i;
for (i = 0; i < result.length; i++) {
y = new person(result[i].person_id, result[i].email, result[i].username, result[i].uborg_id);


personlist.push(y);
}
});});
```

Sending information to user.

```
sendingRespose("please select an organization :");


for (var i = 0; i < suborganizations.length; i++) {
if (finaltext == suborganizations[i].org_id) {
sendingRespose("-> " + suborganizations[i].suborgid + " <-" + " " +
suborganizations[i].suborgname);
}}
//if the input is four digit numbers
} else if (digits_count(finaltext) == 4) {
for (var i = 0; i < suborganizations.length; i++) {
if (finaltext == suborganizations[i].suborgid) {
```

```
sendingRespose("you have selected : " + suborganizations[i].suborgname);


sendingRespose("these are possible questions in this area :");
sendingRespose("If you cannot find your question, enter -Q- to display the contact information of the person responsible for the "+ suborganizations[i].suborgname +" department.");
for (var i = 0; i < questionslist.length; i++) {
if (finaltext == questionslist[i].suborg_fid) {
sendingRespose("-> " + questionslist[i].questions_id + " <- " + questionslist[i].question);
}}}}

//if the input is six digit numbers
} else if (digits_count(finaltext) == 6) {

for (var i = 0; i < questionslist.length; i++) {
if (finaltext == questionslist[i].questions_id) {
sendingRespose("you have selected : " + finaltext);
//show the posible solutions
sendingRespose("these are possible solutions for your question : ");

for (var i = 0; i < questionslist.length; i++) {
if (finaltext == questionslist[i].questions_id) {
sendingRespose(questionslist[i].solution);

for (var j = 0; j < personlist.length; j++) {
//shows the contact informations
if (personlist[j].user_id == questionslist[i].person_fid) {
sendingRespose(" you can cantact @" + personlist[j].user + " for more informations : " + personlist[j].email);
}}}}
```

References

Ana Tkalac Verčič, A. Š., 2020. Managing internal communication: How the choice of channels affects internal communication satisfaction. *https://doi.org/10.1016/j.pubrev.2020.101926.*

Annu Haapakangas, D. M. S. E. M. H. J., 2019. *The effects of moving into an activity-based office on communication, social relations and work demands – A controlled intervention with repeated follow-up.* [Online] Available at: https://doi.org/10.1016/j.jenvp.2019.101341 [Accessed 2019].

DragicaIvin, M. N. E. T. J. V., n.d. The impact of internal communication on strategic and economic effects in Serbian companies. *https://doi.org/10.1016/j.pubrev.2011.12.014.*

Flexible Arbeitswelten: Handlungsfelder, E. u. P. a. .., 2017. *Stephan Zinser.* s.l.:s.n.

Hathi, M. M. -. S., 2014. Internal Communications: Emerging Trends and the Use of Technology. *Newsweaver,* p. 21.

Mazzei, A., 2014. Internal communication for employee enablement: Strategies in American and Italian companies. *Emerald Group Publishing Limited,* p. 95.

Oliván, J. B., 2017. *Communication as an Element of Knowledge for the Company's Human Resources.* [Online] Available at: https://doi.org/10.1016/j.sbspro.2017.02.241

Richard F. Fellows, A. M. M. L., 2015. *Research Methods for Construction.* s.l.:s.n.

Rolfö, V., 2018. *Relocation to an activity-based flexible office – Design processes and outcomes,* s.l.: KTH, Royal Institute of Technology.

Sidner, S. W. a. C., 2018. Email Overload: Exploring Personal Information Management of Email. *Lotus Development Corp..*

Slack, 2020. *slack.com.* [Online] Available at: https://slack.com/intl/en-at/help/categories/360000047906 [Accessed 2020].

STEIN, N., 2012. *Is Poor Collaboration Killing Your Company?,* s.l.: https://www.salesforce.com/.

Strahan, S. M., 2015. Increase the value of an internal communication team by embedding communication planning into a business unit's strategic planning process. *2015 IEEE International Professional Communication Conference,* pp. 1-8.

Turban, E. B. a. S., 2018. *Open offices can lead to closed minds,* s.l.: https://www.economist.com/.

Zhang, M., Wang, L., Xu, S. & Wang, Y., n.d. *GPS signal anti-jamming based on dual-polarized antenna array.* s.l.:IEEE.