Sharing Knowledge

Designing to facilitate the exchange of knowledge among employees in an organisation

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Abstract

To effectively manage and facilitate the knowledge sharing process in organisations is crucial, as it contributes with economic and competitive organisational value. This thesis investigates the knowledge sharing process in an organisation, and how a design solution could be developed to facilitate this process. The investigation of the organisation showed that, a barrier for the employees to exchange knowledge, is that they are not fully aware of each others knowledge gaps. Consequently, due to low awareness of each others knowledge gaps, the employees are having difficulties to know if their knowledge could be valuable to share. This illuminated an area to focus upon, and an opportunity for a design solution to be developed. The design solution evolved along with insights obtained from usability testing, to achieve a result which correlates with the needs of the employees. The final design solution is a tool, which enables the employees to gather information of their knowledge gaps, thus enhance the awareness of what knowledge to share. The tool, and the process of its creation, provides an answer of how a design solution could be developed to facilitate the exchange of knowledge among employees in an organisation.

**Keywords:** Knowledge, Knowledge Sharing, Knowledge Management Systems, Interaction Design.
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# 1 Introduction

The process of knowledge sharing implies that individuals exchange knowledge with each other, hence, creates new knowledge (Bock, Zmud, Kim & Lee, 2005). To effectively manage and facilitate the knowledge sharing process in organisations is crucial, as it contributes with economic and competitive organisational value (Ipe, 2003). Furthermore, to promote exchange of knowledge between employees who possesses different kind of knowledge, could result in more innovative working outcome than one single employee could accomplish alone (Ipe, 2003). Ipe (2003) suggests that “competitive advantage and product success in organisations results from individuals with diverse knowledge collaborating synergistically toward common outcomes” (p. 342). Ipe (2003) further argues that knowledge is the most important asset in organisations, and to efficiently manage this knowledge is critical with regards to the success of the organisation.

Despite the significance of knowledge sharing – organisations tend to face barriers which impedes their ability to efficiently handle and facilitate the exchange of knowledge among its employees (Riege, 2005). Van den Hooff & de Ridder (2004) emphasizes the importance of mapping out barriers which impedes the ability for employees to exchange knowledge, since the exchange of knowledge between employees is a decisive factor in the success of the organisation. A limited knowledge sharing process may cause knowledge gaps in an organisation, which consequently could affect the organisations overall performance negatively (Bock et al., 2005).

The purpose of this thesis is to investigate what the knowledge sharing process could look like in an organisation, and what the barriers and opportunities could be for employees to exchange knowledge with each other. On this basis, the goal has been to detect what kind of design solution that could be appropriate to develop in order to facilitate the knowledge sharing process.

The organisation examined in this project is a web development agency located in Malmö, Sweden. The organisation has been in the industry for approximately four years, and today consists of 17 employees. Due to the fact that the organisation is quite young – yet they have not figured out any defined process or approach when it comes to knowledge sharing among the employees. With the significance of knowledge sharing in mind, to work with an organisation that is in actual need of finding out how their knowledge sharing process could be facilitated constitutes the motivation and relevance of this project.
1.1 Delimitations
The research in this thesis is limited to a single organisation. Therefore, whether the design solution that is being developed applies to other organisations needs further research and testing.

1.2 Target Group
The target group in this thesis consists of the employees working in the examined organisation.

1.3 Research Question
How could a design solution be developed to facilitate the exchange of knowledge among employees in an organisation?


2 Theory

In this section, theory is presented which have been of relevance in order to develop the design solution in this project. The theory ascends from the field of psychology, such as theories regarding what motivates as well as demotivates individuals to share knowledge. Furthermore, theoretical perspectives regarding systems with the intention to facilitate knowledge sharing is described.

2.1 Knowledge

Ipe (2003) suggests that the nature of knowledge exists in two forms; implicit and explicit. Implicit knowledge is described by Smith (2001) as “technical or cognitive and is made up of mental models, values, beliefs, perceptions, insights and assumptions” (p. 314). An arguably famous example of implicit knowledge is the knowledge of riding a bike or swimming by Polanyi (1966). Polanyi (1966) explains that ‘if I know how to ride a bicycle or how to swim, this does not mean that I can tell how I manage to keep my balance on a bicycle, or keep afloat when swimming’ (p. 4). That is, the knowledge of how to ride a bike and how to swim is obtained through experience, hence, it is hard to verbalize and communicate it with others since you are not fully aware of how you learned it yourself (Polanyi, 1966). In order to exchange implicit knowledge, one must “learn by observing, imitating and practicing, or become ‘socialized’ into a specific way of doing things, like learn from mentors and peers” (Smith, 2001, p. 316). In connection, Irick (2007) argues that the sharing of implicit knowledge depends upon social events and social interactions.

Explicit knowledge, on the other hand, is “data or information that is described in formal language, like manuals, mathematical expressions, copyright and patents” (Smith 2001, p. 315). That is, explicit knowledge is obtained through e.g. studying and reading, whereas implicit knowledge is obtained through experience (Smith, 2001). Hence, since explicit knowledge is formal and structured, it can easily be communicated and shared with others in written form, such as via e.g. documents, literature and repositories (Nonaka, 2008).

2.2 Knowledge Sharing in Organisations

Knowledge sharing is the process when individuals mutually exchange their knowledge, hence, jointly creates new knowledge (Van den Hooff & de Ridder, 2004). Van den Hooff & de Ridder (2004) believes that the knowledge sharing process consists of two key elements, that is, knowledge donating and knowledge collecting. Knowledge donation implies “communicating to others what one's personal intellectual capital is”, whereas knowledge collection implies “consulting colleagues in order to get
them to share their intellectual capital” (Van den Hooff & de Ridder, 2004, p. 118).

In organisations, the knowledge sharing process is highly dependent on the employees who are the ones who possesses, creates and exchanges knowledge with each other (Ipe, 2003). Ipe (2003) describes knowledge sharing in organisations as “the act of making knowledge available to others within the organisation” (p. 341).

### 2.3 Motivations for Knowledge Sharing

Employees in an organisation are not likely to share knowledge without a strong personal motivation (Ipe, 2003). Lam & Lambermont-Ford (2010) presents two motivational categories; *extrinsic* and *intrinsic* motivation. Extrinsic motivation occurs when the incentive for knowledge sharing is to acquire additional resources, such as money, promotion or some other kind of reward. Intrinsic motivation, on the other hand, occurs when employees are motivated to share their knowledge because it is self-fulfilling, enjoyable, challenging or exciting (Lam & Lambermont-Ford, 2010).

Furthermore, Van den Hooff & de Ridder (2004) argues that an organisational commitment is crucial for the knowledge sharing process. Mowday, Steers, & Porter (1979) defines organisational commitment as “the relative strength of an individual’s identification with, and involvement in a particular organisation” (p. 226). Van den Hooff & de Ridder (2004) presents three different types of organisational commitment:

- **Affective commitment** - refers to the willingness for the individual to continue the employment due to a feeling of identification, involvement and emotional attachment to the organisation.

- **Continuance commitment** - refers to a feeling related to the need of continuing the employment because of profit, as well as the awareness of the negative consequences it implies in leaving the organisation in terms of e.g. cost.

- **Normative commitment** - refers to a feeling that one ought to continue the employment due to obligations to the organisation.

Van den Hooff & de Ridder (2004) argues that the affective commitment is expected to have viable influence in terms of motivation to share knowledge, since employees tend to be more inclined and motivated to share their knowledge if they are emotionally attached and involved in the organisation. Van den Hooff & de Ridder (2004) further argues that if employees are aware that the knowledge they share is appreciated and adopted by their colleagues – it could increase motivation to continue share knowledge. Van den Hooff & de Ridder (2004) believes that knowledge collection influences knowledge donating, that is, the more knowledge an employee receives, the more knowledge is s/he willing to share with others.
Bock et al. (2005) argues that one can not force employees to actively share their knowledge, on the other hand, it could be encouraged by facilitating the process and motivated by illuminating the benefits. Bock et al. (2005) presents three different motivational factors in regards to knowledge sharing. These factors are *individual*, *group* and *organisational* benefit.

- **Individual benefit** - refers to personal gain and self-interest.
- **Group benefit** - refers to mutual behaviours, relationship with others and community interest.
- **Organisational benefit** - refers to organisational gain and organisational commitment.

Furthermore, since the process of knowledge sharing implies communicating with each other, an organisation's communication climate is of high importance (Van den Hooff & de Ridder, 2004). A constructive communication climate influences employees to exchange knowledge (Van den Hooff & de Ridder, 2004). Van der Molen & Gramsbergen-Hoogland (2005) argues that an organisation is a network of individuals, and to achieve their goals, they need to communicate.

### 2.4 Barriers for Knowledge Sharing

Riege (2005) presents a number of different factors that may have an inhibitory impact when it comes to knowledge sharing in organisations, and makes a distinction between potential *individual*, potential *organisational* and potential *technology* barriers.

The potential individual barriers concern aspects that may inhibit employee's ability to participate in a knowledge sharing process. Riege (2005) explains that lack of time is a common barrier for employees to share their knowledge, and that it could cause difficulties for employees to identify when others are in need of receiving knowledge. Also, due to lack of time, employees tend to hoard their knowledge and solely prioritize tasks which is beneficial to themselves and the organisation (Riege, 2005). Furthermore, poor verbal and writing communication skills, lack of social network, lack of reflection of past mistakes, lack of trust, dominance in sharing explicit knowledge over implicit knowledge and low awareness regarding how one's knowledge could benefit others is being explained by Riege (2005) as other potential individual barriers.

Riege (2005) explains that lack of a defined strategy, process and routine in regards to knowledge sharing is a potential organisational barrier. Additional potential organisational barriers pointed out by Riege (2005) are; lack of awareness of the benefits of knowledge sharing, the spatial arrangement of the work environment and when specific knowledge is lost when an employee leaves the organisation. When it comes to the potential technology barriers, Riege (2005) suggests that lack of an IT system aimed towards facilitating the
knowledge sharing process, or that the existing IT system do not serve the needs of the organisation and its employees, as a potential technology barrier.

2.5 Knowledge Management Systems

Dalkir (2013) argues that knowledge management systems are “used to facilitate primarily communication, collaboration, and content management for better knowledge capture, sharing, dissemination, and application” (p. 217). Alavi & Leidner (2001) defines knowledge management systems as “systems applied to managing organisational knowledge. That is, they are IT-based systems developed to support and enhance the organisational processes of knowledge creation, storage/retrieval, transfer, and application” (p. 114). In order for a knowledge management system be useful, it needs to be carefully developed along with the challenges an organisation is facing when it comes to knowledge sharing (Ackerman, Dachtera, Pipek & Wulf, 2013). Ackerman et al. (2013) argues that “far more useful systems can be developed if they are grounded in an analysis of work practices and do not ignore the social aspects of knowledge sharing” (p. 532).

Riege (2005) argues that there is a strong potential in implementing technology in order to support the knowledge sharing process. However, the challenge is to implement adequate technology which correlates with the challenges an organisation is facing (Riege, 2005). Riege (2005) states that “technology that works effectively in some organisations may fail in others” (p. 29). Alavi & Leidner (2001) suggests that an organisation needs to employ a variety of different knowledge management systems and approaches in order to effectively deal with various knowledge types.

However, Huysman & Wulf (2006) argues that organisations tend to focus too much on the role of IT when it comes to facilitating knowledge sharing. The same authors further argue that it is not the technology itself that determines the role of IT in supporting knowledge sharing, but rather the way employees use it. Employees tend to prefer the support from social networks rather than electronic systems, hence, to support social networks and knowledge connections is crucial (Huysman & Wulf, 2006). Huysman & Wulf (2006) suggests that knowledge management systems should “support social relationships and communities rather than introducing knowledge repository systems” (p. 11). In connection, Riege (2005) suggests that the knowledge sharing should be people driven rather than technology driven, and that knowledge sharing is about people and social dynamics, and not about technology.
2.6 Related Design Examples

In this section, two examples of knowledge management systems are described in short. The examples provide a more concrete understanding of what a knowledge management system could look like. By looking at contemporary knowledge management systems, these two examples have a common feature, that is, to store knowledge in the system itself and thus making it accessible to all employees in the organisation.

2.6.1 Haydle

Haydle is a service which enables employees to exchange knowledge by answering each others questions. After that a question have been answered – Haydle stores the answer thus making it accessible to all of the employees in the organisation. With Haydle, employees do not need to find out which colleague that is appropriate to ask in order to receive a solution to their specific problems. Instead, employees are able to ask to all of their colleagues via Haydle (Haydle, 2018).

![Haydle](image)

*Figure 1. Haydle.*

2.6.2 Freshservice

Freshservice allows an organisation to store knowledge with solutions obtained by solving problems. The employees are able to search for solutions in Freshservice when they encounter a problem. Since solutions is available in Freshservice, the employees might not need to contact a colleague in order to solve their problems (Freshservice, 2018).
Figure 2. Freshservice.
3 Methods

In this section, the methods of use are explained. First, methods with qualitative research approaches was adopted, in order to obtain insights regarding the examined organisations knowledge sharing process, its barriers and opportunities. On this basis, several design methods were used to explore and develop a design solution. The methods are having a user-centred approach, which implies that the end users influence how the design will take shape (Muratovski, 2015).

3.1 Double Diamond Design Process

The double diamond design process is the model which have guided this project. The model consists of four stages, the *discover, define, develop* and *delivery* stage. The process of the double diamond model was chosen, as it is a suitable approach when designing in an unknown context. The four stages of the model are explained below (Design Council, 2018).

- The discover stage implies discovering the problems in the context in which you design. It is crucial to be open-minded, in order to identify problems areas and gather various insights.
- The define stage implies making sense of the insights and problem areas identified during the discover stage. The goal is to determine a focus area to prioritize.
- The develop stage implies the creation of solutions or concepts which are prototyped, tested and iterated.

![Double Diamond Design Process](image)

*Figure 3. Double Diamond Design Process.*
• The final stage is the delivery stage. In this stage, the goal is to finalize, deliver and launch the result of the project.

3.2 Review of Literature

Review of literature is a method aimed towards extracting data from previous research, its theoretical findings and analyses which could be of relevance for the problem being designed for. That is, by reviewing literature, one becomes well-informed by the current knowledge within in a field, hence, can take advantage of existing theoretical perspectives and findings others already have collected (Muratovski, 2015). Muratovski (2015) suggests that there is no definite closure when reviewing literature. However, from a practical perspective, the same author further suggests that an indicator that it is appropriate to stop is when you stumble across repetitive arguments and similar theoretical perspectives.

In regards to the field of knowledge sharing, the various literature presents similar theoretical perspectives and arguments. Hence, it was palpable when to cancel the process of reviewing literature due to repetitiveness. The literature review in this project has provided a fundamental theoretical basis which have aided the investigation of the organisations knowledge sharing process.

3.3 Interviews

Muratovski (2015) describes interviews as “a method that you can use to find out about people’s ideas, opinions, and attitudes” (p.61). The interview method can be performed in various forms, such as formal and structured, or informal and unstructured (Muratovski, 2015). In this project, the interviews have been performed in semi-structured and unstructured manner. The interviews were conducted at the office where the employees work. After the interviews, trends and patterns in the data were pointed out, organised and analysed.

3.3.1 Semi-Structured Interview

Muratovski (2015) describes semi-structured interviews as interviews that “provide an opportunity for an extended response, but they are also limited by their format and scope” (p. 61). The semi-structured interviews were prepared by the structuring of a guide with predetermined open-ended questions, in order to collect similar types of information from each employee being interviewed (Doody & Noonan, 2013). Open-ended questions imply that the questions encourage detailed response from the interviewee (Cooper, 2015). Cooper (2015) suggests that typical open-ended questions begin with “Why”, “How”, or “What”.

The semi-structured interviews were conducted to map barriers and opportunities that exists in the organisation in regards to knowledge sharing. The various insights obtained from the interviews were organised in themes, and later on discussed with the employees during an unstructured interview. There were eight employees in the organisation who participated in a semi-structured individual interview. Even though it would had been optimal to interview all of the employees, this could not be accomplished due to time constraints and accessibility issues. Each interview was audio-recorded and transcribed.

3.3.2 Unstructured Interview

Doody & Noonan (2013) argues that, when mentioning unstructured interview, the term ‘unstructured’ might be misleading. This is because no interviews are entirely unstructured as it could potentially jeopardize the relevance of the data extracted from the interview. The unstructured interview is used to broadly discuss different themes – rather than specific questions (Doody & Noonan, 2013). Doody & Noonan (2013) suggests that this “enables the participant's thoughts and interests to be explored in depth, which, in turn, generates rich data” (p. 2).

In this project, the unstructured interview was performed group wise with the employees. The themes that were discussed with the employees regarded the various insights obtained from the semi-structured individual interviews. The purpose with the unstructured interview was to discuss the themes in order to see if the employees agreed – or if they thought crucial aspects was missing in the findings. The reason to perform the unstructured interview with all of the employees simultaneously was to induce a fruitful discussion between the employees were they together address aspects which they might not would have thought of during the semi-structured interview. Moreover, due to the fact that solely eight employees could participate in a semi-structured interview, this provided an opportunity to gather insights from all of the employees.

3.4 Observations

Observations is a method used to gather data by conducting a form of visual research (Muratovski, 2005). Riege (2005) suggests that the spatial arrangement of the work environment could affect the knowledge sharing process in an organisation. Hence, to make use of the observation method in this project was evident in order to decipher the work environments potential advantages and disadvantages. To observe the employees in the context in which they share knowledge supplemented the insights obtained from the interview methods with a nuanced and reality-based understanding of the context being designed for.
The main contribution by performing the observation method in this project regarded the detection of a design opportunity in the work environment. This particular design opportunity is further discussed in the design process.

3.5 Brainstorming

Brainstorming is a method used to ideate solutions to solve a specific problem (Interaction Design Foundation, 2018). In this project, the brainstorming method was used in combination with the sketching method, in order to explore potential solutions to the problem being designed for.

3.6 Sketching

The sketching method is used to propose, explore, refine and communicate ideas (Interaction Design Foundation, 2018). In this project, the ideas of potential solutions which arose during the individual brainstorming session were sketched out with the use of pencil and paper. One of the ideas was chosen, and later on translated into a prototype.

3.7 Prototyping

Muratovski (2015) suggests that the initial prototype in the design process should be basic and low fidelity. This implies that the initial prototype can be a simple sketch on a piece of paper which communicates the idea of the design solution being developed with the users (Muratovski, 2015). Furthermore, Muratovski (2015) suggests that “if the design is a screen-based interface, the prototypes can feature visuals resembling the interface” (p. 149). Henceforth, after feedback have been received of the initial prototype – the development of a more advanced and refined prototype can be introduced and tested with the users (Muratovski, 2015).

When it comes to digital prototypes – Cao (2018) makes a distinction between digital prototypes and HTML prototypes. When it comes to digital prototypes, Cao (2018, para. 72) argues that:

*Digital prototypes can be built using apps and software made specifically for prototyping. You can even make simple digital prototypes using presentation software like PowerPoint or Keynote.*

That is, a digital prototype is intended solely for prototyping purposes, which implies that the functionality of the digital prototype can not be reused in the final product. However, when it comes to HTML prototypes, Cao (2018, para. 143) argues that:

*The prototype evolves alongside the design process and seamlessly becomes the final product (or its primary component). This process results in minimal waste—no*
throwaway prototypes, no extra steps, and no extra software costs.

In this project, paper prototyping and HTML prototyping have been used. Cao (2018) lists the advantages, as well as the disadvantages, with these two types of prototypes. When it comes to paper prototypes, the advantages are explained as:

- **Fast** - Ideas can be sketched out quickly, hence, there is no significant loss if the idea is rejected.
- **Inexpensive** - The materials used to communicate the idea is cheap.
- **Team-building** – Paper prototypes are fun to make, which might be good for team-building.
- **Documentation** - Ideas which arise while auditing the paper prototype can be added directly on the paper.

The disadvantages with paper prototypes are explained as:

- **Unrealistic** - Paper prototypes represent digital systems vaguely.
- **False positives** - Paper prototypes might direct the focus towards irrelevant elements during usability tests.
- **No gut reactions** - Paper prototypes rely on the imagination of the users.

Furthermore, when it comes to HTML prototypes, the advantages are explained as:

- **Technical foundation for final product** - HTML prototypes provides the groundwork for the final code of the design solution which saves time and energy.
- **Platform agnostic** - HTML prototypes can be tested on various platforms or devices.
- **Low Cost** - HTML prototypes can be made without expensive prototyping software.

The disadvantages with HTML prototypes are explained as:

- **Dependent on designer skill level** - The quality of the HTML prototype depends on the designer's level of code skills.
- **Inhibits Creativity** - HTML prototypes might cause that the designer forgets about the user experience of the design solution being developed.

However, Cao (2018) argues that there is no ‘best process’ for prototyping, and that it is up to the designer to decide what prototyping process that is appropriate and relevant to the specific case and target group being designed for. In regards to this project, paper prototypes and HTML prototypes have been used. The paper prototypes were used in order to communicate ideas with the employees in a cheap and time efficient manner, whereas the HTML
prototype translated the paper prototype into a refined and polished version of the design solution being developed. One of the reasons to make use of HTML prototyping in this project was due to the fact that the design solution in this project is somewhat complex in its visual appearance and functionality. Hence, to make use of a digital prototyping software could have limited the creative freedom of the prototyping process, which, consequently, would have resulted in a prototype which might not accurately correspond with the purpose of the design solution being developed. To prototype the design solution in HTML offered greater creative freedom which resulted in a prototype which accurately complied with the actual idea. Furthermore, to prototype the design solution in HTML resulted in a somewhat ‘finished product’ – ready to use for the examined organisation.

3.8 Usability Testing

Cooper (2015) argues that the goal with usability testing is to assess the usability of a product. Usability testing measures how easy it is for the users to perform tasks, and is conducted in order to notice what problems the users encounter while performing the tasks (Cooper, 2015). While the users attempt to complete the tasks, the designer should observe in order to notice where problems and confusion arises (Cooper, 2015). The insights obtained from a usability test should be taking into consideration in order to overcome usability issues of the design solution being developed (Experienceux, 2018).

In this project, usability testing has been performed with the employees in order to detect flaws and areas of improvement in the design solution being developed. The employees were asked to perform certain tasks in prototypes, and were observed while performing these tasks. Furthermore, the employees were asked to think out loud regarding their expectations and feelings about the experience. After each usability test, the employees were asked to ventilate their thoughts and opinions. The insights obtained from usability testing guided further iterations of the design solution being developed.

3.9 Ethical Considerations

This project follows the ethical standards formulated in Codex rules and guidelines for research in Humanities and Social Sciences (The Swedish Research Council, n.d.). That is, all employees who participated were orally informed about the aim and purpose of this project, and that it is up to them to participate or not. In regards to the interviews and usability tests, the employees were orally informed that the material gathered is solely intended for research purposes, and that their responses and contributions will be treated anonymously.
4 Interview Insights

In this section, the various insights obtained from the two interview methods is categorised in different themes. The themes refer to the the current knowledge sharing process in the organisation, its barriers and opportunities.

4.1 The Current Knowledge Sharing Process

The interviews showed that the organisation has no defined approach or strategy when it comes to how the exchange of knowledge between the employees should occur. However, one approach to share knowledge in the organisation is via the communication program Slack. That is, if the employees face a problem while working which they can not solve, they communicate with each other in Slack in order to receive a solution to the problem. One of the employees mentioned during a semi-structured individual interview that:

*If I encounter a problem while working, I always try to solve it on my own at first. However, if I fail in solving the problem, I send a message in Slack to my colleagues in order to receive a solution to the problem, or to receive guidance in how the problem could be solved.*

Furthermore, the employees also help each other verbally. One of the employees explained during a semi-structured individual interview that:

*I usually start off by asking a colleague face-to-face. Otherwise, if no colleague is available to discuss the problem, I navigate into the Slack application where I send a message to all of my colleagues about the problem I am facing.*

The current way the employees share knowledge with each other, either via Slack or verbally, occurs spontaneously as the employees encounter problems during the workday. Aside from the knowledge that is being shared spontaneously in Slack or verbally throughout the workday, the time that is being scheduled and organised to jointly exchange knowledge occurs during workshops. The organisation organises workshops if they consider it relevant, and if there seems to be a need of it. The workshops are being organised and moderated by the employees in the organisation. The employee who should organise and moderate the workshop depends on the subject of matter. Preferably, the most knowledgeable employee in the subject are the one who should organise and moderate the workshop. That is, all employees in the organisation are enabled to schedule, organise and moderate workshops if they find it relevant and useful.
In addition, the Chief Executive Officer and the Sales Director is working remotely. The Chief Executive Officer and the Sales Director visits the office approximately once a month, otherwise, they are mainly contactable via Slack. Although the two directors might have a major impact on the organisation's knowledge sharing process – the fruitfulness of the knowledge sharing process is, after all up, to the employees.

4.2 Barriers

Employees in an organisation tend to face barriers which impedes their ability to participate in a knowledge sharing process (Riege, 2005). In regards to the organisation examined in this project, the interviews showed that the barriers are; lack of time, low awareness of existing knowledge gaps, and that workshops tend to lack in relevance in regards to the needs of the employees. Each barrier is further described in the following sections.

4.2.1 Lack of Time

During the semi-structured individual interviews, all of the employees verbalized that lack of time is a barrier which impedes the knowledge sharing process in the organisation. However, there is virtually always time available to help each other solve problems, but there is seldom time available to help each other in a constructive manner. This is because the employees are working with a hectic schedule, and the focus is therefore aimed to solely help each other solve the existing problems in a time efficient manner, rather than devoting time to educate each other in how to actually solve the problem. One of the employees explained during a semi-structured individual interview that:

> When someone encounter a problem, the focus is aimed to rapidly solve the problem in a time efficient manner in order to be able to continue the work. That is, the efficacy of the daily work and project deadlines is prioritized, which consequently decreases the ability to constructively exchange knowledge with each other while working.

In connection, another employee mentioned during the unstructured group interview that:

> In order to convey knowledge, there must be time available to receive questions while helping each other. However, in the current situation, there is rarely time available to receive questions while working. Due to our hectic schedule, the focus is aimed to help each other to get rid of the existing problems in order to be able to continue the work, which consequently deteriorates the ability to educate each other in how to solve the problem.
The lack of time causes difficulties when it comes to help each other solve problems in a constructive manner. Furthermore, due to the lack of time available to help each other in a constructive manner, the employees do not necessarily gain any new knowledge by receiving help. This is because the focus is aimed to solve the existing problems in a time efficient manner, which consequently deteriorates the ability to constructively exchange knowledge with each other throughout the workday. One of the employees explained during a semi-structured individual interview that:

\[ I\ can\ always\ receive\ help\ from\ my\ colleagues\ to\ get\ rid\ of\ my\ problems,\ but\ I\ am\ not\ always\ able\ to\ reflect\ afterwards\ how\ the\ problem\ actually\ got\ solved.\ Therefore,\ when\ I\ get\ help,\ I\ do\ not\ always\ gain\ any\ new\ knowledge.\ \]

4.2.2 Low Awareness

Another comprehensive barrier which inhibits the knowledge sharing process is that the employees are not fully aware about existing knowledge gaps. During a semi-structured individual interview, one of the employees argued that:

\[ A\ prerequisite\ for\ me\ to\ be\ able\ to\ share\ knowledge,\ is\ to\ be\ aware\ if\ my\ knowledge\ could\ be\ beneficial\ to\ my\ colleagues.\ However,\ in\ the\ current\ situation,\ I\ am\ not\ fully\ aware\ of\ what\ knowledge\ my\ colleague\ is\ in\ need\ of\ receiving.\ \]

Furthermore, another employee explained during a semi-structured individual interview that:

\[ I\ think\ we\ need\ to\ enhance\ the\ awareness\ about\ what\ subjects\ and\ areas\ individuals\ want\ to\ learn\ more\ within.\ This\ would\ help\ us\ together\ as\ a\ group\ to\ easier\ benefit\ from\ each\ other’s\ knowledge\ and\ thus\ continue\ develop\ in\ our\ profession.\ \]

The employees are not fully aware of the existing knowledge gaps, which consequently causes difficulties to know if their knowledge could be valuable to share. One employee further argued during a semi-structured individual interview:

\[ It\ is\ not\ always\ easy\ to\ explain\ to\ others\ what\ knowledge\ you\ are\ lacking\ in.\ It\ is\ when\ you\ encounter\ problems\ while\ working\ your\ knowledge\ gaps\ becomes\ palpable.\ \]
Furthermore, during a semi-structured individual interview, another employee argued that due to the fact that the employees work in different teams, might cause that the knowledge a team possesses becomes concentrated in the team. The employee explained that:

\[
I \text{ am to some extent aware of the knowledge as well as the knowledge gaps in my own team, however, when it comes the employees in the other teams – the awareness is significantly lower.}
\]

### 4.2.3 Workshops Vary in Relevance

Even though there is lack of time available to constructively share knowledge while working, the organisation does set time aside for this particular activity to take place during workshops. During the unstructured group interview, the employees argued that they appreciate the workshops since it is an occasion which specifically sets time aside to collectively exchange knowledge with each other in a constructive manner. One of the employees argued that:

\[
\text{Due to the fact that there is lack of time available to exchange knowledge while working – the workshops is a great occasion to forget about the work for a while, and to fully focus on the exchange of knowledge with each other in a constructive manner.}
\]

Furthermore, another employee explained during a semi-structured individual interview that:

\[
\text{During the workshops, the entire organisation is gathered, which provides an opportunity to learn from everyone in the organisation. Also, to hang out with all colleagues simultaneously is fun.}
\]

However, despite the fact that the employees appreciate workshops, the agenda tend to vary in relevance in regards to their actual needs. One of the employees believed that the relevance varies because of low awareness regarding the existing knowledge gaps in the organisation. That is, due to low awareness of the existing knowledge gaps in the organisation, it is difficult to know what is relevant for the workshop to cover, as well as when it is appropriate to organise a workshop. During a semi-structured individual interview, one of the employees mentioned that:

\[
\text{In the industry of web development, you work with a lot of different stuff, and with a lot of different techniques. Therefore, it might be hard to know exactly what is necessary to cover during workshops. The workshops are usually fun and educative, but they tend to lack in relevance in regards to what I actually need to learn.}
\]
In addition, another employee argued during a semi-structured individual interview that:

*I am sure that all of my colleagues possesses knowledge which could be valuable for me receive. However, it is difficult to find time to receive others knowledge in a constructive manner. I believe that the only time that is available to exchange knowledge with each other in a constructive manner occurs during the workshops. The workshops are often educative and fun, but do not always satisfy my needs.*

Thus, workshops are appreciated, but they tend to not meet the needs of employees regarding what knowledge they lack. The workshops are the primary occasion to educate each other and to constructively exchange knowledge. However, due to low awareness of the existing knowledge gaps, the employees is having difficulties to detect if their knowledge could be beneficial to others in the organisation. Consequently, as a result of low awareness, the agenda of the workshops vary in relevance.

### 4.3 Opportunities

Despite the existing barriers, the interviews illuminated opportunities and motivations for knowledge sharing in the organisation. During the unstructured group interview, one of the employees argued.

*Due to the fact that the organisation is quite small, there is no hierarchy of knowledge going on which potentially could cause individuals to hoard their knowledge. Also, given that the size of the organisation is relatively small, the solidarity is potentially stronger than what it is in larger organisations.*

Furthermore, none of the employees verbalized nor gave any indications that they are unwilling to share their knowledge – rather the opposite. This is because during the semi-structured individual interviews, the employees were asked what they would need in order to be motivated to share their knowledge with their colleagues, and to that question, none of the employees responded that they require anything from the organisation. Contrariwise, the employees argued that they enjoy to share knowledge with others since the act itself is fun and self-fulfilling. One of the employees argued during a semi-structured individual interview that:

*It is fun and motivating to teach others in the subjects were I am knowledgeable, and it is fun to see others develop in their profession. On a personal level, it is motivating to educate my colleagues as I get confirmation that I am knowledgeable in a particular subject.*
However, due to the aforementioned existing barriers, the employee’s motivation to share knowledge becomes somewhat reduced. One of the employees mentioned during the unstructured group interview that:

*Due to the fact that I am not fully aware if my knowledge could benefit my colleagues – the inclination and motivation to share knowledge becomes somewhat reduced. If I knew that some of the knowledge I possess could benefit others in the organisation, the motivation would have been significantly enhanced since it would have been easier for me to notice when and why I should share knowledge.*

Furthermore, during the unstructured group interview, the employees pointed out that one should not regard the knowledge gaps in the organisation as a problem that needs to be solved, but rather as something interesting which constitutes a motivational feeling to educate each other. In connection, the employees argued that even though there are certain types of knowledge which is crucial to possess, there is also a dimension of enjoyment to gain knowledge which may not be frequently used during the workday. That is, one should not exclusively regard the knowledge gaps in the organisation negatively, as it also could be something that the employees want to learn because it is interesting and fun.
5 Design Process

The interviews showed that there are three comprehensive barriers when it comes to knowledge sharing. The three barriers are; lack of time to exchange knowledge while working, low awareness of existing knowledge gaps and that the workshops tend to lack in relevance in regards to the actual needs of the employees.

The following section decipher the various insights obtained from the interview methods and thereby frames a focus area which provides a design opportunity.

5.1 Defining a Focus Area

To facilitate the knowledge sharing process, one might argue that the existing barriers should not be in focus exclusively. That is, it might be equally important to consider and take advantage of the opportunities that exists within the organisation which potentially could be amplified through a design solution. When it comes to the opportunities in the organisation, the interviews showed that the employees are intrinsically motivated to exchange knowledge. This is because the employees argued that they enjoy to educate each other because it is self-fulfilling, which Lam & Lambermont-Ford (2010) suggests is significant for intrinsic motivation. Given that the employees possess intrinsic motivation, one might argue that there is a strong opportunity in taking advantage by providing appropriate tools, hence, become useful in a knowledge sharing process. Due to intrinsic motivation, one does not need to provide additional resources, such as money or an award, in order to motivate the employees to share their knowledge. This could have been crucial to consider if the employees had shown to possess extrinsic motivation, as suggested by Lam & Lambermont-Ford (2010).

Bock et al. (2005) suggests that the relationship between individuals is a potential motivational factor when it comes to knowledge sharing. In regards to the organisation examined in this project, the interviews showed that there is a strong solidarity and affective commitment to the organisation among the employees. As pointed out by one of the employees, due to the fact that the organisation is quite small, the solidarity among the employees is strong. The solidarity among the employees relates to the motivational factor of group beneficiation presented by Bock et al. (2005), which is vital to achieve an efficient knowledge sharing process. Furthermore, the employees have shown tendencies of the motivational factor of self-interest presented by Bock et al. (2005). This is because the employees enjoy sharing knowledge because it could be seen as a confirmation that they are knowledgeable in a particular subject. However, due to the existing barriers, the opportunities and motivation among the employees is to some extent hindered to become useful. The employees are not fully aware of the existing knowledge gaps,
which prevents their ability to detect if their specific knowledge could be valuable to share. Low awareness regarding how one’s knowledge could benefit others is being explained by Riege (2005) as a potential individual barrier, which the interviews showed exists in the organisation examined in this project.

The employees currently share knowledge with each other while working in an unstructured and spontaneous manner. The knowledge that is being shared during the workday is primarily focused to rapidly solve problems, rather than educating each other in how to solve the problems. Obviously, it might be difficult for the employees to create more time to constructively share knowledge while working. However, the amount of time during workshops that is devoted for constructive knowledge sharing should be relevant, and should carefully take into account the knowledge gaps that exists within the organisation. Irick (2007) argues that an organisation must set time aside specifically for individuals to learn, share, and help one another. The organisation examined in this project have shown willingness to do this during workshops. However, due to low awareness of existing knowledge gaps, the organisation is having difficulties to know when and why time should be set aside. Furthermore, Van der Molen & Gramsbergen-Hoogland (2005) argues that an organisation is a network of individuals, and to achieve their goals, they need to communicate. The organisation examined in this project shows that the challenge is not for the employees to communicate, but rather to know what to communicate.

When it comes to the current knowledge sharing process in the organisation, one might say that the exchange of explicit knowledge occurs when the employees help each other solve problems by communicating in Slack. This is because the information that is being communicated in Slack is in written form – which Nonaka (2008) suggests is how explicit knowledge is exchanged. Communicating in Slack might facilitate the exchange of explicit knowledge, however, makes it significantly harder to exchange implicit knowledge. This is because implicit knowledge is hard to communicate in written form (Polanyi, 1966). To exchange implicit knowledge, social events and social interactions is a prerequisite (Irick, 2007). Therefore, since workshops is a social event where social interactions take place, one might say that it is an occasion to exchange implicit knowledge.

Alavi & Leidner (2001) suggests that an organisation needs to employ a variety of systems to facilitate the exchange of different knowledge types. With that in mind, the focus should preferably not be to introduce a new way of exchanging knowledge digitally – as the employees already do that in Slack. The social interactions which promotes knowledge sharing occurs during workshops. However, due to low awareness of existing knowledge gaps, the employees are having difficulties to know why and when a workshop should be organised, as well as the workshop should cover. Therefore, the low
awareness of existing knowledge gaps illuminates an opportunity for design solutions to be implemented and an area to focus upon.

5.1.1 Focus Area

The chosen focus area in this project is to enhance the awareness of existing knowledge gaps among the employees in the organisation. By enhancing the awareness of existing knowledge gaps, the employees could easier detect if their knowledge could be valuable to share. Furthermore, by enhancing the awareness of existing knowledge gaps, the process of planning workshops that is in accordance with the actual needs of the employees could be supported.

5.2 Ideation

The awareness of existing knowledge gaps in the organisation could arguably be enhanced in numerous amount of different ways. Therefore, different ideas were sketched out in an individual brainstorming session. Given that the employees are the ones who possesses the information regarding the knowledge gaps, the ideas primarily explored how this information could be extracted and later on used to enhance the awareness. Due to the fact that many of the ideas were unachievable, frivolous or too vague – the majority could quickly be ruled out and rejected. However, two of the ideas stood out which closely correlated with the determined focus area. Therefore, this section solely discusses the two ideas which was feasible and relevant in regards to what the design solutions aims to solve.

5.2.1 First Idea

The first idea was inspired by existing routines and technology used in the organisation, which was detected during the observation. In the current situation, the first thing the employees do when they arrive at the office is to send a message to Slack which describes what they are planning to do during the day. The figure below illustrates an example of how this message could look like in the Slack.

![Image](https://via.placeholder.com/150)

**Figure 4.** Example of “#checkin” message in Slack.

The organisation has configured Slack to store all messages which contains “#checkin” in a separate database. The reason for storing these messages in a separate database is because the organisation wants to access them outside of Slack, in order to be able to display them on an internal dashboard at the office. By displaying the messages on the internal dashboard, the employees become aware of what their colleagues are up to during the day.
The figure below illustrates the internal dashboard. The widget, where the “#checkin” messages is displayed, is highlighted with a red box.

![Internal Dashboard](image)

*Figure 5. The “#checkin” messages at the internal dashboard.*

This particular functionality in Slack used by the organisation inspired the first idea in the ideation process. The idea implied that, each time an employee sends a question in Slack to their colleagues regarding a problem they have encountered, they should also add a hashtag in the message representing the area to where the problem belongs. When mentioning area, it refers to something that the employees works with on a daily basis. The areas could be, for example, specific technologies, tools, techniques or anything used by the employees in their daily work. The figure below illustrates an example of how this message could look like in Slack.

![Slack Message Example](image)

*Figure 6. Example of message in Slack.*

By adding the hashtag followed by the area, in this example the area of CSS, which is a programming language, statistics could be stored in a database regarding what areas that is commonly discussed in Slack. By storing statistics in a database regarding commonly discussed areas in Slack could enhance the awareness of existing knowledge gaps. This is because you could interpret that the areas that are frequently discussed in Slack are the areas where there is lack of knowledge. That is, if an employee is asking for help, it is probably because the employee lack the knowledge necessary to solve the problem, thus constitutes a knowledge gap. The figure below illustrates the flow of the idea.
5.2.2 Second Idea

The second idea was a tool which enables the employees to gather information regarding what kind of knowledge they lack. By enabling the employees to gather this information, the awareness of existing knowledge gaps could be enhanced. In comparison with the first idea, the tool should be autonomous and independent of Slack. This enables the employees to in detail describe their knowledge gaps directly in the tool, which could aid the process of organising relevant workshops which accurately meets the needs of the employees.
5.2.3 Determining Idea

The purpose with the first idea was to provide statistics on areas frequently discussed in Slack. These statistics could enhance the awareness of existing knowledge gaps, and aid the process of planning relevant workshops. However, to solely rely on quantitative statistics based on commonly discussed areas in Slack could be too narrow to organise relevant workshops on. This is because an area can encompass a wide variety of different knowledge gaps, hence, more specific and informative descriptions could be required. Furthermore, one can not guarantee that areas being discussed in Slack is accurately translated into knowledge gaps in the organisation.

Despite the fact that Slack is frequently used to discuss problems, it is not the exhaustive approach to discuss problems in the organisation as this could occur in various situations. Therefore, the first idea would not have provided any thorough statistics regarding existing knowledge gaps, but rather statistics regarding what areas that is frequently being discussed in Slack. With that in mind, the conclusion was made that it might be risky to depend on Slack discussions as the primary way to detect existing knowledge gaps. This could potentially jeopardize the reliability and accuracy of the information being used to enhance the awareness. Therefore, the first idea was rejected, and the decision was made to continue with the second idea.

This decision was made as the second idea enables the employees to describe their knowledge gaps in detail, which could be crucial in order to be able to plan relevant workshops which accurately meets their needs. In the following section, the development of the tool is described.

5.3 Design Solution

This section describes the development of a tool which enables the employees to gather information regarding what knowledge they lack. The information gathered in the tool could enhance the awareness of when and why a workshop should be scheduled, as well as what the workshop should cover in order to meet the needs of the employees.

5.3.1 Paper Prototype

Initially, a prototype was made which explored how the design of the tool could look like. The paper prototype suggests two views of the tool; a start view and an information view. The purpose with the start view is to provide an overall visualization of the different areas were the employees lack knowledge. The employees should be able to add new areas to the start view by clicking on the add-button in the top-right corner. In the paper prototype, the areas are replaced with a single letter as placeholder.
The information view, on the other hand, enables the employees to add specific descriptions about their knowledge gaps in an area. The information view should appear when one of the areas in the start view is being clicked on. On the top of the information view, the name of the area that the employee has clicked on is displayed. At the bottom is an input field which should allow the employees to add descriptions of their knowledge gaps. In the middle, the different descriptions of knowledge gaps are displayed.
The design of the start view considers the insight obtained from the unstructured group interview, that is, one should not regard the knowledge gaps in the organisation solely as problematic, but rather as something interesting that constitutes a motivational feeling to educate each other. Therefore, the design of the tool should preferably not look static and gloomy, but rather interesting and fun, without impairing its core purpose of enhancing the awareness of the existing knowledge gaps. One might argue that there is no universal way to design an interface to appear as interesting and fun, since what is interpreted as interesting and fun is with great probability highly subjective. Hence, the design of the interface should therefore be made along with the opinions and feedback from the employees. The decision to visualize the areas in the shape of circles needs to be validated by the employees in order to know if it was an appropriate design decision. This is carried out during a usability test, which is discussed in the following section.

5.3.2 Usability Test of Paper Prototype

The purpose with the usability test of the paper prototype was to allow the employees to audit and evaluate the idea of the tool. The goal was to get insights regarding the overall idea, and to see if the employees believed it was something that could enhance their awareness and thereby improve the knowledge sharing process. Furthermore, the purpose with the usability test was to get aware if the intended design of the tool was appropriate. The paper prototype was introduced to all of the employees simultaneously in the organisation. To present the paper prototype to all of the employees simultaneously was due to lack of time available to individually discuss the paper prototype with each employee. However, this should not be viewed as a disadvantage, as the employees critically pondered and collectively discussed positive and negative aspects.

During the usability test, the employees argued that the idea of the tool was promising, and they believed it was something that could improve the knowledge sharing process. The employees argued that it was an appropriate decision to visualize the different areas in the shape of circles, since the organisation already visualizes some information in the shape of circles. Furthermore, one employee argued that the circles in the start view could result in a visually appealing yet informative interface, but further suggested that each circle in the start view should be colour coded. This was because the employee thought it could get frustrating if each circle were in the same colour. Furthermore, the same employee argued that, to colour code each circle could result in a design which does not look daunting and gloomy, but rather visually appealing, interesting and fun.

When it comes to the information view, the employees argued that it was good that they were able to specifically describe their knowledge gaps, since different areas could encompass various kinds of knowledge gaps. The
employees liked the idea that the start view solely provides an overall visualization of the different areas, whereas the information view provides specific descriptions about the knowledge gaps. One of the employees argued that, to keep the areas separated from the descriptions could make the tool less messy, which could make it easier to navigate in the tool.

However, even though the employees to some extent validated the design and the idea of the tool – they further argued that it was difficult to fully evaluate the idea solely by auditing the paper prototype. As pointed out by Cao (2018) – the efficacy of paper prototypes is dependent on the imagination of the users since paper prototypes could represent digital systems vaguely. This disadvantage became noticeably when the employees audited and evaluated the paper prototype. The employees argued that they wanted to use the prototype in a more refined and polished version in order to be able to accurately evaluate the idea.

The usability test of the paper prototype served its purpose to communicate the idea of the tool with the employees in a cheap and time efficient manner. However, due to the disadvantages with paper prototypes, the employees did not seem to fully comprehend nor get excited over the paper prototype since it was rough and unrealistic. Therefore, the decision was made to create a digital prototype, or more specifically – an HTML prototype.

5.3.3 HTML Prototype

The HTML prototype is a web based application which translated the paper prototype into a usable, interactive and somewhat polished version of the tool, along with insights obtained from the usability test of the paper prototype.

The figure below illustrates the start view where the areas, that is, Drupal, Sketch and Vue, is examples of technologies the organisation works with on a daily basis. These areas are added in order to illustrate how the start view could look like, and is not in the tool by default. The circles are colour coded as the usability test suggested.
Figure 11. Start view of HTML prototype.

The figure below illustrates the start view when the employee has clicked on the add-button in the top-right corner. When the add-button is being clicked – an input field appears where the employees is asked to name the area that s/he wants to add to the start view. In the figure, the area of CSS is being added to the start view.

Figure 12. Start view of HTML prototype when area is being added
The figure below illustrates the start view when the new area has been added, that is, the area of CSS.

![Start view of HTML prototype when new area has been added](image)

**Figure 13.** Start view of HTML prototype when new area has been added

The figure below illustrates the information view. The information view pops up when the employee double-clicks on one of the circles. In the figure, the area of CSS has been chosen.

![Information view of HTML prototype](image)

**Figure 14.** Information view of HTML prototype.
The figure below illustrates the information view when a description has been added. In order to add a description to the information view, the employee uses the input field in the bottom. The description is being added when the employee hits the enter key.

![Image 15](image15.jpg)

**Figure 15.** Information view of HTML prototype when description has been added.

Additionally, in order to remove an area from the start view, the employee should hold down the cursor for two seconds on the area s/he wants to delete. After two seconds, the employee is asked to confirm the deletion of the area. The figure below illustrates this interaction.

![Image 16](image16.jpg)

**Figure 16.** Start view of HTML prototype when area is being deleted.
5.3.4 Usability Test of HTML Prototype

The usability test of the HTML prototype allowed the employees to audit, evaluate and use the tool in a more refined version. The purpose with the usability test was to see if the employees were able to complete specific tasks in the prototype successfully. The usability test was carried out individually with the employees in the organisation. The tasks that were tested with the employees implied:

- Add a new area to the start view.
- Add a description to the newly added area.
- Delete the area.

By observing the employees use the prototype, and by afterwards receive their thoughts and opinions, it became evident that changes needed to be done in regards to the interaction and visual appearance of the prototype. The changes implied:

- The add-button, in the top right corner, needs to be more visible.
- The information view should open up when clicking once on a circle, and not on double-click
- The way of deleting an area from the start view, that is, to hold down the cursor for two seconds on a circle, should be replaced with an edit-button next to the add-button in the top-right corner. The edit-button should toggle an edit-mode. If the edit-mode is activated, the circle that is being clicked on is getting deleted. Else, if the edit mode is not activated, the information view of the area being clicked on should appear.

Aside from the desired changes previously mentioned, another, potentially more crucial insight, concerned the visualization of areas in the start view. In the prototype, the start view solely displays what areas the employees lack knowledge in the shape of circles. However, during the usability test, a realisation was made that the visualization of areas in the start view could be more informative.

In order to achieve a more informative visualization in the start view, the size of each circle should increase in relation to the amount of descriptions that has been added to the areas. The bigger the circle is; the more employees have added descriptions of their knowledge gaps in the area. That is, the circles in the start view should not solely visualize what areas that the employees lack knowledge in, but should also reflect the magnitude of knowledge gaps by increasing in size. To affect the size of the circles could help the employees to prioritize what areas to focus upon, as the amount of described knowledge gaps is reflected in the size of the circles. With the insights obtained – an iteration was made to the HTML prototype accordingly.
5.3.5 Iteration of HTML Prototype

The figure below illustrates the iterated version of start view. The size of each circle reflects the amount of descriptions that has been added to the areas. In the example illustrated in the figure below, the area of CSS is were most employees currently lack knowledge, since that circle is the biggest. Furthermore, an edit-button has been added next to the add-button in the top-right corner. The colour of the add-button has been changed in order to make it more visible.

![Iterated version of the start view of the HTML prototype.](image)

**Figure 17.** Iterated version of the start view of the HTML prototype.

The figure below illustrates the start view when the edit-mode is activated.

![Start view of the HTML prototype when the edit-mode is activated.](image)

**Figure 18.** Start view of the HTML prototype when the edit-mode is activated.
5.3.6 Second Usability Test of HTML Prototype

The purpose with the second usability test was to see if the employees were able to complete specific tasks in the updated HTML prototype successfully. The usability test was carried out individually with the employees in the organisation. The tasks were the same as in the initial usability test of the HTML prototype, which implied:

- Add a new area to the start view.
- Add a description to the newly added area.
- Delete the area.

In comparison with the previous version of the prototype, the employees managed to complete the tasks flawlessly during the usability test. That is, the usability test did not illuminate any desired changes in terms of interacting with and using the prototype. The employees argued that it was an appropriate decision to change the size of the circles in relation to the amount of knowledge gaps, as it made the start view more informative and meaningful compared to the previous version of the prototype.

However, even though the visualization got significantly improved when increasing the size of the circles in relation to the amount of descriptions – more could be done to make the visualization even more informative and accurate. This is because one of the employees argued during a usability test that, if s/he opens up the information view in order to add a description to an area, but that description already have been added by a colleague, s/he would find it unnecessary to add the exact same description. However, a realisation was made that since several employees can experience the same kind of knowledge gap, the size of the circles should take that into consideration. Therefore, the employees should be able to agree with an already added description, which also should affect the size of the circles. By doing that, the visualization will not solely reflect the amount of described knowledge gaps, but rather the amount of employees experiencing knowledge gaps.

Furthermore, given that the purpose with the tool is to enhance the awareness, one of the employees suggested that the tool should somehow inform when it might be appropriate to pay attention to the tool. This is because the tool is a web based application, and it is therefore required that the employees themselves launches the tool in order to take part of the information regarding existing knowledge gaps. This could potentially cause that the tool and its information is forgotten. In order to minimize the risk of that the tool and its information is forgotten, the decision was made to add a widget to the internal dashboard at the office. Since the purpose with the dashboard is to make the employees aware of certain information, it could be an appropriate decision to integrate it as an additional component of the design solution, in order to make the employees aware when they should pay attention to the tool.
The design of the widget, shown in the following section, was inspired by an already existing widget on the internal dashboard. The purpose of the already existing widget is to display stats about the websites administered and hosted by the organisation. The already existing widget makes the employees aware whether the organisations websites is working or not. In the figure below, the already existing widget is highlighted with a red box.

![Existing widget on the internal dashboard at the office.](image)

The main insights from the usability test were:

- The employees should be able to agree with an already added description, which should affect the size of the circles.
- A widget should be added to internal dashboard which informs the employees when it is relevant to pay attention to the tool.

### 5.3.7 Second Iteration of HTML Prototype

The figure below illustrates the iterated version of the information view. Each description that has been added to an area has a button which allows the employees to agree with an already added description. If an employee agrees with a description, the size of the circle increases. Hence, the size of the circles reflects the amount of employees experiencing knowledge gaps, rather than the amount of descriptions of knowledge gaps.
Furthermore, a realisation was made that the employees should be able to delete as well as to update the existing descriptions. Therefore, when clicking on a description, that description becomes editable. If the description is empty, it gets deleted. The figure below illustrates the information view when a description is being edited.
The figure below illustrates the widget in two different modes. The widget to the left represents the mode when there is no need to pay attention to the tool. The widget to the right represents the mode when it is relevant to pay attention to the tool. However, the widget is solely a conceptualized functionality, and it is nothing that actually was implemented on the internal dashboard. The idea is however that, as long as there are knowledge gaps described in the tool, the widget should make the employees aware of that.

**Figure 22.** The widget in two different modes.

The figure below illustrates how the widget could look like in context.

**Figure 23.** The widget on the internal dashboard.
5.4 Result

The result is a tool which enables the employees to gather information of what knowledge they lack. The tool visualizes this information, and thereby enhances the awareness of when a workshop should be organised, as well as what the workshop should cover in order to meet the needs of the employees. Furthermore, since the purpose of the tool is to enhance the awareness, the decision was made to make use of the internal dashboard in order to inform the employees when it is relevant to pay attention to the tool. The development of the tool iterated along with the insights obtained from usability testing, in order to achieve a result which is in accordance with the needs and opinions of the employees. A link to the final version of the HTML prototype is found in the Appendix.
6 Discussion

6.1 Value

Existing knowledge management systems, such as Freshservice and Haydle (see section 2.4), facilitates the exchange of knowledge in a digital manner. These systems might be relevant to implement in larger organisations, as they enable knowledge sharing between different sections, at different locations. However, given that the examined organisation is relatively small, and that the employees are working at the same office, to implement a system which enables knowledge sharing at distance might not bring any immediate value. Furthermore, the examined organisation is currently using Slack, hence, to introduce a new way to exchange knowledge in a digital manner might not be valuable.

The insights obtained from the interview methods showed that the challenge is not for the employees to exchange knowledge, but rather for them to know what knowledge to exchange. Therefore, the focus of the tool developed in this project is not on the actual knowledge sharing procedure, but rather to support this procedure by enhancing the awareness of what knowledge to exchange. Although this thesis suggests that the employees should organise workshops to exchange knowledge along with the information being gathered in the tool, the employees could find it more useful to share some types of knowledge in other ways.

The theory shows that the two types of knowledge, explicit and implicit, requires different approaches to be shared. Given that existing systems, such as Freshservice and Haydle (see section 2.4), communicates knowledge in a written manner, one might say that these systems solely enable the exchange of explicit knowledge. This is because implicit knowledge is hard to share in written form, hence, a different approach is required (Smith, 2001). Therefore, a value with the tool developed in this project is that it does not exclude implicit knowledge to be shared. This is because the procedure of how to exchange knowledge is determined by the employees, and not by the tool. For instance, the employees might share explicit knowledge in Slack, whereas they might share implicit knowledge during workshops. That is, the actual knowledge sharing process is, after all, up to the employees to decide. Fortunately, as the insights from the interview methods suggests, the employees possess intrinsic motivation for knowledge sharing. This ought to imply that, as long as the employees are aware of the knowledge gaps, the intrinsic motivation will with great probability be sufficient to improve the knowledge sharing process along with the information of knowledge gaps gathered in the tool.
Keeping in mind that the examined organisation is lacking defined strategy when it comes to knowledge sharing, and that a limited knowledge sharing process could affect the outcomes of the work negatively (Bock et al., 2005), the tool developed in this project could be highly valuable to implement. This is because the tool builds on already established behaviour, the intrinsic motivation for knowledge sharing, as well as already existing technology in the organisation, the internal dashboard. However, even though the tool is developed in accordance with the insights obtained by examining the organisation, one can arguably only confirm its true value by having it implemented during a longer period of time. The value of the tool and how it fulfils its purpose could only be determined after the employees have gathered information of knowledge their gaps, and how efficiently the tool enhances the awareness of this information.

Given that Ipe (2003) argues that knowledge is the most important asset in organisations, and that organisations could contribute to the development of society, one might say that an efficient knowledge sharing process in organisations could benefit society at large. Therefore, from a societal perspective, facilitating knowledge sharing in organisations might have a bigger impact than merely the economical and competitive success of organisations.

6.2 Contribution to Interaction Design

In regards to the field of interaction design, this thesis contributes with a perspective of how knowledge gaps could be embodied and visualized. The information of knowledge gaps is possessed in the mind of individuals, and this thesis presents how interaction could be designed to extract and visualize this information. By visualizing the amount of knowledge gaps reflected in the size of circles, this thesis contributes with a perspective of how information could be displayed in order to enhance awareness, and how it could aid the process of prioritizing.

6.3 Ethical Implications

The act of communicating knowledge gaps with each other could provoke ethical implications, as knowledge gaps could be considered as a personal flaw. Therefore, it might be inconvenient to some individuals to be entirely transparent about what knowledge they lack. Consequently, this could cause individuals to hoard their knowledge gaps due to the fear of being viewed as an unqualified employee. The tool developed in this project to some extent tackles this issue by making the communication of knowledge gaps anonymous. That is, the purpose of the tool is to enhance the awareness of existing knowledge gaps in the organisation – rather than individual knowledge gaps of each employee.
6.4 Future Direction

In the current situation, it is required that at least one of the employees in the organisation possess the knowledge corresponding to the knowledge gaps gathered in the tool. However, situations might occur when none of the employees possess the required knowledge to fill an existing knowledge gap. Hence, this illuminates a potential issue which needs to be further investigated. A future direction is thereof to deal with the knowledge gaps in the tool that none of the employees are able to fill.

Another future direction could be to more efficiently take advantage of the visualization of knowledge gaps in the start view of the tool. Even though the widget on the internal dashboard informs the employees when it is relevant to pay attention to the tool, the start view could be displayed on another screen at the office. This could contribute with an enhanced presence and awareness of the existing knowledge gaps.

Preferably, in a continued process, the tool should be implemented and tested during a longer period of time in order to notice flaws and areas of improvement. Thus, the future direction of this project should primarily be guided by the feedback and opinions received from the employees.

6.5 Self Critique

The design process in this project intended to be guided by the model of double diamond. However, the process of ideating potential design solutions during the develop stage could have been more divergent and thorough. That is, more time could have been devoted to ideate a wider range of possible design solutions, and a more divergent thinking could have been applied. With that in mind, one might say that this project has not dogmatically followed the process and principles as the model of double diamond suggests.

When it comes to the prototyping process, one might say that the transition from paper to HTML prototype went too fast in this project, and that it could have been a better approach to develop the prototype in a more gradual manner. This is because the HTML prototype could be considered to have appeared as a somewhat finished product too early in the design process. Consequently, this could potentially have impaired the creative freedom among the employees during the usability tests. However, as discussed in the design process, the employees did not seem to fully comprehend nor get excited over the paper prototype since it was rough and unrealistic. Moreover, there were to some extent difficult to gain access to the employees due to time constraints, which increased the pace of the prototyping process. Even though criticism could be directed towards the pace of the prototyping process, it could be crucial to be adaptive to the target group in order to accomplish rewarding usability tests. To present material which does not excite the target group could potentially jeopardize the value and reliability of the data extracted and later used for further iterations. In addition, the
final iteration was not tested with the employees due to time constraints, which could have been crucial to validate the final version of the tool.

In regards to the design process, different approaches could have been applied in order to achieve a different outcome. Given that the target group in this project is working with interaction design on a daily basis, it could have been advantageous to involve them more actively in the design process. For instance, a co-creation session could have been beneficial to arrange with the employees in order to utilize their competencies and professionalism.

Furthermore, Ackerman et al. (2013) argues that systems aimed to facilitate the knowledge sharing process needs to be carefully developed along with the challenges an organisation is facing. Even though the interview methods in this project provided insights in regards to the challenges the organisation is facing, the data is somewhat limited due to time constraints and lack of access to the employees. Therefore, the research in this project is probably not carried out as carefully in the sense argued by Ackerman et al. (2013). Perhaps, if the possibility existed to conduct a more thorough and careful investigation, other insights of importance could have been obtained thus affected the outcome of this project.
7 Conclusion

This thesis has aimed to present an answer to the following question:

How could a design solution be developed in order to facilitate the exchange of knowledge among employees in an organisation?

The theory shows that an organisation could face barriers which impedes the knowledge sharing process. These theoretical perspectives have been evaluated in regards to the organisation examined in this project and their current knowledge sharing process. The barriers in the organisation were the following:

- Lack of time to share knowledge while working.
- Low awareness of each others knowledge gaps.
- Workshops vary in relevance.

The barriers in terms of lack of time was hard to solve, as the employees is working with a hectic schedule. On the other hand, the interviews showed that the organisation is willing to set time aside to share knowledge during workshops. However, due to the barrier in terms of low awareness of existing knowledge gaps, the organisation is having difficulties to know when a workshop should be organised, as well as what the workshop should cover to meet the needs of the employees. Therefore, the barrier in terms of low awareness of existing knowledge gaps illuminated a gap for design solutions to be implemented.

In an individual brainstorming session, an ideation process was carried out which explored how the awareness of existing knowledge gaps could be enhanced. Two of the ideas stood out as they were feasible and closely correlated with the insights obtained from interviews. By evaluating the two ideas, flaws and weaknesses was noted in one of the ideas. Hence, the decision was made to continue with the idea which most accurately correlated with the focus of the design challenge – to enhance the awareness. The chosen idea was prototyped, and evolved in accordance with the data extracted from usability testing, in order to achieve a result which complies with the needs of the employees.

The proposed design solution in this project is a tool which enables the employees to communicate their knowledge gaps. By doing that, the awareness of existing knowledge gaps could be enhanced. Consequently, as a result of enhanced awareness, the process of planning workshops which is relevant to the needs of the employees is supported. However, even though this thesis suggests that the employees should exchange knowledge during workshops, the employees might find other valuable ways of making use of the tool. That is, the main focus of the tool is not on the actual knowledge
sharing procedure, but rather to support this procedure by enhancing the awareness of what knowledge to exchange. The tool, and the process of its creation, provides an answer to the question of how a design solution could be developed to facilitate the exchange of knowledge among employees in an organisation. However, one should keep in mind that this thesis merely provides an answer to the question – not the answer.
References


Experienceux (2018). *What is usability testing?*. Retrieved 2018 April 24 from https://www.experienceux.co.uk/faqs/what-is-usability-testing/


Appendix

URL to HTML Prototype
The URL below is the linked to the final version of the HTML prototype. The HTML prototype is not integrated with a database, hence, does not store any data being added.
http://html-prototype.glitch.me

Semi-Structured Interview Questions
- How do you share knowledge today in the organisation?
- What are the barriers for you to share knowledge?
- What are the barriers for you receive knowledge?
- What are the organisational barriers for knowledge sharing?
- What makes you motivated to share knowledge?
- What makes you less motivated to share knowledge?
- Do you need anything to get motivated to share knowledge?
- When you encounter a problem, how do you usually solve it?