

NOTTINGHAM TRENT UNIVERSITY
SCHOOL OF SCIENCE AND TECHNOLOGY

**Reducing Corporate Time Waste Trying New Ideas: A
Software Solution**

by

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of the requirements for the degree of
Bachelor of Science with Honours**

In

Software Engineering

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ABSTRACT

The work introduces the idea of time loss in trying new ideas and how it impacts large companies. The company 'LexisNexis Risk Solutions' was used for investigation into this, and a solution was created.

The work investigates the current issue inside of the company by performing multiple methods of primary research and evaluation. Existing systems have been reviewed and assessed to conclude that no current system exists that would fully solve the client's problem. A new web-based system was proposed that would aid in solving their problem, which was agreed to be developed. Initial requirements were created from the primary research and then mock-ups of what an initial prototype would look like were created as well. The system was developed following agile principles which involved having regular meetings with the client where they could suggest features. Four sprints were completed before a full initial prototype was created. The system was tested in the company and an interview with a high-ranking employee at the company was also done to gather results about how the system performs and if it achieves its goal.

The system has been partially successful in achieving its goal as employees from the company have given positive feedback regarding its capabilities to reduce time loss in deciding and trying new topics. Some results were ambiguous, and the system did not have all the features the client desired, so it was not a complete success.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Companies often have to implement new topics into their work which can require a lot of time and labour. Large companies especially can sink countless hours into it, considering all aspects and avenues of the implementation. These attempts at implementation can often be pointless due to a lack of understanding, a better, unknow alternative, or simply taking too long to implement.

A case study conducted by Mirvis, Sales, and Hackett (1991) on New England Metal Fabrication found that implementing new technology too quick can cause major problems, while another case study done by Tulenheimo (2015) on Construction Engineering Industry in Finland found that taking too long to decide on a technology can lead to the technology being outdated and old even before being used.

The aim of this project is to create a solution to this problem, specifically in the client company LexisNexis Risk Solutions.

1.2 Project

'LexisNexis Risk Solutions' (LNRS) is a large company that is currently facing these issues. LNRS is a data and analytics company that has offices around the world with over 33,000 people in their workforce (Lexis Nexis, 2024). They deal with sensitive

data and are constantly trying to innovative to gain a competitive edge over competitors. In an attempt to attain this edge and keep up with the changing times, LNRS are constantly trying to implement new topics into their workflow, oftentimes without knowing if they are going to work as expected. The client was approached about this project and was eager to participate in exchange for a possible solution at the end.

At the end of the project, a system will be created that fits the client's needs. This system will be an initial prototype that should solve the issues stated and can gather results to prove the system does help solve the issue. In a wider context, the system should help to reduce stress and save time of potential users. The effects of choosing and trying an ill fitted topic can have negative effects on all employees in the company and their clients. This system should help to alleviate these feelings and create a more positive workplace. The system may also be replicated for other workplaces in the future to help with reduce their respective time loss as well.

1.3 Overview

Chapter 2 contains the research done about this issue. The majority of the research was done on the client company, having them complete questionnaires, and having an interview with a high-ranking employee. A review was also done into the existing systems that could be used to potentially solve the issues, but no current solution seemed to fully solve the issue.

Chapter 3 is focused on what could be created to solve the issues, based upon the research done in chapter 2. This entailed having a look at the current system and finding points of weakness that could be altered to create a more efficient system.

This was where the idea of the system was finalised in preparation for the development done in chapter 4.

Chapter 4 shows the full development process of the system and the stages it went through. It starts with the planning stage of the system and showing the wireframes of what the system should look like along with a flowchart showing how the system should function and a few other technical aspects. As the system was developed following agile principles, this section shows how the requirements changed and what occurred during each sprint and client meeting.

Chapter 5 discusses the results of the system. The results are gathered from the client company and their employees by sharing around the system and getting their feedback. Users tested the system by performing various pre-defined tasks and noting down how long it took, then performing the tasks again but without using the system, to create a comparison of how the system helps. A final interview was also had with the same high-ranking employee from the primary research to get his thoughts and opinions.

The final chapter, chapter 6, gives a summary of the work in terms of both the system and the process of creating it. It is a reflection on what has occurred and what may happen in the future. Future aspects are also talked about here, along with the issues that may arise from usage of the system.

1.4 Aims and objectives

1.4.1 Aims

The aim of this project is to create a system for LexisNexis Risk Solutions that can help reduce time loss in regards to choosing and implementing new topics.

1.4.2 Objectives

- Create a functioning system that the client can use straight away.
- Gather results from the client company on how the system meets its respective goal and how a full, final system could be useful.
- Evaluate if the system could be used by other companies and how the system may benefit them.

CHAPTER 2

CONTEXT

2.1 Introduction

This research was performed in order to find if the client does need a new system. If a new system is needed, this research would also be used to gather requirements for it.

An initial interview was done with a high-ranking member of the company to discuss the system and what it should achieve. As the interview was only done on a one-to-one basis, a questionnaire was created to be distributed around the company higher-ups to see if there was an overall need for this system and what sort of issues they would like to see resolved. This also helped in creating priorities for the requirements to know where to begin development. A look into existing solutions was done as well to see if there was anything that currently exists which could solve their issues. These existing solutions would also be a good base to start development on if a system were needed, taking inspiration from them both in terms of features and layout.

2.2 Interview

The initial interview was held with the client to get a better understanding of the system idea they had in mind and the problems it should solve. Due to the company being in technology, they had a good grasp of software development and were able

to give a compact summary of their ideal requirements. A transcript of this discussion can be found in Appendix A.

This interview was done through a Microsoft Teams call between the developer and the client companies head architect. The architect was used as the main point of contact between the two going forward. The interview garnered some interesting and unexpected results that showed potential areas of weakness in the client company that could do with improvement. It also gave a good insight into what a potential system solution could consist of.

2.2.1 Summary

The first two questions of the interview were used to get a general sense of what the client would like from the system. Their answers gave a good idea of the sorts of functionality that the system should initially have along with some extra optional additions. One of the first points they mentioned was the idea of being able to find experts in a topic to get help and being able to contact them for advice.

The next few questions aimed to find out what their current issues are. While the initial questions did gather the features they wanted, these answers allowed for a more in depth look at how the features should work along with possibly some alternative or extra features that could help fix the issues. They also helped to start creating priorities for the different functionalities stated in the initial questionnaire answers. One of the key points is that they are having a lot of difficulty in finding who to talk to and starting that initial conversation when trying to get advice on the topic they are considering using. Among these questions was one about what system the user had tried to use to fix their issues. This turned out to be the system 'Confluence' which they also use for other parts of their job. This answer helped

with giving an initial system to use as a base of inspiration for a potential new system.

A question was then asked about whether the system would be used on mobile devices. Their answer suggested it would not but should be kept in mind just in case.

A few questions were asked that were a bit more technical and focused on how the system would be developed. The client was asked if they could commit to regular meetings to check progress, which they agreed to. They were also asked if they had a preferred language for the system to be developed as they may want to continue developing the system later on. A language was given that the client uses for most of their other applications.

A final question was asked about the companies' design guidelines where the client stated that some existed but were quite vague and not always followed.

2.3 Questionnaire

Upon completion of the interview, a questionnaire was distributed among higher-ups in the client company to get a consensus of the general need of the system as well as the specific areas the system should cover. Only the higher-ups in the client company had been selected as this system will be mostly used by them due to them making the decisions on which topics to try. Due to this though, only a few responses were able to be gathered. The initial questions, 1 to 8, were preliminary questions to gather the correct permissions to use each response.

The initial questions were aimed at trying to find the current issues the company faces in respect to the area of research. Question 9 intended to gather information

on how often respondents ran into problems accessing knowledge. Most of the responses were only 'Occasionally' with a few others between 'Often' and 'Very often'. None of the respondents selected 'Always', which was expected, but unexpectedly, none of them selected 'Never' either (Figure 1). This suggests that these issues do occur to most higher-up employees, even if it is only 'Occasionally', meaning this system would benefit most of these employees if it could solve this issue.

9. How often do you have trouble accessing knowledge about the technologies you want to use, whether it's internal or external to your company?

[More Details](#)

● Never	0
● Occasionally	3
● Often	1
● Very often	1
● Always	0



Figure 1: Questionnaire results from question 9 where the user had to select from five different responses.

The next question was more specific and focused on an issue that came up during the initial client interview. All of the respondents stated that, at some point, this issue has affected them and that advice from others could have mitigated it (Figure 2). This question has showed clear evidence that there is a common issue that needed to be solved

10. Have you ever gone down the wrong route with a technology that advice from an existing user of that technology might have advised against using?

[More Details](#)

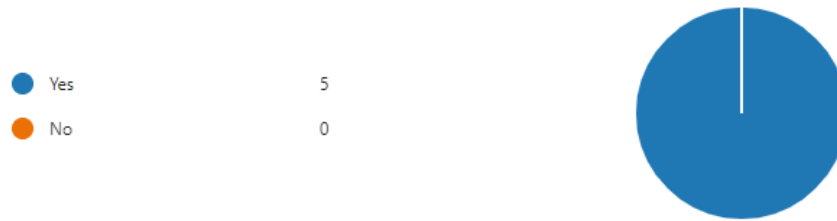


Figure 2: Questionnaire results from question 10 where the user had to select from two different responses.

Questions 11 and 12 looked at a similar issue to question 10 but leaned more into the idea of seeing how this issue may have caused potential time loss. These results show 60% of participants have created proof of concepts (POCs) that could have had potential time saves if they had more knowledge, while 40% of participants have stated they have not (Figure 3). These results were more varied than previous, which could be due to the question asking specifically about POCs which may not be needed for all topics, suggesting that the focus of this application should be more on general choices of topics.

11. Have you ever created POCs (proof of concepts) where internal user knowledge would reduced timescales or have eliminated the need it completely?

[More Details](#)

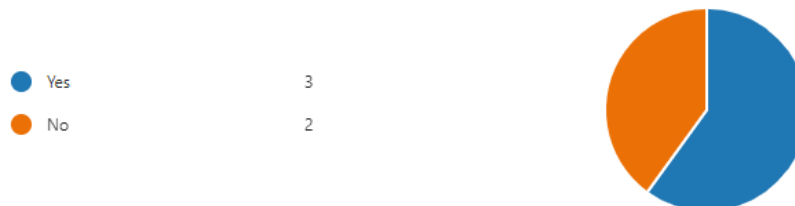


Figure 3: Questionnaire results from question 11 where the user had to select from two different responses.

The results of question 12, though, show that a focus on POCs should still be considered as there can be significant time wastes in this area. Question 12 is a follow up to question 11 for those who answered yes and asks about how often this problem occurs. The results are evenly split between 'rarely/once', 'yearly', and 'every 2-4 months' (Figure 4). While the response of 'rarely/once' is not that important, the other two responses can be seen as quite alarming. A company can roughly spend around 3-4 weeks developing a POC for a single project (Singh, 2022) which can lead to a significant time waste if it occurs every 2-4 months or even once a year. Weeks are wasted creating these POCs that could have taken far less time or simply did not need to be created. For these reasons, this concept should not be forgotten and should be implemented if there is enough time.

12. How often does this occur?

[More Details](#)

Once a month	0
Every 2-4 months	1
Twice a year	0
Yearly	1
Rarely/once	1



Figure 4: Questionnaire results from question 12 where the user had to select from five different responses if they had selected 'Yes' on question 11.

Further into the questionnaire, another similar question to question 10 is asked in order to gain a greater understanding of the need for a new system, question 15. This question looks into another area that was talked about during the initial interview, finding alternative options. The results found that all of the respondents

had, at some point, adopted a technology or method where there was a better alternative that they did not know about prior (Figure 5).

15. Have you ever adopted a technology or method only to discover a better alternative shortly after?

[More Details](#)

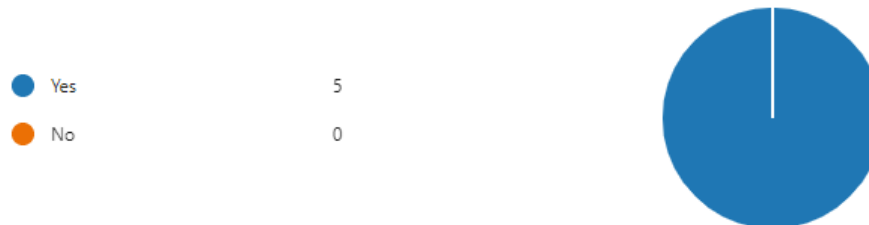


Figure 5: Questionnaire results from question 15 where the user had to select from two different responses.

The following questions aimed to get an idea of what their current system is and where it can be improved, if necessary. Prior questions have begun showing some of the issues, but a good understanding of the current system can help to highlight what features may already exist that can be built upon or improved. The first of these questions, question 13, shows that 80% of respondents believe that their current practice could be improved (Figure 6). This combined with the previous responses about their current issues begins to show that the area of weakness may be from their current system and that it needs to be improved or at least updated.

13. Do you feel that the practice for finding/evaluating new technologies or methods could be improved?

[More Details](#)

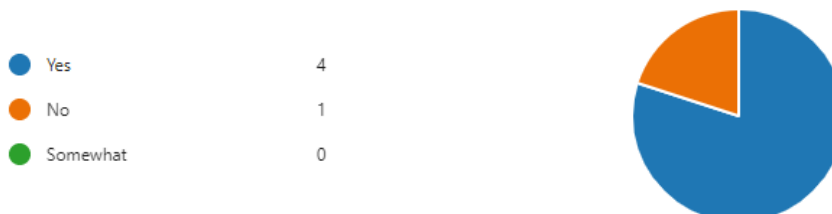


Figure 6: Questionnaire results from question 13 where the user had to select from three different responses.

In order to get more detail, an open-ended question was asked to find out how the current system works for finding out which technology or method would be best for their needs (Table 1). A common theme in these responses is creating POCs which was previously discussed. If POCs are a big part of their current system while also a potential time waster, the focus of this system should include POCs to help save the most time. Another repeated idea is checking with peers, fact finding and googling. These ideas relate back to some of the other questions that showed potential time wasted, namely question 15 about using a less efficient technology or method. All of these could be solved and/or streamlined with better communication between teams and experts in their respective fields, which should be another big focus of this system.

Table 1: Questionnaire results from question 16 (If you have several technology solutions to choose from, how do you normally select the right one?)

ID	Responses
1	Lots of googling, but eventually a POC is often required.
2	Check with peers
3	Make lightweight POCs in each, attempt to find out common sticking points and issues with each and weigh up the pros and cons of each afterward.
4	Experimentation, fact finding, POCs

5	Run POCs or demos for each technology and compare the pros and cons. Often it won't be clear cut and a business decision needs to be made
---	--

To confirm assumptions concluded from question 16, another open-ended question, question 14, was asked to see how users would like to see their system improved (Table 2). While not all respondents gave an answer for this one, the majority did. A recurring theme for these answers is a lack of proper communication and knowledge of where to find help. A solution to these issues, similarly to what was suggested from question 16's results, is to have a singular system where users can search for topics and find people to help. One respondent talked about 'more opportunity for R&D' which could link back to the idea of creating a new system but could also mean that the client would like more control and input for the system. To ensure both are met, the client will be kept informed about the project and will be able to constantly give their input. The project may also be further developed internally if the team wishes to do so after the project has ended.

Table 2: Questionnaire results from question 14 (How would you improve the current practice?)

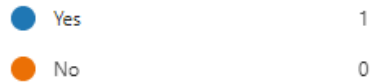
ID	Responses
1	Access to people who have been down a similar route before would be very useful. A large (well, huge) company like this, you know they exist, but there is no way of finding them apart from word-of-mouth, which is an extremely inaccurate way of performing this - especially when going across business units.

2	Information about who knows what easily available
3	Stop using confluence. Use a faster, better documentation service with better search features and actually make people write documentation.
4	More opportunity for R&D

Building upon the conclusions drawn from question 16 and 14, communication with experts in a certain technology or method could potentially help with reducing time waste. For this to be effective however, a team of experts would need to be available for employees to contact for advice. Question 19 and 20 were aimed at seeing if respondents would be interested in creating and being part of technology or method-specific groups to answer and advise others in the company. While one of the respondents had stated they were already in such a group, 50% of the other respondents stated they would be interested while the others said they potentially might be (Figure 7). These results suggest that there is definite interest in creating groups like previously mentioned, showing that the new system should try and implement them.

19. Are you currently in a technology-specific groups (e.g., Java, Database, AWS, Azure, etc.)?

[More Details](#)



20. Are you interested in joining technology-specific groups?

[More Details](#)



Figure 7: Questionnaire results from question 19 and 20 where the user could optionally answer either or both questions, using either two or three responses, respectively.

The final question was to garner a consensus of if a system like the one proposed was to be created, would it get used. The results came back positive with all respondents saying they would at least use the system occasionally.

21. If there was a tool to find experts of technologies and methods in your company, how often would you use it?

[More Details](#)

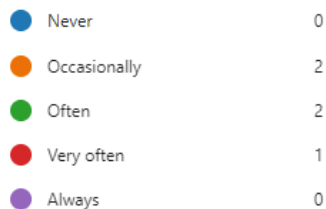


Figure 8: Questionnaire results from question 21 where the user had to select from five different responses.

2.4 Review of existing systems

To gain an understanding of the options currently available to the client, a review of current systems was conducted. This consists of reviewing systems that could potentially cover some, or all, of the issues they have stated. Both their pros and cons have been weighed as to show the reasons the client should or should not use the respective system.

2.4.1 Stack Overflow for Teams

Stack Overflow for Teams is a knowledge base software where teams can create and view Q&A threads (Stack Overflow, 2024). It has a very similar format to the regular Stack Overflow website, but only contains Q&As asked internally.

2.4.1.1 Pros

- Due to this system being very similar to the Stack Overflow website, many of the users will already be familiar with the format and how to interact.
- The Q&As format would work well for finding answers to specific questions whilst also removing the need for repetitive questions.
- The Q&A forums can have tags associated with them so that only certain people get notified when a new post becomes live.
- Users who created the post can select the answers that worked for them and highlight them so other users can find the correct answers quickly.
- The Q&As can be team specific allowing for specific questions to be kept inside of the respective team.

- It can integrate with the single sign-on the company currently uses as well as their Microsoft Teams or Slack accounts.
- Questions that have not been reviewed recently get flagged up to ensure they are constantly up to date.
- This system is fully contained online so there is no need to install software on the users' devices.

2.4.1.2 Cons

- The system only covers Q&A type formats.
- There is nowhere to keep track of general information for a topic, such as documentation.
- The system is not very customisable with the users being stuck using the Stack Overflow format.
- There is no way of finding experts in respective topics due to the Q&A format.
- The system being fully online does mean that it can be open to down time as well as having to pass potentially private data to their cloud storage.
- No option for the system to be hosted in house.

2.4.1.3 Cost

This system costs \$13.50 USD per user a month but can also give custom prices for enterprises.

2.4.1.4 Conclusion

This software has many benefits that the company could aid from. Their Q&A format is a great way of sharing and exchanging knowledge, especially for niche cases. It has easy integration with their current systems which would allow for a more seamless transition into using it. However, this software fails to grasp the main issue the client wanted to solve, having a way to find users in the company who are experts in specific topics. While this does offer a good alternative that does fix some

of the issues with their current communication, it does not fully cover all their use cases that the software would need to. The Q&A format may also restrict some users who would be too nervous to ask a question on a public forum, even if it is just within their team. The base cost is also quite high in comparison to other systems that may offer more features.

2.4.2 IT Knowledge Base

IT Knowledge Base is a ticket system where a user can create and view tickets about topics. These tickets can then be given solutions and comments which other users can refer to if needed. This, along with a variety of other features, allows for the creation of various knowledge bases (ManageEngine, 2024).

2.4.2.1 Pros

- There are options for both cloud hosting and client “on-premises” hosting, allowing for more control for the client.
- The system has an intuitive way of gradually creating a knowledge base as more tickets are risen.
- There are different accessibility options for the tickets, restricting who can view them.
- The tickets are stored under configurable topics which can potentially be added or edited by users.

2.4.2.2 Cons

- It will take time to create knowledge bases as it requires users to raise the initial tickets.
- It can be hard to navigate through lots of tickets to find relevant knowledge.
- There is no way of finding experts in a particular topic.
- They do not have an option to integrate with the users’ current systems like single sign-on or their team messaging software’s.

2.4.2.3 Cost

There is no concrete price for this system as they work out the cost for each client uniquely.

2.4.2.4 Conclusion

This knowledge base software has many features that the user can utilise to help with their existing issues. The system is quite configurable and has an option to host in house, which would mean the data the system uses would be kept within the business. However, this system fails to provide a solution to the problem of finding experts within the company, which is a big priority for the client. The system could also take a while to create full knowledge bases which would initially deter users from using the system.

2.4.3 Confluence

Atlassian Confluence is a knowledge base software where users can create custom pages and share information. It allows multiple users to work on these pages, meaning many users can contribute to the knowledge base (Atlassian, 2024). The client currently uses Confluence for a variety of reasons but has tried to use Confluence to solve this issue with no success, as stated in the interview.

2.4.3.1 Pros

- It is already used within the company so they would be used to how it works.
- The knowledge pages are fully customisable.
- Has a built-in search functionality.
- Can allow multiple users to edit/create knowledge bases easily
- Can set different read/write permissions for each knowledge base.

- Has a comment feature for each individual page as well as for each collection of pages.

2.4.3.2 Cons

- Pages can be hard to navigate between.
- It has been previously tested in the company and has not worked out.
- Allowing users free access to design pages as they want may cause visibility and layout issues as well as inconsistent designs.
- The search functionality can often bring irrelevant results if there is lots of information that is not related to the knowledge bases.
- Must be hosted online with information stored online as well.

2.4.3.3 Conclusion

Atlassian Confluence seems to be a great system for creating fully custom knowledge bases. It has an abundance of features that, once learned, can be utilised to create a fruitful knowledge base. With the company also already using confluence, the implementation would not be difficult. The main draw back with this software is that the client has already tried implementing the software and has suffered backlash from it. The file system and pages for knowledge bases seemed to be confusing and the custom pages were often completely different from one another, making it harder to understand. The search functionality would also often pick up results from different pages due to them using confluence for other types of pages. This makes the results long and tedious to search through.

2.4.4 Document360

Document360 is another knowledge base tool that allows users to create custom documents and collections. It allows for creation of different types of documents ranging from technical documentation to market research (Document360, 2024).

2.4.4.1 Pros

- Has an easy user interface for creating documents
- Allows the creator of the document to see what the document will look like to the prospective user while creating it.
- Has a built-in search functionality for finding documents.
- Allows for the creation of a range of different documents.
- Has a tagging system so that the user can add the relevant tags to a page.
- Can comment on each page and give feedback for the creator to see.
- Can create workflows for each page to show how it is developing.

2.4.4.2 Cons

- Allowing users free access to design pages as they want may cause visibility and layout issues as well as inconsistent designs.
- Will require a lot of setup initially.
- There is no way of finding experts in a particular topic.
- No integration with current systems
- Must be hosted online with information stored online as well.

2.4.4.3 Cost

This system costs \$11.55 USD per user a month but can also give custom prices for enterprises.

2.4.4.4 Conclusion

Document360 seems to be a great tool for creating documentation and has a variety of features for both users creating pages and viewing pages. The recommendations feature is a great addition and gives an easy way for users to suggest improvements or changes directly to the creator of the page. The system does also have the cheapest price of all the systems that have been looked at. This system has no way of helping

the user find experts of a particular topic though unless a user has hardcoded it into the page.

2.5 Summary

This section has covered a wide range of different research methods in order to gain business requirements for a potentially bespoke system. The initial client interview began to shape what a system should do and what issues it would solve, while the questionnaire gave a good understanding of the want for the system and what areas it should focus on. This, followed by the review of existing systems, has shown a gap in the current ready-made solutions. As such, the decision was made to go ahead and create a bespoke solution that meets the clients wants while also taking inspiration from the current systems.

CHAPTER 3

NEW IDEAS

3.1 Introduction

The initial survey, questionnaire, and review of existing systems have all been assessed and used to create a set of new ideas for what this system should and should not do. The questionnaire brought light to the justification for this system and the areas of weakness in the business where this system could help. Multiple questionnaire responses have highlighted the fact that time is wasted trying out new ideas and that other users in the company could have advised against trying them. One of the most surprising results was that every two to four months, some users create POCs that turn out to be redundant. This shows a real issue with how the company communicates and shares ideas that is leading to time waste in the long run. This could also further handicap the business as they may miss out on new technologies and fall behind competitors. After an extensive look into how companies need to adapt to new technologies and markets, George S. Day and Paul J. H. Schoemaker stated that, "Organizations best able to handle fast-changing markets and technologies ... and seize opportunities faster than rivals." (2016).

Taking all of this into consideration, a new system will be created for the client to help reduce time loss in the business as they have many issues that current solutions do not solve.

3.2 Current system

To better illustrate the need for a new system, the previous research has been used to create a flowchart of how the current process works (Figure 9).

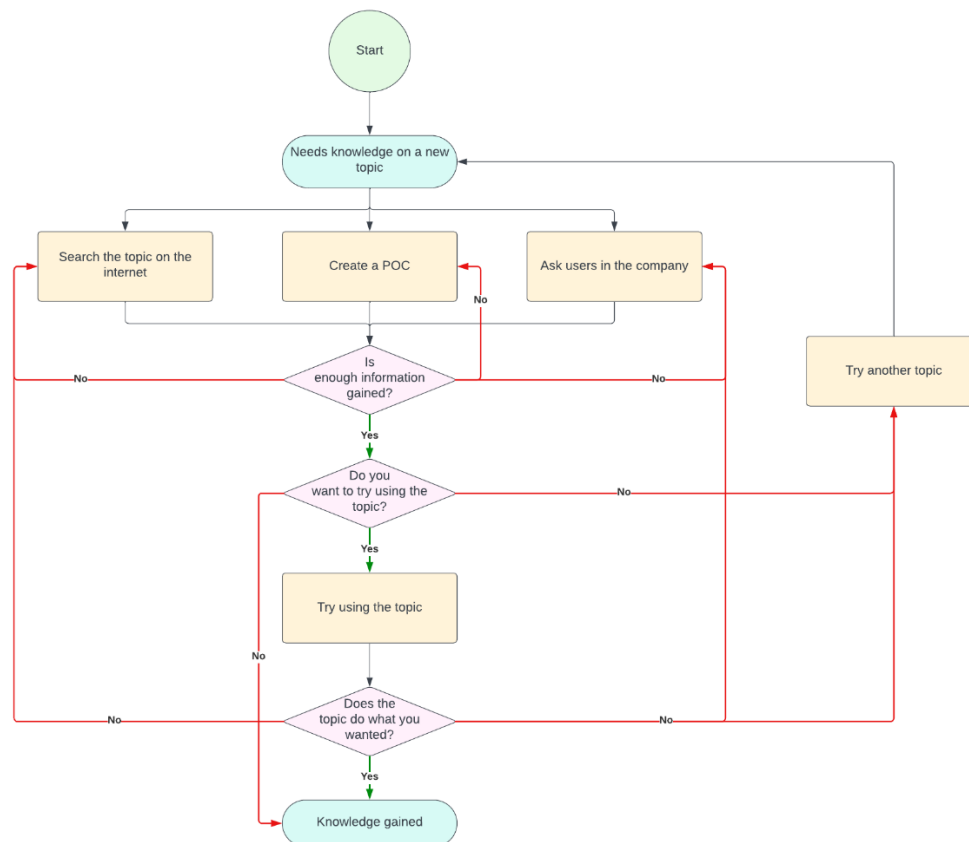


Figure 9: A flow diagram showing the current system for getting information on a topic

This diagram is quite convoluted due to how their current system is. Users in the company have three main ways of finding out knowledge about a new topic, searching on the internet, creating a proof of concept, or asking other users in the company (these three ways have been based upon the most common ways shown in the initial questionnaire). After using one of these methods, the user can either decide that they have enough

information to make a decision, or decide they need more information. If they require more information, they can either repeat their previous method or try a different one until they have enough information. Once they do have enough information, they can decide on if they want to try the topic. Upon trying the topic, they may realise that the topic does not do what they thought it did. In this case, they can either try a new topic and start the cycle again or go through the methods again to see if there is any more information they could use.

These main ways have their own unique issues though. Searching on the internet can be a useful resource but can often have misleading/wrong information or information that the user may misinterpret, leading to potentially trying a new topic that does not do what the user needs. The information they need may also be confidential so they would not be able to look on the internet for it. POCs can take a lot of resources and time to create which the user may not have. Asking users in the company can often be a long task as well due to many users not knowing who to talk to. In terms of the system, this can end up costing the user (and in turn, the company) a lot of time going through each of these methods to find out whether to try a new topic.

3.3 Proposed system

With the previous system analysed and assessed, a basic flow diagram has been created showing a new system for getting information on a topic (Figure 10).

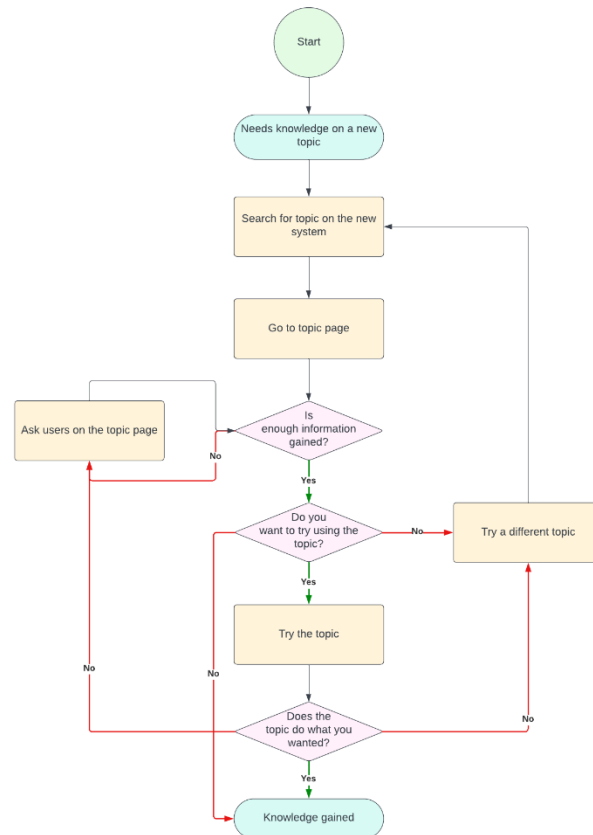


Figure 10: A flow diagram showing the proposed system for getting information on a topic.

For this system, users in the company will need to navigate to the system and search for the topic they need more information on. Once the topic page is found, the user will be able to gain all their needed information from there, including information of other users in the company who could give more information on the topic. If the information on the system is not enough, the user will have to contact one of those other users and continue to contact users until they have gained enough information. The user should then have enough information to decide on whether they want to try the topic. If the topic does not work the way the user had hoped, they can either search for an alternative topic on the system or ask other users on the topic page for advice.

In comparison to the flow chart of the current system, this system has less optional routes. A big issue with the current system is there is too many different ways of finding information. Some of these ways may not even be helpful for the specific topic and could just waste the user's time.

3.4 Scope

For this project, the system that will be created will be the initial prototype and not the full final release. This is due to both time constraints and the amount of features the client would like in the system. This is also because this system will be used as a proof of concept to show that a system like this would help to reduce time waste in the company while also giving an active solution to their problem, as stated in the project aims and objectives. The system will be tested by users at the end to find out if it did achieve this goal.

The system hopes to be taken over by the client at the end of this project so that they can continue to develop and work on it. As such, the system should be developed in a language that the client understands and has many experts in. The initial questionnaire has highlighted that ReactJS is a commonly used language in the company, so the system will be created in that.

3.5 Idea

Taking all the prior research into account, the system that needs creating needs to be something that enables users to find out more information on a topic and to know who knows what in the business. From this, a user could find a specialist in a topic and get their opinions on it. To make this system give the best overall advice, the user should be able to see multiple people who are experts as to not just go off one person's opinion. Experts would probably be asked the same questions repeatedly by other users, so the system

should have a way of showing the experts thoughts on a topic straight to the user. Experts of a certain topic should not be self-appointed but instead, communally selected as an expert to ensure they are experts in a topic. As such, all users of the system should input their thoughts on topics that they have used and/or are relevant to them to make sure that all user's thoughts have been considered.

To allow this system to be accessible to all the company's employees across the globe with constant up time, a website will be used as part of the solution. Currently, there are quite a few existing websites that exist that solve at least part of the clients' problems, as shown in chapter 2. Previously looking at existing websites in chapter 2, none have fully solved the issues the client faces. The existing websites have, however, given a good starting point of what sorts of features this website could have, as well as seeing what current websites lack and what this website could bring. This also aligns with the previous decision to develop the system using ReactJS.

3.6 Summary

Current existing systems do not fully solve the problems that the client faces. As such, a bespoke system will be created to satisfy their needs. This system will be an initial prototype of a full system and will have a variety of features to achieve this such as the ability to search for topics.

CHAPTER 4

IMPLEMENTATION OR INVESTIGATION

4.1 Introduction

With a variety of new ideas generated, the system needed to be developed in line with what the client needs. This section will cover all parts of how the system was developed along with why it was developed in such way.

4.2 Methodology

To create this system, a certain development methodology had to be used. Agile principles were decided upon for development due to their ability to include the client in regular stages of development. It also meant that the project did not need a concrete set of requirements before development began, allowing for changes to do be done throughout. During the initial interview, the client was asked if they could have regular meetings about the project as to conform with Agile development principles. The client was happy enough to do this, and such, regular meetings were set up to check on progress.

For this methodology to work, some initial requirements were gathered for what this initial prototype should contain, as well as what it could contain depending on time constraints, and technology choices were finalised.

4.3 Technologies

4.3.1 Language

React has been chosen for the system development language as it is used for creating fast and reactive web apps that does most of the processing in the background, hiding the complexity. (React, 2024) As stated in chapter 3, it is also used by the client for other web applications so they should be used to how it feels and will be able to take it over with ease. It has been paired with Next.js to create a full stack, reactive application. Next.js is “used by some of the largest companies”, and has a great “...performance, efficiency and developer experience” (Next.js, 2024).

4.3.2 Hosting

Vercel has been chosen to host the system due to it being developed by the creators of Next.js and has great compatibility with hosting applications developed in Next.js on the cloud (Vercel, 2024). Vercel pricing is also quite competitive, costing around \$10 per user a month in their pro package, and offering custom pricing for enterprises (Vercel, 2024).

4.3.3 Database

PostgreSQL has been chosen for the database as it is a serverless SQL database language that integrates directly with Vercel and Next.js, requiring little setup to do so (Vercel, 2024).

4.3.3.1 Database design

As PostgreSQL is a relational database, a diagram has been created showing what the different tables would look like and how they would interact with each other in the initial prototype (Figure 11).

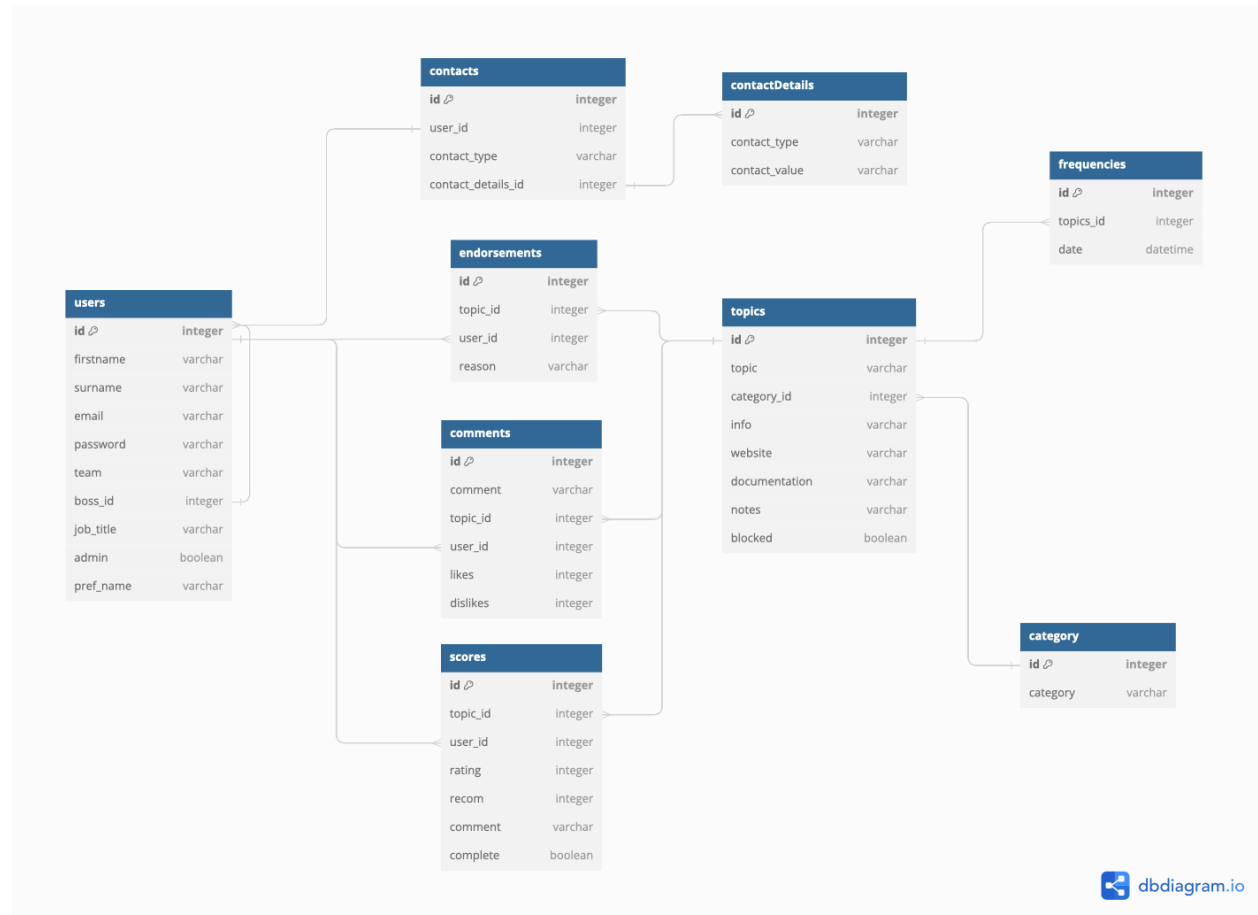


Figure 11: A database diagram for the basic functionality of the system.

All these technologies combined creates a full web application with hosting and a dedicated database while being light weight and not costing the client much.

4.4 MoSCoW requirements

Following the initial survey and questionnaire, requirements were created as to what the system should do and have. This system needs many requirements to meet the clients' requests. However, from the previously collected data, this system has only one major requirement; allow users to search for topics they want to get other users opinions on. To achieve this though, the requirements have been broken down and graded using the MoSCoW prioritisation technique which separates the requirements into four distinct categories, must have, should have, could have, and won't have. This technique is ideal for projects and gives a clear indication of what the system would be like on completion (Agile Business Consortium, 2014). The decision of the placement of the requirements is derived from the previous collected data and breakdown of requirements, as well as another meeting with the head architect of the client company where they were discussed at length. The won't have column has been omitted from this table however as the amount of work that can be done over this period is unknown. As this is being developed in an agile method, these requirements will change as the system develops. A final requirements list will be created towards the end of the project that will contain a won't have column. Table 3 states the initial system requirements along with their ranking and a unique reference.

Table 3: Initial system requirements graded using the MoSCoW method

Reference	MoSCoW	Requirement
FR01	Must	Enable users to effortlessly search for topics.
FR02	Must	Facilitate users self-scoring on each topic.
FR03	Must	Allow users to recommend or express their feedback on topics
FR04	Must	Provide a commenting feature for users to share thoughts on topics
FR05	Must	Allow users to input and manage their contact information
FR06	Must	Allow users to contact other users
FR07	Must	Support profile customization for users
FR08	Must	Allow users to input personal information such as their name and preferred name
FR09	Must	Enable users to search a diverse range of topics beyond technology
FR10	Must	Send reminder emails for new topic additions

FR11	Must	Empower admins to create and manage accounts, including team/managers.
FR12	Must	Provide admin capabilities to update and/or delete accounts and team details
FR13	Must	Allow users to specify their time zone
FR14	Must	Ensure robust security measures to safeguard user data
FR15	Must	Restrict access to internal users only
FR16	Should	Allow users to input availability and holidays
FR17	Should	Allow users to refine search results
FR18	Should	Identify skill gaps in teams and users
FR19	Should	Send monthly reminders for score updates
FR20	Should	Enable users to set their account status to "away" during absence
FR21	Should	Be hosted on the cloud
FR22	Should	Implement regular data backups of the system.

FR23	Should	Allow managers to request score improvements from team members
FR24	Should	Ensure compatibility with various desktop screen sizes
FR25	Should	Implement automated release processes
FR26	Should	Allow users to input their country and office location
FR27	Should	Regularly update the database
FR28	Could	Enable users to suggest new topics
FR29	Could	Facilitate the creation of knowledge groups by users
FR30	Could	Allow users to establish forums for specific questions
FR31	Could	Integrate with the client company's existing systems for single sign-on and data scraping
FR32	Could	Display website statistics for users
FR33	Could	Be compatible with mobile screens
FR34	Could	Incorporate a competitive element for user retention (e.g., highest team scores)

FR35	Could	Allow users to customize contact methods based on time and day
FR36	Could	Enable users to specify their previous experiences with or use of a particular topic
FR37	Could	Allow companies to implement custom colour schemes

With these requirements graded, they need to be explored more as to get an idea of what this will mean for the system. The requirements have been split into two distinctive groups, functional and non-functional requirements, wherein they will get expanded and put in perspective of this initial prototype.

4.5 Non-functional requirements

4.5.1 Accessibility and speed

The system needs to be accessible and quick for all users in the business. The system should also be deployed onto the cloud to so that it has a constant up time, is secure and can be accessed from all the companies' offices across the globe. The system also could be accessed through mobile devices, so it could be developed to be compatible with them.

4.5.2 Security and data

Since the system will be dealing with user data, it is imperative that the system is secure and adheres to the latest security standards. To ensure this, the system will be designed around minimising the risk specified in as the 'Top 10 Web Application Security Risks' specified by OWASP. This is a comprehensive list of the most critical security risks to web applications that should be minimised where possible (OWASP, 2020).

Data must be kept and processed securely, with the most sensitive information being encrypted at all stages. This will reduce the likelihood of user's data being stolen or leaked. This data should also be regularly backed up and could be spread across multiple servers to ensure it is never lost.

React and the Next.js framework have a variety of security features as well that help to keep the application secure. One feature React has is Server Actions which allows the

system to run code directly on the server without exposing it to the user. This protects against various types of system attacks that could target the user's data or attempt to get administrator access. They work by using techniques like POST requests and strict input checks (Next.js, 2024).

This system will also utilise Next.js middleware which allows code to be run before a request is complete and then change the response depending on what the user inputs. This is most effectively used during authentication as it ensures the user has the correct permissions before displaying a page. Middleware can give the system a significant increase in not only security, but performance as well (Next.js, 2024).

4.6 Functional requirements

4.6.1 System name

Following the research done into existing systems, a common theme was seen regarding their names; they all had short, snappy names with deeper meanings to them. Myers (2013) further stated that creative website domain names give, "the opportunity to look beyond just the name and identify other symbolic, informational or emotional benefits from the products or services that they provide." This system should therefore have a short and snappy name that can be paired with a creative and informative domain name.

The name KNUW has been chosen which stands for 'Knowledge Network for Unifying the Workplace'. It is chosen due to the accurate acronym and for also sounding very similar to the word 'know', which gives an idea of what the website is about, knowing things. This fits the criteria for a short and snappy name with a lot of meaning behind it. The domain name will then be 'KNUW.it' as to meet the criteria for a creative domain name. The '.it' ending

comes from the Italy as it used to denote Italian sites but has been used here to create a catchy sentence using 'KNUW', 'KNUW it'. It is meant to sound like the phrase 'know it'.

To further ensure this website name will be fit for purpose, research has been done to see if there is another domain or website using the name 'KNUW' in any format. The website 'Namechk' (2024) was used to search for domains containing the word KNUW. The only ones that were found to be registered were knuw.com and knuw.photo (Figure 12).

Knuw.com currently is not being actively used and is up for sale, while knuw.photo does not have a website up that can be used. This information shows that the name 'KNUW' is mostly free and does not interfere with any existing system.

Domains

knuw.com	REGISTERED	knuw.net	BUY	knuw.me	BUY
knuw.org	BUY	knuw.us	BUY	knuw.info	BUY
knuw.la	BUY	knuw.asia	BUY	knuw.biz	BUY
knuw.tv	BUY	knuw.ws	BUY	knuw.nyc	BUY
knuw.okinawa	BUY	knuw.online	BUY	knuw.network	BUY
knuw.ninja	BUY	knuw.photo	REGISTERED	knuw.photography	BUY
knuw.photos	BUY	knuw.pics	BUY	knuw.pictures	BUY
knuw.pink	BUY	knuw.pizza	BUY	knuw.place	BUY
knuw.plumbing	BUY	knuw.press	BUY	knuw.productions	BUY
knuw.reisen	BUY	knuw.repair	BUY	knuw.report	BUY
knuw.republican	BUY	knuw.rest	BUY	knuw.restaurant	BUY
knuw.reviews	BUY	knuw.rich	BUY	knuw.rip	BUY
knuw.rocks	BUY	knuw.paris	BUY	knuw.partners	BUY
knuw.sale	BUY	knuw.sarl	BUY	knuw.schule	BUY

Figure 12: Collection of domains using the name 'KNUW'

With this information, the domain for 'KNUW.it' was separately researched to see if it was registered. This is because it has an Italian domain, so it does not appear on some sites that only show UK or US domains. The website 'netart.com' was used to research this, which also stated that 'KNUW.co.uk' is also free (Figure 13).

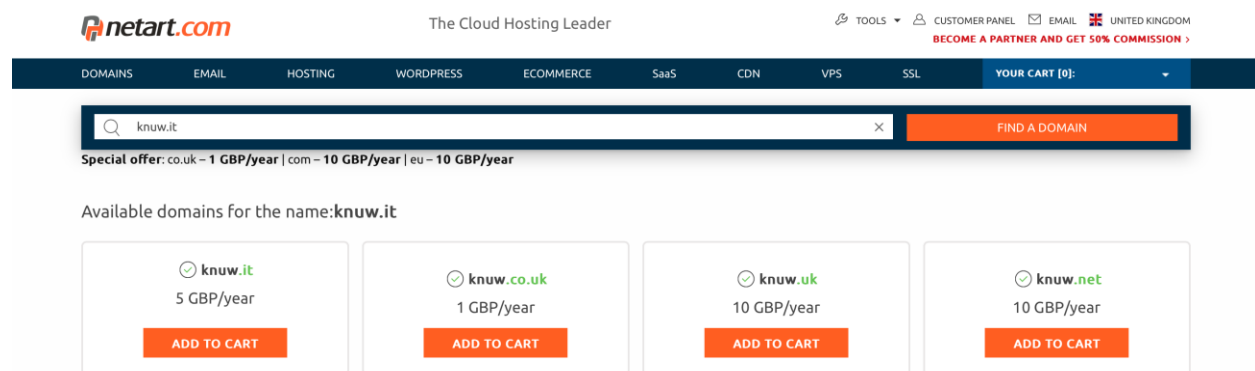


Figure 13: Some available domains for 'KNUW' including 'KNUW.it'

4.6.2 Users

Users must be able to interact with the system. For this system to work effectively, users should be unique and contain enough information to identify the user. Following what most systems intake for users, the users in this system will require a first and last name, email, and password. A preferred name field could also be added to allow users to specify how they would prefer to be called. It should also have some fields that are unique to this system, like team name, boss, and job title. This will allow users to help identify who the user they are talking to is and what they do in the company.

An 'About me' section must also be included. This can contain a variety of information about the user to help other users know more about them and feel more comfortable when starting to talk to them. This aims to solve the problem brought up in the initial interview where users can sometimes find it challenging to start conversation with people they do not

know. This section could also have predefined prompts to encourage people to talk about their interests.

There must be administrator users who can keep the system updated and make changes when necessary. These user types are required as only certain users should have access to change the system. This is to avoid users making accidental changes or breaking the system entirely. Administrators of the system should be specified by other users with administrator permissions. For this to work, there must be at least one administrator user when the system is created.

Users should also be able to give and receive endorsements. The idea of endorsements is that users could give other users endorsements if the other user helped them with a specific topic. The user is prompted to select the topic and reason for endorsing the other user, then it gets shown publicly on the other user's account. Endorsements aim to create an efficient way of showing if the user is an expert in a certain topic according to other users. This means that endorsements are accurate since they are chosen, normally, by an impartial third party. This helps solve the issue brought up in both the initial interview and questionnaire where they found it hard to find experts in a topic.

4.6.3 User contacts

Users must be able to specify the contact methods from which they can be contacted. If a user wants to contact another user after seeing their comments or scores, they must be given an easy way to find and contact them. This will allow the user to choose how they would prefer to be contacted and reduce the likelihood of their message being ignored or missed. To further decrease the chance of a message being missed, the system could allow for users to specify what times it is best to contact them, along with when they are away, and allow them to input their respective time zone.

The user contacts should consist of predefined options to allow for the system to display icons rather than text for the contact methods, making them more compact and easier to view. These predefined options should be set system wide to ensure consistency and could include extra options that the user may want to use.

4.6.4 User thoughts

Users must be able to input their thoughts on topics. The system heavily relies on users giving their input on topics for people to get the best idea of if the topic is a good fit for their purpose. As such, users must be allowed to give their opinions on all topics available and should be prompted to do so.

If the system simply asked for user's feedback on each topic, it would require users of the system to read through all the user feedback to get a consensus of if they should use the topic or not. To avoid this, other metrics should be introduced for the user to use. This proposed system will use a 1 to 5 grading system for the users to grade themselves on their knowledge of the topic, a positive, negative, or neutral grade for if they would recommend the topic (with neutral being either no opinion or still trying the topic), and a general comment section where the user can leave any comments or thoughts they have. This aims to cover all the bases for a user giving their opinion on a topic while also making it easy to search through and understand.

As time goes on, a user's thoughts on a topic may change so they should be allowed to amend and change their original choices. A user may also be prompted to review their scores every quarter to ensure they are up to date and accurate.

4.6.5 Topics

As for the topics themselves, they should be chosen by system administrators. This is to avoid users creating unnecessary topics or accidentally creating duplicates. The topics should contain a vast amount of information to give the user a basic understanding of the topic. To avoid having to rely solely on administrators to add this information, an option to suggest additions to the topic page could be added too.

To make these topics easy to navigate, they must have consistent layouts, regardless of topic type. This will benefit all users as a user manual will be able to specify where each element is for new users, and returning users will be able to navigate quicker and more efficiently in all topics. It also increases compatibility for the system since it will be easier to scale the topics pages for different screen sizes.

Topics should also have images like icons attached to them. This will allow the user to quickly view the topics without having to read each one individually.

4.6.6 Searching

Allowing users to search for topics is key for this system to work. It would be incredibly inconvenient for the client if they had to go through multiple tabs to find the topic they are looking for. As such, the searching should be easy to access and be in the form of a search bar that is prevalent on each page of the system.

The searching must also not be unique to just one type of topic, but instead search all the topics to give the best results. While searching however, it would not be optimal to show the user all these different options as it may overwhelm them. The results should be split into different categories that can be expanded or closed. These options should be defined by the client.

The user should have the ability to filter search results. This is to help reduce the number of redundant results that are not relevant to the user. This will be increasingly helpful as the systems gets more and more topics. This initially should be restricted to only filtering by category as any other filtering is outside of the scope of the project.

4.6.7 Statistics

The system could display statistics to the user. This will allow the system to be more interactive and have more reasons for users to interact with the system frequently. This was suggested during the initial interview as the interviewee felt that the employees in the company would be attracted to these types of statistics.

4.7 Interface designs

4.7.1 Introduction

After the requirements of the system had been determined, the look and feel of it was investigated. The prior research into existing systems was used to gain an initial idea of how the system should look and be styled. These initial designs were made as wireframes to give the client an idea as to how the elements may be laid out and displayed on a page. The wireframes are based off a pre-existing set of features from a community website wireframe kit created by Sunie Pham (2023). Colours were mostly omitted, and basic ones were kept as to keep the focus on the layout. The system name was implemented as well so the client could see how it would look on the website.

4.7.2 Login page

Figure 14 shows the welcome screen that users will see the first time they try to access to system. It gives a brief overview of the system along with its name and logo. The user can

enter their email or username along with their password to login. There is no option for a register page that many other systems have due to users not needing to register themselves. A 'Forgot Password?' button is prevalent however to allow the user to reset their password if needed. The 50/50 design of the page has been inspired by 'Guru' and 'Document360', while also making it unique.

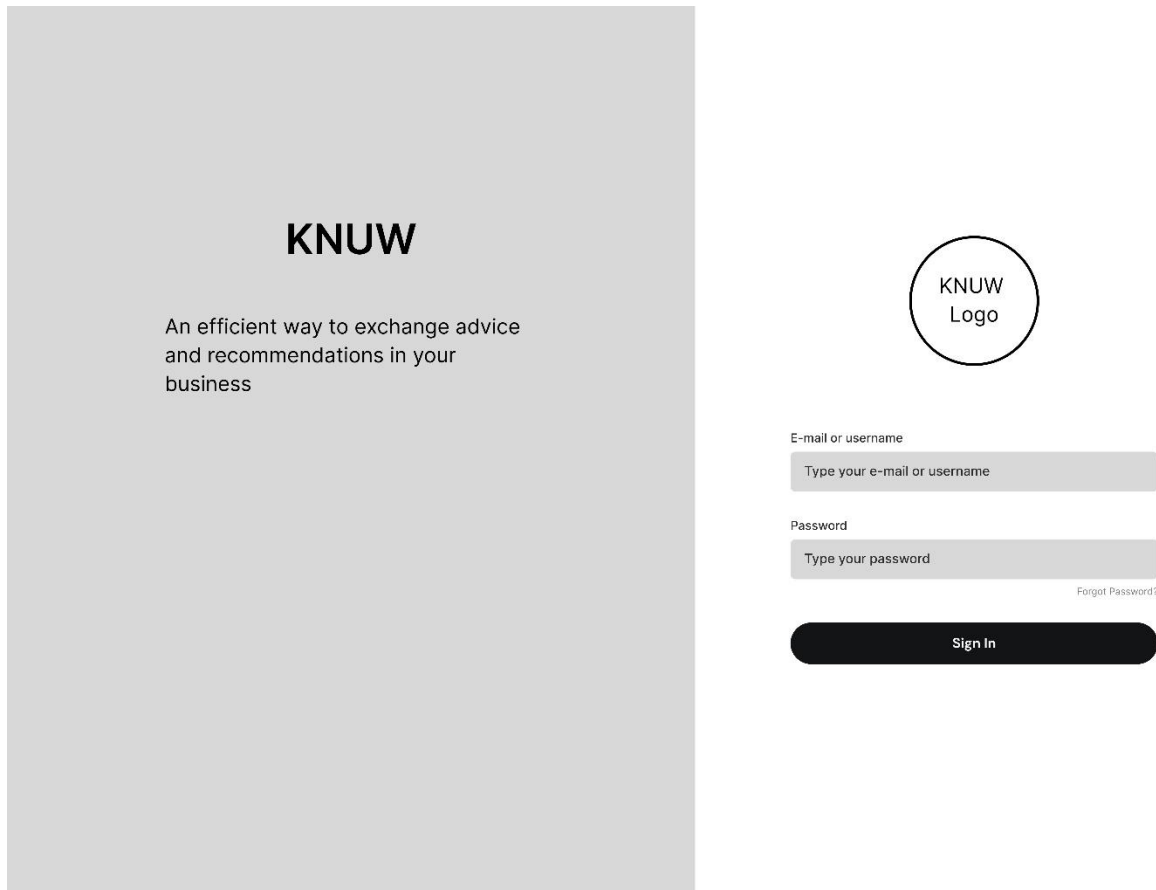


Figure 14: A design of the welcome page of the system

4.7.3 Home page

After the user logs in, they will be redirected to the home page shown in Figure 15. It is made up of three main parts, the navigation bar, content section, and the footer. This is standard web design principles that are seen in most of the existing examples.

The main body of this page, the content section, contains a variety of boxes with information. These boxes contain system analytics that the user can look through. This is to adhere with the want to show the user statistics to keep the system engaging. It also contains a few moving parts such as a scrolling section and a slide show. Figure 16 shows what the system would look like if the user were to scroll through the scrolling section and look through the slide show.

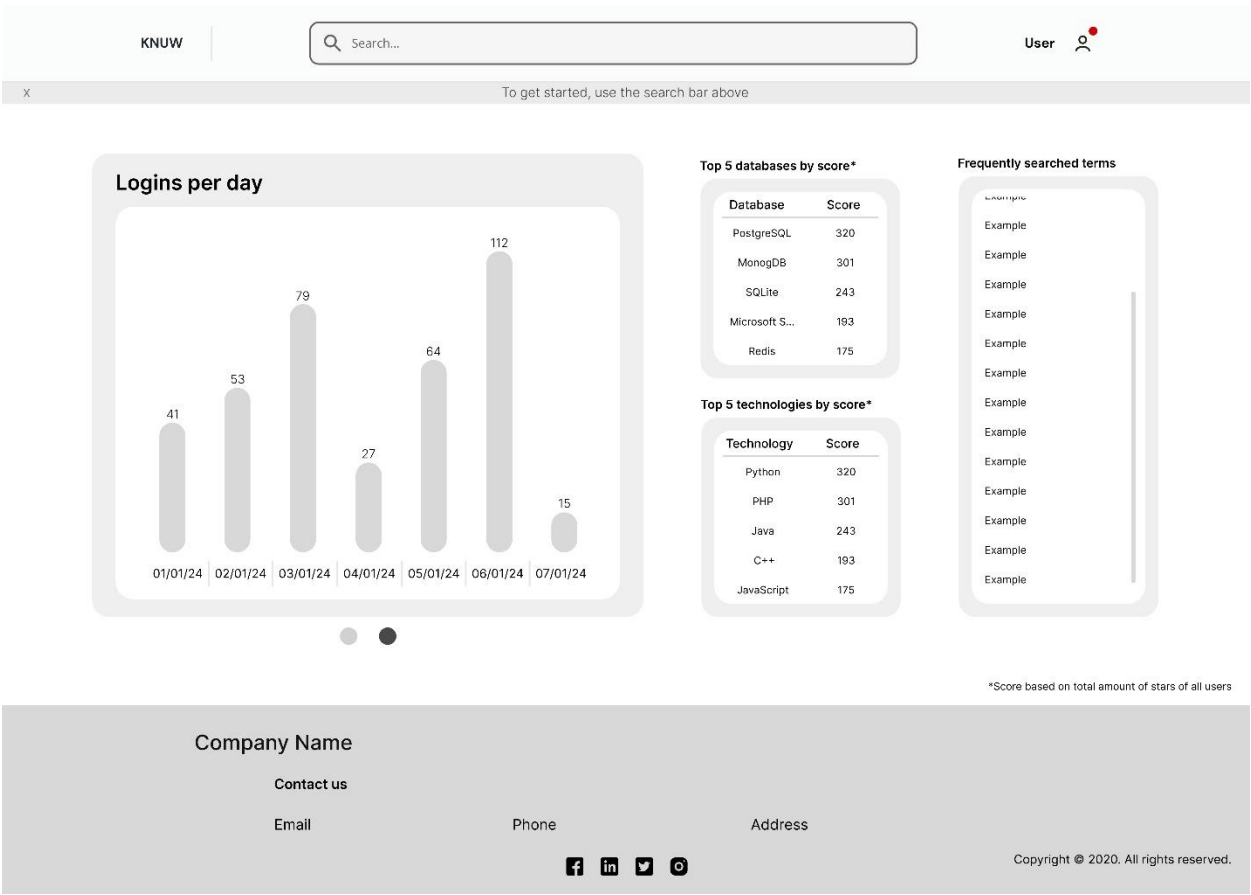


Figure 16: A design of the home page of the system with the slideshow on the next slide

Theses system analytics have been put into boxes which are placed around the page. This has been done to allow the user to customise what information to show the user by just changing what is shown in the box.

At the top of the content section, a text field is shown giving a summary of how the system should be used. A cross is present at the beginning of this text field to allow the user to close it.

4.7.4 Search results

Upon searching for a topic, the user will be redirected to the search page. Figure 17 shows what this page should look like.

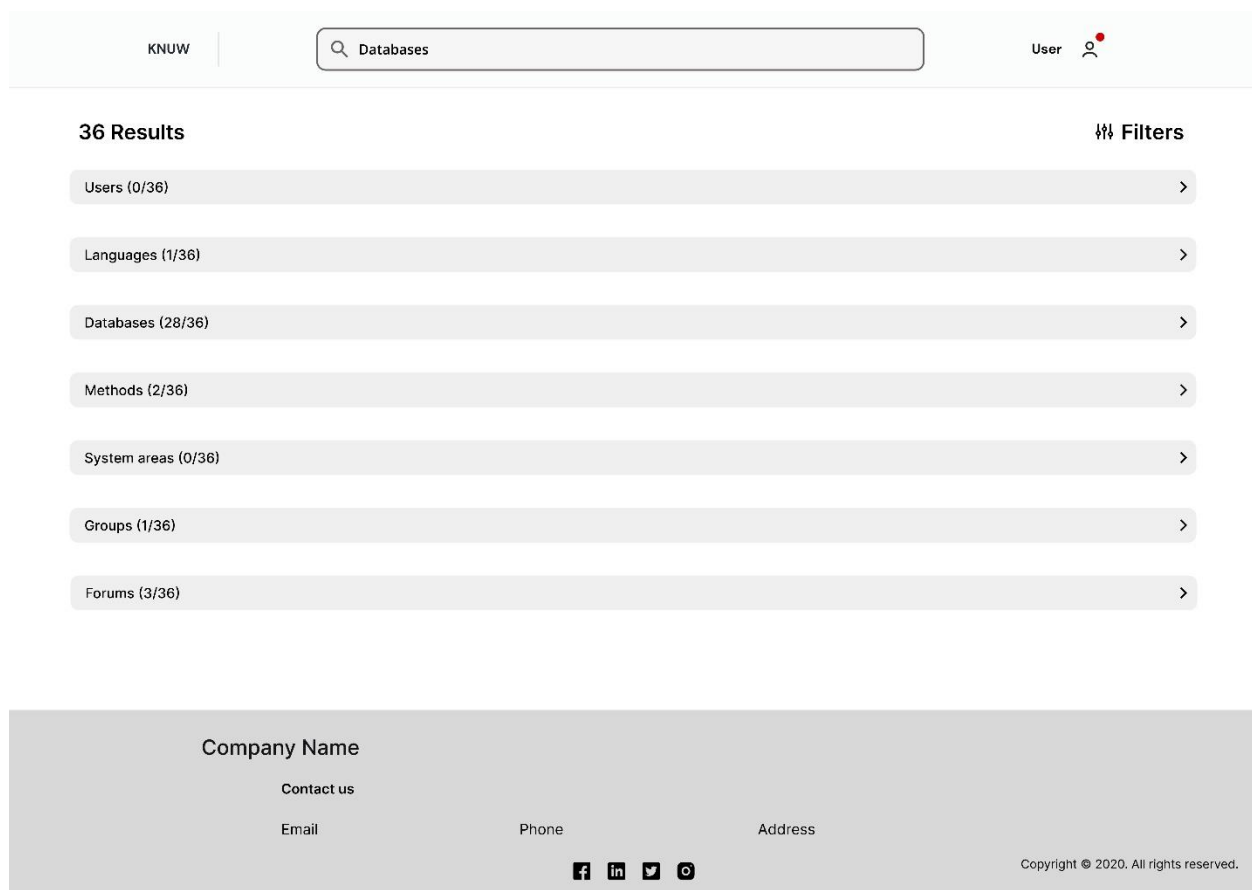


Figure 17: A design of the search results page of the system

This page keeps the top navigation bar and the footer seen in previous pages to allow the user to have the necessary information on each page. The main body of this page is displaying the results that are relevant to the searched word or phrase. The results are split

into separate categories to begin with to allow the user to quickly navigate to the category they want, without having to waste time scrolling through every option. When the user wants to see the options inside of a category, the user can click or press on the category and a drop-down menu will appear displaying the topics in that category (Figure 18).

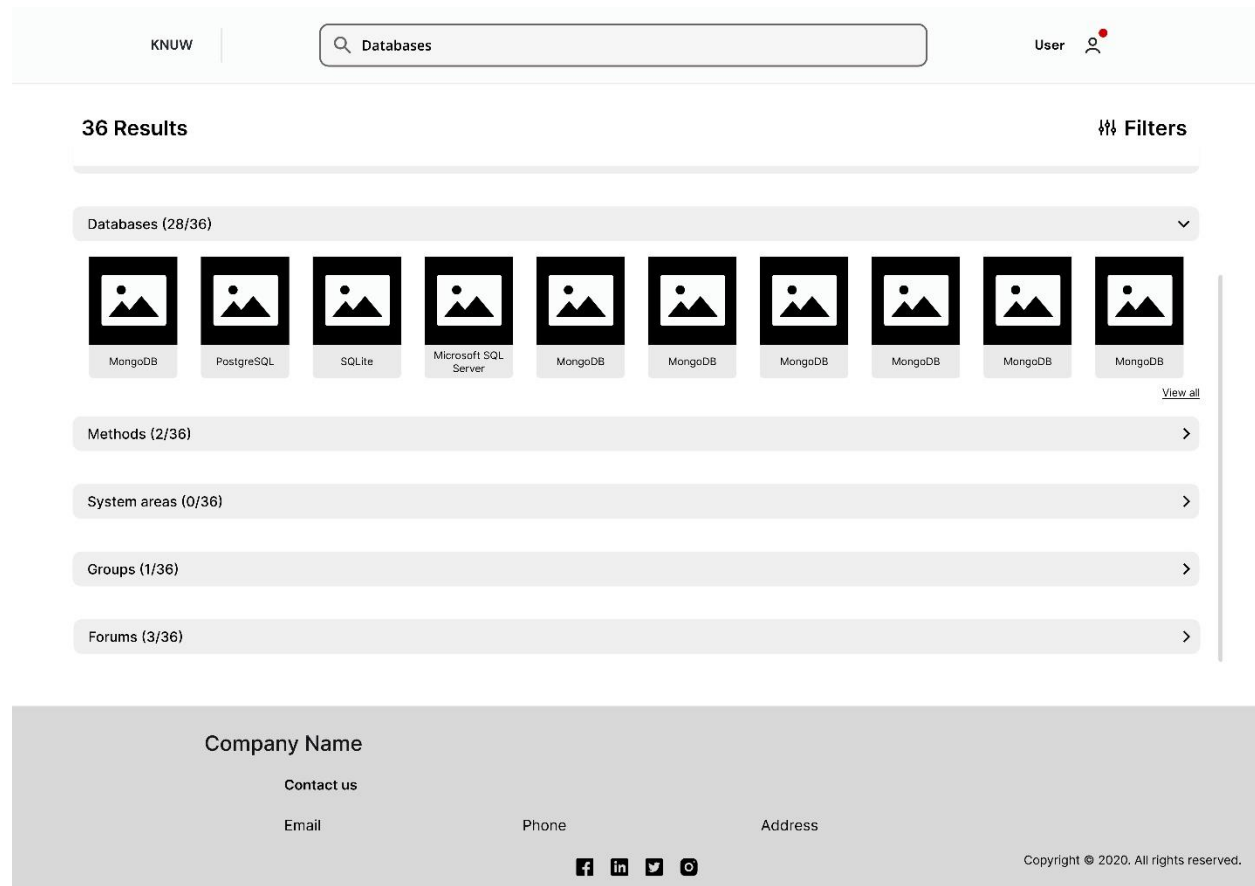


Figure 18: A design of the search results page of the system with one of the categories expanded

Each topic in a category is shown in a compact box, showing both a topic picture and a title. These two elements have been chosen based on the prior research. The topics need to be distinguishable immediately to save the user time, which was a key aspect highlighted in both the interview and questionnaire. To achieve this, topic pictures are shown which would normally be either a logo or other relevant picture that lets the user know what the topic is.

In case the topic picture is too ambiguous, or the user simply does not know the logo of a topic, a topic name will also be attached. To ensure the user selects the right topic, a product description could have been added too. This was not included however to save space on the search page. There could be hundreds of results and adding extra fields, like topic description, could make looking through the topics long and daunting.

A filter button has been included in this wireframe as well since the option to filter searched topics could further help to reduce time if there are lots of results. This button would open a menu containing a variety of different filters for the user to apply.

4.7.5 Topics

Specific pages for the topics have been designed as well. These will be accessible to the user after they have selected the specific topic from another page. While all the information on these pages should be unique to each topic, the layouts for the pages should be the same. A wireframe of a page containing an example topic has been shown in Figure 19.

Figure 19: A design of the individual topic pages of the system

This page has kept the top navigation bar and bottom footer for the same reasons and the previous pages.

The main body of this page contains a collection of boxes, like the home page. This is for the same reasons as the home page, to allow the user to customise the information in the boxes without the layout changing. Most of these boxes have pre-defined headings to allow the user to know what is contained in each one.

In the top left of the page, there is a long rectangular box which contains the topic information. It contains the topic picture, title, description, website, documentation link, notes, and a true-or-false field stating whether the topic is blocked in the company. The picture and title are used to display to the user which topic they are currently viewing. The topic description is shown to give the user a more detailed overview of the topic and what it does. Should the user wish to know more or explore the topic features, a section for the website is apparent to give them a starting point of where to look. A link to the topic's documentation will allow the user to get a more in depth look at the topic and how it could be utilised. The notes section has also been added as an optional field that can be filled in by an admin to give any general notes on the topic that may be needed. The blocked field lets the user know if a topic is blocked in their company, preventing the user from wasting time looking into the topic only to discover they cannot use it. A small button is also present in this box which allows user to submit any changes about the topic they think are relevant. There could be a lot of topics so it may be hard for the admins to keep all the topics constantly up to date. This feature hopes to lighten that load.

In the top right there is a box containing 'Top user comments' about the topic. This section is here to show the user the most liked and helpful comments regarding a topic that has been written by a user in their company. They can quickly see from this section who made

the comment, how they would rate the topic out of five, if they would recommend the topic, the comment they have left, and the amount of likes and dislikes it got. The ratings are there to show if the user thinks the topic is good, while the next section is there to show if they recommend the topic. These are two different criteria's and can be independent of one another, with a user thinking a topic is bad, but still thinking it is the best for the job. These ratings aim to give the user considering the topic a quick overview of if the topic is good and if the topic is recommended so that they can get a good idea of the system and, possibly, prompt the user to message whoever's ratings these are to get a better understanding of why they left them. This is also the reason the users name and profile picture are left next to the comment. This also acts as a button where the user can select this and get redirected to that user's page which lets them know the best way to contact them. The comment itself is shown to give a short and concise summary of the user's thoughts on a topic and the likes/dislikes are there to show what other users think of the comment. When a user likes/dislikes a comment, the like/dislike button will highlight blue or red respectively to prompt the user that they have selected one. A recurring theme in questionnaire was the idea that users wanted to know who the other users are that know topics so that they could discuss their options with them. This 'Top user comments' section gives a good overview of the top user's opinion and gives a good starting point for a conversation with the user. Near the bottom of the page, there is a section that contains the rests of the user comments if the user wishes to view more.

Below the 'Top user comments' section, there is another section called 'Top endorsed users'. This section shows the top three endorsed users for this topic, along with their rating, whether they recommend it, and the number of endorsements they have. This section will allow users to see who the top experts are in this topic as chosen by their peers. While this section only contains the top three users, at the bottom of the page, the user can view all the users and their endorsements for this topic.

Next to the 'Top endorsed users' section is a small section containing the 'Popularity rating' of the topic. This was a small addition added to the page to add some statistics in, which was an idea brought up during the initial interview. This rating is worked out using the number of searches for this topic in the last seven days. This is to ensure the rating is fair and could change daily. This hopes to make the page more interactive while also giving the user a metric to see how popular this topic is that they are considering using.

In the middle of the page, there are two boxes called 'Add/append comment' and 'Update'. Users are meant to rank against every topic that is relevant to their job and can optionally rank against others. These two sections are to allow users to either update their existing rating/comment for a topic or create one. If the user has an existing score, these options will be prefilled with them.

At the bottom of the page, both comments and user boxes have 'Filter' and 'Sort by' options for them. They will both contain a few different pre-defined options for the user to choose from.

4.7.6 Users

The user's page is an essential part of the system. Here, you can see all a user's information on one page. The layout of this page, along with an example user, can be seen in Figure 20.

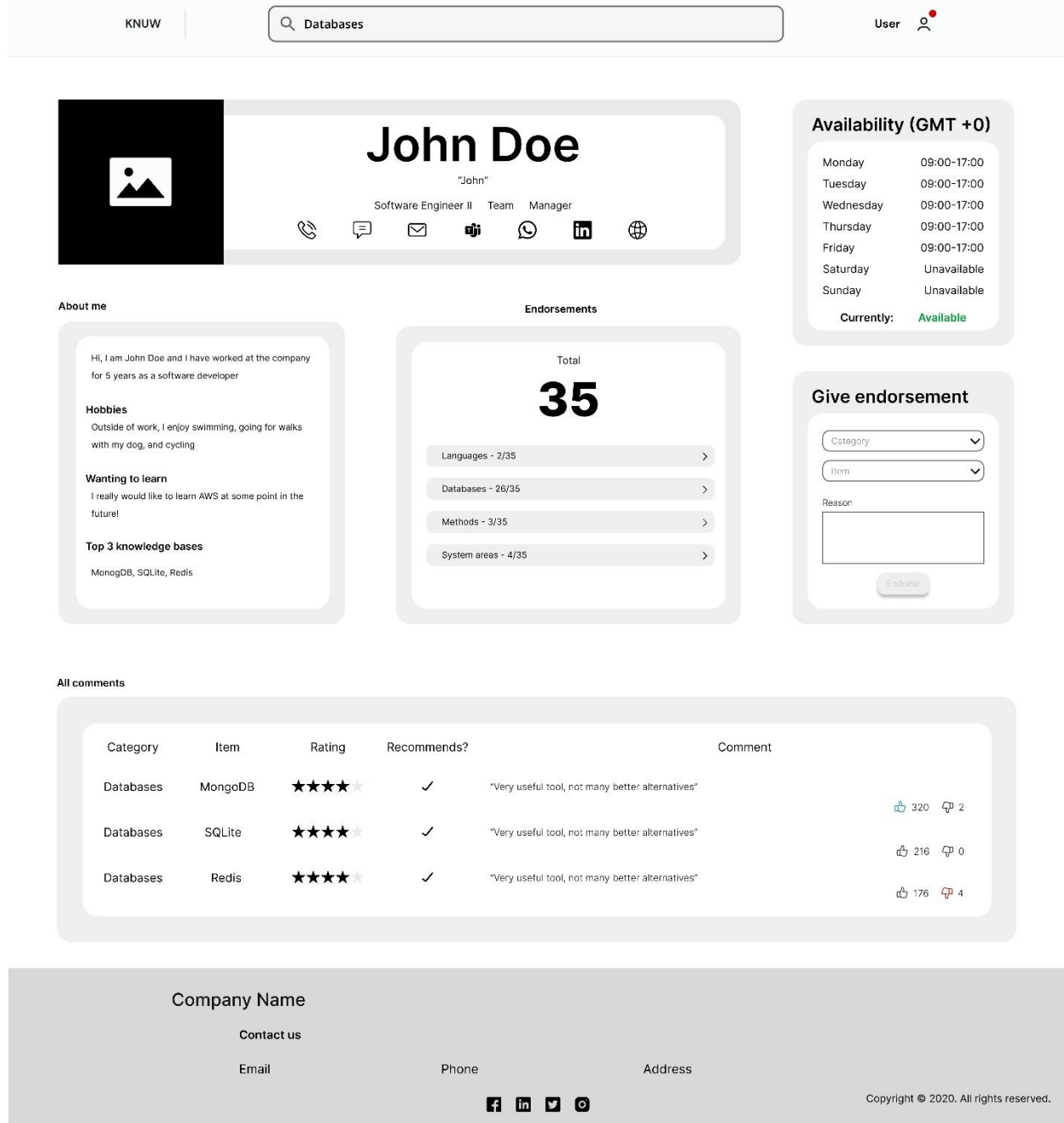


Figure 20: A design of the individual user pages of the system

Similarly to the other pages, the top navigation bar and bottom footer are present. The main content of the page is similar to the previous topics page, with the page being made up of a collection of boxes.

The top left box contains the main user information section consisting of a user profile picture, name, preferred name, position, team name, manager, and methods of contact. Job information is displayed below this so that any other users can work out who this user is in the company and what team they work for. This is also helpful in case a user wants to contact them but cannot for whatever reason, so they may wish to contact their boss. An array of contact methods is displayed at the bottom. This is a dynamic list of options that changes depending on which contact methods the user would prefer to be contacted on.

In the top right there is an 'Availability' box which contains the times the user is normally available to contact. Their respective time zone is also shown above these times to ensure the times are correct to that user. At the bottom, there is a status field that determines if the user is available for contacting at the moment. This should either be 'Available', 'Unavailable', or 'Holiday' (if they are currently away on leave). These options will be determined based on the times and time zone of the user. These options are also colour coded to reduce that chance of them being misread.

An 'About me' section has been included on this page as well below the main user information section. In it, there are some predefined prompts that the user must provide answers to. The section consists of an initial introduction, their hobbies, what they want to learn, and their top three topics/knowledge bases. These aim to give an overall summary of the user and what they are like while also keeping a consistent theme between user answers.

Two sections are included that cover user endorsements; one being viewing the endorsements the user has gained and another being giving the user an endorsement. The viewing of existing endorsements contains a menu that is similar to the search page with the menu containing drop downs for each of the categories. Once opened, a list of endorsements could be seen that would specify which topic and the comment the user had

left. This will allow users to see which topics the user is an expert on so that they could potentially ask them about multiple topics.

The 'Give endorsement' section is made up of three parts that the user must fill in order to give an endorsement. The first part is a category drop down menu where they can select a category. Then the next part is another drop down menu but for topics inside of the previously selected category. The final part is the comment for the endorsement which should specify why they are getting the endorsement and what they did. This will help users better understand which part of the topic they are the best at, if applicable.

The final section at the bottom of the page is the comments section. This contains all the comments the user has left along with their ratings.

4.7.7 Adding/updating scores

To allow user to give their thoughts and score on topics, an 'Adding/updating scores' page has been created where the user can see new topic they need to score as well as their existing scores if they wish to update them (Figure 21).

KNUIW

Databases

User

Adding / Updating scores

Please fill out any new scores that are not already done and/or update your existing scores to better reflect you.
This page **automatically saves on each score entered**, so feel free to leave this page at any point.
Your new scores will not be counted as done until at least **both the rating and recommendation fields are completed**.

?

New scores

Languages (0/2)

Databases (0/2)

Methods (0/2)

System areas (2/2)

Existing scores

Languages (34/158)

Databases (42/158)

Methods (23/158)

System areas (59/158)

Company Name

Contact us

Email

Phone

Address

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Figure 21: A design of the adding/updating scores page of the system

As with the previous pages, the top navigation bar and footer are present. The main content of the page is similar to the search results page where there is a collection of drop-down menus for each category. This page has two sets of drop-down menus though, one for 'New scores' and one of 'Existing scores'. This is so that it is easier for the user to navigate and see which are the new topics that need scoring, compared to the previous topics they have already scored. Upon selecting one of the drop-down menus, a list of topics will appear (Figure 22).

The topics under each category display the same characteristics as with the search page, a topic picture, and a topic title. This allows for the user to see the topic and its core details without taking up much screen space. Next to this is the scoring mechanisms for the topic. These are the same ones shown on the topics page. Users here can input their thoughts and opinions on a topic so that it can be shown on the topic page. If a user is attempting to

update an existing topic, the scoring fields will already be prefilled with the information they had previously given but will allow for them to be altered.

4.8 Flow Chart

To show how the system will work, a flow chart was created. The flow chart (Figure 23) shows each process of the system and how they work with one another as well as how the user would interact with them. These are inspired from the wire frames and requirements that were previously created.

This flow chart starts with the user accessing the system, needing to know more about a topic. The system needs to be only accessible for users inside of the company so the system checks if it is a valid user entering the website before letting them in. The user then searches for a topic and navigates to it. They then look at the user comments and decide if that is enough information or not. If it is, then the user has gained the knowledge they need and can now leave the system. The user can optionally leave an endorsement for the user who left the comment too if they wish. If the comments were not enough, the user can select a user profile of someone who has knowledge of that topic and attempt to contact them if they are online. If they are not online, they can either leave a message for when they are back or try a different user. If the user does not know how to start a conversation with the other user, they should use the other user's information section to help. After the conversation, if the user has gained enough knowledge, they can leave the system and optionally leave an endorsement. If the user requires more knowledge, they can go back to the topic page and message another user and go through the flow again.

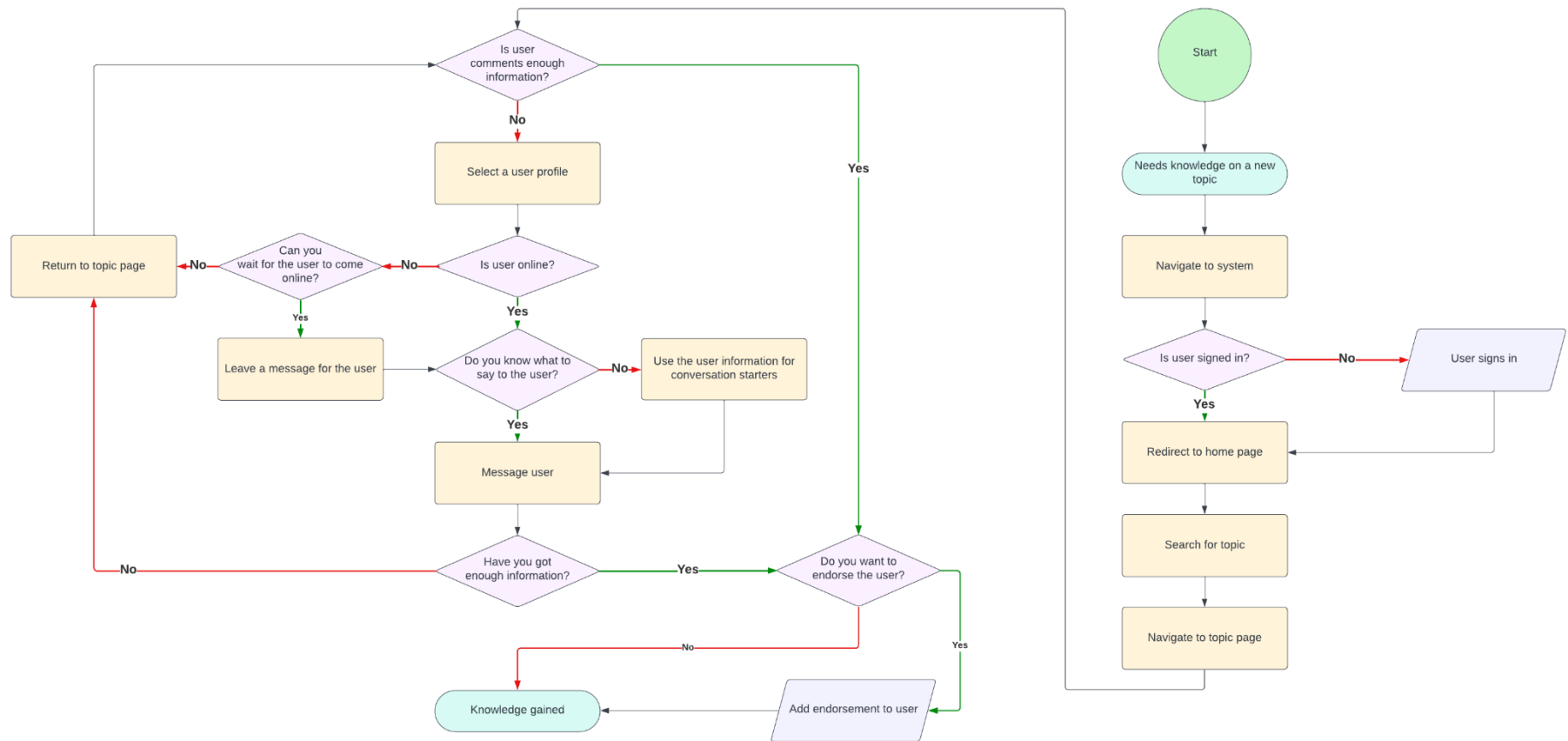


Figure 23: A flow chart showing how the user would interact with the system

4.9 Development

With the planning done and the client agreeing with the choices, the system began development. This development was stretched over multiple weeks with regular meetings with the previously mentioned architect, every two weeks to ensure constant steady progress was made and to adhere with the agile methodology. During these meetings, a showcase of the current state the system was in was done, along with a discussion of what features would be developed next.

4.9.1 Meeting one

This meeting was used as a kick-off meeting where the client was given the final rundown of the requirements and wireframes. This was so that the client completely understood what to expect from this system and give an option to add any last-minute changes. The first requirements for this sprint were laid out along with some optional extra ones. This was due to not knowing how much work would be completed per sprint. The requirements consisted of creating a login page and potentially the search bar.

4.9.2 Meeting two

The system had begun development and some basic functionality had been done. Some functionality had been developed that was mostly taken/adapted from a basic tutorial that had been previously used to help learn React and Next.js. This mainly included the login page (Figure 24) and a basic home page (Figure 25). A top navigation bar was also added that had a place holder search bar. The login page was developed using the Next.js middleware, which was talked about previously, for security reasons. The look of the page was intended to be as similar as possible to the wireframe. A forgot password button was

omitted for this initial system as it was not needed at this point. If the user needed their password reset, they would need to contact an admin who would be able to do it for them.

The home page did not contain the statistics shown in the wireframes due to a focus on more practical features of the system. These would be added later if there was enough time. The client expressed it was not a major concern for them if the statistics feature was not prevalent in this version of the system as well. The same went for the footer of the website as it did not seem needed at this time.

This sprint served as the basis for how much work could get done during the 2-week long sprints, so the initial won't have requirements were drafted.

The client was happy with how the login page and home page looked. They especially mentioned how the layouts were very similar to the wireframes and suggested to keep it as such. The search bar saying 'KNUW it' was also commented upon as a fun addition to the system. The client then suggested a focus on the search bar functionality and the search results page.

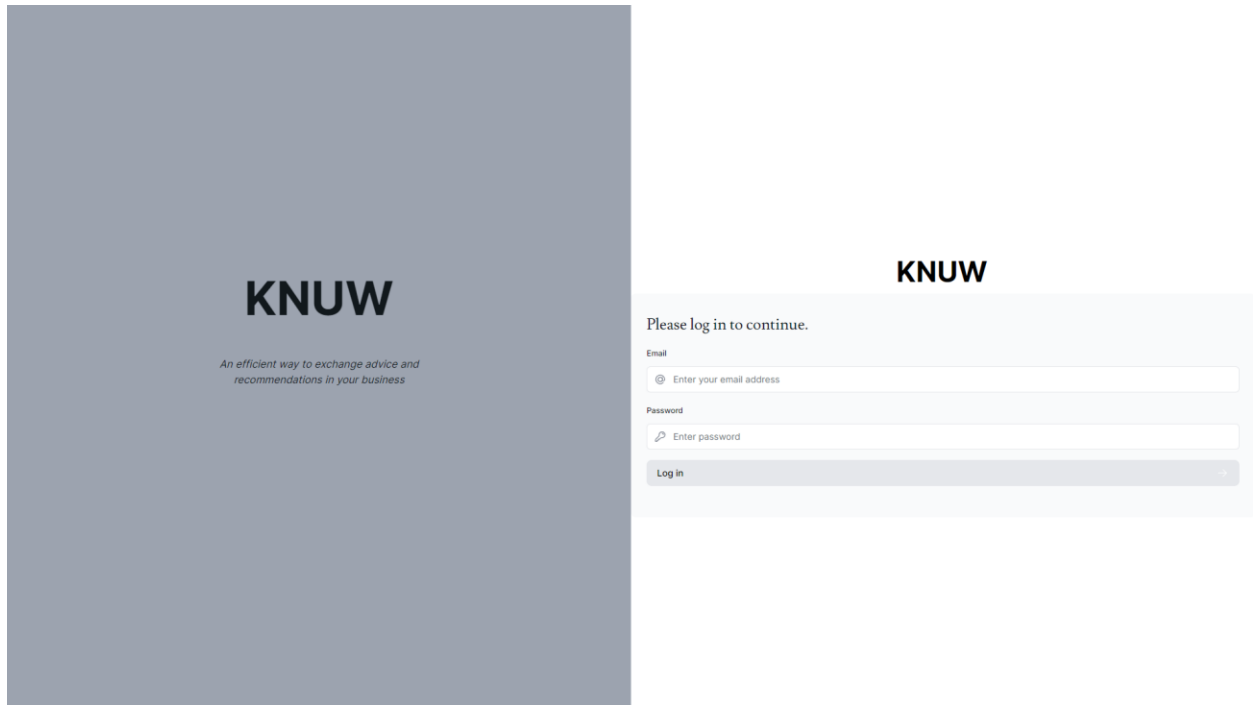


Figure 24: A screenshot of the system login page after the first sprint



Figure 25: A screenshot of the system home page after the first sprint

4.9.3 Meeting three

The search functionality had been fully implemented and integrated with the database. The search page also sorted the results by category to allow the user easier navigation (Figure 26, Figure 27). These categories are dynamic and display all the categories that are in the database. The result under these categories displays the topic image and title, like in the wireframe. In Figure 27 the topic image is a placeholder. This is because in the database there is no image associated to that topic but the option to add images to topic is available. These results were also clickable buttons that redirected the user to the topic page that just contained some placeholder information at the moment. This search section did not include a filters button like the wireframe due to it being out of scope for this version of the system. The client was informed of this and agreed that this should be left out of scope to allow for a focus on the more important features.

The client liked the categories and the way the topics looked under each one. The clean look of the system was also mentioned, saying that the grey scale colour palette gave a nice effect. The client suggested a focus on completing the topics page by adding the comment and scoring features for each topic, along with the scoring page shown in the wireframes. They also suggested a small change of adding the users name next to the user icon.



Figure 26: A screenshot of the search page after the second sprint



Figure 27: A screenshot of the search page with a category expanded after the second sprint

4.9.4 Meeting four

The topic pages were completed including the comments, ratings and other features specified in the wireframes. (Figure 28, Figure 29). The likes on each comment are interactive allowing the user to like or dislike a comment. They have been programmed to only allow for the user to leave one like or dislike per comment. The likes and dislikes for the comment created by the logged in user have been greyed-out as the user cannot leave a like or comment on their own comment. These screenshots do show an error in the likes and dislikes feature which was noticed during the demonstration where the dislikes became negative. This feature will be explored and hopefully solved in the next iteration. The 'Current popularity' box is also a placeholder and has no functionality behind it. This is out of scope for this iteration but gave the page a nice layout so was kept.

The users on the page could be selected and redirected to a separate page containing their information. This was only basic template page with no database information yet.

The 'Suggest a change' button is a placeholder at the moment and does not have any functionality. This will be added in a possible later version of the system, which the client was happy with.

The client really liked the look of the page and its layout. The liking system was easy and responsive, granted it was not working properly. They like the update scores form and how it did not refresh the page and seemed instant. They suggested a final focus on finishing the users page, as well as again creating the scoring page shown in the wireframes. They also stated again that they would like the user's name to appear in the top bar.

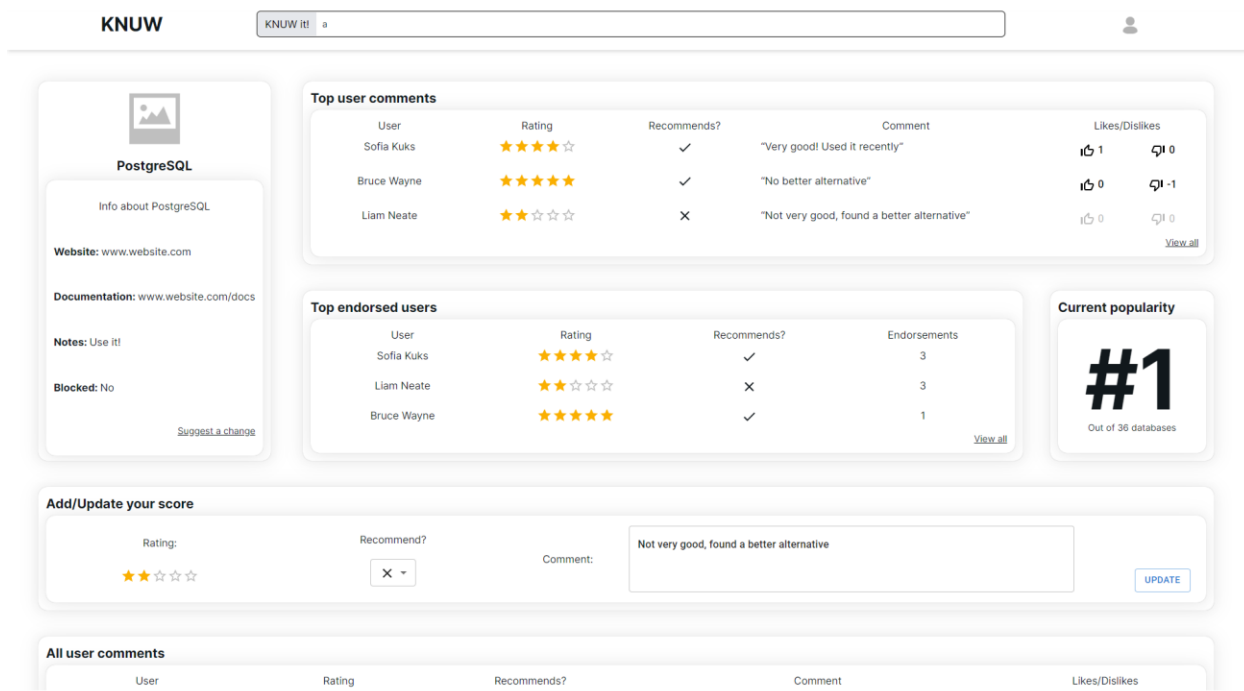


Figure 28: A screenshot of a topic page after the third sprint, top of page

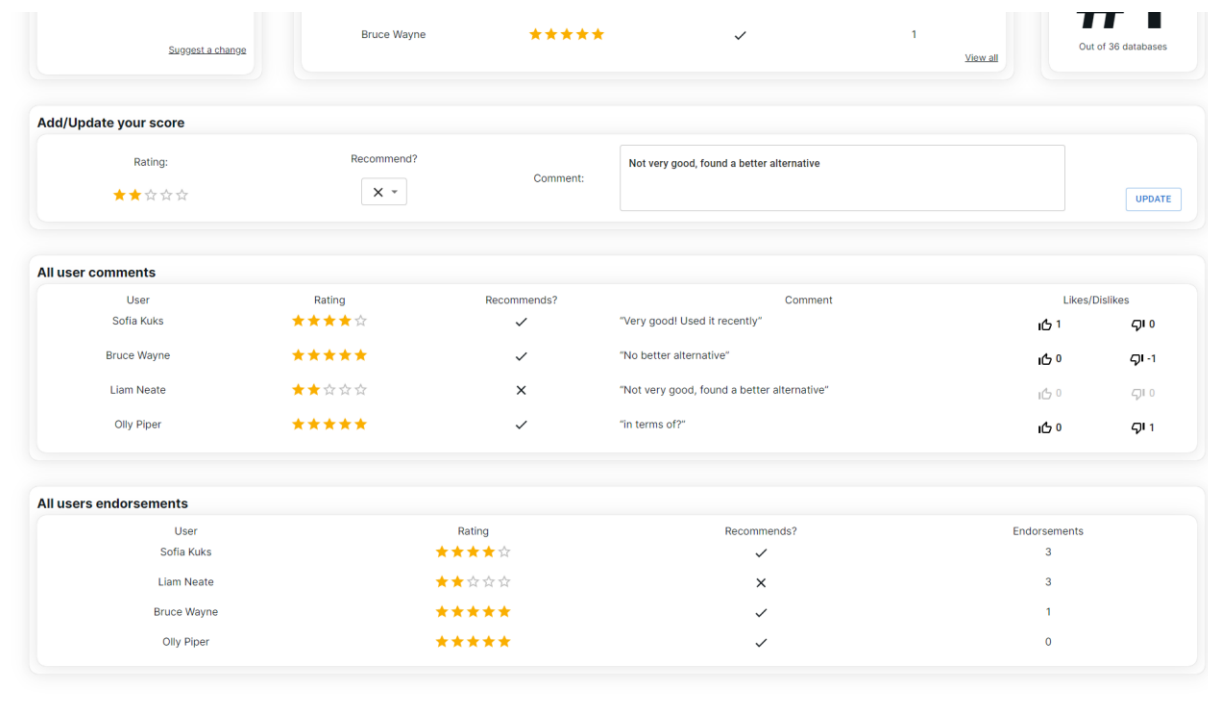


Figure 29: A screenshot of a topic page after the third sprint, bottom of page

4.9.5 Meeting five

Due to deadlines around this time, only a small amount of development was done that was focused on fixing bugs and getting the users page finished (Figure 30, Figure 31). The final user page deviated a bit from the wireframe with the 'Endorsements' and 'About me' sections being split onto their own lines. This was done to accommodate for the comments section to be fully shown in the endorsements section as while they were on the same line, it was not displaying properly. The 'Engagement rank' was also added to keep the layout square and not have a gap due to these items being on separate lines. This is just placeholder and has no functionality at the moment.

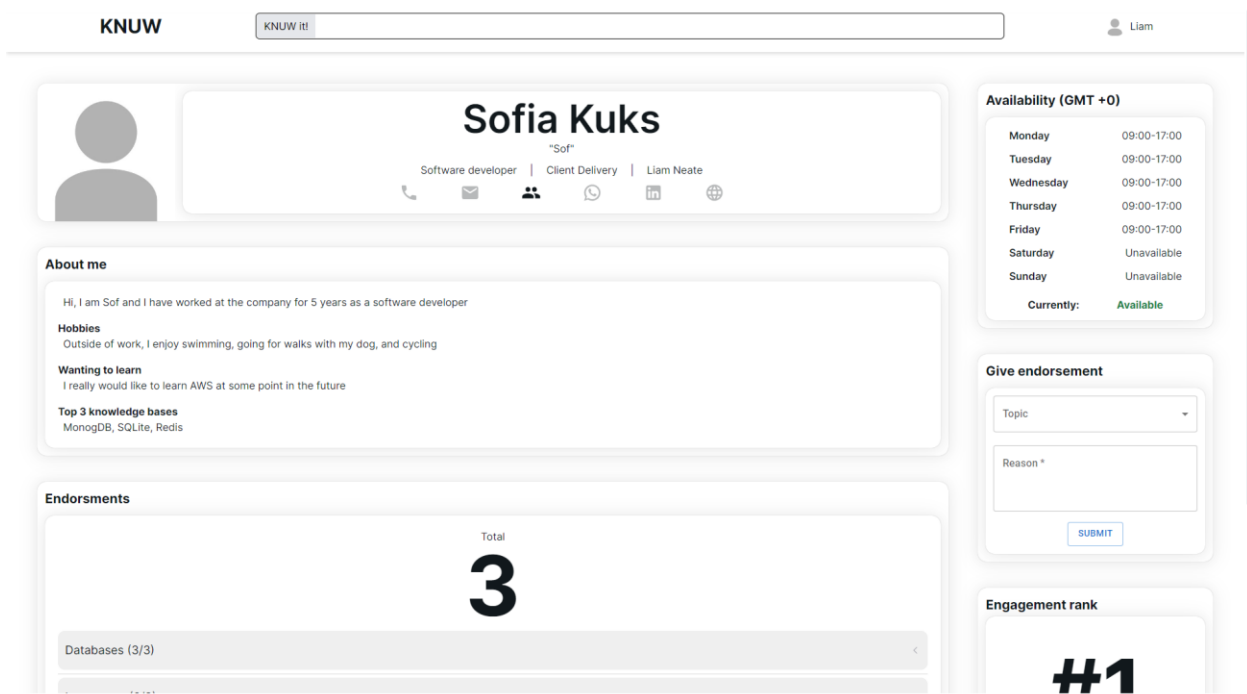


Figure 30: A screenshot of a user page after the third sprint, top of page

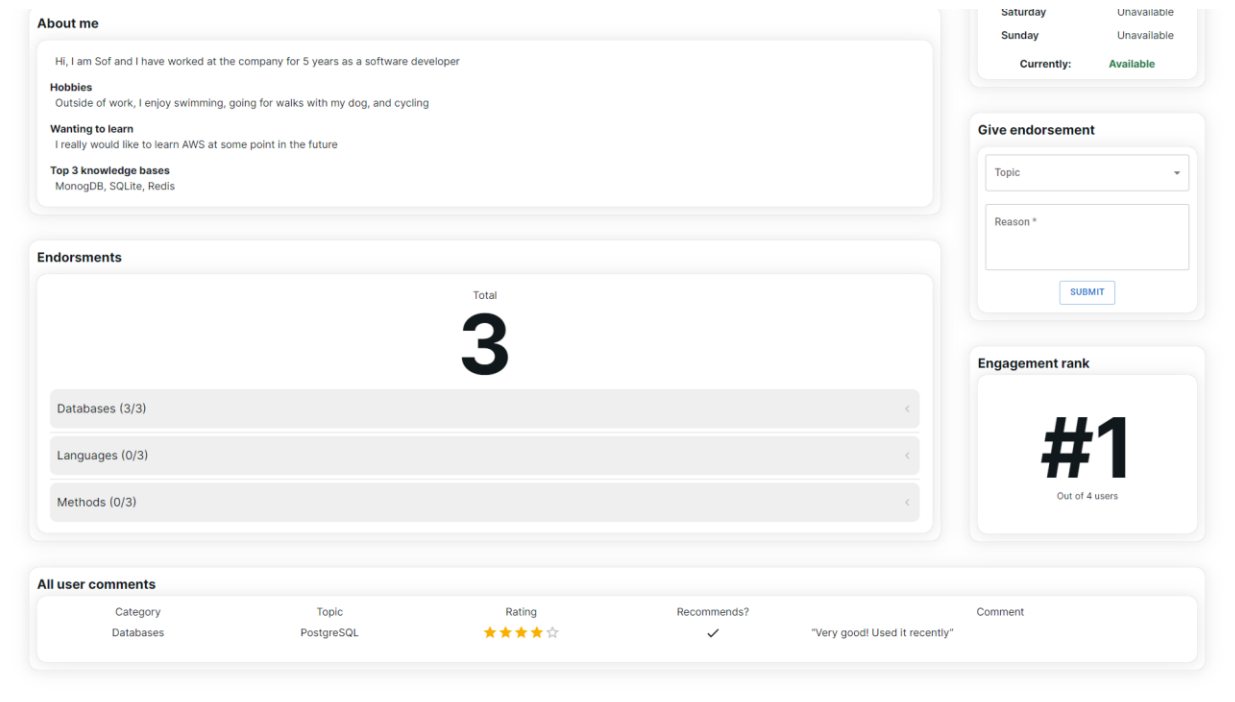


Figure 31: A screenshot of a user page after the third sprint, bottom of page

The user information section at the top is also slightly different, with all the different contact options being shown rather than just the ones they use. This method greys-out the contact methods that the user does not use. This keeps a consistent design and lets the user explicitly know which contact methods they do not use.

The previously likes issue was also fixed during this sprint with likes and dislikes no longer going negative. The users name appearing in the navigation bar was also added in this sprint as the client had been asking for a while. Unfortunately, the other sprint requirement to create a dedicated scores page was not met. The client was understanding as to why it was not included but was happy with the other changes added. They were also happy with the engagement rank feature as it added an extra layer of interactivity that they thought would inspire friendly competition. They did say however the 'About me' section did look a bit too long for what it was and that the big '3' for total endorsements looked a bit strange with the longer box.

This meeting also served as a final client meeting where the client got a chance to test the system and give their feedback which is discussed in section 5.

4.10 Changes

Due to this being developed following an agile methodology, the requirements and system changed throughout development.

4.10.1 Database

The final database slightly differed from the original design. The main changes were the removal of the contacts, contactDetails, and frequencies table, along with the addition of the likes table. The new database design can be seen in Figure 32.

The contacts and contactDetails tables were merged into the users table as they were unique to each user, so they did not need separate tables. The contacts became a few hard coded ones rather than an infinite number of custom ones for the reasons stated previously.

The frequencies table was completely removed as the idea of keeping track of the frequency of page visits was not a needed requirement. Vercel also offers its own way of keeping track of page views which could optionally be added later and would require less configuration and maintaining.

The likes table was added during development after realising that the liking functionality was more complicated than initially expected. Each like needed to have an identifier to know which user had left it so that the system can check if the user has liked the comment or not. There also needed to be a way to know if the user had left a like or dislike for the counting system to work. The likes and dislikes were compressed into this one table as they mainly had the same functionality.

There were a few more small changes to the tables such as the change from integer to UUID for primary keys as they were more secure and are easier to keep unique. The varchars are more detailed to show how many characters each field can take. Most were set to 255 as that is the industry standard for most strings, however, the phone field in the users table was set to 15 since that is the max length of a phone number.

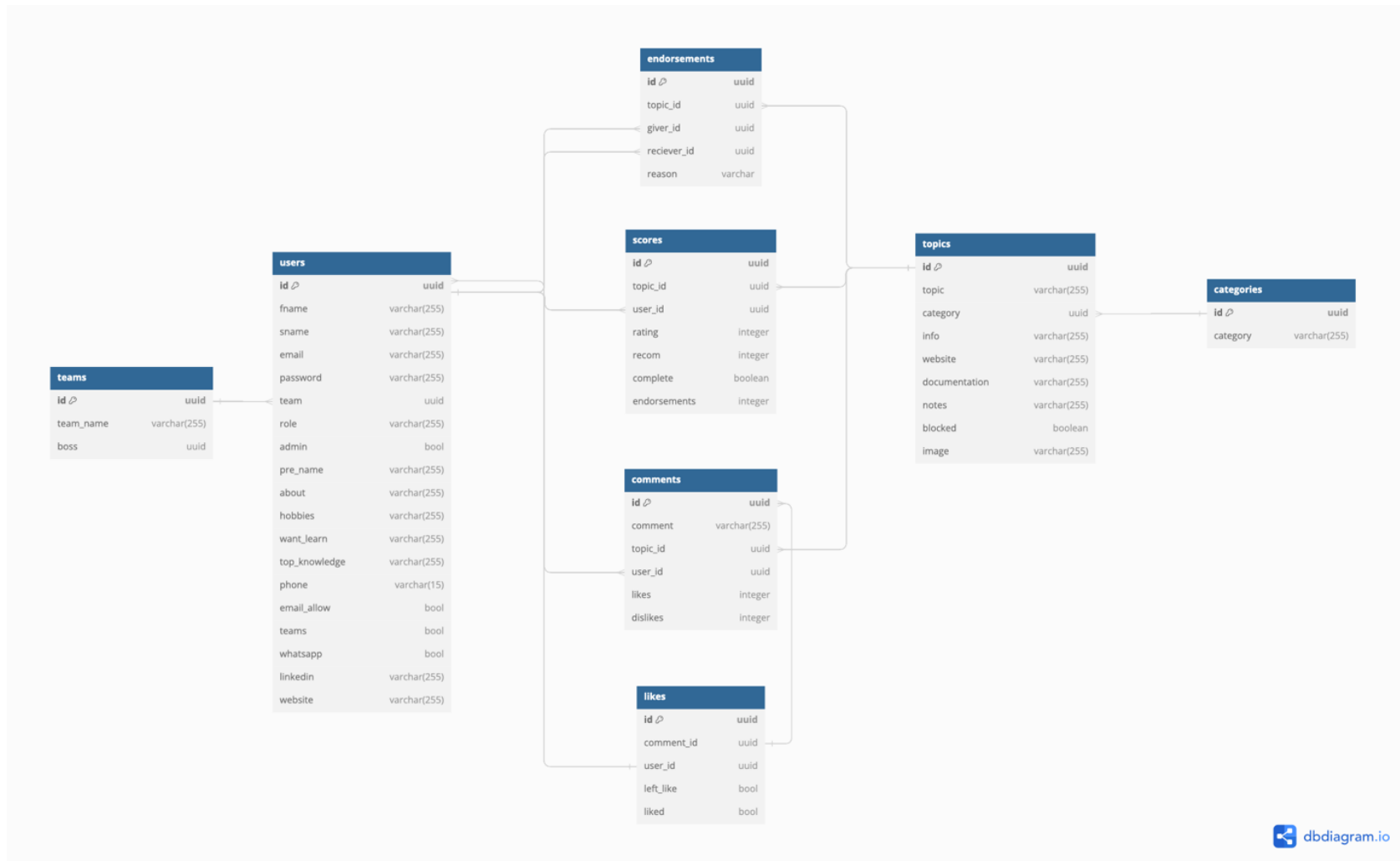


Figure 32: The final database design for the initial prototype of the system

4.10.2 Requirements

The requirements went through quite a few changes as development went on. The table of requirements was frequently altered as development went on to reflect the final system more accurately and what the client wanted. The new table of requirements can be seen in Table 4.

The main change that can be seen between the requirements tables is the addition of the 'won't' have section. This is a key part of MoSCoW requirements that was purposefully left out to begin with. This was because the amount of work that could be done over this project was unknown. However, after the first sprint, an estimate of how much work could be done over this period could be made along with how deep the developers understanding of the language and technologies was. The understanding of these helped with deciding the 'won't' have's since it helped to see what features would not be doable without committing a significant amount of time to learning them. As such, these 'won't' have's were mostly decided upon during the meeting after the first sprint. The rest of the requirements were slightly shuffled around as the priorities of them changed.

Two extra columns were added to this table to show if, and when, the requirement was completed. This was done to show how the development of the system came along in terms of requirements as well as what requirements were met. Some requirements were completed but do not have an entry in the 'Sprint completed' column due to them being general features of the system as part of the technology or language used.

Table 4: Final system requirements using the MoSCoW method

Reference	MoSCoW	Requirement	Completed	Sprint completed
FR01	Must	Enable users to effortlessly search for topics.	Yes	Sprint 2
FR02	Must	Facilitate users self-scoring on each topic.	Yes	Sprint 3
FR03	Must	Allow users to recommend or express their feedback on topics	Yes	Sprint 3
FR04	Must	Allow users to input and manage their contact information	Yes	Sprint 3
FR05	Must	Allow users to contact other users	Yes	Sprint 3
FR06	Must	Allow the user to have a unique account	Yes	Sprint 3
FR07	Must	Enable users to search a diverse range of topics beyond technology	Yes	Sprint 2
FR08	Must	Empower admins to create and manage accounts, including team/managers.	Yes	N/A
FR09	Must	Provide admin capabilities to update and/or delete accounts and team details	Yes	N/A

FR10	Must	Have information pages on each topic.	Yes	Sprint 2
FR11	Must	Ensure robust security measures to safeguard user data	Yes	Sprint 1
FR12	Must	Restrict access to internal users only	Yes	Sprint 1
FR13	Should	Have a page showing all the topics the user has given scores for and/or need to give scores for.	No	N/A
FR14	Should	Display results for all topics the contain the key word the user searches for.	Yes	Sprint 2
FR15	Should	Allow users to input personal information such as their name and preferred name	Yes	Sprint 3
FR16	Should	Provide a commenting feature for users to share thoughts on topics	Yes	Sprint 3
FR17	Should	Allow users to refine search results	No	N/A
FR18	Should	Be hosted on the cloud	Yes	N/A
FR19	Should	Ensure compatibility with various desktop screen sizes	Yes	N/A

FR20	Could	Implement automated release processes	Yes	N/A
FR21	Could	Allow users to input their country and office location	No	N/A
FR22	Could	Identify skill gaps in teams and users	No	N/A
FR23	Could	Enable users to set their account status to "away" during absence	No	N/A
FR24	Could	Allow users to specify their time zone	No	N/A
FR25	Could	Allow users to input availability and holidays	No	N/A
FR26	Could	Facilitate the creation of knowledge groups by users	No	N/A
FR27	Could	Allow users to establish forums for specific questions	No	N/A
FR28	Could	Display website statistics for users	No	N/A
FR29	Could	Be compatible with mobile screens	Yes	N/A
FR30	Won't	Incorporate a competitive element for user retention (e.g., highest team scores)	No	N/A
FR31	Won't	Allow users to customize contact methods based on time and day	No	N/A

FR32	Won't	Enable users to specify their previous experiences with or use of a particular topic	No	N/A
FR33	Won't	Allow companies to implement custom colour schemes	No	N/A
FR34	Won't	Implement regular data backups of the system.	No	N/A
FR35	Won't	Allow managers to request score improvements from team members	No	N/A
FR36	Won't	Enable users to suggest new topics	No	N/A
FR37	Won't	Integrate with the client company's existing systems for single sign-on and data scraping	No	N/A
FR38	Won't	Send reminder emails for new topic additions	No	N/A
FR39	Won't	Send monthly reminders for score updates	No	N/A

4.11 End outcome

After these development sprints, the initial prototype was completed. Not all the requirements stated were met, but all the must haves were as well as a majority of the should haves. A few must haves that were not mentioned in those sprints (FR08 and FR09) are ones that did not get user interfaces created for them, but still had the functionality from them in the code. These missing requirements were all based around the admin ability of editing the database entries, which can be done by creating a variety of SQL commands and sending it to the database.

Most of the should haves were completed but quite a few were not mentioned in those sprints. FR18 was already implemented as the system was being developed using React and hosted on Vercel. FR19 was also met thanks to React as it has automatic compatibility for a variety of screen sizes. FR17 was not met due to time constraints and the requirement not having a big impact on the system.

The majority of the could haves were not included due to the time constraints and the pressures of other assignments that needed doing. FR29 however was included due to React being reactive to mobile screen sizes automatically.

4.12 Summary

In order to develop this system, a variety of different planning techniques were used. Some wireframes were created along with a database diagram and an initial requirements list. The initial prototype system was fully developed using agile principles that consisted of changing requirements and constant client meetings. As such, these initial plans created ended up being changed along the way. The outcome was a usable system that the client was quite pleased with and had lots of input into.

CHAPTER 5

RESULTS / DISCUSSION

5.1 Introduction

With the system developed, testing begun to find out if it meets its intended purpose. This is a key aspect of this project due to one of the project objectives being to gather results to estimate success.

5.2 Testing

5.2.1 Testing plan

To test the system, a testing plan had to be created. This test plan consisted of a few different parts. The first part was a meeting with the client correspondent to get their thoughts on the system and how they felt it would help the company. The second part was to distribute the system around the client company and let the client try the system out.

5.2.2 User review

Along with the final client meeting in the development cycle, a full user review was conducted with the architect of the client company. The user had full access to the system with a unique login that was created for them. They got to test each page as well as try to send invalid requests through the system to see how resilient it was.

The bad requests the user sent were all caught by the software thanks to its use of NextJS middleware. All bad requests that were passed were sent to an error screen stating what went wrong along with how to send a correct request.

All pages the user visited seemed to be fully functional and were very quick loading, with them even commending it for its responsiveness. One issue did come up, however, which was a problem with the ability to give endorsements. The system that was created for it seemed to have broken in the latest version. Going forward, a fix would be put forward to repair it.

The user stated a variety of features that they would like to see in later iterations of the system, many of which were already part of the latest MoSCoW requirements. One big feature they were very keen on was using the system to identify skill gaps in the company. The system would look at how many people knew a certain topic, and if it were low, would alert managers and higher-ups that there is a potential gap in their knowledge. This would be a top priority if the system gets developed further.

5.2.3 User testing

To get the best results possible, the system was distributed to multiple employees in the company. These employees were the same ones who had previously answered the initial questionnaire due to this system being mainly used by them. As the system was hosted on the cloud, the process of distributing only required a URL to be passed around. Login credentials were created for each user as well to allow them to have a unique experience. Each user was asked to find a variety of experts from the system without being given a demonstration of how the system works. This was to get an understanding of what the system experience would be like for first time users who are going in blind. The number of searches was kept short however to not take up too much of the employee's time. After

completing this, the user was asked to repeat the search for an expert in the same topic but only using their existing system. This aimed to give a comparison between using the new system and the old. To collect the data that is being evaluated, a questionnaire was sent around along with the URL and login details which the client entered their results on.

5.2.3.1 Section 1

The first expert the users had to find was an expert in PostgreSQL. The expectation going into this was that it would take less than a minute for the users to find each expert due to the speed of the system and the simplicity. This question showed that two users took longer than that however, while the rest met the expectation and took less than a minute (Figure 33: Timing results from question 8 where the user was asked to find an expert of PostgreSQL using the new system.). This may be due to the users taking their time to get used to the system for the first time, or the server being slow on first load of the page.

8. After logging onto the system, how long does it take you to find an expert in PostgreSQL?

[More Details](#)

● Less than a minute	3
● Less than 5 minutes	2
● Less than 20 minutes	0
● Less than an hour	0
● More than an hour	0



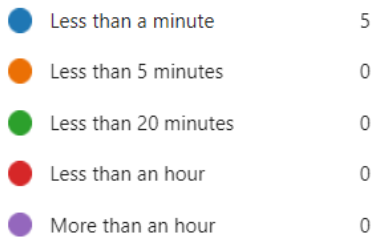
Figure 33: Timing results from question 8 where the user was asked to find an expert of PostgreSQL using the new system.

The second and third expert the users were tasked with finding was experts in both Python and SCRUM methodology. These adhered to the prior assumptions of all users taking less

than a minute to find. This was likely due to the user being used to the system after the first question and the server having loaded all the pages.

9. After logging onto the system, how long does it take you to find an expert in Python?

[More Details](#)



10. After logging onto the system, how long does it take you to find an expert in SCRUM methodology?

[More Details](#)

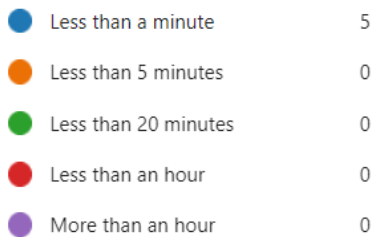


Figure 34: Timing results from questions 9 and 10 where the user was asked to find an expert of Python and SCRUM methodology using the new system.

5.2.3.2 Section 2

For the second section of this user testing, the users were asked to find experts in the same topics but without using the new system. They could use any previous tools they used to, or simply use word of mouth. Users who were already expert were asked to imagine they were not and instead imagine they are new to the topic.

For the first question, the results were varied with most people taking less than 20 minutes. These results were to be expected as the client is a technology-based company and PostgreSQL is quite a well-known database. Two users found an expert in less than a minute which could be due to an expert being in their team or nearby to them if they were in the office. One user was less than five minutes which is still quite quick. One other user took less than twenty minutes which is quite a long time in comparison. This could be due to them having to message around to find an expert or trying to use an old tool. One user surprisingly took over an hour. This could be due to the user not having time to message around to find an expert.

11. How long does it take you to find an expert in PostgreSQL in your company without using this new system?

[More Details](#)

● Less than a minute	2
● Less than 5 minutes	1
● Less than 20 minutes	1
● Less than an hour	0
● More than an hour	1



Figure 35: Timing results from question 11 where the user was asked to find an expert of PostgreSQL without using the new system.

The results from question twelve conformed again to our prior assumptions as it took all the users less than twenty minutes to find an expert (Figure 36). This would mainly be due to Python being a very popular language that quite a lot of people would know and may call themselves an expert in. The majority also took less than a minute to find an expert which was the same with the new system. This could show that for well-known topics, the system is not as effective or needed.

12. How long does it take you to find an expert in Python in your company without using this new system?

[More Details](#)

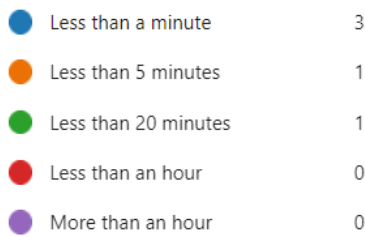


Figure 36: Timing results from question 12 where the user was asked to find an expert of Python without using the new system.

The last topic, SCRUM methodology, took the longest time on average for users to find an expert, with 40% of people taking more than an hour to find someone (Figure 37). This was an unexpected result but could be because of a lack of experts in that topic in the company. In future iterations of the system, a method for detecting areas that lack experts could further help to reduce time loss. The other users however, reported that they took less than twenty minutes, which correlates with what was expected.

13. How long does it take you to find an expert in SCRUM methodology in your company without using this new system?

[More Details](#)

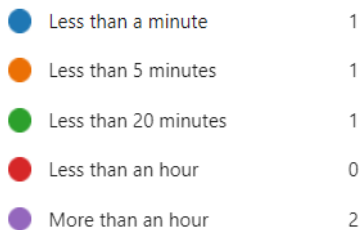


Figure 37: Timing results from question 13 where the user was asked to find an expert of SCRUM methodology without using the new system.

5.2.3.3 Section 3

In the last section of the user testing, users were asked to rate the system against a variety of metrics. This was to gain general feedback about the system and to see if the users could see themselves using the system in their future work.

The first three questions consisted of rating different aspects of the system on a one to five scale. The first question was ranking how easy it is to navigate the system. The average rating was a 4.6, with all users giving it a four or higher rating (Figure 38). The majority of users rated it a five while the rest rated it a four. While the system was left quite simplistic to make navigation as easy as possible, a lack of direction, especially from the dashboard, and a lack of user guides may have caused these lower scores. Overall, a 4.6 is a high score and implies the navigation is still quite good.

14. Out of 5, how would you rate the ease of navigation in the system?

[More Details](#)

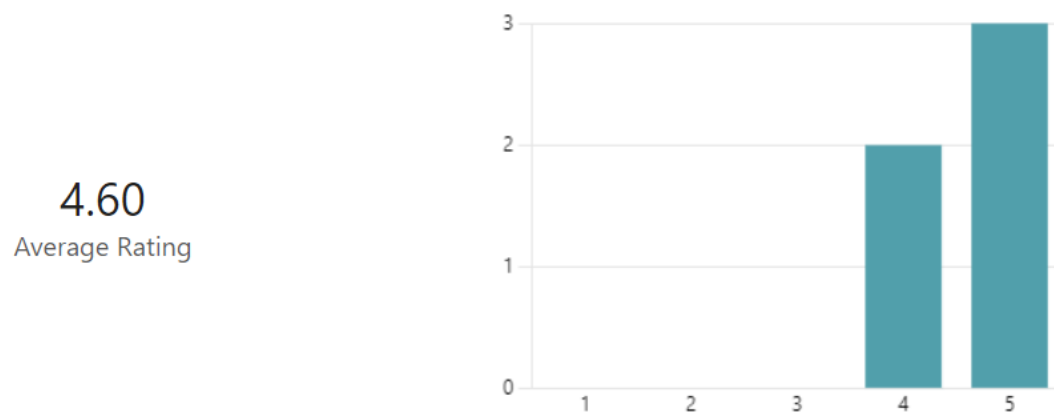


Figure 38: User ratings about how easy the system is to navigate out of five

The next question, question 15, focused on the look of the system. This one scored the lowest out of the three, gathering an average score of 4 (Figure 39). The majority of

respondents selected a four, along with one three and one five. The overall lower score for the look of the system may come from the lack of colours and the simplistic look of the system and suggests some changes may be needed. Overall, a four is still a strong score that indicates the system has at least a usable look to it.

15. Out of 5, how would you rate the look of the system?

[More Details](#)

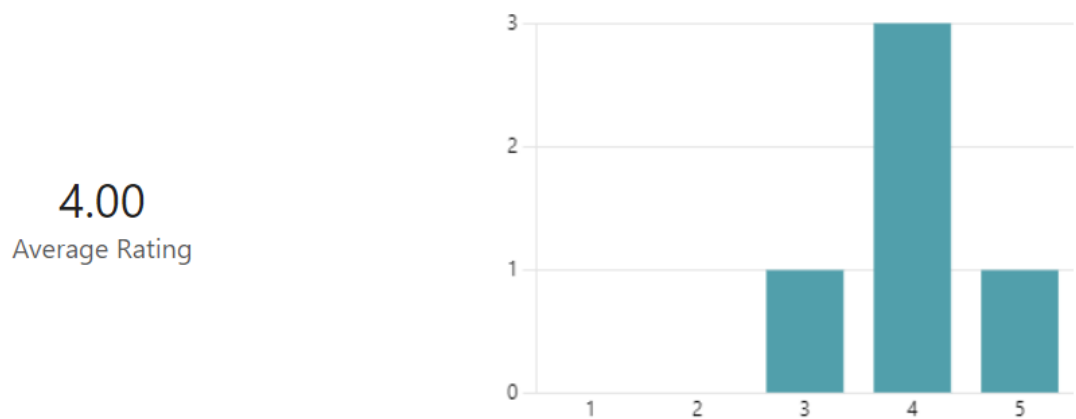


Figure 39: User ratings about the look of the system out of five

Question 16 was about the speed of the system. The average was a five, having all users giving a five out of five (Figure 40). This suggests the system is very fast and responsive which is what is expected for a cloud-based application. This may also contradict an assumption made from a previous question stating that the speed of the system on first use may be slower than expected. Overall, this is a good score that suggests the system is working optimally and at a high speed.

16. Out of 5, how would you rate the speed of the system?

[More Details](#)



Figure 40: User ratings about the speed of the system out of five

Question 17 was measured against a different metric (Figure 41). This question asked the users if they believed this system would speed up the decision making in their work. This question consisted of four answers, namely 'Yes', 'No', 'Maybe', and 'Too early to tell'. Only 40% of the users get a definitive yes, while and other 40% said maybe, and the rest saying it is too early to tell. This makes it seem as though the users are quite sceptical to use the system but are still open minded to the idea it may help. Adding extra queries for the user to search or using real company data may have helped instil more confidence in the users. Overall, however, no user said they would not use it, so this result is still positive.

17. Would this system help to speed up decision making in your work?

[More Details](#)

● Yes	2
● No	0
● Maybe	2
● Too early to tell	1



Figure 41: User results from a question about if they believe the system would help speed up their decision making.

The final question, question 18, asked the users if they think that they would use the system in their work (Figure 42). The majority of users responded positively stating they would use the system, while the rest stated that they might. No users responded that they would not use the system. The reason for these maybes is most likely due to the same reasons stated in the previous question; lack of exercise to try and lack of real user data. This data though does suggest this system would be used for the users work which was one of the main goals for the system.

18. Would you use this system in your work?

[More Details](#)

● Yes	3
● No	0
● Maybe	2

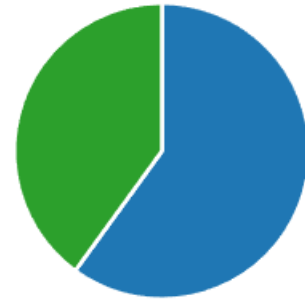


Figure 42: User results from a question about if they believe they would use the system in their work.

5.3 Discussion of results

5.3.1 User review

The user review seemed to have gone well, with the user giving positive comments, aside from the one issue.

Upon reflection, this user review could have been a bit more formal as to gather more useful and quantitative data. Yet, overall, the review seemed to suggest that the user liked the features that were implemented and how easy the system was to navigate and understand. This user may be a bit biased in this though, as he had seen the system being developed. The user also seemed excited about the prospect of developing the system further and had many ideas about the direction the system should go.

5.3.2 User testing

The user testing went well, with all the previous questionees trying out the system.

The two types of tests however may have been biased towards the created system as users were asked to pretend as if they did not know about the topics they were looking for. In a real application, many users would have pre-existing connections in the company where they would know experts of basic topics, like what the users were searching for.

The system they tested also used dummy data rather than actual user data due to sensitivity of the companies' data. This meant that there were no real experts on the system and could have given a misleading look as to what the final product would look like with more users and data. If this system were to be full of data from the company, it would more than likely take the users longer to find experts due to having to search through more topics and different users.

The searching within the company did poll some surprising results with some users taking over an hour to find experts in their company. This could have been because of the vagueness of the questions as there was no definition given of what an expert is. This may have also affected the results of the testing for the new system as users could have been confused as what counted as an expert and just selected the first user that came up on the product page.

Upon reflection of these timing scores and system scores, a comments box should have been included where users could have expressed the reasons why they gave the scores they did or why it took the amount of time it did to complete the tasks. This would remove any ambiguity regarding what the system may lack and needs work on.

5.4 Summary

The user testing as a whole was very positive and gained some surprising insights. There was a strong notation that the system did achieve what it set out to do and that the client would use it in their work. There were a few mistakes during these tests and some of them could have been conducted better, but the results that were gotten were helpful.

CHAPTER 6

CONCLUSIONS / FUTURE WORK

6.1 Conclusions

This system aimed to answer the overarching question of would a system help reduce time spent looking for experts. Upon reflecting on the system and reviewing the results, the answer is yes; a system could help to reduce time spent looking for experts.

The user testing was very positive and showed a clear time difference between the new system and the current method of finding experts. While there may have been some slight ambiguity in the questions, there is still enough evidence to support this claim with a substantial time difference between the two. In addition, the ratings of the system by users were high, showing a clear liking to how the system looks and feels. No users said that they would not use the system but only a few said that they would. Many of them stated that they were still unsure about the system and that they would need to try it out more. This leaves some ambiguity about the system in terms of whether the user would use the system, but this is an acceptable outcome as the users only had a few hours at most to test the system and it did not contain any company data. Overall, user testing showed a resounding success for the system and further proves it meets the main need of the system.

Comparing to the other systems looked at in the literature review, this system seems to have solved a variety of their flaws for the client's needs. The cost of this system is noticeably lower due in comparison due to only the server hosting and potential URL

hosting. The client does also have the option to host the system in-house instead which would further reduce the cost of this system and allow them to have full control over security and access. This feature was available in some of the systems, but only a handful of them. Furthermore, the system can be easily monitored due to Vercel's monitoring functionalities that they can leverage. Being a bespoke system developed in a language the company knows, they can easily make their own changes quickly without needing to consult with a separate company or be stuck in a pre-defined layout. This was not a feature that was available with the other systems, instead the user was locked to their layout and formats.

6.2 Future actions

This system was created as an initial prototype of a full system. As such, it is important to consider how the system may develop and change over time as a final version is created. The client has expressed interest in continuing this project as the initial prototype went down positively and already began showing a possible time save. This project has been partly designed with the idea of the client continuing the project so it would be a good idea to let them do so. The technology the system has been developed in is one that the client is actively using and has multiple experts of, which can be used to support this transition. The initial system developer should also work in tandem with the company to ensure a smooth transition. During this process, a lot of features could be implemented which were discussed and considered previously.

The MoSCoW requirements list included a lot of features that did not get added in this version. These requirements would be a good starting point for any future features as they have been created from primary research in the company. A key feature that was in this MoSCoW list, and that came up during the final client review, was having a way of finding out which topics need more experts. There is a common situation in businesses where there

is only one or two experts of a certain topic. If they were to leave the company, the company would have no way of getting that knowledge back. As such, a good feature of this future system could be a way of letting people know topics that only have a few experts, or five star rated users, in. This would then allow them to set goals within teams to learn these topics so that there are more experts. This could be a very important feature and, hence, would be investigated more for the next version. To support next versions of the system, the same development cycle should be repeated as to gather initial requirements from the wider company and get their input.

The system is quite cost-effective due to the types of data it works with and the frequency of usage. The client could, and should, keep working with the existing hosting company as it was the best option for this system in terms of performance and cost. However, the client may choose to host in house instead which the system will fully support.

If this project were to be repeated, the initial research questionnaire would be done in person. This would allow users to give better comments and scores as well as ensuring they fully understand the questions. This would give a better starting list of requirements that better represented what the majority wanted. The final results collection would be done in person too for the same reasons. A live demonstration to the company as well would be done at the end to get the best possible results and more varied feedback. The same methodology would be used though as it gave good insight into what the system should be like and allowed the system to be right for the client.

6.3 Aims and objectives

The main aim of the system was met, having multiple features in the system to achieve this along with client results. The clients' main features for the system were completed and functional, with parts like user voted experts and comment ratings being part of the system.

The objectives of this project were also mainly achieved. A functioning system was created that the clients could start using, and a variety of results were gathered to assess how successful the system is and how successful it could be in a final version.

To meet the final objective, the system has to be evaluated to see if it may benefit other large companies facing similar issues. This system was developed quite plain with no client branding on it. The system has a separate database that can be changed and customized. The system itself can be easily replicated and deployed multiple times. For these reasons, it would be easy to set this system up to work in other companies, without each companies' systems interacting with one another. As the results gathered did give a positive notation that this system will help reduce time loss in the client company, a safe assumption could be made that it would help reduce time loss in other companies. More research should be done going forward however if the system were to be used by other companies, in order to check that this is the case. This may also raise some legal issues due to the system being passed to the client to continue development.

6.4 Issues

There are some issues that needed to be carefully considered and thought about for this system. Namely, these are the legal, ethical, social, and professional issues. These issues that could affect this system, and any users of the system, have been considered here, along with how prevalent the issue is and whether there is a current mitigation plan in place.

6.4.1 Legal

The name of the system is not copyrighted. This could have legal implications for the system as another company or person can take this name and claim it as their own,

requiring the system to be renamed. This could also lead to an identical website being created with the same name with the intent of tricking users into thinking it is this system. As the name is not copyrighted, there would be no way of getting the website removed and could lead to sensitive user data being leaked. These are very serious issues that could have a high impact in the future and the name should be copyrighted immediately upon use of the system.

With the system being handed over to the client to continue development, there rose an issue with who would own the system. Leaving this ambiguous could lead to misunderstandings and legal actions being used against one another. The client was talked to thoroughly about this issue and concluded that the developer remains the owner of the software, even after handing it over. The company may wish to then pay for ownership of the system later down the line. This means that for now, the system could be distributed to other companies with no issues. This was a high impact issue and was sorted quickly to avoid complications.

6.4.2 Ethical

The comment sections on the topics could raise a potential issue with users bullying or harassing others. The system could have a lot of users and teams with varying opinions that could lead to such comments. This could become a serious, high impact issue if not monitored and dealt with appropriately. To help avoid this, system administrators can remove any comments from the database, and therefore the system, entirely.

This system requires constant up time and is hosted on the cloud. This could mean that a lot of resources are needed to keep the website running which could have a negative impact on the environment. However, in a news article by Westlake (2022), they found that cloud-based technologies are more sustainable and greener than traditional data centres, with

most of these even being powered by renewable energy, meaning this is quite a low impact issue. Should the client want to host the system in house, it may use more power and have a bigger impact on the environment which the client should be made aware of.

While the system was being developed, it was imperative that the client was kept correctly informed and was not lied to about the progress of the system and the promises that were made. To ensure this, regular client meetings were had to show how the system was developing which also gave the users a chance to give their input about the system. This issue had a low impact as it did not have an impact on the system but may have had an issue on the relationship with the client.

6.4.3 Social

In future iterations, the system will have the ability for managers to set goals for their team on what topics to learn more about and improve their score. This could cause issues in the professional workplace with users struggling to balance getting their work done and learning new topics. This could turn into a high-risk issue by creating more problems for the company that it solves.

The endorsement feature could be abused by users in the company giving extra endorsements to their friends and/or potentially trading endorsements to increase their score. This would create a false perception of who is an actual endorsed expert in a topic and could lead to the spread of incorrect information. This may also lead to potential unjust praise and recognition from their peers which would encourage them further. This is a low-risk issue however as users who do this could be easily found out once users start asking them for help on these topics.

Due to this system having a self-scoring functionality, a user could falsely state their knowledge in topics. This would go against the professional competence and integrity clause

of the BCS code of conduct (2022). This could also lead to false information being spread around from self-proclaimed experts who do not know the topic very well which could end up losing the company a lot of time. This could become a high impact issue as it could make the whole system obsolete.

6.4.4 Professional

To allow users to get the best advice regarding selecting a topic, they may have to disclose sensitive information about what work they are doing. This may raise some professional issues if teams are not meant to discuss the information with others in the business.

However, for this client, all their teams are freely allowed to talk about their work with one another in the business, so this is a low impact issue that does not require much attention.

It is also low impact as it is optional for users to discuss in depth technical requirements of the topics which is mostly done outside of the system anyway.

While user data is encrypted and securely stored on a cloud database, there could be a leak of this information. No cloud database is 100% secure so there will always be a risk of this.

Data leaks are a high impact issue, but with the data being encrypted, there is a smaller likelihood of a data leak happening due to any leakers not being able to decrypt the data.

The client could also host the system in house which would reduce the likelihood of a leak even further. Due to the systems information being only company information, this is mainly a professional issue.

6.5 Synoptic assessment

6.5.1 University course

During my three years of University, I have learned and developed a variety of key skills that will help me with my prospects. Before starting University, I knew I wanted to go into

software development in the future. Because of this, I had chosen the software engineering course that Nottingham Trent University offered, rather than the more general computer science course. This has meant that the modules I have completed are more oriented to my career prospects.

The most impactful course from this 3-year course (4 years if you include the placement year) were the ones that taught me new programming languages and ones that covered complex software development methodologies and techniques.

Regarding learning new languages, the second-year software engineering module was incredibly helpful as it made me learn C++. This module not only helped me to learn how to code in C++, but also helped show me how to learn new programming languages in general and the benefit of knowing multiple languages. This was also continued by the final year advanced software engineering course where the more technical aspects of the language were explored. This allowed me to gain a more in depth understanding of how the code works and what the different syntaxes are for. This also further developed my ability to learn new languages as I had a complex understanding of what goes on in the machine for code to work. This would help in a software engineering role as I would be able to pick up the languages they use quicker, and better understand how their systems work.

Regarding learning software development methodologies and techniques, the final year advanced analysis and design course was very helpful. The lectures went over key aspects of each different methodology and gave real world examples as to when each should be used. The lecturer as well had a lot of experience in the field using these techniques which made them more relatable and understandable. The assessment was great in giving a good opportunity to try these skills myself in a proper software development team. These skills were essential for a software engineering role as they would be utilized almost daily.

6.5.2 Placement year

For my third year, I was fortunate enough to do a placement year as a software engineer. While here, I was able to develop my existing skills while also picking up quite a few new ones that were essential for a software developer, such as how to properly perform and set up development sprints. Their placement scheme allowed me to get an understating of how the average software developer role works, further solidifying the idea I wanted to pursue it.

6.5.3 Final year project

This project has put all my skills to the test. I have had to use knowledge from all parts of my academic and professional journey. The understanding of development methodologies has enabled me to create a development plan for this and get the most out of it. It has also given me real experience of what it is like to have a client and how to best use my time. I will reflect on this experience when I am in full time work as to give me an idea of how much work I can get done over a period.

Having a real client has created a lot of pressure which has helped to push me along and stick to the schedule. This has also meant I have had to learn a new language to meet their business requirements. This was a lot easier than anticipated thanks again to my academic studies that taught me how to adapt to new languages. I am glad of this however as this language is a widely used one that most web-based systems use currently.

6.5.4 Further plans

For further plans, I currently have a job lined up as a graduate software engineer. For the interview for this job, a lot of the previously mentioned knowledge I had gained was used and tested. There was also a group component of the interview which consisted of doing

pair programming. Thankfully, this was a component that was covered in the second year and last year software engineering modules, so I already had an advantage in it. C# was used as the programming language we had to use during the interview. I had not previously used this language but because of the advanced look into programming languages done in the final year software engineering module, I was able to quickly pick it up and understand its syntax. My knowledge of development methodologies was also tested as part of this interview stage.

My previous experience at my placement company gave me extra confidence in the one-on-one interviews, allowing me to better articulate myself and answer their questions. This experience has also made me more aware of the sorts of things they will be expecting from me once I start the graduate job.

6.6 Reflection

Looking at the project as a whole, it was very successful. The client was very responsive and enthusiastic, the development methodology was followed, and the end result was a working system that met the aims and objectives.

REFERENCES

Agile Business Consortium, 2014. *Chapter 10: MoSCoW Prioritisation*. [Online]
Available at: <https://www.agilebusiness.org/dsdm-project-framework/moscow-prioritisation.html>
[Accessed 10 02 2024].

Atlassian, 2024. *Confluence*. [Online]
Available at: <https://www.atlassian.com/software/confluence>
[Accessed 28 02 2024].

BCS, The Chartered Institute for IT, 2022. *CODE OF CONDUCT FOR BCS MEMBERS*. [Online]
Available at: <https://www.bcs.org/media/2211/bcs-code-of-conduct.pdf>
[Accessed 25 March 2024].

Document360, 2024. *Document360*. [Online]
Available at: <https://document360.com>
[Accessed 28 02 2024].

Lexis Nexis, 2024. *Lexis Nexis Risk Solutions*. [Online]
Available at: <https://risk.lexisnexis.co.uk>
[Accessed 12 April 2024].

ManageEngine, 2024. *IT knowledge base*. [Online]
Available at: <https://www.manageengine.com/products/service-desk/self-service/it-knowledge-base-software.html>
[Accessed 25 02 2024].

Myers, S., 2013. A New Domain for Advertising: A Content Analysis of Website Names.
International Journal of Marketing & Business Communication, 2(2), pp. 10-23.

Namechk, 2024. *Namechek*. [Online]

Available at: <https://namechk.com>

[Accessed 19 02 2024].

Next.js, 2024. *Middleware*. [Online]

Available at: <https://nextjs.org/docs/app/building-your-application/routing/middleware>

[Accessed 27 March 2024].

Next.js, 2024. *The React Framework for the Web*. [Online]

Available at: <https://nextjs.org/>

[Accessed 10 02 2024].

Next.js, 2024. *What are Server Actions?*. [Online]

Available at: <https://nextjs.org/learn/dashboard-app/mutating-data#what-are-server-actions>

[Accessed 28 March 2024].

OWASP, 2020. *OWASP Top Ten*. [Online]

Available at: <https://owasp.org/www-project-top-ten/>

[Accessed 10 02 2023].

Pham, S., 2023. *Sweetdeli - 40+ screens Website Wireframe Kit (Mobile & Desktop) [Free]*.

[Online]

Available at: <https://www.figma.com/community/file/1275065418802022271/sweetdeli-40-screens-website-wireframe-kit-mobile-desktop-free>

[Accessed 22 01 2024].

Philip H. Mirvis, A. L. S. E. J. H., 1991. The implementation and adoption of new technology in organizations: The impact on work, people, and culture. *The New Workforce and Workplace*, 30(1), pp. 113-139.

React, 2024. *React*. [Online]

Available at: <https://react.dev/>

[Accessed 10 02 2024].

S. Day, G. & J.H. Schoemaker, P., 2016. Adapting to Fast-Changing Markets and Technologies. *California Management Review*, 58(4), pp. 5-161.

Singh, S., 2022. *How to Create a Successful Proof of Concept in Software Development*. [Online]

Available at: <https://www.netsolutions.com/insights/proof-of-concept-poc/>

[Accessed 04 01 2024].

Stack Overflow, 2024. *Unlock your team's collective knowledge..* [Online]

Available at: <https://try.stackoverflow.co/explore-teams>

[Accessed 25 02 2024].

Tulenheimo, R., 2015. Challenges of Implementing New Technologies in the World of BIM – Case Study from Construction Engineering Industry in Finland. *Procedia Economics and Finance*, 21(1), pp. 469-477.

Vercel, 2024. *The native Next.js platform*. [Online]

Available at: <https://vercel.com/solutions/nextjs>

[Accessed 10 02 2024].

Vercel, 2024. *Vercel Postgres*. [Online]

Available at: <https://vercel.com/docs/storage/vercel-postgres>

[Accessed 10 02 2024].

Vercel, 2024. *Vercel pricing*. [Online]

Available at:

https://vercel.com/pricing?gad_source=1&gclid=CjwKCAjw5v2wBhBrEiwAXDDoJeXJdBNiJIZQIfSFbMmJyczx2f8-GqW95JOcbPCZ7PVI12MMgKThPRoCP8AQAvD_BwE

[Accessed 15 April 2024].

Westlake, 2022. *IS CLOUD COMPUTING GOOD FOR THE ENVIRONMENT?*. [Online]

Available at: <https://www.westlake-it.co.uk/news/2022/08/30/is-cloud-computing-good-for-the-environment/#green>

[Accessed 25 March 2024].

APPENDIX A: INITIAL CLIENT INTERVIEW

Q: What is the main goal for the system?

A: To allow people to search for things they are considering using and find people who have already used it or have experience with it. They should then be able to see what other people think of the thing and see if they recommend it or something else. They should also be allowed to contact other users if they want more information on the thoughts they have put on the system.

Q: Would you like any other functions in the system?

A: There are somethings that would be nice to have, like maybe a forums page and some statistics like top technology of the week. Things like that would be nice and would interest people around here but are not needed for the system. Oh, an if you could integrate our single sign on too, that would be amazing.

Q: What are the current challenges with communication?

A: Knowing who to talk to is the main pain point. Normally you ask someone, and they know some who knows someone etc... Plus, starting conversations with people from completely different teams who you do not know is often a challenge.

Q: Do you have any current systems to try and help with this issue?

A: We do use confluence in the business for our projects, so we have tried using that as a knowledge base. The problem with Confluence is that the pages were quite hard to navigate to which already put a lot of people off. We did also try and excel spreadsheet with information, but that was almost impossible to keep up to date with the number of topics we cover.

Q: Where do you feel the most time is wasted when deciding on new technologies?

A: Mainly trying them out, but also MOC's and research as they can take quite a substantial amount of time to complete and review.

Q: Will the system be used on mobile devices?

A: I would not have thought so, due to the way we work and how security is, it would mainly be used just on a computer. There may be a small minority of people who do want to use it on their phone, so it is probably a good idea for it to be compatible with them, layout wise.

Q: The system is planned on being developed using agile principles, would you be open to having regular meetings every 3 to 4 weeks?

A: Yes, that would be great. We want to keep an eye on the progress of the system and give input wherever we can. Prototyping would also be something we would like to do if that is something you can offer.

Q: Is there a preferred language you would like the system to be developed in?

A: Most of our systems are developed in reactJS, so we would like it developed in that, especially if we decide to continue using the system after the project has finished. If you could also integrate it into a cloud provider, that would be a big plus.

Q: Are there any company design guidelines I could look at to ensure the system fits with your existing ones?

A: We have a very loose set of guidelines I could find for you, but it is nothing strict. I have previously done some wireframes for a system like this if that were something you would like to look at for inspiration.