

Enhancing Collaborative Interactions between Diverse Team Members

by

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Thesis submitted to the University of Nottingham

School of Computer Science

for the Degree of Doctor of Philosophy

February, 2019



Bismi-llahi r-rahmani r-rahim

In the name of Allah,

The most gracious,

The most merciful

Acknowledgments

All praise and thanks to Allah, who always comes first for giving me the opportunity to complete this thesis. Prayers and Peace of Allah be upon our beloved prophet Mohammad, the messenger of Allah.

I would like to thank my father, Dr. Mahmoud, my mother, Wesal, my brothers, Ayman and Majeed, and my sisters, Razan, Elham, and Muna, for always being there, encouraging me and standing by me; their prayers and unlimited support mean a lot to me. They have truly stood by me and offered their love and emotional support, and always believed in me.

I would also like to offer my sincere thanks to my husband, Dr. Eng. Muhyaddin, who is at the centre of my heart, without whose support this thesis would not have been possible, and my children, Abdul-Aziz, Ahmed, Noor-alhuda, and my little one Faisal, who all bring joy in my daily life. They are a blessing.

My utmost gratitude also goes to my supervisors, Dr. Boriana Koleva and Dr. Stefan Rennick Egglestone, for their kindness, great support, and advice.

I would also like to thank everyone who has contributed to this thesis: the participants and my friends.

Last but not least, I would like to acknowledge the government of the Kingdom of Saudi Arabia and King Abdul-Aziz University for their financial support of this PhD study.

Abstract

Highly pressured working environments can provide a challenging context for collaboration, especially where teams of diverse individuals are formed to tackle short-term projects. Hence, this Ph.D. thesis presents research which explores how to prepare individuals before they meet, so that a group of diverse team members working together for the first time can establish common ground easily and begin to interact collaboratively.

The thesis research adopted a user-centred, qualitative approach to gain a deep understanding of the various challenges, motivations, and strategies for the collaborative interactions experienced by group members. A semi-structured interview was conducted with ten deep-level diverse participants who represented challenging cases of working in a group in a university context. As a result, three concepts were proposed to understand the enablers of, and barriers to, collaboration – "red areas," "green areas," and "interaction strategies." These concepts were explored further through a series of workshops conducted in two different countries, the United Kingdom (UK) and the Kingdom of Saudi Arabia (KSA), involving more than 70 participants from industry and academia. Consequently, seven design concepts were proposed: We-spirit, Universal, Compassion, Expectations, Empowerment, Development, and Protection. These concepts were employed to suggest a new social-networking technology design based on an anonymous group profile, which group members can use to establish common ground and enhance collaborative interactions. Two studies of real case scenarios with deep-level diverse groups at universities in the UK and KSA were conducted to evaluate the concept of an anonymous group profile. The findings of these studies were implemented through the suggested design.

In this thesis, different studies provided comprehensive data that were analysed thoroughly to offer a set of contributions. First, this thesis provides insight into the period before the collaborative work starts, which needs more exploration than that conducted in previous research. Second, it provides a deep understanding of the diverse challenges, motivations, and strategies experienced by team members. Finally, it proposes a future design for social-networking technology for a group of members, to aid collaborative interactions through an anonymous group profile.

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Chapter 1

Introduction

This chapter provides an overview of the main issues described in this thesis as well as the approaches and methods used to conduct the work to answer the research questions.

1.1 Problem statement

Diversity is the unique difference between people. On one hand, diversity can benefit society at many levels and enrich any group/teamwork. On the other hand, diversity can create difficulties in collaborative interaction and communication. Diversity covers many areas including races, nationalities, religions, cultures, ages, genders, attitudes, opinions, thoughts, backgrounds, skills, and experiences (Van Knippenberg & Schippers, 2007). Harrison, et al. (1998) divided diversity into two categories: surface-level and deep-level diversity. Surface-level is associated with visible attributes such as the demographic, whereas deep-level diversity is the underlying attributes that become apparent only after interaction with a person, such as attitudes and behaviours (Harrison, et al., 1998).

The impact of diversity in groups is controversial. While a diverse group can produce positive effects, it can also have a negative impact on the collaboration between participants (Powell et al., 2004). Diversity can lead to stereotyping, conflict, mistrust, and misunderstanding (Brief, 2008). However, scholars say diversity is very valuable and important for the generation of new knowledge and ideas (Kossek & Pichler, 2006). Moreover, diversity may create a healthier society with individuals who are more open, understanding, accepting, respectful, and thankful, by giving them the chance to experience different unknown behaviours outside of what is normally familiar.

As today we live in a "global village," the presence of diversity is certain in communities and groups in academic, non-academic, for-profit, and non-profit organizations. Moreover, in many real-life experiences, individuals must work with a group of people to accomplish a task and, in many circumstances, cannot select their collaborators. Nowadays, organizations are keen to hire diverse individuals to gain competitive advantage by bringing original ideas and perceptions to make their work and services more effective and efficient (Kochan et al., 2003).

As an example of a real-life scenario, large organizations may rely on diverse teams of individuals with high education and specialization to complete challenging tasks. Additionally, students in universities mostly work in teams and need to complete challenging coursework over a short timescale. These teams of diverse individuals

often meet at short notice to collaborate either face-to-face or online, and sometimes over long distances. How collaborative interactions can be enhanced among diverse group members is a challenging question.

Over decades, the study of diversity in social interaction has received considerable interest from researchers in the various fields of psychology, sociology, philosophy, education, and computer science. In addition, there are scholars in management, information systems, psychology, and computer-supported and cooperative work (CSCW) study teams and virtual teams (Rowe, 2014). The literature is rich and thus important to consider when designing and evaluating a technology that can enhance collaborative interactions among diverse group members.

However, results from previous studies are conflicting. For example, researchers have presented three disparate findings on the impact of the diversity on a team. Some researchers have found positive impacts of team diversity (Haughton, 2008; Jackson et al., 1991; Paul et al., 2005; Pelled, 1996; Ely & Thomas, 2001), while other researchers have found there are drawbacks of diversity on a group (Jackson et al., 1995; Milliken & Martins, 1996; Powell et al., 2004; Van Knippenberg & Schippers, 2007; Williams & O'Reilly, 1998). Still others have found no impact from team diversity (Bowers et al., 2000; Rijamampianina, 1999). Many researchers have identified a positive impact from diverse individuals on a properly managed team, thus maximizing the advantages and minimizing the disadvantages (Mehra et al., 2006; Patrick & Kumar, 2012; Pelled, 1996; Rijamampianina, 1999; Ely & Thomas, 2001; Van Knippenberg & Schippers, 2007).

Thus, as diversity in many groups is certain and can have a positive effect, a significant question for human-computer interaction (HCI) researchers is how to design and evaluate a technology that enhances the preparation of a small group of diverse individuals to improve their collaborative interaction.

1.2 Research aim

The aim of this thesis is to understand collaborative interactions between team members with deep-level diversity to inform the design of a technology that can enhance the interaction and collaboration abilities of diverse individuals working together for the first time.

1.3 Research questions and objectives

To address the overall aim outlined in the previous section, this thesis should answer the following fundamental research questions:

- How can we better understand and categorize the possible challenges, motivations, and strategies experienced by diverse team members in order to inform technology design?
- Based on these findings, how can we design technology to support diverse individuals working together for the first time to establish common ground and begin to interact collaboratively?

Thus, the investigation was conducted to fulfil the following objectives:

- Investigate the literature in various fields related to diversity and teams/groups, to decide requirements and find design opportunities;
- Identify a suitable target group of participants to investigate the research questions through qualitative studies;
- Undertake user-centred design of a technology that employs the literature and study findings to support teamwork between diverse individuals.

1.4 Research methodology

This research implements a mixed-methods user-centred qualitative approach to explore and understand the experience of collaborative interactions between team members having deep-level diversity. An important aspect of the study design was to identify a setting in which deep-level diverse individuals engage in collaboration, with the potential to yield insights for future technology design. A real case of particularly challenging collaboration involves postgraduate MSc and PhD students at universities. Postgraduate students mostly have diverse backgrounds, nationalities, ages, skills, experiences, and knowledge, and inherently have a very limited time to accomplish a broad range of intensive work, some of which must be performed in groups with others. Accordingly, for the above reasons, the author chose to begin by considering the above settings.

The research was structured as a series of studies as follows:

First, an exploratory qualitative study using semi-structured interviews was conducted with postgraduate (PG) students in the UK, focusing on challenging cases (as reported in Chapter 4). Ten in-depth interviews were conducted to explore participants' prior experiences of collaborative work and synthesize challenges, motivations, and strategies for interaction in diverse teams. Based on the findings, three concepts were proposed to capture the enablers and barriers to collaboration: red area, green area and interaction strategies.

Then, these concepts were explored further through a study involving a series of workshops conducted in two very different countries: the United Kingdom (UK) and the Kingdom of Saudi Arabia (KSA) (as reported in Chapter 5). The participants were recruited from both industry and academia and were diverse in different aspects, such as expertise, knowledge, work positions, values, norms, language, culture, lifestyle, religion, beliefs, goals, income, social class, and marital status. The study revealed a total of 363 examples of the first concept, 369 examples of the second, and 360 of the third. These examples illustrate how diverse individuals can behave and act when they work in a group. These findings led to several concepts: we-spirit, universal, compassion, expectations, empowerment, development, and protection. One can use these concepts as a set of guidelines to support future technology-design work in this space.

Based on the findings, novel collaboration technology concepts were proposed and evaluated though exploratory studies with deep-level diverse groups at two universities in the UK and KSA, as reported in Chapter 6.

1.5 Research contributions

The main contributions of this research are two novel conceptual frameworks, grounded in qualitative data to inform technology design. They offer a new perspective on a previously studied topic. Indeed, the RGS conceptual framework presents the possible challenges of the red area, motivational challenges with the green area, and interaction strategies for collaborative interactions in challenging situations. This conceptual framework provides an overall understanding of the collaborative interactions which a technology designer can take into consideration before designing any technology for collaborative work. This thesis identified significant challenges or motivations related to a group member's culture, religion, and personality, which can all help to understand possible different situations in group work. These data and findings have wider implications in the field of HCI research.

The second conceptual framework is a set of themes that produced seven design techniques for collaborative work: we-spirit, universal, compassion, expectations, empowerment, development, and protection. These techniques are driven by the first conceptual design aimed at aiding and guiding the design of social-networking technologies (SNTs).

Finally, this research suggests that there is a significant need to support individuals working within a diverse group **before** they meet with other group members. Preparing group members with knowledge about others and how to interact within the group helps to build common ground and consequently aids collaborative interactions. This can be achieved by adding new functionality and extending the design of social networking technology, using an **anonymous group profile** rather than individual profiles.

1.6 Thesis structure

This thesis is structured into eight chapters, including this introduction. Brief summaries of the succeeding seven chapters are included below.

Chapter 2

Chapter 2 reviews literature relevant to this research, focusing on *diversity* and exploring its aspects in groups. The chapter considers some relatively general diversity models and their impact on work. It then gives a brief overview of diversity management, including practices used to manage new members in diverse groups. Finally, this chapter reviews social-networking technologies (SNTs), as the thesis aims to design a technology to enhance collaborative interactions among diverse members in a group. The chapter concludes with a statement of how the thesis can contribute in the context of previous work, informed by the literature presented.

Chapter 3

Chapter 3 provides an outline of the approaches and methods used in the research presented in this thesis. It begins with an introduction to user-centred design (UCD). Then, the different methods employed to collect qualitative data are explained, including how semi-structured interviews and workshops are used to understand the participants' experiences. Finally, the chapter explains how low-fidelity prototyping and Wizard of Oz methods were used for the evaluation of the proposed technology.

Chapter 4

Chapter 4 presents a qualitative study conducted as ten interviews with challenging-case participants. The outcome is a set of concepts: red areas, green areas, and interaction strategies. These concepts are intended to sensitize designers to key aspects of the experience of working in a diverse group, which is an under investigated topic in the literature.

Chapter 5

Chapter 5 presents the results of a series of workshops in the UK and the KSA regarding the three main concepts revealed from the last chapter. The main aim is to understand these concepts more and develop new ones that can aid in technology design. The results from both workshops revealed a total of 363 examples of the first concept, red area, 369 examples of the second concept, green area, and 360 examples of the third concept, interaction strategies. These examples show that what is a green area for some, such as consumption of alcohol, is a red area for others, which makes technology design very difficult. However, understanding these concepts and the strategies used by the participants helped the researcher to establish a new set of seven design concepts to extend the design of SNTs to include a new functionality. These are we-spirit, universal, compassion, expectations, empowerment, development, and protection.

Chapter 6

Chapter 6 is an exploratory evaluation of novel collaboration technology concepts developed based on the findings from the studies reported in Chapters 4 and 5. By deploying Wizard of Oz prototypes in two real-world cases in the UK and KSA, a corpus of data was collected through questionnaires, and interview analysis of this material provided further insights into the implications for technology design to help group members to interact collaboratively.

Chapter 7

Chapter 7 discusses the main contributions of this thesis and proposes a design that builds on the two conceptual frameworks and the findings from the studies of the initial design.

Chapter 8

Chapter 8 concludes by providing a reflection on the process of research, starting with a summary of the key contributions. The chapter also presents a reflection on the strengths and limitations of the studies reported in Chapters 4, 5, and 7. It concludes with an overview of future work and closing remarks.

Chapter 2

Background

This chapter is a detailed review of the academic studies relevant to understanding the challenges of enhancing collaboration among diverse individuals. The chapter concludes with a discussion of the contributions made by this thesis in light of the identified literature.

The purpose of this thesis is to design and evaluate a technology that supports and enhances the management of diverse individuals working together for the first time, to aid their ability to interact collaboratively and exchange knowledge. Therefore, this chapter covers several related topics such as diversity and knowledge-sharing challenges, motivations, and strategies. Then, the literature review related to groupware, SNTs and PT will be explained.

Some scholars differentiate between the terms *team* and *group.* In this thesis, they are considered the same and defined as a collection of individuals with common goals, gathered to accomplish a task (Klimoski & Mohammed, 1994). Groups may vary in terms of their goals, the degree of differentiation between members' outputs, and productivity. This chapter reviews the most important studies and literature related to group work from various fields to collect requirements and find opportunities for a technology design that can enhance collaborative interactions between group members. For example, scholars in various fields study teams in management, information systems, psychology, and CSCW (Rowe, 2014).

2.1 Diversity overview

According to genetics, humans are alike in features with greater similarities than differences, but no two people are the same, even identical twins (Robinson & James, 2003). Diversity in individuals can be defined against a range of objective or subjective characteristics, some of which are more visible than others (Van Knippenberg & Schippers, 2007).

Diversity is not only about the demography of individuals, such as gender and age, but also it encompasses various dimensions of individuals' expertise, knowledge, values, norms, language, culture, lifestyle, religion, beliefs, goals, geographic location, income, social class, health, marital status, and parental status (Loden & Rosener 1991; Neale et al., 1999; Van Knippenberg & Schippers, 2007).

Diversity affects the way humans interact. For instance, age is a visible factor that may cause the quality and effectiveness of interactions to differ. The mechanisms of interaction, discussion, collaboration, and socializing have positive effects on

societies and help individuals accept and respect each other (Robinson & James, 2003).

2.2 Diverse groups

Globalization, competition, and innovation have created a need for diverse members on different fields and sectors. Technologies have facilitated individuals with their teams and even enabled the possibility of virtual groups. This organizational transformation of work has drawn the attention of researchers (Kozlowski & Bell, 2003). Diversity in groups or teams can be defined as an "aggregate group level construct that represents differences among members of an interdependent work group with respect to a specific personal attribute" (Joshi & Roh, 2007, p. 3). Another researcher has defined diversity as "real or perceived differences among people that affect their interactions and relationship" (Bell, 2007 p.4).

U.S. management literature—popular and scholarly—advises managers to raise workforce diversity to increase work-group effectiveness (Ely & Thomas, 2001). Nowadays, diversity is certain in many work places. Many projects in organizations require a group of diverse individuals to accomplish a task. For example, when the media covers international events, it collects many teams of researchers, writers, producers, cameramen, and technicians, several of whom have met for the first time to perform the job. These teams of diverse people usually work together in a high pressure environment that offers no second chances.

2.3 Diversity theories in a group

There are several theories related to diversity, such as the similarity-attraction hypothesis (Byrne et al., 1966), social-identity theory (Tajfel & Turner, 1979), social-categorization theory (Tajfel & Turner, 1986), self/social categorization (Turner, 1987), and the attraction-selection-attrition framework (Schneider, 1987. These theories have similar perceptions, averring that teams share a social identity based on their social-category partisanship. For example, individuals describe themselves according to their association in several groups such as demographic, political, religious, social, and work (West et al., 2005).

Social-identity researchers have proposed that team identity significantly promotes collaboration within the team. Team members are attracted to, and show preference for, interaction with others who have common demographic

characteristics (Lauring & Selmer, 2012). Researchers have also suggested that identity has a direct influence on trust, which functions as a facilitator of the identity-cooperation relationship (West et al., 2005).

Similarly, common-ground theory (Clark, 1996) indicates that individuals rely on common knowledge, beliefs, and suppositions by communicating verbally or non-verbally with each other to relax their relationship and build trust. Indeed, the more common ground the individuals can find, the better the communication (Olsen & Olsen, 2000). Technologies can help individuals to work, collaborate, and study remotely. Olsen and Olsen (2000) argued that when members of a group share a great deal of common ground, they are ready for collaboration, collaboration technology, and organizational management for diversity, and will have a chance to succeed in remote work.

Collaboration readiness is participants' willingness to engage, collaborate, and communicate with others (Olsen & Olsen, 2000). In contrast, collaboration-technology readiness "refers to the difficulties individuals face in adapting and bringing collaboration technologies into use" (Bjørn et al., 2014). Organizations should experience and adapt advanced collaboration technologies in small steps in their structures and practices. Individuals should facilitate, organize, support, and associate themselves with cooperative activities. CSCW researchers are challenged in how to design and bring "stability, availability and accessibility to collaboration technologies to support frequent interaction across time and space" (Bjørn et al., 2014). However, social-networking technologies have made life easier for so many people to communicate and collaborate.

Organizational management for diversity encompasses the organizational culture, behaviour, practices, and contexts which impact collaboration across distance. The structural composition of the organization and effective leadership should support and enhance collaboration across distances to help participants establish common ground. Establishing common ground remotely through technology can be problematic for several reasons such as: language, culture, difficulties in understanding the salience of information, and interpreting the meaning of silence.

In addition, several theories and models relate to diversity. One example is the transition model (Adams et al., 1976), which has been used widely to describe how people understand and manage new changes in their lives such as new cultural experiences or illness. Another similar model is the culture-shock model developed by Oberg (1960), which describes the process of a new arrival adjusting to a new

cultural environment, for example an immigrant, business person, worker, or student. The new arrival may feel frustrated or anxious as a result of being in unfamiliar surroundings. This experience may contain four phases: honeymoon, regression, adjustment, and recovery. However, as mentioned above, this review will not examine each diversity characteristic; rather, it will consider that all people on teams or in groups are diverse individuals, with varying characteristics. Table 1 summarizes theories on diversity.

Table 1: Diversity theories in-group

Theory	**Definition**
Similarity-Attraction Hypothesis (Byrne et al., 1966),	These are theories that have a similar perception, which is that "teams share a social identity that is based on their social category partisanship". For example, to a greater or lesser extent individuals describe themselves according to the fact that "their membership in various groups […] may include demographic, political, religious, social, and work groups" (West et al., 2005).
Social Identity Theory (Tajfel & Turner, 1979)	
Social Categorization Theory (Tajfel & Turner, 1986)	
Self/Social Categorization (Turner, 1987),	
The Attraction-Selection-Attrition Framework (Schneider, 1987)	
Common Ground Theory, (Clark, 1996)	Individuals rely on a common basis of knowledge, belief and suppositions by communicating verbally or non-verbally with each other to relax their relationship and build trust between them.
Transition Model (Adams et al., 1976)	A person understands and manages new changes in their life such as experience and cultures. People mainly go through various fast or slow repeated phases of the process of adjustment.
Culture Shock Models (Oberg, 1960)	The process of the adjustment to new cultural environments of a new arrival, such as an immigrant. This experience contains four phases: honeymoon, regression, adjustment and recovery.
"Distance Matters" framework Olsen & Olsen, 2000	The more common ground individuals can find using technology, the better the interactions are.

2.4 Models of group-behaviour development

Several group-behaviour models are described in Table 2. These models can be useful in understanding group behaviour and trying to help people overcome their possible challenges and enhance their possible motivations.

Table 2: Classic models of team development (Kozlowski et al., 1999)

Source	Early Formation Stages		Development Stages		Disband-ment
Bion (1961)	Dependency	Fight/Flight	Pairing	Work	-
Caple (1978)	Orientation	Conflict	Integration	Achievement	Order
Francis & Young (1979)	Testing	Infighting	Getting Organized	Mature Closeness	-
Gibb (1964)	Acceptance	Data Flow	Goals and Norms	Control	-
Hill & Grunner (1973)	Orientation		Exploration	Production	-
Kormanski & Mozenter (1987)	Awareness	Conflict	Cooperation	Productivity	Separation
Modlin & Faris (1956)	Structuralism	Unrest	Change	Integration	-
Tuckman (1965)	Forming	Storming	Norming	Performing	-
Tuckman & Jensen (1977)	Forming	Storming	Norming	Performing	Adjourning
Whittaker (1970)	(Pre-affiliation)	Power and Control	Intimacy	Differentiation	-
Yalom (1970)	Orientation	Conflict	Intimacy		Termination

Tuckman's (1965) model is appropriate for HCI researchers as it is a linear, sequential-stage model that can be used for 'simple teams' with static tasks, unspecified roles for members, and a shortage of previous experience working with one another or for similar sorts of tasks (Kozlowski et al., 1999). Moreover, this well-sited model has been used as the basis for other models (Morgan et al., 1993). This model provides various opportunities for technology design. For example, each stage has different characteristics, behaviours, and goals that will be explained in the following paragraph.

2.4.1 Tuckman group-behaviour model

Tuckman (1965) developed a team-behaviour model containing the following four stages, each with varying characteristics, behaviours, and goals:

- Forming: individuals get together initially to learn about each other and form a group. At this stage, the members of a group usually behave in a way that can be accepted by others and prevent controversy or conflict by avoiding any serious issues; they stay within their comfort zone.

- Storming: members leave their comfort zone and may feel they are winners or losers; thus, they will try to set rules that can stop conflict.
- Norming: in the agreement stage, the group determines tasks, goals, and rules of engagement.
- Performing: the group should start to be effective in meeting their goals.
- Adjourning: 12 years later, Tuckman (1965) added this stage to describe the process of ending the group structure and moving on.

In this model, the earlier the stage, the longer it takes to reach agreement and take different decisions. Therefore, each stage needs different design features to satisfy users' needs. In this thesis, the technology aims to shorten the period of the early formation stages to save time, space, money, effort, and energy. However, other researchers have studied which features make successful teams, and these will be discussed in the next section.

2.4.2 Hackman's conditions for successful teams

Scholars over decades have also developed and improved several models of team effectiveness (Hackman, 1987; Hackman & Morris, 1975). However, more recently, researchers have recommended trying to identify the conditions that enable a team to be successful (Hackman, 1990). Hackman (1990) identified six conditions to enable a team to perform very well:

1. The team is fully appropriate for the task to be performed;
2. The team members perceive themselves as an intact performing unit;
3. The team has an understandable, trustworthy, and engaging direction for its task;
4. The formation of the team's task, composition, and core norms of conduct should support and facilitate competent teamwork rather than obstruct it;
5. The organizational context that fulfils the needs for teamwork provides help, support, and encouragement, and reinforces excellence throughout policies and systems;

6. Team members should receive sufficient expert coaching when it is most needed and they are ready to receive it.

For HCI researchers, these conditions are important to consider when designing technologies that aim to help diverse group members work effectively. In this thesis, some of these conditions will be considered in the design process because these conditions are controllable and relate to team relationships such as the second, third, fourth and fifth conditions. The next section will explain the different levels and types of diversity in a group, to improve understanding of group diversity.

2.5 Diverse-group categories

Scholars have identified several categories of diverse groups, with some using levels and others dimensions to explain types of diversity and the impact of these categories on the group. Below are the most common categories.

2.5.1 Diversity levels

Harrison et al. (1998) identified two common types of diversity:

- **Surface-level**: associated with visible attributes such as the demographic attributes of age, gender, and ethnicity;
- **Deep-level diversity**: differences in the underlying attributes that become apparent only after interaction with a person such as attitudes, behaviours, personality, values, norms, knowledge, skills, experiences, and beliefs.

2.5.2 Two dimensions diversity

Loden and Rosener (1991) categorized diversity into two dimensions: primary and secondary:

- **The primary dimension** is similar to the Harrison et al. (1998) category of surface-level diversity, describing the visible characteristics that exert primary influences on individuals' identities such as age, gender, race, ethnicity, sexual orientation, and mental or physical abilities;

- **The secondary dimension** is the less visible characteristics that exert more variables on people's identity and add greater richness to the primary dimensions of diversity such as education, background, religion, language, family status, lifestyle, communication style, experiences, and income, similar to the Harrison et al. (1998) deep-level diversity.

2.5.3 Three dimensions diversity

Rijamampianina and Carmichael (2005) argued that diversity has three dimensions: primary, secondary and tertiary.

- **The primary dimension** consists of race, ethnicity, gender, age, and disability;

- **The secondary dimension** includes religion, culture, sexual orientation, thinking style, geographic origin, family status, lifestyle, economic status, political orientation, work experience, education, language, and nationality;

- **Tertiary dimensions** are beliefs, assumptions, perceptions, attitudes, feelings, values, and group norms.

However, the secondary and tertiary dimensions can interweave to create unique mixtures of individuals, profiling both different and similar characteristics (Rijamampianina & Carmichael, 2005). These characteristics may change over time.

The three dimensions model is very important to consider when designing technology. These dimensions are dynamic and may influence each other and emerge in different ways in diverse contexts, making management difficult. The primary dimensions are similar to the Harrison et al. (1998) surface-level diversity, whereas the secondary and tertiary dimensions are similar to deep-level diversity. Therefore, in this thesis, the deep-surface diversity category was used in designing the studies and technology, taking into consideration the challenges deep-surface diversity groups can face when they collaborate.

2.5.4 Impact of diversity categories on a group

Researchers of diversity mainly study whether and how the heterogeneity or homogeneity of the team members' characteristics relate to team processes,

performance, and productivity. Harrison et al. (1998) compared the effects of surface-level diversity, demographics, and deep-level attitude diversity on group social integration among hospital and supermarket teams. The researchers showed that deep- and surface-level diversity have different impacts on group performance at different times, minimizing the effects of surface-level diversity and maximizing the effects of deep-level diversity, and creating an opportunity for group members to interact effectively. However, Bowers et al. (2000) found that diversity levels do not clarify mixed results from a meta-analytic integration of 57 effect sizes from 13 studies (567 teams, 2,258 participants). Bowers et al. (2000) aimed to verify if the homogeneous team in terms of gender, ability level, and personality would have better levels of performance than teams that were heterogeneous on these attributes.

Divergent study results may accrue from a variety of factors including the nature of the task and its difficulty. Moreover, diverse individuals can cause study results to vary from one another, as individuals are very complicated to understand or categorize. Instead, a researcher should help individuals overcome challenges and motivate them to work effectively. Research in this thesis aims to prepare team members to overcome possible challenges related to different contexts, tasks, or people before beginning a project. The next section will explain the impact of diversity on teams.

2.6 Impact of diversity on groups

The impact of diversity on teams is quite controversial. Researchers have identified three findings regarding the impact of diversity on physical groups of people. First, diversity in physical groups can lead to negative effects such as misunderstandings, reduced outcome quality, conflict, and employee turnover (Jackson et al., 1995; Milliken & Martins, 1996; Powell et al., 2004). Second, many researchers have found positive impacts from diversity (Haughton, 2008; Jackson et al., 1991; Paul et al., 2005; Ely & Thomas, 2001) such as creativity, innovation (Kossek & Pichler, 2006), and competitive advantage (Cox, 2001; Kochan et al., 2003). Finally, a few researchers found no impact from diversity on group outcomes (Bowers et al., 2000; Rijamampianina, 1999). For example, Wegge et al. (2008) reported that several studies showed age diversity can negatively impact group performance (e.g. Williams & O'Reilly, 1998); in contrast, other studies have mentioned that researchers not only found no negative effects but discovered that age diversity can benefit groups (O'Reilly, Williams, & Barsade, 1998).

Many researchers have indicated the need for more studies to examine contextual variables and understand these mixed findings, such as society-level factors, time, and managerial approaches to diversity (Olsen & Martins, 2012). Numerous researchers have argued that because managerial approaches to diversity are controllable, depending on the organization's diversity-management approaches, organizations can be enhanced or harmed by diverse individuals (Cox, 1993; Konrad & Linnehan, 1995).

However, some researchers have argued that diversity does not impact group or organizational outcomes, but instead influences the four main organizational processes of motivation, interaction, visioning, and learning (Rijamampianina, 1999). Consequently, diversity management has been implemented in organizations due to the increase of diverse individuals in the workforce (Mor Barak, 2013). Furthermore, organizations have employed diversity management for moral and ethical reasons, such as assuring policies support equal-employment opportunities (Mor Barak, 2013; Shen et al., 2009).

2.7 Diversity management in a group

Scholars have argued that managing diverse groups properly could be constructive, such as by creating a fair and safe context for the whole workforce (Mehra et al., 2006; Patrick & Kumar, 2012; Rijamampianina, 1999; Ely & Thomas, 2001). In addition, the integration of diversity is a shared factor amongst high-performing diverse groups (Ely & Thomas, 2001).

Diversity management is defined as "planning and implementing organizational systems and practices to manage people so that the potential advantages of diversity are maximized while its potential disadvantages are minimized" (Cox, 1993). Organizations should adopt flexible and wide-ranging initiatives and strategies in managing diversity such as education, training, and mentoring relationships (Cox, 1991).

Many scholars have argued that diversity management has implications and impacts at multiple levels, such as the individual, group, and organizational (Olsen & Martins, 2012). Diversity management can have major negative or positive effects on organizations with diverse individuals (Cox, 1993; Konrad & Linnehan, 1995), and the next section provides an overview of diversity management in actual situations.

2.7.1 Managing new members of a diverse group

The process of managing new diverse members of a group to adapt to their new experience is one of the challenges organizations face. Scholars refer to this process as socialization (Choi et al., 2010), and "In its most general sense, organizational socialization is the process by which an individual acquires the social knowledge and skills necessary to assume an organizational role" (Van Maanen & Schein, 1979, p. 211). The socialization of new diverse members of a group is important to the overall performance and satisfaction of the individuals in that group (Saks et al., 2007). Theories related to socialization follow.

2.7.1.1 Van Maanen and Schein socialization theory

Van Maanen and Schein (1979) introduced six tactics that organizations can employ to enhance the socialization experiences of the new diverse members of a group:

- **Formal vs. Informal:** new diverse members may receive formal induction, or be inducted informally;
- **Collective vs. Individual**: new diverse members may learn as part of a group of new diverse members;
- **Sequential vs. Random**: new diverse members may receive a coherent sequence of learning or a random set of learning;
- **Fixed vs. Variable**: new diverse members may receive a clear and fixed agenda or have general ideas;
- **Serial vs. Disjunctive**: new diverse members may have "experienced mentors who help them learn their jobs or not";
- **Investiture vs. Divestiture**: new diverse members may use their own way of accomplishing a task or need to change and adapt to an organizational plan.

This theory is the most popular typology of organizational socialization. Work by Van Maanen and Schein on organizations (1979) has influenced many studies which used these techniques to socialize new diverse members of a group, and consider how they affect the adaption of new members (Gruman et al., 2006; Saks et al., 2007).

2.7.1.2 Institutionalized socialization and individualized socialization

Based on the six tactics suggested by Van Maanen and Schein (1979), Jones (1986) proposed two important terms: institutionalized socialization, and individualized socialization. Institutionalized socialization tactics include collective, formal, sequential, fixed, serial, and investiture tactics. These help organizations decrease new diverse members' anxiety and uncertainty, and adapt to their new roles in the organization. Individualized socialization tactics involve individual, informal, random, variable, disjunctive, and divested tactics, which are also important (Jones, 1986). New members believe organizational change is as important for innovation as personal change (Saks et al., 2007).

Technologists also use these tactics in their designs. For example, hattrick.org, a social-networking technology and also a football management game, uses highly institutionalized techniques. New members are socialized with experienced players in online forums where questions are answered. Clear processes provide roles in the game and motivate new members to train at "Hattrick University" (Choi et al., 2010). In contrast, Wikipedia uses more individualized techniques to socialize new members, by providing no training to Wikipedia's editors (Choi et al., 2010), although there are policies delineating how an editor should behave. It would also appear that new members who have greater knowledge about the group's aims are more pleased and involved with their work than those who possess less knowledge (Choi et al., 2010).

2.7.2 New-member management in organizations

For this thesis, several websites were perused for a total of 30 different international organizations. The goal was to discern differences between them and learn about the organizational applications of new diverse-member management (see Appendix 5 for references). Of these organizations, eight were medical, two governmental, 20 academic, and ten business. As an example, five companies were chosen from the top 50 World's Most Admired Companies 2015 according to the Fortune Global 500, as follows: General Electric, from the top ten; Toyota, top 20; Samsung Group, top 30; Unilever, top 40; and finally, Volkswagen Group, top 50. Five additional organizations were randomly chosen.

To investigate the example of academic organizations, the two largest recruiters of international students in the United States and the UK were chosen because they are two of the ten most common destination countries for mobile students

(UNESCO Institute for Statistics, 2015); other examples were randomly chosen from different levels to see how they diverged. Furthermore, several questions were sent to the human resources departments of several organizations to ask them about diversity management and the preparation of their new workforce. Unilever was the only organization to respond.

Below is a summary of information found on the above organizations' websites. From most of these, no clear strategies or plans emerged of how organizations manage their new members. However, they advertised themselves as wonderful places to work, and indicated how they facilitate the ability of new members to do their work. Organizations in general employ a variety of tactics to help new diverse members adapt in the organization. However, of the organizations studied, most required diverse individuals but were selective in choosing those who exhibit a type of personality which would fit their culture (Choi et al., 2010; Unilever, 2015).

The Volkswagen Group website stated, "We are looking for strong academic achievers but we also want well-rounded ambitious people with plenty of motivation and a 'can-do' attitude" (Volkswagen.co.uk, 2015, para. 2). Samsung stated, "More importantly, we expect you to be highly motivated, enthusiastic, passionate and able to thrive in a team environment. Also, the ability to think on your feet and to make your voice heard is vital" (samsung.com, 2015, para. 1).

Second, all organizations overviewed employed a variety of tactics as part of their induction programmes to prepare new employees/students for the new environment. Organizations may provide soft and hard copies of documents to new employees before or after the new individuals arrive. These documents contain necessary information about the organization, such as history, vision, mission, goals, structure, policies, rights, and safety. Furthermore, some organizations require new employees to attend several induction programmes on safety rules, visiting the factory, and visiting the market (Unilever, 2015). Unilever, for example, uses a virtual portal where employees can go on a virtual journey to explore various departments in the company (Unilever, 2015).

In contrast, Nissan had created a social-networking site for their staff to socialize and support each other:

> Nissan established Ryoritsu Park as part of its internal social networking site to provide a community for employees to share information and support the balance between career and childcare needs. The community is open to current mothers and fathers,

as well as employees who are considering having children (Nissan-global.com, 2015, para 11).

In addition, the University of Southern California has an orientation programme for new faculty in advance of their arrival. This programme helps new faculty gain early access, seven months before their start date, to several university services such as creating accounts, library services, and a campus map (faculty.usc.edu, 2015). Also, the university has varying orientation programmes for different schools for students. These programmes are offered to all new students, who can register and attend an orientation session (dornsife.usc.edu, 2015). The organizations described above are trying to use technologies to process the socialization of new, diverse members. These preparations require a great deal of time, space, cost, energy, and effort from both the individuals and organizations.

Hence, the research in this thesis aims to explore collaboration in diverse teams to inform the design and evaluate social-networking technologies that can be used to persuade diverse members in a group to find common ground and work in a healthy environment, such that each member can overcome their possible collaborative-interaction challenges before they start their new experience. The next section provides an overview of certain theories related to diversity.

2.8 Diversity and knowledge sharing

The study of diversity in social interactions has received considerable interest from researchers in various fields: psychology, sociology, philosophy, education, and computer science. Diverse people encounter several challenges as they collaborate and exchange knowledge and experiences in group work. Social-networking technologies make networking easier and faster than before. Individuals can access social-networking tools and interact with colleagues or members at any time and place. However, exchanging some types of knowledge such as tacit knowledge can be critical through these technologies (Zhang et al., 2012). The ultimate goal of this study is to enhance the ability of diverse people to interact and share knowledge and expertise; thus, the next sections will present a summary of knowledge sharing.

2.8.1 Knowledge-sharing overview

Knowledge sharing is a significant area of knowledge management (Hendriks, 1999). Moreover, it is one of the main research streams in CSCW (Ackerman et al.,

2013; Ackerman & Halverson, 2003), as well as other areas of research such as home and office. Knowledge sharing is "the provision of task information, know-how to help others and to collaborate with others to solve problems, develop new ideas, implement policies or procedures" (Wang & Noe, 2010). The sharing of knowledge can be a very challenging activity, depending on the context, individuals involved, and type of knowledge to be shared.

Many researchers consider all information to be knowledge but knowledge includes information and proficiency (Wang & Noe, 2010). Polanyi argued that two categories of knowledge are important to consider: explicit knowledge and tacit knowledge (Grant, 2007; Panahi et al., 2013). These two types of knowledge have become commonly discussed topics in the knowledge-management community (Grant, 2007).

In the context of this study, tacit knowledge is knowledge usually obtained by the process of learning independently or as a group (Panahi et al., 2013). It relies on its owner, because it results from personal experience, and this can make it challenging to communicate and share (Panahi et al., 2013). In contrast, explicit knowledge is typically encoded and published through formal mechanisms such as lectures, manuals, books, journals, and papers (Grant, 2007; Nonaka & Takeuchi, 1995) and is thus significantly easier to obtain and share.

2.8.2 Knowledge sharing benefits

Knowledge sharing (KS) is highly important for organizations, because it reduces costs, saves time, improves team performance, enhances innovation and performance, and eventually helps the organization gain competitive advantage (e.g. Arthur & Huntley, 2005; Collins & Smith, 2006; Mesmer-Magnus & DeChurch, 2009). Furthermore, tacit KS improves the quality and accuracy of the work performed, as well as decision making and learning (Haldin-Herrgard, 2000; Selamat & Choudrie, 2004). Therefore, extensive time and money have been invested in knowledge management and the development of knowledge management systems by several organizations (Wang & Noe, 2010). Nonetheless, "Fortune 500 companies lose at least $31.5 billion a year by failing to share knowledge" (Babcock, 2004) due to misunderstanding how individual characteristics influence KS (Wang & Noe, 2010).

2.8.3 Knowledge sharing motivation

Individuals have various motivations that influence and motivate KS. This research focuses on aspects that may enhance individuals' motivation for KS.

Confidence can relate to engagement in KS (Wang & Noe, 2010). Furthermore, KS can strengthen the relationship and connections between participants (Reagans & McEvily, 2003) and motivate further KS whilst also enhancing the quality of information received (Reagans & McEvily, 2003).

Trust (Robert et al., 2009) or "swift trust," —a kind of trust that is temporarily formed by online teams —is very important for the maintenance of shared explicit and tacit knowledge in virtual communities (Panahi et al., 2012). Virtual-community studies have found that the number of direct ties and personal relationships positively affect KS (Chiu et al., 2006; Wasko & Faraj, 2005). Moreover, in a web-based professional community, individuals who preserve and strengthen their social ties by regular contributions are motivated to continue contributing to that community (Chen, 2007). Tacit KS needs social interaction, networking (Grant, 2007), experience sharing, observation, informal relationships, and mutual trust between individuals (Panahi et al., 2012; Wang & Noe, 2010). Hence, this study aimed to explore collaboration in diverse teams to inform the design of an online platform for informal relationships, networking, socialization, and building trust and confidence to enhance tacit KS between new diverse members in a group. However, there are many factors which challenge knowledge sharing among diverse members, and the next section discusses these.

2.8.4 Knowledge sharing challenges

A range of factors can limit KS, categorized as interpersonal, procedural, technological, and cultural (Ardichvili, 2008), unconsciousness of having knowledge, language, time, value, competitive advantage, poor social-networking skills, distance, age, gender, education, experience level, trust, and intellectual property (Haldin-Herrgard, 2000; Riege, 2005; Stenmark, 2000). However, the most challenging problem is social barriers (Hendriks, 1999).

International organizations have employees from various nationalities, cultures, and languages, which can create KS challenges (Ford & Chan, 2003; Minbaeva, 2007). The diversity of team members can limit the sharing of knowledge between themselves (Wang & Noe, 2010). Thus, the need persists to study and understand

the impact of individual personalities or dispositions in a team regarding KS (Wang & Noe, 2010). Moreover, studies are needed to examine differences between online KS and face-to-face interactions (Wang & Noe, 2010), and further studies are needed to show how cultural differences influence KS in emerging economies in countries and regions, such as in the Middle East (Wang & Noe, 2010). Hence, ways are needed to manage and help people overcome KS challenges (Zhang et al., 2010), such as high levels of diversity. Table 3 summarizes aspects of KS, benefits, motivations and challenges.

Table 3: Knowledge-sharing benefits, motivations and challenges

KS benefits	**KS motivations**	**KS challenges**
Reduces costs	The need for success, connection, survival and belonging	Interpersonal, such as: poor social networking skills, apprehension evaluation, anxiety based on fear of negative evaluations, unconsciousness of having knowledge, education and experience level
Save time	Enjoy, play	Procedural
Improve team performance	Socialization, networking, informal relationships, and tie strength social cohesion	Technological
Enhance innovation	Observation	Cultural
Gain competitive advantage	Trust	Lack of time
Improves quality of work	Confidence	Language
Improves accuracy of work performance	Individuals' personality	Competitive advantage
Improves quality of decision-making	Desire for recognition and respect	Intellectual property, distance, and lack of trust

2.9 Group and technology design (Groupware)

Studies of technology design for diversity and groups are discussed in this section. Groups have used technology increasingly for collaborative interaction, communications, and KS, and the use of technologies by teams has been studied widely by many researchers in various areas of computing.

2.9.1 Groupware overview

The earliest studies related to the invention of electronic mail (e-mail) were in the late 1970s. In the early 1980s, researchers studied the introduction of personal computing. Team use of technology started to become increasingly complicated and sophisticated. Many investigations expanded across topics and issues to generate theories and models to conceptualize the use of technology in teamwork, such as CSCW, group support systems, computer-mediated communication (CMC), and virtual teams.

Terzis and Nixon (1999) defined CSCW as,

> The scientific discipline that motivates and validates groupware design. It is the study and theory of how people work together, and how computer and related technologies affect group behaviour. CSCW is an umbrella collecting researchers from a variety of specialisations – computer science, cognitive science, psychology, sociology, anthropology, ethnography, management, information systems – each contributing a different perspective and methodology for acquiring knowledge of groups and for suggesting how the group's work could be supported.

Groupware and CSCW are used interchangeably as synonyms.

2.9.2 Groupware advantages

Groupware was designed to help groups find common interests upon formation, to overcome communications barriers and motivate teams' collaborative interaction for effective teamwork (DeSanctis & Gallupe, 1987). These technologies save time, space, and costs on travel for meetings. Moreover, they may motivate and encourage communications in organizations and leverage professional expertise, which facilitates group problem solving, KS, and management (Bhatt et al., 2005). Groupware needs human interactions to support a collaborative work environment.

Grudin and Poltrock (1997) developed a diagram (see Figure 1) to show the focus and provide examples of computer-systems development and its users. The first ring and the largest shaded ring in the figure show for the mainframe, designed for organizational goals. The smallest inner shaded ring shows applications designed for individual users of PCs. The ring after the biggest shaded ring is the project support, such as a group design support system and workflow automation systems; such systems are usually designed for large groups. The next unshaded ring is the systems designed for small groups such as workstations and PCs.

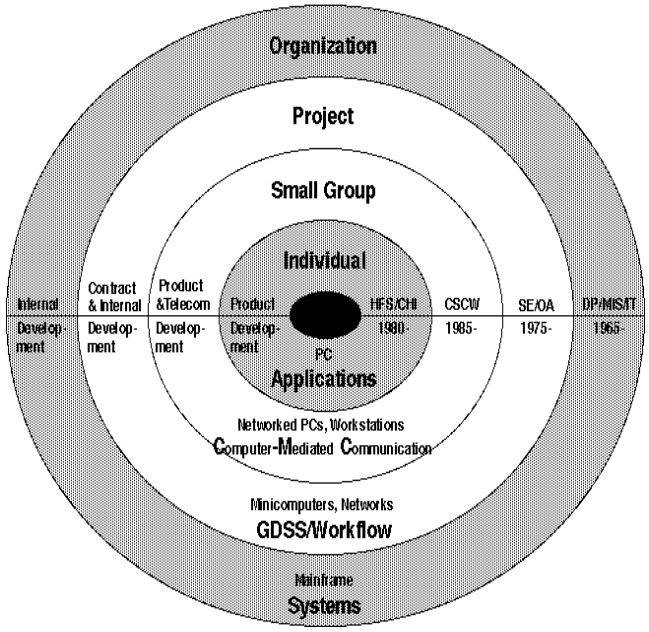


Figure 1: The focus and examples of computer systems development and its users (Grundin, 1994)

2.9.3 Groupware classifications

Groupware is classified based on the following:

1. The time and space of the cooperative work, such as time/space matrix (Dix et al., 1998; see Figure 2);

2. The system function, such as meeting support;

3. The structural support function of the technology. Fuks et al. (2005) categorized groupware using a 3C collaboration model as follows:

   - Communications: CMC: direct communication between participants is supported such as through e-mail and teleconferencing;

   - Cooperation: common experiences are captured by collaborative interactions: writing or drawing, such as electronic meeting rooms, group decision-support systems, and document-management systems;

   - Coordination: shared applications and artefacts: users interact with a shared work object.

Figure 2 shows the first classifications of groupware: a time and space matrix of collaborative work, developed by Dix et al. (1998). The figure represents where and when collaborations between users of groupware can occur. Common names for axes are for time (synchronous/asynchronous), and place (co-located/remote different place, same place, same time, and different time).

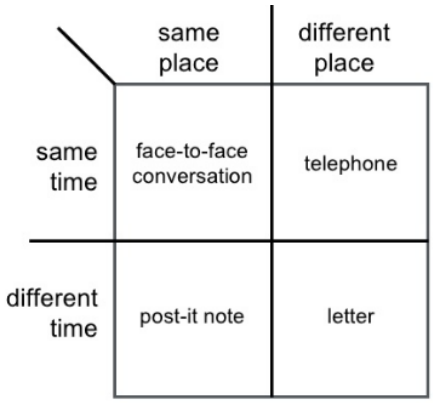


Figure 2: Time/space matrix (Dix et al., 1998)

Designers can face various design issues when they design groupware systems because these systems should facilitate the following challenging requirements:

- Different kinds of conversations and multiple users;
- Coordination mechanisms and collaborative interactions;
- Sharing knowledge and expertise;
- Creativity and innovations;
- Social protocols and organizational issues;
- Management issues and enabling customization.

Grudin (1994; see Table 4) argued that developers have eight challenges in developing groupware for social dynamics.

Challenges	**Problem**	**Solutions**
Disparity in work and benefit	"Groupware software usually requires extra work from users who do not perceive a direct benefit from the use of it."	"Create benefits for all group members during design stage."
Critical mass and prisoner's dilemma problems	"Groupware may not enlist the "critical mass" of users required to be useful, or can fail because it is never to any one individual's advantage to use it."	"Build in use incentives, emphasize individual/group benefits."
Disruption of social process	"Groupware can lead to activity that violates social taboos, threatens existing political structures, or	"Understand the subtleties of the target environment. Work with representative users."

	otherwise demotivates users crucial to its success."	
Exception handling	"Groupware may not accommodate the wide range of exception handling and improvisation that characterizes much group activity."	Learn how work is really done
Unobtrusive accessibility	"Features that support a group process are used relatively infrequently, requiring unobtrusive accessibility and integration with more heavily used features."	Integrate group features with individual activity, make the design accessible and add groupware features to already existing systems.
Difficulty of evaluation	"Group context introduces social, motivational, economic, political dynamics that are hard to measure."	
Failure of intuition	"Intuition in products development environments are poor for multiuser applications, resulting in bad management decisions and error-prone design process."	"Involve real users early on in the design process."
The adoption process	"Groupware requires more careful implementation and introduction in the workplace than product developers have confronted."	Cooperate with all possible users of the system.

Table 4: Eight challenges for developers to develop a groupware and social dynamics (Grudin, 1994)

These challenges can cause the following implementation issues, if not considered: interoperability, abuse, security, bandwidth, overload, and false expectations.

2.9.4 Groupware-technology theory

Media richness theory (Daft & Lengel, 1986; Dennis & Kinney, 1998) states that performance improves when team members use "richer" media for equivocal tasks that have two or more possible meanings. Adaptive structuration theory (Desanctis & Poole, 1994) studied "the production and reproduction of the social systems through members' use of rules and resources in interaction" (Desanctis & Poole, 1994, p. 25). Furthermore, task-technology fit theory (Goodhue & Thompson, 1995; Zigurs & Buckland, 1998) states that technology can have a positive impact on the performance of individuals if the technology-design capabilities match the task the individual must perform. The Goodhue and Thompson (1995) theory works at the individual level of analysis, whereas Zigurs and Buckland (1998) offered an

analogous model, working at the group level. Media-synchronicity theory (Dennis et al., 2008) looks at media synchronicity which is a "state in which individuals are working together at the same time with a common focus" (Dennis et al., 2008).

Many researchers reviewed technology-mediated teams including Dennis et al. (2001), Powell et al. (2004), and Hertal et al. (2005) for example. Their studies revealed several frameworks, including the group life cycle model of virtual teams (Hertal et al., 2005), in which "five phases are distinguished in the management of teams with high virtuality, including preparation, launch, performance management, team development, and disbanding."

For the input-process-output lifecycle model for virtual teams (Powell et al., 2004), the input contains design, culture, technical expertise, and training. Process entails socioemotional (relations, cohesion, and trust) and task processes (communication, collaboration, and task-technology fit). Finally, output is the measurement of performance, satisfaction, and innovation at the organizational, group, and individual levels.

Shen et al. (2014) stated that the organization needs to have experience in collaboration technology, such as collaboration readiness and technology readiness, before employing virtual teams. Table 5 summarises groupware technology-design theory.

Table 5: Groupware technology-design theory

Theory	**Author**	**Explanation**
Media Richness Theory	Daft & Lengel, 1986; Dennis & Kinney, 1998	argues that the performance improves when team members use "richer" media for equivocal task
Adaptive Structuration Theory	Desanctis & Poole, 1994	"the production and reproduction of the social systems through members' use of rules and resources in interaction" Desanctis & Poole, 1994
Task-technology Fit Theory	Goodhue & Thompson, 1995; Zigurs & Buckland, 1998	argues that technology can have a positive impact on the performance of an individual if the technology design capabilities match the task that the individual must perform
Media Synchronicity Theory	Dennis et al., 2008	"looks at media synchronicity as a predictor of communication performance" Dennis et al., 2008
Group Life Cycle Model OF Virtual Teams	Hertal et al., 2005	"which five phases are distinguished in the management of teams with high virtuality including preparation, launch, performance management,

		team development, and disbanding" (Hertal et al., 2005)
The input-process-output life cycle model	Powell et al., 2004	for virtual teams: technology divided into three categories; Inputs, Process and Output
Collaboration and technology readiness	Shen et al., 2014	"focuses on collaboration and technology readiness, positing previous experience as a critical factor prior to implementation of the virtual team" (Shen et al., 2014)

2.10 Diversity and technology design

HCI researchers believe technologies should be designed to add value to a person's life. Much HCI research promotes and encourages designers to recognize and value individual diversity. Some studies consider gender (for instance Grubbs & Milne, 2010; Matheson, 1991; Savicki & Kelley, 2000; Savicki et al., 1999). For example, Bardzell (2011) reported on feminist theories of knowledge production, arguing that "a community, and not individuals, is the subject of knowledge production" (Bardzell, 2011), and hence core feminist values such as fulfilment, agency, identity, equality, empowerment, and social justice (Bardzell, 2011) might be considered when seeking to design technology to support collaborations and KS in diverse communities.

Moreover, terms such as *culture* are often implicated in considerations of diversity, and HCI research has recently encompassed several studies related to cross-cultural design practice (Irani et al., 2010). For example, Irani et al. (2010) presented the term "postcolonial computing" as a specific orientation to the analytical process. However, in considering diversity at a cultural level, researchers often miss specific personal factors that can be equally important in explaining behaviour. Some recent HCI studies considered the "technospiritual" and reported on how faith-based communities use or resist Internet technologies for religious practices (Woodruff et al., 2007; Wyche & Griner, 2009). How diverse individuals share their beliefs face-to-face or online is missing in those studies. Furthermore, psychological studies found that groups with cultural diversity face challenges to communicate (Triandis & Suh, 2002).

In many cases, individuals consistently negotiate a boundary between physical and online interactions in their working lives, and the study of this question therefore needs to consider online and co-located interaction. Co-located verbal

communication can be much more difficult than online communication due to social anxieties, lack of social skills, and many other factors (Kappen et al., 2013). Thus, studies are needed to understand the interaction and collaboration between diverse individuals who are interacting physically and online at the same time, as well as how they manage themselves.

Table 6 summarises the diversity topics used for technology design.

Table 6: Diversity and technology design and evaluation

Diversity topic	**Example**
Culture	Irani et al., 2010; Triandis & Suh, 2002
Gender	Matheson, 1991; Savicki et al., 1999; Savicki & Kelley, 2000; Hoy & Milne, 2010
Feminist	Bardzell, 2011
Postcolonial e.g, "postcolonial computing"	Irani et al., 2010
Beliefs or Religion e.g, "techno-piritual"	Woodruff et al., 2007; Wyche, 2009
Context offline-online	Blum, 2004

2.11 Social networking technologies as persuasive technology

Fogg (2008) argued that SNTs are PTs. They are mass interpersonal persuasion (MIP), in that using mass media as interpersonal persuasion can occur. Facebook has become an open system in which anyone can build and distribute applications for Facebook, such as online gaming, and this has made it possible for MIP to exist.

As described previously, SNTs have several influential features that may persuade individuals to consider them as PT. Moreover, PT can play three functional roles: as tools to increase capability; as media to give interactive experiences; or as social actors to create relationships (Fogg, 2003). SNTs can have the same functional roles, serving as tools to increase the capability of users, making a person available for communication any time, any place, anywhere, and communicating with more than one individual simultaneously. Also, SNTs can serve as a vehicle for media by always providing diverse interactive experiences, hence allowing the user to rehearse behaviour. Finally, SNTs can function as social actors to create new relationships, through providing the positive feedback of "likes" and helping the user to become more social online.

Many studies show that SNTs are one of the key technologies used to facilitate KS (Cross et al., 2003). Therefore, social networking is a key to exchange knowledge and experiences between individuals. Studying social networking has been significantly highlighted in the domains of psychology, sociology, education, philosophy, and recently, computer science. The next section will review related literature about SNTs.

2.12 Social networking technologies

Individuals are social creatures by nature, and SNTs have enriched this nature by allowing individuals to share and distribute information using technology. They also provide spaces for interaction and collaboration that influence behaviours. They facilitate and trigger social behaviours through their persuasive design and features.

For instance, Facebook, Twitter, and LinkedIn are social media that help people network socially, by exchanging and sharing information, or by discussing activities. Therefore, SNTs can be defined as technologies that act as media for social networking. In this thesis, the term SNTs names those social-media tools that are used for social networking.

SNTs are considered PTs due to their potential ability to change the behaviour of users. Recently, different SNTs such as Facebook have become the most common and popular Internet-application tools (Coenen et al., 2006). Nowadays, communication and computing are the main features of any information technology (IT), which has a marked impact on the whole society (Zheng & Ni, 2006). In 1954, Barnes described a *social network* as "a map of the relationships between individuals, indicating the ways in which they are connected through various social familiarities." More than 50 years later, the Internet has melted away barriers around the usual physical networks, and facilitates SNT, thus modifying the nature of relationships, connections, communications and sharing among individuals.

In 1997, Leonsis used the term social media with the following definition as: "places where people can be entertained, communicate, and participate in a social environment" (as cited in Bercovici, 2010. Facebook, Twitter, LinkedIn, Instagram, YouTube, Snapchat *inter alia* are examples of SNTs having a considerable influence on the interactions of society, individuals, and organizations.

Herring (2004) considered SNTs to be another genre of CMC technologies, whereas Kaplan and Haenlein (2010) defined SNTs as "Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content". Moreover, Coenen et al. (2006) defined SNTs as "web-based systems that aim to create and support specific types of relationships between people."

In 2013, the Office for National Statistics reported that 43.5 million adults (86%) in the UK regularly used the Internet, with almost all people aged 16 to 44 years using it. Statistics also showed that almost all people in the UK aged 16 to 24 accessed SNTs, compared to 48% of adults generally.

2.12.1 Social-networking technology types

Different types of SNTs provide special services, according to their aims (see Table 7). For instance, LinkedIn and XING are for professionals, businesses, and individuals, whereas Instagram is for photo management and sharing photos socially. Twitter is mainly for sharing information and following conversations.

Table 7: SNT types and examples, gathered from different sources, Al-Kubaisy, a PhD first year report (2013)

Type	Definitions	Examples
Professional SNTs	provide different professionals to meet with experts and partners to share new events, and jobs and generate new ideas	LinkedIn ResearchGate
Photo, video Management	aim to help users to manage and share photos with their selected friends	Instagram Snapchat
Micro Blogging Sites	help users to find others with whom they would like to follow similar conversations	Twitter
Publishing Social Networking	provide facilities to create, share, publish and discuss blogs with others	Blogger, Live Journal
Content Ranking	"recommender systems", systems that help users to discover new and popular content on the web and vote for that content	Reddit StumbleUpon
Social Sharing	facilitate users to manage and share web pages, links, videos music	YouTube Pinterest
Social Gaming	deliver a fun, interactive and immersive experiences for players worldwide	Hi5 Happy
Community Social Networks	online communities allow users to make new friends who share similar interests and/or connect with friends in real life for share information, messages, pictures and video	Facebook, Google+ MySpace

The examples in Table 7 and many other SNTs have had a significant influence on the behaviour of people, as well as on the technological design of devices. The most

popular SNT is Facebook, with approximately 1.11 billion users around the world (Smith, 2013) and just under 33 million in the UK in 2013 (Rose, 2013).

Facebook has a large impact on relationships and ties outside the family among those who do not frequently communicate through other channels (Burke & Kraut, 2014). Moreover, different SNTs users experience the platforms differently. For example, Zhao et al. (2013) argued that Facebook consists of three functional regions: "a performance region, an exhibition region, and a personal region". Furthermore, SNTs can be used for friend-sourcing, providing informational benefits, and maintaining social bonds (Jeffrey et al., 2014).

Individuals use these SNTs differently due to cultural differences. Those in different nations can have different goals and use SNTs differently (Spiliotopoulos & Oakley, 2013). Moreover, Friedman et al. (2008) found that nationality can affect the degree of privacy concern, which includes interaction design aligned with cultural sensitivity.

2.12.2 Social networking technologies affordances

Treem and Leonardi (2012) argued that visibility, persistence, editability, and association are the four distinct affordances of SNTs which emerged from their analysis of the literature for any studies that had the key words "social media," "Web 2.0," "enterprise 2.0," or "social software" in organizations.

2.12.2.1 Visibility of knowledge

Visibility afforded to the user by an SNT tool can make it highly attractive. The purpose and intent of having knowledge visible is to share it across organizational hierarchies and internally in departments, and externally share knowledge across organizations, industries, and fields. Heightened visibility positively impacts work behaviour. For example, those with web logs feel they can assert and search for ideas that are useful and that have farther-reaching implications than first thought. Visible knowledge also contains an immense understanding of the nature and inclinations of users. Finally, visibility makes it easy to identify trends in activities in and around an organization (Treem & Leonardi, 2012).

2.12.2.2 Persistence of knowledge

Persistence relates to the availability of information even after the main provider is unavailable. For example, a web log is preserved online, even if the blogger has

left; it remains available for all consumers to view and use. High persistence makes it easy to garner reliable information and communication in an organization. Persistence helps sustain knowledge over long periods of time, making it less able to lose pertinence and more accessible. The Internet is boundless and can store huge amounts of data, furthering the capacity of an organization to garner knowledge (Treem & Leonardi, 2012).

2.12.2.3 Editability of knowledge

Editability is the ability of the user to mould the message according to need. Wikis and web logs are easy to edit, should a mistake occur before or during publication. The user can regulate the online profile with sections such as "About You" to provide the most desired information. The user can also aim for a target group by editing content according to the perceived need of the receiving audience. Finally, editability helps in sharing quality information by reducing errors, inconsistencies, and faults (Treem & Leonardi, 2012).

2.12.2.4 Association

Last, association by a user helps the audience connect to the uploader of the content, as social ties form between individuals who follow a blogger or online account. A secondary association occurs when an individual connects to information, for example, through wiki, web log, or a tagged contribution. Association can also help support social connections by forming an online community of sorts by sharing information. Association also helps users track and follow information they find relevant for themselves (Treem & Leonardi, 2012).

Hence, the affordances of SNTs can motivate social interaction between diverse individuals and overcome their interaction challenges. Individuals can make use of the affordances of the SNTs to draw others' attention, thereby motivating and persuading them to communicate and have shared interests.

2.13 Why is there a need for a new technology design?

An online social-networking system was chosen for several reasons. First, individuals undergoing a new experience, such as a course or job, may be asked to move to another city or country. If they are using online technology, space, time, cost, and effort can be saved. Second, hiding one's physical appearance may help

people with social anxiety to interact more effectively (McKenna et al., 2002). Third, many individuals prefer CMC such as SNTs rather than face-to-face communication (Gibbs et al., 2006; McKenna et al., 2002). Fourth, the combination of online and face-to-face communication improves socialization and a sense of togetherness among individuals and enhances the quality of learning and achievement (Delfino et al., 2005). Fifth, Dietz-Uhler and Bishop-Clark (2001) stated "that CMC leads to face-to-face discussions which are perceived to be more enjoyable and include a greater diversity of perspectives than face-to-face discussions not preceded by CMC". Finally, technology-design opportunities may accrue from the study of relationships that begin online and move to face-to-face interactions (Gibbs et al., 2006).

For example, Facebook offers many facilities for different types of communities, groups, and organizations such as academic, non-academic, profit and non-profit. These communities, groups, and organizations exploit the advantages of these facilities such as Facebook Pages, Profiles, Groups, and Community Pages.

The purpose of each tool is different. For example, Facebook Profiles are personal profiles designed for non-commercial use, and which represent individuals. Facebook users can follow profiles to see public updates from friends. Although only official representatives create and manage Facebook Pages, they look similar to Facebook Profiles with additional tools. Facebook Pages are public and generally available to everyone on Facebook for advertising and communicating broadly with fans of organizations, businesses, celebrities, and brands. In contrast, Facebook Groups can be created by anyone to establish a place for individuals to communicate and share their interests.

The three types of Facebook Groups are public, closed, and secret, and they can be used for different purposes:

- **Public groups:** Everyone can see, find, search, and post to public groups. These groups are used widely to create a community space and explore activities. People also tend to create a group aligned with their background, interests, home location, study, and political interests.

- **Closed groups:** Anyone can ask to join a closed group, see members, and see the group's name and description; however, only group members can see posts. People who do not want to create a community or share their posts with the public mainly use these groups. An example

of a closed group is when university students work together on coursework or a project.

- **Secret groups:** In such groups, no information is available to the public. Only secret group members can see the group name, descriptions, members, and posts. Secret groups can be good for a small group of people who know each other and there are no restrictions on the personal profiles seen by group members.

Facebook may not be a good choice for people collaborating for the first time, or who care about their privacy, such as in group work. For example, group work needs a professional technology space designed to facilitate their needs and enhance their professional interactions, persuade them to share their common ground, and overcome possible challenges. Therefore, a new SNT is required to overcome these issues and satisfy people's needs.

Even though Facebook provides capabilities for communication and collaboration facilities that can serve the members of a group, it is not the most appropriate method of interaction. Reasons to use Facebook or other SNTs vary but the main concern is privacy issues. For example, to connect with a friend one must accept the friend's request based on knowing one's identity and basic profile information; this means one's identity and social life are revealed to other friends.

Most users find they can use Facebook to express their feelings, connect, and share moments with friends. According to Wang et al. (2011), people regret posting and sharing on the SNT Facebook, largely because of sensitive topic content with strong sentiment, lies, or secrets, including the following:

- Personal and family issues
- Alcohol and illegal drug use
- Religion and politics
- Work and company.

Although Facebook posts are mainly shared with friends, people regret their posts and, in many cases, cause severe harm, including causing relationships to end and job loss (Wang et al., 2011). This issue confirms the need for new technology for groups, because Facebook is an inappropriate technology to enhance collaborative

interactions for group members to overcome challenges and promote motivation. In the next sections, SNT as PT is described.

The proposed novel system was designed to contribute to the fields of HCI and CSCW. The online features of the system are to be used before the new experience, to overcome collaboration and knowledge sharing challenges and enhance KS and collaboration.

2.14 Focus of this thesis

Based on the review of related work which identified research gaps, this thesis aims to make three main contributions as follows.

2.14.1 Exploring the period before the work starts

CSCW, group-support systems, CMC, and virtual teams are trying to study, design, or evaluate technology that can be used during group work. However, the management literature, such as that on the team behaviour model (Tuckman, 1965), illustrates that the model contains five stages. The first and most important stages are forming and storming. These two stages consume time, space, effort, energy, and money and thus need to be considered at the early stage. Therefore, this thesis focuses on how technology can be designed to enable and prepare diverse group members to prepare themselves before they start working together. This goal will also help save time, space, effort, energy, and money.

2.14.2 Deepening understanding of diversity challenges, motivations, and strategies

The literature shows that preparing individuals for a new experience such as coursework or a job is vital. Usually, this preparation begins when people meet each other face to face after the new experience has begun. However, some organizations try to prepare individuals before starting their new experience by providing them with soft and hard documents related to the new experience. Moreover, organizations use websites and SNTs to provide necessary information for individuals. Although this information is very important, it does not provide any detail regarding the people who will be involved in the new experience before they meet.

Organizations also employ induction programmes to prepare individuals for the new experience. The duration of these programmes can be long, depending on many factors such as diversity, which can consume additional time, space, cost, and effort. Moreover, these programmes do not facilitate individuals' needs to overcome personal challenges, and nor do they prepare individuals to work as a group. Furthermore, these preparations are insufficient to facilitate diverse individuals to overcome interactions, collaborations, and knowledge-sharing challenges before the beginning of the new experience. To do so, individuals need a healthy environment that can enhance informal relationships, mutual trust (Panahi et al., 2012), social interaction, networking, knowledge, and experience sharing (Grant, 2007). These challenges are significant as they help overcome issues of diversity and KS challenges, and enhance the quality and quantity of KS. Moreover, the impact of diverse group members can be negative, positive, or have no impact on the group work. These findings do not provide clear conditions that enable successful diverse individuals working in a group.

Thus, this thesis research began by focusing on gaining a deeper understanding of possible challenges, motivations, and strategies for diverse individuals working in a group. This focus was answered using several related qualitative studies with diverse individuals in two different countries—the UK and the KSA—discussed in greater detail in Chapter 4.

2.14.3 Using SNTs as PTs to enhance collaborative interaction

The research explored whether an environment that enhances collaborative interaction between diverse team members can be provided through a system using SNT.

SNTs, as a system, have several promising influential features that may persuade individuals to use it. Moreover, visibility, persistence, editability, and association are four distinct affordances of SNTs, used to motivate social interaction between diverse individuals and overcome possible collaborative interaction challenges. Individuals can make use of the affordances of SNTs to draw others' attention, thereby motivating and persuading them to share interests and collaborate effectively.

The proposed system is aimed at a new group of diverse individuals who have similar goals. These individuals can be committee members in organizations who

discuss and prepare work guidelines or students in a university to accomplish coursework. The system aims to establish a healthy common ground to overcome challenges and enhance trust, interaction, communication, and collaboration between individuals to aid and lead diverse individuals to the goal of effective KS. Hence, this research work investigated how to extend the design of SNTs to include a new functionality for new diverse members in a group to help them to socialize by interacting in advance of their physical work. This design can assist them to share knowledge by enhancing their motivation and being able to overcome possible challenges.

Chapter 3

Research design and method

This research is an HCI investigation aiming to understand collaborative interactions between team members with deep-level diversity, to inform the design of technology which will enhance the ability of diverse individuals working together for the first time to interact and collaborate. A user-centred design (UCD) was used as a tool for several reasons: to consider the needs of many diverse individuals; to include technology users throughout the design process by considering different studies and techniques; and to build a highly usable and accessible technology for these users.

Another important aspect of the study design was to identify a setting in which deep-level diverse individuals engage in collaboration, potentially yielding insights for future technology design, focused on a "challenging case". Postgraduate students are chosen to be the main participants in this thesis to represent the challenging cases. They are diverse and inherently have a very limited time to accomplish a variety of work, some of which must be performed in groups with others. Therefore, participants were recruited to discern their various experiences, allowing the design to consider diversity and challenging cases.

In addition, studies were conducted in two countries–the UK and the KSA–because these differ markedly in beliefs and culture, as do most of Saudi's education systems from UK study norms. For example, in the KSA, the study norm in most education systems entails having two campuses, separate buildings, separate staff, and separate students, all segregated by gender. In contrast, in the UK, study norms include generally mixing staff and student gender. Also, work sites in the KSA have different norms from those of the UK. These differences can give richness to the data collected because the designers sought possible challenges, motivations, and strategies that diverse individuals face in any collaborative group work. Various qualitative research methods were adapted to design and evaluate the system.

This chapter begins with a discussion of the user-centred design, followed by discussion of the research design explaining the different approaches used—semi-structured interviews and workshops to collect necessary data on the issues and design requirements. Wizard of Oz was used to design and evaluate the concepts. The details about the application of approaches and methods are provided in separate chapters.

3.1 User-centred design method in HCI

Empirically, a designer needs tools in the research process, as well as techniques and procedures, which are designed to ensure a technology meets the required levels of usability. For this thesis, the tool used in this research process was UCD. The UCD, as defined by the Usability Professionals Association, is a design approach run by information about the users of the product (Putnam et al., 2009).

Design focuses on the technology's users rather than on the technological possibilities or on designers/researchers. Design must initially involve users in the development process of the technology, including knowing who they are, what they need, what the technology is used for, testing it with users, investigating how they react to the design, and their experiences with using it. This process has the clear objective of improving the user experience (Lai & Yang, 2009). The goal of the UCD is the satisfaction of the needs of all potential users, adapting the technology used to their expectations, and creating interfaces that facilitate the achievement of its objectives (Lai & Yang, 2009).

UCD is a cyclical process and, according to ISO standard 13407, this process can be divided into four phases (Bim et al., 2007):

- **Understand and specify the context of use:** identify the users of the item, learn the use of it and under what conditions
- **Specify requirements:** identify user goals and needs;
- **Produce design solutions:** this phase can be subdivided into different sequential stages, from the first conceptual solutions to the final design solution;
- **Evaluation:** design solutions are validated through tests with users.

Therefore, this thesis adopts a UCD approach to extend the design of SNTs to include a new functionality and support diverse group members.

3.2 Research design

Figure 3 illustrates the stages of the research design cycle and the corresponding thesis chapters. The research design rested on two main aims:

- Explore a deep understanding of the possible challenges, motivations, and strategies individuals may face or use when they work in a group;
- Evaluate the new concepts and design, based on the findings of the exploration.

For these aims, this research was designed in several phases corresponding to these purposes. The following subsections explain these several phases, the method used, and the rationale for choosing them.

For each study in this thesis, the author employed a pilot study. This study applied the questions for the interviews with one to two participants to identify and eliminate potential problems. Researchers use a pilot test in many contexts to limit negative effects, economic losses, resources, and time. If the test is positive in these contexts, the project can proceed; otherwise, it will be left aside or modified to make it more feasible.

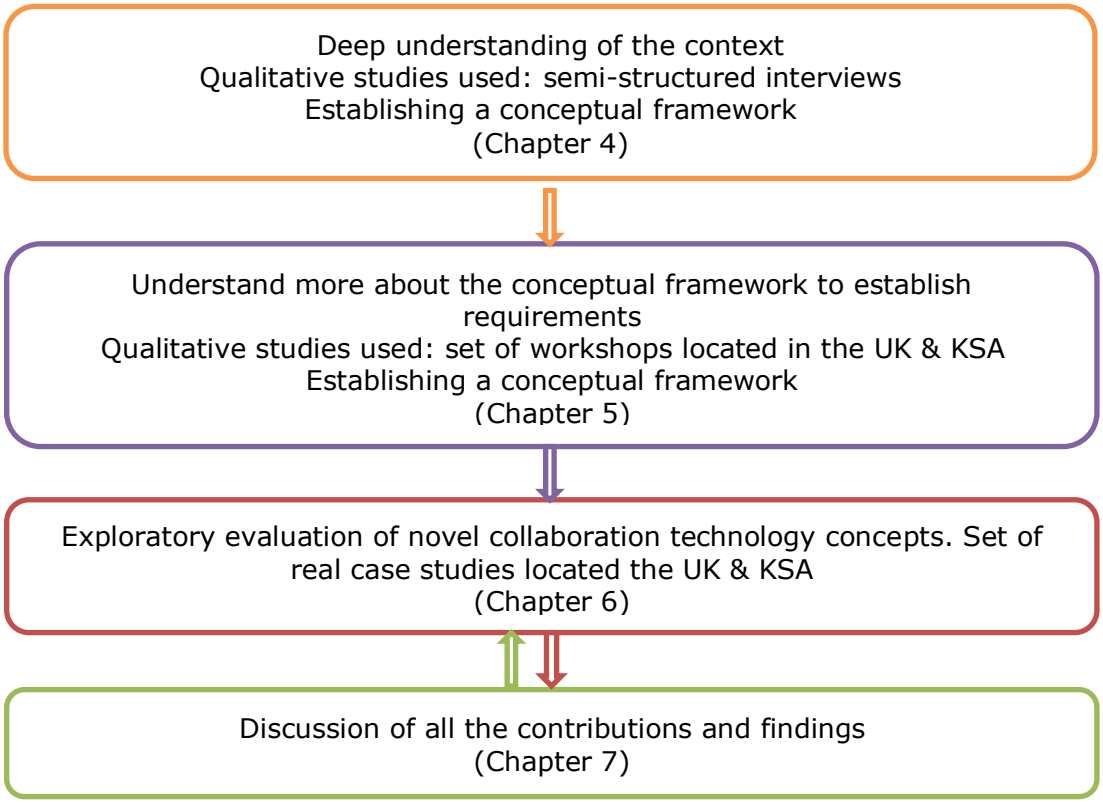


Figure 3: Design cycle and corresponding thesis chapters

3.2.1 Method and analysis process

This thesis aimed to explore and understand more about the challenges, motivations, and strategies that could be used in any group work. Therefore, the

issues were explored by trying to understand the experiences of diverse individuals. Then, these experiences were analysed using the seven phases suggested by Jabareen (2009) to develop conceptual frameworks, as described in Section 3.2.3. The following sections describe the method used to collect the qualitative data needed in this thesis.

3.2.2 Semi-structured interviews

The work focused on exploring and understanding the challenges, motivations, and strategies of group members to find opportunities to design and evaluate a technology. Therefore, semi-structured interviews were the main method used to explore the issues and understand respondents' attitudes about the subject under discussion (Guion et al., 2001).

This type of interview allows information to flow freely, and the answers given are not preconditioned to meet any particular standard. Because answers to basic questions were key to achieve the objective of the research, one may plan the collection of information through the establishment of a roadmap, with questions aimed at the intended goals (Rajmil et al., 2004).

Semi-structured interviews have the advantage of flexibility, enabling other issues to be explored during the interview, even when diverting from the interview guide. This exploration, in turn, allows for differences between participants to emerge (Guion et al., 2001). Conversely, the process has some disadvantages. For example, interviews require great agility by the interviewer, and may be especially useful for experienced interviewers. Although the interviewer may have previously prepared questions, most questions are generated as the interview proceeds, providing the interviewer and interviewee with the flexibility to elaborate on questions. A semi-structured interview can be planned or occur spontaneously (Lester, 1999). For this study, interviews were conducted in person in a private room. The following section explains the open-ended questions used in all interviews in this thesis.

Open-ended questions

Open-ended questions can elicit new information and allow the interviewee to respond, reflect, and think. Open-ended questions should start with the words what, where, why, when, how, and in what ways. The answers to open-ended questions are detailed, and participants need to think before answering. However,

it is difficult to tabulate and evaluate the answers because the content is as diverse as the thoughts of each participant (Cassell & Symon, 2004).

In research, asking for detailed answers encourages conversation. Open-ended questions do not limit answers to one-word responses; rather, they allow participants to feel that the interviewer is interested in their problem and understand its significance. By asking open-ended questions, researchers provide space to interviewees to speak freely, providing rich detail about the topic of discussion, while also giving the researcher an expanded response in a free form.

To obtain the desired result, questions must be properly used. Some advantages of open-ended questions are:

- Encourage the interlocutors to answer, in no way limiting themselves;
- Orient the interviewee to think, analyze actions, and stimulate the birth of thoughts that previously may have not occurred; and
- Give the interviewee the opportunity to voluntarily transmit information and freely talk about their feelings.

Disadvantages of open-ended questions are:

- Can precipitate a long answer that does not fit in the limited allotted time;
- Can provoke revelations that are not relevant to the case;
- May confuse an interlocutor who is not accustomed to answering general questions, thereby diverting the conversation; and
- May cause inconsistent and confused responses that are difficult to understand.

In this thesis, semi-structured interviews provided data to explore the experiences of participants, and to explain different concepts. The conceptual framework is explained in the following section.

3.2.3 Conceptual framework

A conceptual framework, as defined by Jabareen (2009), is "a network, or 'a plane' of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena. The concepts that constitute a conceptual framework support one another, articulate their respective phenomena, and establish a framework-specific philosophy."

The main features of conceptual frameworks suggested by Jabareen (2009) are:

1. "Each concept plays an integral role
2. Interpretative approach to social reality
3. Provides understanding
4. Soft interpretation of intentions
5. Indeterminist in nature and therefore do not enable one to predict an outcome
6. Developed and constructed through a process of qualitative analysis
7. The sources of data consist of many discipline-oriented theories that become the empirical data of the conceptual framework analysis". Jabareen (2009)

The methodology of developing conceptual frameworks in this thesis has followed seven phases suggested by Jabareen (2009) as follows:

- "Phase 1: Mapping the selected data sources
- Phase 2: Extensive reading and categorizing of the selected data
- Phase 3: Identifying and naming concepts
- Phase 4: Deconstructing and categorizing the concepts
- Phase 5: Integrating concepts
- Phase 6: Synthesis, resynthesis, and making it all make sense

- Phase 7: Validating the conceptual framework
- Phase 8: Rethinking the conceptual framework" Jabareen (2009).

3.2.4 Workshop (big focus group with exercises)

In this thesis, workshops were used (see Chapter 5) as a focus group to understand more about the concepts developed in Chapter 4. The goal was to explore and understand the challenges, motivations, and strategies of group members, and to create a conceptual framework for designing and evaluating a technology.

A workshop is interactive, managed and developed by researchers, involving all target participants. Focus groups include four common elements (Etzkowitz, 2003):

- Involvement of multiple respondents collected in one place;
- Interaction between participants is required. During focus groups, researchers use scripts to focus on specific problems and set up specific topics for discussion. At the same time, focus groups should allow for spontaneous statements by participants;
- A moderator conducts discussions.

The effectiveness of the focus groups is determined by the comfort of most people when involved in the discussion as part of the group. With proper implementation of the method, focus groups provide better opportunities for in-depth information than individual interviews. The success of focus-group research depends on several organizational and methodological factors (Barbour, 2008).

The moderator has only a short time to establish a trusting relationship with a group of strangers and encourage them to talk about topics that can often be uninteresting and unpleasant for them, as they often find it difficult to articulate their thoughts. Focus groups are used when it is necessary to obtain detailed data perceptions from group members about their perceptions of the object of research, its associations, and views associated with it, and to model behaviour (Berg et al., 2004).

For this thesis, the workshop was used to conceptualize and motivate participants to write their possible challenges, motivations, and strategies when they work in a

group. Worksheets were distributed to participants to make them feel comfortable and private, and discussion was optional to ensure individuals' privacy.

3.2.5 Wizard of Oz evaluation technique

Chapter 6 describes the Wizard of Oz technique used in this thesis to evaluate the novel collaboration technology concepts developed in Chapters 4 and 5. In this technique, the researcher (an analyst hidden behind a graphical user interface) "simulates" the interaction with a computer application that does not yet exist, so the observer can correct the operation of the application (Mäkelä et al., 2001).

The Wizard of Oz experiment is often used in the creation and evaluation of prototypes with the following objectives (Hudson et al., 2003):

- Testing the effectiveness of the system;
- Analyzing how people and the machine interact to extract linguistic information required for the actual system; and
- Providing training-recognition modules, because in some applications spontaneous speech recognition is required.

This method was used in this thesis alongside the low-fidelity prototype. Therefore, to test the concept of the design, the Wizard of Oz technique was assessed to be most effective.

3.3 Research and ethics

Studies discussed throughout this thesis received ethical approval from the School of Computer Science at the University of Nottingham. Participants were provided with consent forms and information sheets, found in Appendix 3.

In this thesis many participants were involved, so it was important to use information sheets and consent forms to meet three basic characteristics: sufficient information, understanding, and voluntariness. From an ethical point of view, the process by which the consent form was obtained is more important than its production (Flewitt, 2005).

Participants in all studies in this thesis were informed about the voluntary nature of participation and aware that they were able to leave the study without

explanation, at any time. Furthermore, they were informed about the restrictions of third-party access to data, procedures to preserve confidentiality, and the form of publication of results. Finally, the author divulged her identity, potential conflicts of interest, address, telephone number, and other forms of contact and availability to answer any questions that might have arisen during the investigation (Emanuel et al., 2000).

Finally, the study aimed to understand individuals' experiences. This data may contain many personal details that can affect the individual. To address these issues, participants made the decision to participate voluntarily. Also, the researcher considered the privacy, confidentiality, and anonymity of research participants, including their name, address, and sexual activity, before they chose to be involved in the study, to ensure that participants felt comfortable and willing to give details about their experiences.

Moreover, in this thesis, "challenging" environments for collaboration were chosen to be the subject of case studies. Challenging environments usually lead humans to make several bad choices that can damage their experience should these be revealed. For example, if an interviewee student revealed cheating on coursework, and if this information were revealed, they may lose their degree, causing them major harm. Hence, in all studies in this thesis, all participants' identities were fully protected by anonymization.

3.4 Summary

This chapter presents the approaches and methods employed in this thesis. These are the process of semi-structured interviews, described in Chapter 4, and the workshops, described in Chapter 5, to examine and detail the concepts. Finally, research ethics were considered in all aspects of study for this thesis.

Chapter 4

Exploratory studies to document the challenges, motivations and strategies for collaboration in challenging cases

4.1 Study overview

Chapter 2 argued that globalization makes diversity certain, especially the deep-level diversity which this thesis is looking for. Many organizations have increased diversity in their workforces, and the impact of diversity in a group can have positive or negative effects on organizational outcomes (see Milliken & Martins, 1996; for reviews). In addition, the integration of diversity is a shared factor amongst high-performing diverse groups (Ely & Thomas, 2001). However, scholars have argued that if diverse groups are managed correctly this can have constructive effects (Mehra et al., 2006; Patrick & Kumar, 2012; Rijamampianina, 1999; Ely & Thomas, 2001; Van Knippenberg & Schippers, 2007).

Many researchers have described a need for further studies to examine contextual variables in order to understand the mixed results on the impact of diversity on organizational outcomes, such as society-level factors, time, and managerial approaches to diversity management (Olsen & Martins, 2012). Therefore, this chapter presents an exploratory study that investigated issues related to collaborative group work. These investigations aimed to identify concepts that can be used to design a technology to overcome certain challenges of collaborative group work. These challenges are important to explore because group work is essential in many different organizations: academic, commercial, and governmental.

This chapter presents material prepared for interviews and describes the analytical process applied to data recorded during the interviews. The chapter concludes by presenting key concepts that emerged from this process. The aim of this study is to investigate participants' motivations to interact and collaborate. Moreover, the study aimed to understand their interactive behaviour and experience sharing with and without the use of technology to enhance their experience. Another goal was to identify the collaboration challenges they faced, and understand these challenges with and without technology. Moreover, the study aimed to understand the strategies participants used to overcome certain challenges. Finally, the interviews investigated the use of SNTs in group work.

4.2 Choice of setting

An important aspect of the study design was to identify a setting in which deep-level diverse individuals engage in collaboration, which has the potential to yield

insights for future technology design, focused on a "challenging case." Very challenging cases are often hard to find for a study, but are essential to identify possible critical motivations, barriers, challenges, and strategies. Challenging cases can reveal ideas and possibilities for future technology design. A real challenging case occurs where collaboration is particularly challenging, which in this case is by postgraduate MSc and PhD students at a UK university. Postgraduate students have diverse backgrounds, nationalities, ages, skills, experience, and knowledge, and inherently have a very limited time to accomplish a broad range of intensive work, some of which must be performed in groups with others. Alongside academic work, many participants have a broad range of motivations, including building their networks and learning other languages, engaging with and experiencing another culture, and taking the opportunity to visit nearby countries. Even in relation to academic performance, a range of motivations and pressures may be strongly influenced by creating future job opportunities.

4.3 Procedure

4.3.1 Participants

Ten students were recruited by the study through e-mail advertising. No compensation was offered to ensure that participation was due to interest, rather than for financial reasons. No food or other rewards were offered which could impede their ability to talk freely.

Participants spanned a range of backgrounds, experiences, nationalities, ages and genders, (see Table 8). Two groups of participants were recruited. The first group, who represented the challenging case, were six computer science postgraduate students from the University of Nottingham who had prior experience of working in groups: PSH1, PNA2, PBL3, PSB4, PNA5, and PCR6.

Table 8: Participant profiles

ID	Nationality	Gender	Age	Background	Doing
PSH1	West Saudi	Female	28	Computer Science	MSc in Advance computing science
PNA2	Nigerian	Female	27	Computer Engineering	MSc in IT
PBL3	British	Female	27	Math and philosophy	MSc in IT
PSB4	East Saudi	Female	26	Information System (IS)	MSc in IT
PNA5	Nigerian	Female	25	IS	MSc in MIT
PCR6	Chinese	Male	22	Information Technology (IT)	MSc in IT
PSF7	East Saudi	Female	30	English	PhD in English
PBL8	British	Male	26	English	PhD in Computer Science (CS)
PIN9	Indian	Female	24	IT	PhD in CS
PBR10	Indian/English	Female	47	Theater Designer	PhD in CS

The second group of the exploratory qualitative study took place as four semi-structured comprehensive interviews with PhD students: PSF7, PBL8, PIN9, and PBR10, to identify challenges, motivations, and strategies for collaboration from their previous experiences. For both aspects of the study, participants represented a wide diversity of dimensions (Rijamampianina & Carmichael, 2005): primary – race, ethnicity, gender, and age; and secondary –religion, culture, geographic origin, family status, lifestyle, economic status, political orientation, work experience, education, language, and nationality.

4.3.2 Interview process

Each participant was interviewed separately, face-to-face, in a private office, to ensure that they felt comfortable sharing their experiences. A semi-structured deep and long interview method was used to provide a consistent approach, whilst also allowing an in-depth exploration of issues of importance to respondents. Each interview was concluded when the researcher believed the collected data had reached the saturation point. On average, interviews lasted for about an hour.

Interviews were audio-recorded and transcribed in full, producing approximately around 66,400 words. A structured methodology was used to analyze the data. A summary of each natural meaning unit was written and these were categorized

under the three themes of *challenges*, *motivations,* and *strategies* for interaction and KS with diverse team members, as reported in the next section.

The author used various strategies to make interviewees feel free to express their thoughts and provide personal details, using a private office to give participants confidence. Also, the researcher gave examples of personal experiences and asked participants about their experiences to clarify any misunderstanding and conduct the interview in a friendly way.

The two exploratory qualitative studies took place in the School of Computer Science at the University of Nottingham. The information sheet, sent to participants before they participated in the study, explained the process and aim of the study. Interviews lasted about an hour. Participants signed a consent form before the interviews began to ensure their willingness to participate and give permission to record the interview.

Two pilot interviews were conducted to ensure the design of the questions was appropriate for obtaining the level of data needed to answer the aim of the research. Pilot studies helped test the relevance, acceptability, clarity, and face validity of the questions. Pilot studies were very successful and provided the encouragement to conduct the interviews with participating students using the same strategies.

4.4 Analysis process

The data were recorded using a recorder borrowed from the school, and then transcribed in full and analysed. Each of the ten interviews lasted about an hour. The first six interview transcripts contained about 32,250 words and the last four about 34,140 words, with the total being approximately 66,400 words.

The procedures of analysis involved six phases, each of which is described below. The aim of the interviews was to discern personal experiences of diverse individuals. Mainly, interviews sought to reveal participants' challenges, motivations, and strategies, and so the three major themes are challenges, motivations, and strategies.

Step 1: fully transcribe each experience

Each interview was fully transcribed so that it could be read through to get a sense of the whole.

Step 2: Bringing out relevant and irrelevant material

In Step 2, all collected material was opened and revised. Quotations, which provide vital information or practical experience about the three themes, were categorized and highlighted, to facilitate the process of analysis by eliminating uninteresting or repetitive materials.

Step 3: Categorizing data into three themes

The next step was categorizing each quotation into the three themes of challenges, motivations, and strategies. Each quotation was cut and pasted under its related specific theme into a new Word document. This process continued until the whole quotation was categorized under these three themes. These materials were used as reference for later analysis.

Step 4: Expanding themes by written description

To enhance understanding of the concepts of these materials, written data description included a useful summary of the contents of these quotations. Some interesting and useful information is presented in the body of the thesis, whereas some was not considered pertinent. The importance of this process was to reveal the interesting results and to confirm the analytical work.

Step 5: Highlighting novel data

This process focused on revealing possible challenges, motivations, and strategies that were not considered in the literature. Therefore, these themes were chosen because of their potential for designing future systems for diverse groups.

Step 6: Demonstrating key concepts

In this step, the three specific themes chosen earlier were developed into key concepts. The process began by choosing a short sentence for each that was indicative, memorable, and illustrative. In this process, quotations were taken from the raw interview transcripts. The following main headings represent these analysis steps, as presented in Chapter 3, by Jabareen (2009).

4.5 Data analysis

4.5.1 Thematic analysis

The following three sets of themes were produced through Steps 2–4 of the analysis. Each theme in each set is represented through a textual description, developed from a set of quotations grouped using the process identified above. This descriptive material then produced an interesting output from the interviews, and an intermediate stage in the process of identifying and presenting concepts.

4.5.2.1 Theme 1: Challenges

Participants reported many challenges before, during, and after the graduate school group-work experience. These challenges can be categorized in three different contexts: social, cultural, and operational. The following subsections describe these contexts and provide examples.

Social-context challenges

The social-context challenges reported by participants relate to social anxieties, language levels, and mistaken expectations. These social-context challenges occurred in the three different periods: before, during, and after the experience. The following are examples of each challenge related to the social context.

Social anxieties

Participants reported several challenges related to social anxiety before they participated in the course. For example, they lacked social skills, feared judgments, and were shy; this led three participants to have limited social interactions. For example, PSB4 expressed her fear of judgment since she was wearing a scarf on her head:

> *I was quite afraid … about how people would deal with me. I'm stranger compared to them.*

Another participant reported shyness and lack of social skills:

> *Most of the students were international students and they were shy and they do not know how to interact with each other. P1*

However, after three months, P1 succeeded in overcoming these challenges:

> *I should work on that more but it kept on going to 2 to 3 months until I got to know everybody. P1*

Language

Different accents and levels of participants' language was another challenge making the KS harder:

> *We are from different nationality sometimes it is difficult to understand their accent and sometimes they know what they want to say but they cannot put it or express it in English. PNA2*

False expectations

PNA5 reported that one of her friends went back home because she could not cope because the reality was different from her expectations. Her age and her lack of experience caused her expectations not to match with reality:

> *Although she's much younger, more exposed than her because she's been in N all her life. I've been in S alone for like a long time … it just made me feel like I better push very hard, because if someone can just give up like that it was a bit of a wakeup call. Because she hadn't been away from home and wasn't finding it easy … She felt like it wasn't what she expected and wasn't what she signed up for. PNA5*

Also, participants came from different routines of work that made their expectations vary. For example, PSB4 said,

> *It's more difficult than what I thought but if I think about the lifestyle I think my culture is the most difficult one to be changed and when I came here I had a lot of conflict between what I'm used to and what I have to deal with.*

In addition, coming to the new environment and finding a different culture from the one to which they were used to made individuals feel pressured to adjust to many different aspects of life going on around them:

> *It was a different country, different situations, different aspects, and different requirements to do the job to do work to do the course assignment. PSH1*

> *Feel it will be good and it's not. PBL8*

> *The directness seems interesting but when I did go down to work with them it wasn't, so I wouldn't work with that person again. PBR10*

Cultural-context challenges

Every culture and belief system has norms and values that influence individuals' behaviours. Some of these can limit the interaction between people from different cultures. In this study, participants reported three cultural challenges related to gender interaction, traditions, and modesty, as well as physical symbols and different kinds of interaction. These cultural challenges occurred before, during, and after the experience.

Gender interaction traditions

Participants reported gender-interaction traditions as the greatest challenge they faced in their interactions. Two kinds of gender-interaction traditions emerged: one came from beliefs and values such as physical connections, exemplified by shaking hands; a second came from cultural values, such as normal communications. Two participants reported they had never studied or cooperated with men who were not their relatives, which created difficult situations because most students on the course were men. For example, PSH1 said,

> *Because of my culture, it is easy for me to express what I am going to say in front of someone who same to my background, which is that I only interacted with girls back home, but here, because all of us are from different backgrounds, all of us are international students, each of us has reservations regarding how they have their social conduct, as they said, and for me that was my problem.*

Also, PSB4 said,

> *I believe in no physical communication. It's like Japanese people. They are not Muslim but for them it's no physical communication.*

PBL3 said,

> *When I was on the course it was quite obvious that most people were male and they sort of hung around in their groups of boys. So maybe that it was less accessible for me to make friends.*

Modesty or physical symbols

Two participants wore a hijab, a scarf that covers their hair, to protect their modesty, and they indicated that this made interactions more difficult for them and others. For example PSB4 said,

> *I'm wearing the hijab and that makes some sort of line so they don't want to start talking first.*

Also, she said,

> *I did not want to mix. I don't know why. Maybe I was quite afraid … about how people would deal with me. I'm a stranger compared to them usually. … International but no one wears a hijab.* PSB4

Different kinds of traditions

Some cultures do not advocate physical touching such as shaking hands. PNA5 said,

> *Every time I go to C you shake hands with almost everyone … not that often. That looks like something quite intimate.*

In the following subsections are descriptions and examples of operational-context challenges.

Operational-context challenges

Participants reported many challenges related to the operational context in KS between them. These challenges entail facing new experiences of intensive and

challenging work in a limited time, group work, and competiveness. Individuals faced these challenges during the experience. Below are examples of each challenge related to the operational context.

New experience of intensive and challenging work

Lack of information about the new experience related to life, people, pressures, and work caused the main operational-context challenge, as participants faced many new things to address at once. Moreover, the course itself was quite intensive and challenging, as the participants reported. For example, PNA5 said,

> *They shouldn't give us false hope, because on the Internet they said for MIT you don't need a Computer Science background so we're coming here thinking at least I have a CS background, which isn't true. You need some. It's too hard for a lawyer or someone just coming in. It's not right. … You come in and they shock you with so many things.*

Limited time

All participants reported that time was the main challenge to interactions and KS. Many tasks had very short deadlines, requiring students to spend time focused only on a particular task. For example,

> *There's no time, the study is quite stressful and we don't have the time for a social life. PSB4*

Another said,

> *In terms of social life, I did not have much time for that as there was too much to do. PNA2*

Group-work challenges

Most tasks and coursework required a work group, which challenged individuals to complete the intensive work in a limited time in a new country and in an environment with a new system, but simultaneously work and cooperate with new people, personalities, skills, cultures, backgrounds, and languages. Thus, participants faced different kinds of difficulties, and limiting effective KS.

Furthermore, these group products must be evaluated by not only the lecturer but also group members, and this adds pressure when they are together. Another challenge was raised by two participants who indicated that competitiveness is a challenge that restricted valuable KS, due to the study environment and each member of the group wanting to get the best grades:

> *Some people should stop basing their votes on participation, on race, on their friends. I feel if the person did their work you don't have to be mean. This is his life we're talking about. Only if the person was extraordinarily lazy could you say the person was not working but I feel people need to stop that because I feel some people were doing that, which I felt was wrong. PNA5*
>
> *Lack of knowledge about all members. (PIN9)*
>
> *People who don't often listen or who I feel are not listening to me to a certain extent. They seem to be a bit more demanding. PBR10*

Although KS and interactions were challenging for many, participants showed high motivation for KS. The next section details participants' motivations and perceived benefits.

4.5.2.2 Theme 2: Motivations

All participants showed significantly high motivation for KS and interactions with a diverse group of new people. Participants had high motivation before, during, and after the experience. Before the experience, participants' motivations were to gain tacit knowledge, build networks, and create job opportunities. Commensurately, they appreciated things more, were more respectful and appreciative, overcame stereotypes, learned new languages, and increased productivity. Finally, all participants were eager to keep in touch using online technologies, and the next subsections provide examples of these motivations.

Gaining tacit knowledge

Participants believed that interactions with a diverse range of individuals could enrich their own knowledge and perspectives:

> *I did not learn a single word from the class; whatever I learned was in the labs on the course works or group work, because when you work with different backgrounds and different international people, everyone has an idea of how to process their work so for me I was like a sponge; I try to understand everyone's method in doing their work.* PSH1

> *The more diversity in the class is the better for our learning … it is not about education it is a life lesson.* PSH1

> *Diversity at work can be more beneficial.* PBL8.

Building networks

Moreover, they reported this was a major opportunity to build new networks around the world:

> *I keep them at least we know each other and I will go to China this year so the ones I have in Facebook I will contact them or say I am coming. Hopefully we will meet up and I'll get hints from them on interesting places to visit.* PNA2

Create job opportunities

Creating job opportunities and having contact when visiting different countries was another motivation.

> *It's to gain some friendships and to get more opportunities. Friendship is quite important in your future career. Friends can give you a hand, which may be an essential part to lead you to your success.* PCR6

Creating job opportunities allowed participants to be proud of themselves, regardless of culture, and empowered them to know that they do not need to be like others to be accepted, and this can affect productivity and self-confidence:

> *Just makes me appreciate things more. … When some people tell me about their experiences.* PNA5

More respectful and appreciative

Furthermore, this chance allowed participants to open themselves to different cultures and histories, enhancing their ability to accept, appreciate, and respect those who come from these backgrounds:

> *In a place where people talk in different languages and they have different thoughts, different beliefs and different backgrounds you learn something new every day ... They make me more respectful for different people who don't share the same thoughts.* PSB4

Delete stereotypes

One participant offered ways she overcame stereotypes:

> *So it's not like I can learn something about everyone from Germany if I'm friends with one person from Germany. You find out about that person and part of their personality is influenced by where they're from but that doesn't define them and it doesn't define their country.* PBL3

Learn and improve in new languages

Some participants also said their experience offered them a chance to learn different languages and relate more strongly with those from different nations. For example, PSH1 said,

> *I am learning four languages right now, I love to know about other cultures and interact with others.*

Improving in the English language was a strong motivation for people to interact:

> *I had a high motivation to get my English improved. The reason I came here and took that course is because my English sucks so I have a strong feeling that I must get it improved.* PCR6

Increase productivity and responsibility

Also, feeling responsible to provide aid to people worldwide was great motivation. The group work provided space to present oneself and show that all are human and

have many commonalities and good aspects that people share. People can share their differences with each other to enrich minds and knowledge, and to fulfil lives with peace and happiness; however, these attributes can negatively affect productivity. For example, PNA5 said,

> *With the other group X, it was fun. We'd be interacting about coursework and then they'd randomly be like, 'Oh yeah, we're having a Chinese party. You guys should come there's going to be Chinese food.' …. The other group with Y is just serious, serious, serious. The only time we talked about something different is when they were complaining about coursework. That's it. Otherwise, group meeting out. I found it boring… It was my lowest mark. Most people said that coursework was their lowest mark. The other one with the X was easiest for me.* PNA5

When all participants were strongly motivated and perceived good benefits, they reported using various strategies to answer challenges and overcome some of the challenges they faced. The following section describes some of the strategies used in overcoming challenges.

4.5.2.3 Theme 3: Strategies

Faced with socially, culturally, and operationally derived challenges, participants adopted several strategies for managing their collaborative work.

Strategies to overcome social-context challenges

Some participants tried to educate themselves about others using SNTs to understand how to interact with them better:

> *From there you got to know people from their post. You can tell who is married, you can tell about personality – who is sociable and adventurous, you can tell from pictures, some people post many things on Facebook, so you can tell about their family, and also who has had a bad day.* P9

Some established relationships early, so they could find help and support when needed. Asking others about their culture or interests was the most common

method employed among participants to begin talking, establish common interests, and build a relationship:

> *Smiling at other people will break the ice definitely. Then, I will ask them how you are? Where are you from? And try to ask them about their culture, environment, and background in study. I do not believe that I will talk to someone only when I need them, I will talk to them in the first place and make them my friends.* P1

Participants found SNTs very useful to find common ground with others and to maintain relationships:

> *Having social technologies helps us laugh and send some jokes and makes our friendship and finds something that we can talk about and then we talk about studies. So, it is like ice breaking especially for those who do not have time to go out and have fun. It is very nice that I am in the bus and someone is texting me on WhatsApp.* P1

Strategies to overcome cultural context challenges

Some participants chose to spend much of their time with people who were similar to them (especially in culture and nationality), because such companions felt more familiar and already had common ground. This was the easiest way for them to avoid diversity challenges:

> *If you look at our class you would find Arabic people in one area, Cyprus people in another area, Chinese people in another area … Indian people too.* P2

> *Maybe it just makes me feel at home because we have a lot in common. We can laugh.* P10

Inherently, group coursework forced participants to address diverse people. To cope with this challenge, some participants chose to educate fellow students about their culture, beliefs, background, and personality by interacting through SNTs. SNTs allowed users to evade some emotional strains that can be present in face-to-face interaction, helping participants feel more comfortable and making it easier for their behaviour to be understood:

> *I had some problems because they do not know my background, they do not know why I am wearing a hijab, why I do not shake men's hands. They thought I am being rude …, but when I shared this information on Facebook … like in Islam for example women do not shake men's hands, they understood, instead of being closed up and not telling anyone who I am. In this age to say that face-to-face I think it would be very personal, I do not like anyone telling me that in my face I would take it very offensively.* P1

Other students chose to behave in ways unacceptable in their cultures and beliefs. Participants noted that some people in their course regularly behaved in contravention to their expressed culture and belief norms, instead choosing to act in ways similar to those around them, to establish common ground and feel they belonged to the community. P4 said, "Although it seems like their religion doesn't allow them to drink or something, they still smoke and drink". Others said,

> *I believe in no physical connection, just talking or saying 'Hi' or something. But if someone started and gave me his hand I wouldn't really say no because you don't want to make him embarrassed. Maybe afterwards I would tell them if they became my friend.* P2

> *When I am asked to work with men, coming from a Muslim Saudi conservative society, I do not feel comfortable working closely with men. … It is religious and cultural.* P3

One participant joined a religious group to improve his English and find people with whom he could share, despite not being a religious person himself:

> *I joined one of the religions called M here, and every Sunday I go to the church to get my English improved.* P4

Strategies to overcome operational-context challenges

Some participants used SNTs before the experience to familiarize themselves with the real-life experience and build their expectations:

> *Actually, we have an X forum … before I came here I usually searched and view it to get some useful information …*

> *instructions. What you should bring with you when you come here and some principles or advice. … I also referred to some social network website or tools. … Yeah for most of the cases there will be answers and you can talk with others. … You cannot Google everything … Even though you can find something …maybe you want to get more specific answers and you will think to ask people will be a better idea.* P4

Table 9 summarizes the thematic analysis of the exploratory study. For more details please see Appendix 1.

Table 9: Summary of the thematic analysis of the exploratory study

Challenges	Motivations	Strategies
social anxieties	gaining tacit knowledge	favorite online technology
language	building networks	tacit knowledge exchanging
false expectations	create job opportunities	overcome social anxieties
gender interactions traditions	more respectful and appreciated	establishing relationships and common ground
modesty or physical symbols	appreciate things more	online and face to face interactions
different kinds of traditional interaction	delete stereotypes	save time and space
new experience of intensive challenge work	learn and improves new languages	behave against their culture and belief
limited time & group work challenges	increase productivities and responsibilities	building trust & being with like-minded people

4.6 Discussion

Participants' experiences varied over three different time periods: before, during, and after group work on their course. For each of these three different periods of time, participants faced various challenges, had different motivations, and used different strategies to overcome barriers and gain the most from the experience. For example, participants reported social-context challenges related to social anxieties, language level, expectations, routines, and experiences. These social-context challenges appeared before their group work experiences and continued to be challenging during the experience, and even after, when they wanted to keep in touch with other group participants.

In the cultural context, participants reported challenges stemming from gender-interaction traditions, modesty, and physical symbols. Individuals experienced

these cultural challenges before the collaboration started and these challenges continued to be so during and after the experience:

> *Brief description about the cultures and values about each one, would this help. … If they gave just a handbook about each culture and explain why we sometimes would do that then. … Maybe it would be something nice.* PSB4

Furthermore, participants had high motivation before the experiences, such as wanting to gain tacit knowledge, build networks, and create job opportunities. The following motivations appeared during the experience in addition to preparation for the group: becoming more appreciative, respectful, and appreciated, overcoming stereotypes, increasing productivity, and taking on more responsibility. Finally, all participants were eager to keep in touch using online technologies.

Finally, as a strategy, all participants used online technology intensively for several reasons. Through SNTs they exchanged tacit knowledge, overcame social anxieties, and saved time and space. Furthermore, one participant interestingly preferred to use online technology to share culture, beliefs, and knowledge on sensitive topics, rather than discussing these topics in person. Another interesting finding was the use of online applications before the experience began to familiarize participants with the real-life experience and build realistic expectations. An additional remarkable finding was that participants acted against their beliefs and cultures to become part of the community. This strategy harmed participants more than benefited them because they felt guilty and uncomfortable, which led to low productivity.

HCI researchers should consider challenges, motivations, and strategies to facilitate users and help them to overcome possible challenges and enhance their motivation. The following section provides the conceptual framework for the **R**ed/**G**reen Area and Interaction **S**trategies (RGS) developed through the analysis.

4.7 RGS conceptual framework

All of our interviewees highlighted the need to balance the benefits and challenges of involvement in a diverse team, and articulated strategies to deal with these. Striking such a balance lies at the core of effective diversity management, and therefore the author proposes a simple lightweight framework to support organizations in the effective diversity management of rapidly assembled teams.

The participant motivations, challenges and strategies for collaborative interaction within diverse teams can be encapsulated through the concepts of **Red Area, Green Area** and Interaction **Strategies.** Crossing these areas can create three different states for participants – **Garden, Struggle,** and **Resistance** (see Figures 4, 5 & 6).

The **Red Area** is any undesirable online and/or physical situation that negatively impacts collaborative interaction by reducing the team member's confidence, comfort, enjoyment, creativity, and innovation. It represents the challenges and examples include undesirable time, media, topics, space, behaviour or interactions related to traditions, beliefs or personality traits. For example, as seen in Figure 6, the examples are labelled in the Red Area, such as lack of knowledge about all members. This Red Area makes the group members less social and uncomfortable especially with a critical time.

The **Green Area** is any situation that makes a participant feel comfortable, open and relaxed, but sometimes people are not aware of a Green Area until they feel its impact. A Green Area motivates and stimulates creativity and innovation. For example, as seen in Figure 6, the examples are labelled in the Green Area, such as exchanging experiences and food. This Green Area makes the group members more sociable and they enjoy their time.

How much impact an area has (its size) can differ between people based on their experience and culture. This can also change over time through experience and interactions with others. It is also important to note that a Red Area for one person could be a Green Area for another (e.g. shaking hands). Therefore, individuals in a diverse group need to set strategies that can satisfy the whole group and make the most of their creative energy.

Interaction Strategies are mostly used to establish common ground and promote collaboration, ideally aiming to reduce the impact of Red Areas and promote Green ones. However, if group members do not have enough information about each other prior to interaction, then they are likely to guess what could be Green Areas for others based on their own experiences and expectations. For example, as seen in Figure 6, the examples are labelled in the interaction strategies, such as handshaking. This strategy is welcomed by many members but not all, and can affect the member in three ways. In some cases, individuals might use strategies to establish common ground that actually cross the Red Area of others and put them in a state of **Resistance**. Those whose Red Area has been crossed will resist

the strategy and their collaborative interactions will be impacted negatively. In highly diverse groups with less experience and preparation, interactions strategies might result in crossing the Red Areas of others more frequently.

Alternatively, interaction strategies might through chance, experience or good preparation cross the Green Areas of those involved. Members of the group will be in a **Garden** state, in which they feel confidant, comfortable, motivated and creative.

Individuals can also use strategies that purposefully cross some of their own Red Areas to be in others' Green Areas in order to establish common ground and belong to the community. These individuals are in a state of **Struggle** – they have to accomplish a task but they are less likely to feel motivation and enjoyment.

The more group members interact with each other the more Green and Red Areas will be revealed. The group might also pass through states of **Resistance, Struggle** and **Garden** in the course of their collaborative interactions.

The analyses of the exploratory interviews of ten diverse participants who provided details about their experiences revealed several concepts, shown in Table 10. They summarize the data and provide more meaning to the material.

Table 10: Summary of the six concepts identified through analytical work

Concepts 1: Red Area	**Red Area of members of a group causes challenges that affect collaborative interaction.**
Concepts 2: Green Area	Green Area of members is significant to motivate their productivity and collaborative interaction.
Concepts 3: Interaction Strategies (CGS)	The interactions between members to find their common ground. These strategies can change very dynamically when the Green or Red Area are used.
Concepts 4: Garden	This area appears when the Interaction Strategies used the Green Area for the group members. Members of a group can feel in the Garden when their Green Area is used, which may make members feel confidant, comfortable, and creative, while also feeling enjoyment.
Concepts 6: Struggle and Resistance "Prison"	This state is when one of the group members uses Interaction Strategies that purposefully cross some of their own Red Areas to get to another's Green Area. This case places the individual in a struggle condition or "Prison", and can cause a major level of stress that has the potential to affect collaborative interaction with other members. OR This state is when others (one of the group members) uses Interaction Strategies that cross another group member's Red Areas, placing the individual in Resistance

conditions called "Prison", since his/her Red Area is attacked. This case could lead to psychological difficulties that could affect collaborative interaction with other members.

The **Green and Red Area** concepts are related to work in neurosciences. This work is important to consider as it gives theoretical support to the proposed concepts and helps the author to extend the design of SNTs by including a new functionality to be used by teams before they start their collaborative interactions.

4.8 The Three Emotion-Regulation Systems

Based in the neurosciences, three significant emotion-regulation systems should be considered to know how and why human minds work to make individuals feel negatively or positively, and to have balanced positive mental health (Gilbert, 2009).

4.8.1 The threat-protection system

This system, like the **Red Area**, makes a person feel they are in a prison, with feelings of **Struggle and Resistance** to certain behaviours, since it is responsible for negative emotions to protect people from feeling threatened. It works by developing safety strategies in individuals' minds which can operate automatically. These safety strategies have developed from human experiences which sensitise individuals to threat protection. Safety strategies for threat protection influence individuals' behaviours in the ways people perceive and navigate their world, involving mixtures of styles of thinking, behaving, and feeling (Gilbert, 2009).

4.8.2 The drive system

On the other hand, **the drive system** is responsible for positive emotions which are similar to the **Green Area**. It enhances the brain to guide people to important life goals by finding resources that have pleasure, drive, excitement, and achievement, such as food, sex, and friendships (Gilbert, 2009).

4.8.3 The contentment system

However, **the contentment system** is a state of mind free of seeking or finding. It entails positive emotions that relate to peacefulness, well-being, and quiescence, which link to attachment and caring. Contentment is "the absence of threat or low activity in the threat-protection system that mediates feelings of well-being and

contentment" (Gilbert, 2009). This system is like the **Garden Area,** in which all members feel controlled, comfortable, and at peace.

If the individuals know each other's **Red Area** and **Green Area** before they interact it may help their **contentment system** to work and make their collaborative interaction effective.

Neuroscientists have found that any positive mental state, such as kindness, compassion, confidence, comfort, and enjoyment, has the ability to enhance individuals' life satisfaction, improve resilience, and "living well" (Gilbert, 2009). These goals are targets for all organizations and individuals. Therefore, it is important to understand the individuals' needs to help them when they are in a group and collaborating to accomplish a task. The question which arises here, however, is how HCI researchers can design a technology to enhance the positive mental health of members.

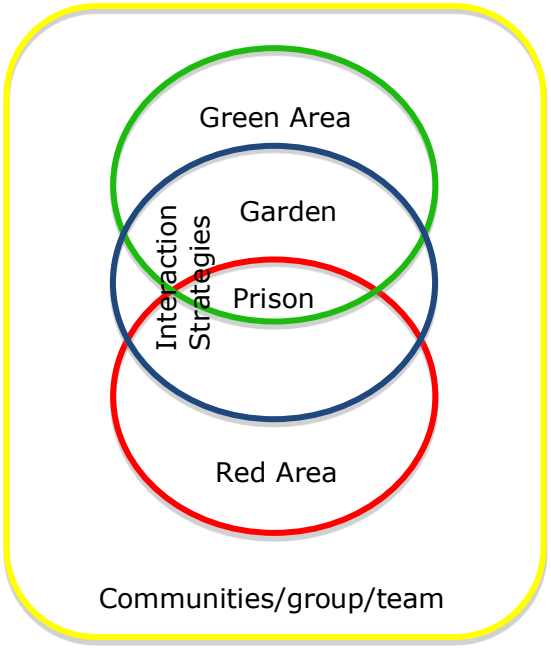


Figure 4: Models of the six concepts identified through analytical work

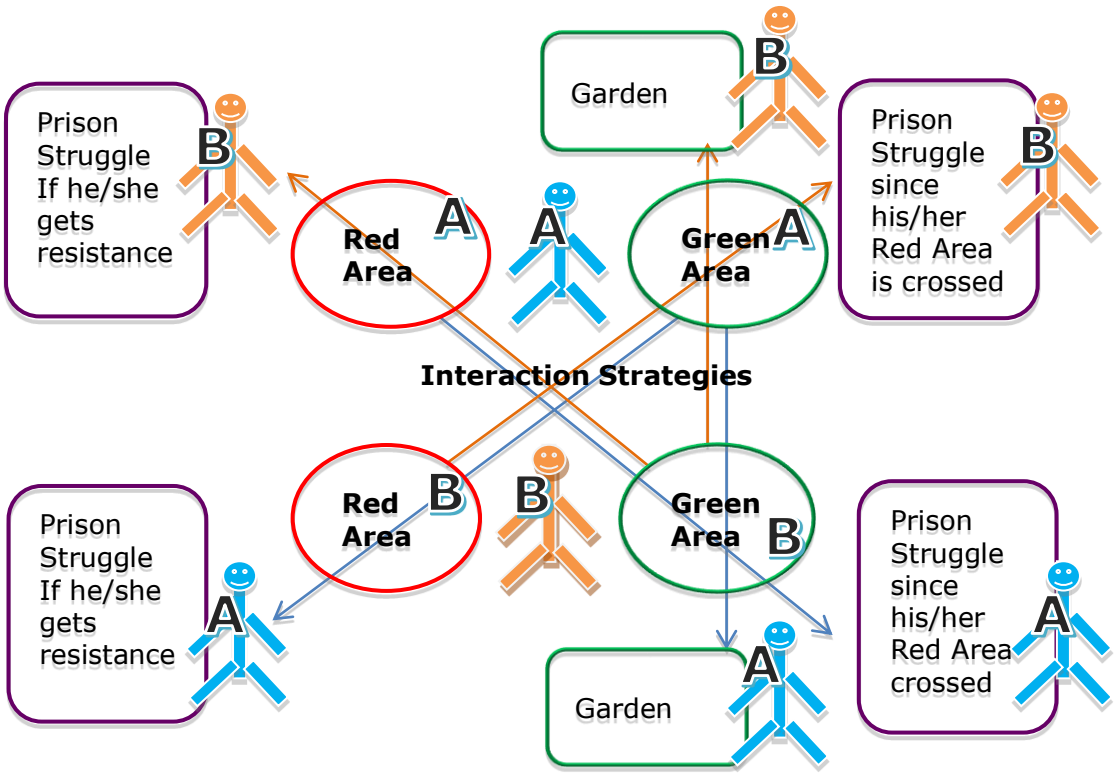


Figure 5: Models of how the six concepts can occur when a group of two members A and B interact

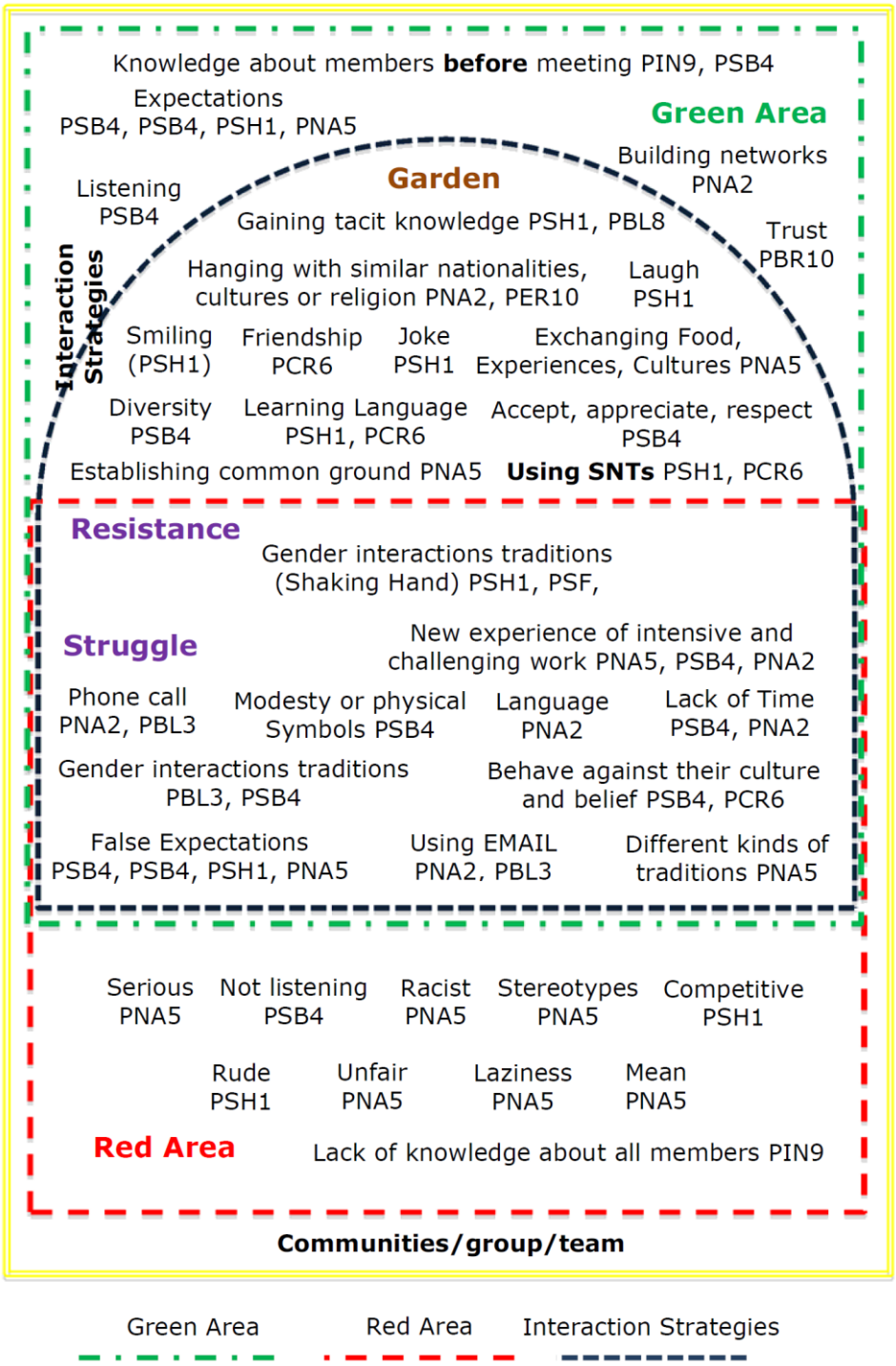


Figure 6: Findings mapped to concepts

Chapter 5

Interactive workshops leading to design concepts for novel groupware collaboration technology

The previous chapter identified three main concepts that required further research in order to sensitize designers to aspects of group work experiences among diverse individuals, and the implications of these concepts for design. The three main concepts are the Red Area, Green Area, and Interaction Strategies. These concepts were chosen for their relevance to design work and for their novelty in relation to previous studies on technology which support teamwork. These concepts were grounded in data gathered during the first exploratory study with ten diverse individuals. This chapter aims to present greater understanding of these concepts through engagement with a larger number of participants in two countries. The method used was interactive workshops, which were carefully structured and designed to capture personal experiences. The findings were analyzed to inform the design of a technology that could facilitate team members to build a healthy work environment.

The chapter begins by describing the aim of the additional studies, presents the material prepared for the workshops, and describes the analytical process applied to data collected during these workshops. Finally, the chapter provides a comprehensive set of thematically grouped examples to develop conceptualizations underpinning a novel collaboration technology.

5.1 Study overview

The aims of the interactive workshops were to further explore individuals' experiences of collaboration with diverse team members, and to obtain more examples of the concepts identified from the first exploratory qualitative study. These interactive workshops were conducted in two countries: the UK and the KSA.

The first set of interactive workshops took place in the UK since the concepts of Red Area, Green Area and Interaction Strategies were identified through the interview study based there. The aim was to understand more about these concepts and generate examples of them to ensure their existence. The KSA was chosen to explore if differences between the two countries in culture, beliefs, and language affected how participants related to these concepts. A notable difference is that in the KSA, all education from primary school through university is separate by gender. In contrast, work environments are usually mixed, with the exception of educational organizations. This association of genders can cause many challenges for men and women. However, the aim was not to compare the results of the two series of studies but to obtain additional deep understanding of the concepts to

help designers create a technology that helps diverse users in different settings. Also, conducting these studies in two different countries can yield lessons on how such studies can be conducted.

5.2 Procedure

The author organized and managed workshops in both countries as follows:

- The interactive workshops started with a PowerPoint presentation that provided a brief description of the study background and explained the three main concepts: Red Area, Green Area and Interaction Strategies;
- The proposed technology was described, which involved a simple online interaction as an SNT for group members to socialize and explain to each other their possible motivations and challenges, before physically meeting, to help members collaborate more effectively;
- In the UK, the participants completed three exercises using a worksheet provided, giving five examples for each of the concepts in the Red Area, Green Area, and Interaction Strategies;
- In the UK, participants discussed their examples after they completed the worksheets, if they wished;
- In the KSA, the Bristol Survey was used to do the three exercises;
- The workshops were mainly interactive to understand the concepts and discuss the possible examples, so the participants completed the three exercises using the Bristol Survey after the workshop;
- From the interaction with the participants during the workshops, ideas were gained and the exercise sheet was improved each time to gain greater depth of meaning. For example, during the first workshop, many participants said that they could not share some of their Red Areas for various reasons. This issue about sharing some of the Red Areas with others led to improvement in the exercises for subsequent workshop studies by asking for each example of the concepts if participants were willing to share them with their group members and how. Please see Appendix 8 for a copy of this exercise sheet.

5.2.1 The UK workshop procedure

The first three series of workshops took place in the UK at the University of Nottingham as follows:

- The first workshop was with researchers in the Computer Science School (20 participants, 14 of them men).
- The second workshop was with PhD students in the Computer Science School (six participants, four of whom were women).
- The final workshop was with PhD students in the Business School (four participants, evenly divided between men and women).

Based on the observations, the participants were deep-level diverse and also diverse in their age, gender, nationality, culture, belief, background, and experiences. Nationalities included Iraqi, Saudi, Lebanese, French, and British. In the exercise, the author chose not to ask about nationality and age to help participants feel free to talk about their private Red and Green Areas, and their Interaction Strategies.

The first and second workshops were completed in two weekly meetings for researchers, staff, and PhD students of the school. An e-mail was sent to each of the groups regarding the study before the meeting. When the e-mail was sent to the PhD students in the Business School, four replied they were interested and would like to join the study.

In the UK, exercises were completed on paper and the author fully transcribed them for all 30 participants, providing examples of the three main concepts:

- 123 examples in the Red Area
- 129 examples in the Green Area
- 120 examples in Interaction Strategies.

From these workshops in the UK, several issues arose and the study was developed more fully as follows:

- First, the author developed the exercises after each workshop to give a fuller picture of these concepts. For example, questions were added on if they would like to share their area and how;
- Second, participants did not complete the whole exercise, for example giving two examples instead of the requested five;
- Third, handwriting and spelling mistakes made the transcripts challenging and time consuming;
- Fourth, participants could not complete the exercise if they did not physically attend the workshop;

- Finally, having no office in the KSA meant that collecting the papers and saving them in a secure place was challenging.

Therefore, to resolve the above issues in the KSA workshops, a Bristol survey was employed. The next section describes how the author carried out studies in the KSA, as informed by the lessons learned in the UK.

5.2.2 The KSA workshop procedure

The second series of workshops was conducted in the KSA, and these were with deep-level diverse individuals of different ages, genders, cultures, backgrounds, and experience; most participants were Muslim and Saudi. The aim was to gather many examples to generalize the concepts to fit different cultures. The first workshop was conducted with ten employees from Unilever in Jeddah City, seven of whom were women. As age data were optional, only five participants gave their age (25, 26, 28, 36 and 40). The second workshop was conducted with female employees from various companies (e.g. NCB bank, DAH University, an interior design company, and Procter and Gamble), with a total of 19 participants aged 27 to 42. Twelve had a master's degree and the rest had a bachelor's degree. Six studied and worked in a single-gender environment, and the remainder were in a mixed gender environment. The third workshop was conducted in the King Abdul-Aziz University in Jeddah City, and had a total of 19 female participants from different cities in the KSA, studying different courses at the University; they had different experiences.

In the KSA, the exercises were completed by participants using the Bristol Survey, to overcome issues raised in the UK workshops. The online survey encouraged participants to write five examples of each concept. Also, it saved data securely, making it easy to read and requiring no transcription. The participants also attended the workshops for only a few minutes to understand the study, and they completed the exercises when convenient. These participants from the three workshops provided the study with many examples of the three main concepts: 240 examples in the Red Area, 240 examples in the Green Area, and 240 examples of the Interaction Strategies.

Therefore, from workshops in the UK and KSA, a total of 363 examples accrued in the Red Area, 369 examples in the Green Area, and 360 examples of Interaction Strategies were collected and analyzed.

5.3 Analysis process

The aim of the workshops was to discover more about personal Red Areas, Green Areas, and Interaction Strategies when people worked with diverse individuals. Below are the four steps used to analyze the data collected from the workshops in the UK and KSA.

5.3.1 Step 1: transcribe the data

In this first phase, all worksheets from UK participants were fully transcribed. Due to the use of the Bristol Survey in the KSA, the data from the workshops there was copied and pasted.

5.3.2 Step 2: group material into the three main themes and identify subcategories

Each set of quotations was then grouped into representative themes: Red Area, Green Area, and Interaction Strategies. The process involved cutting and pasting each quotation to new documents using Word, with themes defined by groups of quotations. During this process, quotations were moved around until complete coverage of the material had been obtained. Once the process was completed, this material was used as a reference for later analysis.

5.3.3 Step 3: develop written descriptions of themes

To support the exploration of this thematic data, text was then written to describe the sub-categories that constitute Red, Green and Interaction Strategies, respectively.

5.3.4 Step 4: express concepts

Through this step, a set of concepts was identified, grounded in quotations selected from the thematically organised material produced by the workshop.

5.4 Findings from the workshops in the UK and KSA

The findings from the series of workshops in the UK and the KSA are presented in the following subsections.

5.4.1 Red Area

Tables Appendix 2 have all the categorized notes from the Red Area and the quotations of the participants. A number of Red Areas, such as racism, sexism, and bigotry, are recognized at societal level as unacceptable and are captured under the category of '**Expected or universal rules or boundaries**'. For example,

> *P17 Xenophobic, homophobic, misogynistic jokes and comments*
>
> *P13 Sexist and/or misogynist behaviour*
>
> *P30 Any racist, anti-Semitic comments, accusations or actions (face to face, in any introductions to the collaboration)*

In addition to these universal values, personal boundaries can also arise from individuals' circumstances and personalities. These factors are captured under the '**Cultural**' and '**Personal Preferences**' categories and some cases were unexpected (such as not liking to talk to a group while standing up due to being short):

> *P8 I am quite short so I dislike speaking to a group of people when we are all standing up as it makes me feel self-conscious.*

It is also worth noting that some of the Red Areas relate to the behaviours of colleagues, whilst others to behaviours that the individual does not want to engage in themselves. The category "**Work behaviour of others**" captures a range of examples that participants provided for the former:

> *P21 Extreme competition and lack of team work spirit.*
>
> *P26 Slackers, people who do not work and rely on others to finish their work or generate ideas.*
>
> *P23 Facial expressions, especially when they seem mocking or negative.*
>
> *PKu2 People who don't follow process. I would share with the person face to face or via email about the importance of*

following process. It would be in private in an unofficial one to one meeting or private email.

PKu3 Sending long emails instead of just calling. Face to face.

The category '**Lack of respect**', while also relating to the behaviours of others, was separated out to draw attention to it, because it appeared prominently in the answers:

PKu1 Taking my things or checking my mobile even if I was sitting right next to it.

P17 Lack of conversation turn taking – interrupting others, not allowing them to speak, talking constantly without a break.

P15 Group work. A dominating personality or being disrespectful to the opinions of others (physical). In a destructive way i.e. saying ideas are bad but offering no alternatives. Having to manage such a personality in a group is hard.

P6 Dismissive behaviour => attacking or engaging with another person's argument because of that person's personality.

P23 Sarcasm: example made fun of when suggesting solutions/proposing plans.

During the workshops, participants indicated that most of these areas would not stop them from working with the people in their group but could cause annoyance and difficulties in interactions, thus limiting effective work.

The overall set of Red Areas for the participants in the KSA covered largely the same topics as those from the UK workshops. However, there were more examples related to their beliefs and personality and fewer on the use of technology and organizational behaviour:

PKa2 Touching or shaking hands, drinking alcohol, sobbing about personal problems, gossiping. I cannot share it. The people who don't mind will get offended.

PKa13 Physical contact. I cannot share it. I feel awkward talking about it. People ask for reasons and I am not comfortable talking about it them as it might offend some people.

PKa15 Drinking alcohol. I cannot share religion.

Since they are many different examples related to the Red Area, Table 11 below summarizes the different topics in the Red Area from both the UK and KSA.

Table 11: Categories of Red Area

Category of Red Area	Examples
Expected or universal rules or boundaries	criminal activity, racism, xenophobia, anti-semitism, bigotry, sexism, misogyny, homophobia, discrimination, bullying, negative prejudices, stereotypes
Cultural	physical interaction, working in a mixed gender environment, drinking alcohol at business lunch/dinner
Sensitive conversation topics	personal issues, politics, religious beliefs, culture, personal results, death, baby, who is attractive, vegetarianism
Lack of respect	impolite, aggressive, shouting, pushing, swearing, sarcasm, not listening, interrupting, dismissive behaviour, gossip, inappropriate jokes, loud music
Work behaviour of others	competitiveness, lack of team work spirit, slacking, extremely positive people, self-marketing, defensive behaviour, mocking or negative facial expressions, not being on time, using phone in a meeting, talking in their native (non-English) language, unhygienic behaviour, dressing unprofessionally
Personal preferences	not liking: phone calls, public speaking, speaking to people standing up, sharing everything online, plane travel, quiet offices, bringing children to work, banter, party games, team building exercises and jokes
Organizational behaviour /setting	not recognizing individual differences, no spaces for creativity, time pressure, lunchtime and evening meetings, expecting response outside work times, no caffeine, crowded offices, bad management

5.4.2 Green Area

The tables in Appendix 2 have all the categories of the Green Area and the quotations of the participants. Many of these represent the opposite of the stated Red Area. Remarkably, the overall set of the Green Area for participants in the KSA was very similar to that collected from the workshops in the UK, and covered the same themes. However, a number of items were in the Red Area for some participants and the Green for others, such as political and personal conversation topics, competitiveness, quiet working places, formalities, jokes, music, and alcoholic drinks.

General uniform technology needed

The group should come up with an online method of interaction that is familiar and can be used by all group members:

> *P23: Having an online method of interaction that is agreed on by all members and is used by all.*

Participants mentioned many positive behaviours they used to maintain presence in their Green Area, such as:

Helpful and supportive

Many examples from the workshops express that being helpful and supportive can put them in their Green Area. Examples of the quotations are as follows:

> *PKa4 Providing help and support*
>
> *PKa14 Support, not financially but emotionally*
>
> *P27 Supportive behaviour – and I know the people want me to do well. Why? Building me up makes me relaxed, I need it.*
>
> *P28 Supportive and constructive work environment, someone telling me off or being aggressive makes me freeze and unable to function at all, let alone work. Opposite is my red lines.*

Kind and caring

Moreover, some examples from the workshops express that being kind, caring, friendly and sympathetic can put them in their Green Area. Examples of the quotations are as follows:

> *PKu6 Someone asks you about a personal matter that happened to you before & they're following up on it.*
>
> *PKa1 Kindness and hardworking.*

Friendly

> *PKu1 Being friendly with all co- workers.*
>
> *P18 Colleagues as friends.*

Sympathetic

> *PKa14 Show some sympathy and understanding to what others are going through.*

Empathy

In addition, numerous examples from the workshops express that being empathetic, honest and trustworthy can put them in their Green Area. Examples of the quotations are as follows:

> *P14 Empathizing with other people. Enthusiasm is contagious of you for the other person.*
>
> *P8 I am a down to earth person + like to make the people I am communicating with more comfortable. I therefore get on myself with people of a similar mind-set, who like to have a laugh and don't think too much of themselves.*
>
> *P8 Ask questions of others – try to make sure people are not being ignored. I am usually good at including others where maybe others are missing them out at the conversation.*
>
> *PKa7 Understanding their green lines.*

Honest and trustworthy

PKu2 People who are transparent.

PKa1 Transparency

P29 Honesty. Feeling comfortable to voice our opinions.

P8 Sometimes it is good to be honest about a different situation – often no one wants to admit something is making them feel uncomfortable but bringing it up + being open helps everyone.

Respect

Moreover, numerous examples from the workshops express that respect, acceptance and responsibility from all of the group members can put them in their Green Area. Examples of the quotations are as follows:

P21 Enhancing mutual respect; before stating my ideas, I try to listen or even motivate others to discuss their own ideas. I always try to find interesting bits on their ideas and promote them.

P23 Being appreciated and valued and respected for my opinions makes me able to take on more of the work.

P21 Show interest in different nationalities, what are their traditions what do we have in common.

Responsible

P13 Being willing to make the first step to the others.

PKa8 Shared responsibility.

P17 Others being aware that I have other commitments and limited time.

Acceptance

P29 No aggressive argument (i.e. a positive environment when disagreeing). Disagreeing is normal and expected but loud, aggressive arguments are very negative.

P16 Acceptance – learning to live with it, at least in public.

We-spirit

P26 Working with a motivating group, because they bring a positive energy to the environment.

P21 Being the same or similar mentally to the rest of the group, being able to express myself freely, without being afraid of social conventions or political correctness.

P1 Interactions that bring together people with vast cultural differences.

P6 Visible opportunities to support others – sharing knowledge in the office reflects my own understanding.

P5 Giving everyone equal discussion time to contribution.

Empowerment: Recognition

P16 Recognition of contribution.

P5 Being invited to join in discussion or contribute.

P13 Having the feeling that I don't have to prove myself in front of others constantly.

Empowerment: Authority and Flexibility

P1 Dynamic and creative environments where there is freedom of expression and the ability to work/play in an expressive or real way.

PKa2 Positive enforcement about work.

P29 Flexibility. Instead of working as a group all the time (i.e. in the library), having the flexibility to work and share work through Dropbox or Google Drive.

P13 Some degree of flexibility in regard to how when and where I am doing my work.

There were many different positive approaches such as smiling, listening, and being civil.

P30 Positive approach and smiling a lot.

P15 Listening to others to encourage free sharing of ideas – respecting quieter participants who may speak less but influence + get back on an idea at a later time.

Table 12 below summarizes the categories of the gathered Green Area.

Table 12: Categories of Green Area

Category of Green Area	**Examples**
Expected or universal rules	equality, freedom of expression, fairness, privacy, respect, friendly, honest, on time, kind
Shared conversation topics	shared professional, philosophical, political, social, personal (hobbies, holidays, children) interests, sharing of weaknesses
Work behaviour of others	smiling, eye-contact, humour, open, non-judgmental, supportive, listening, creative approach, honest, enthusiastic, focusing on the task, punctual
Personal preferences	informal clothing, dress code, being organized, no routines, less strict timings, competitiveness, online interaction, use of e-mail, shaking hands
Organizational behaviour /setting	creative environment, informal setting, visible opportunities and support, feedback, flexibility, clear agenda, tasks, and responsibilities, recognition of contribution, small groups, new technologies, training sessions, social environment, music, quiet, breaks
Socializing outside work	eating and drinking out, walking, exercising, driving to work, attending events, team building activities

5.4.3 Interaction Strategies

The tables in Appendix 2 have all the categories of the Interaction strategies and the quotations of the participants. They involve specific behaviours by group members, specifying ways of working together and the use of technology, with the aim of avoiding members' Red Area and enhancing Green ones. However, some Interaction Strategies may unwittingly cross the Red Area of other participants. For example, a group participant may play music to create a relaxed working environment and provide a topic for social conversations, but for other members this may be problematic as they work better in a quiet office.

We-spirit technology design needed

We-spirit technology design technique needed to help group members to build their common ground to work on their Garden.

> *P15 Reflection on all role within a group and all actions impact others – being respectful to others.*
>
> *P22 When dealing with people from other fields remember they will not understand everything and be happy to explain terms (hopefully they do the same).*
>
> *P23 Prompt communications and responses between members; on time responses.*
>
> *P25 Talking and finding things we have in common – not necessarily to do with the project. E.g. I used to get on really well with a co-worker because from time to time we would talk about other things, I found we had a common interest in playing poker.*
>
> *P28 Setting common ground rules at the beginning of a project or collaboration to find out and tell what, but also how other people like working.*

Furthermore, PKsa6 suggested doing a questionnaire **before** they start working as an Interaction strategy to share their Red/Green Area with each other as a group. This can place individual expectations closer to reality and build common ground faster and more easily:

> *PKa6 Prior to course we fill in a survey and results are shared with the group.*
>
> *PKa12: Establishing team norms at the beginning of the engagement.*

Sharing Green and Red Areas

One of the participants said that listing advantages and disadvantages can be a strategy to build the group's common ground:

> *PKa10 Listing advantages and disadvantages.*

Expectation should be close to reality

Many participants expressed the importance of making the expectations about a task and responsibilities closer to reality:

> *PKu8 Defining roles and responsibilities, having mutual agreement and assigning tasks specific to each member.*
>
> *P25 Having some knowledge of what to expect. For example, knowing what the activities will be and the general plan.*

Expectations about individuals and their experiences and skills:

> *PKa2 Share training ideas and new courses.*
>
> *PKa5 Everyone writing on a board the rules of the meeting.*

The findings also show that it is important to set expectations with regard to organizational policies and behaviour:

> *PKa5 Reference to company policy.*
>
> *PKa3 Clearing the conflict points.*

Privacy and protection needed

Many participants said their privacy is located in their Red Area but they did not give examples about their private information:

> *PKa7 Demanding private info.*
>
> *PKu4 Working @ companies that put strict rules to protect the employees like Unilever.*
>
> *PKu4 Put rigid rules by the government or Ministry of Labour with punishment to avoid anything.*

Free for Development

Participants stated their needs for development:

> *PKa12 Discussing openly when any behaviour was found unacceptable.*

P25 Thing to remain disciplined and not too formal – avoid building any barriers.

PKu9 Different project to learn more and different ways.

PKa13 Discussing house rules and having those set collaboratively.

Since many different examples were given related to Interaction Strategies, Table 13 below summarizes the strategies used to establish common ground.

Table 13: Categories of Interaction Strategies

Category of Interaction Strategies	**Examples**
Work procedures	open discussion, introductions, setting rules and responsibilities at the beginning, speed dating approach, considering the context of work, collaborative problem solving, regular meetings, flexible working patterns, documentation, training sessions
Group member behaviour	asking questions, listening, empathizing, talking one-to-one, social interaction outside work, sharing experiences, using humour, acceptance, letting people know when something is not acceptable, being honest, simplifying language, listening to music together
Use of technology	e-mail introductions, checking SNTs to find common areas, chat group for the team, profile for each member, sending group messages

5.4.4 Willingness to Share Red and Green Areas

Participants demonstrated a willingness to share most of their Red and Green areas with some caveats in how that sharing could best be supported and managed. Only seven participants noted examples within the Green Area that they were unwilling to share. There were ten of these (out of the gathered total of 369) and they related to personal preferences and the behaviour of others, with participants worrying that they were too personal, and might make them seem needy, or that they might be misunderstood. A larger number of Red Areas – 32 (out of a total of 363) were noted as problematic for sharing (five belonged to one participant while the others were distributed). These related to personal preferences and conversation topics.

For 37 examples (within Red and Green Areas), participants specifically noted that they would like to share them online (e-mail, WhatsApp, social media).

5.5 Discussion

The main aim of this study was to understand more about the three concepts of the Red Area, Green Area, and Interaction Strategies, to collect requirements for technology design. As mentioned before, from the workshops in the UK and the KSA, 363 examples of the Red Area, 369 examples of the Green Area, and 360 examples of Interaction Strategies were collected and analyzed. These data informed the development of a conceptual framework for technology design.

To sum up the results, humans are diverse individuals who have had different experiences in life, causing them to have different personal boundaries when working with other individuals as a group. For this reason, researchers should consider different individuals' needs when designing technology for them. The tables presented above show examples of the three identified concepts: Red Area, Green Area, and Interaction Strategies. Moving on to the key question of this thesis, it must be considered how the data collected relate to the design of a technology for team members which can help them to avoid each other's possible Red Areas and find their Green Areas, to build common ground, and enhance their ability to work effectively together.

From the interactive workshops, several features appeared for these two areas. First, although these areas can be sized differently over time, they cannot disappear. Second, although most Red and Green areas were easy to share, this was not true of all of them. In addition, during the interactive workshops many participants said that asking about these areas made them think about certain hidden areas that they never think about. Moreover, while the interactive workshops in the UK and KSA showed that Red Areas for some can be Green for others, some aspects of the Red Area can change to Green, as shown in the next sections.

5.5.4 Size/ Impact of Red and Green Areas

Workshop participants in the UK and KSA mentioned that the size of one's Red Area can grow smaller over time and through experience. For example, in the KSA, if a man or woman is working with those of the other gender for the first time, their

Red Area may be large; however, with experience, the Red Area may shrink to encompass only the basic rules between them.

In the UK, for example, if people were not used to working with people from other cultures or experiences, over time, their Red Area might diminish as they establish basic rules for interaction. In less effective scenarios, the Red Area can increase between colleagues. In contrast, the size of the Green Area can differ between people, based on their experience and culture, and area sizes can change due to time and experience. If one does not interact with others, a Green Area will not emerge.

However, certain **Red Areas cannot entirely disappear**. For example, the universal ones and the Red Area related to beliefs are less likely to disappear unless a person changes their beliefs, which could cause them to develop a new Red Area.

5.5.4 Sharing of Red and Green Areas

Most of the participants expressed that they could share most of their Red and Green Areas, with some caveats in how that sharing could best be supported and managed. There were only ten examples within the Green Area that they were unwilling to share, while 32 examples of the Red Area (out of a total of 363) were noted as problematic for sharing.

Why participants were unwilling to share

Participants were worried that:

- their comment was too personal
- they might seem needy
- they might be misunderstood
- the topics were sensitive
- they looked unprofessional
- they did not want to look different, but to belong to the community.

Some Red Areas are hard to share with others because they are sensitive, such as religious points of views and gender favouritism. Moreover, certain people want to show that they are flexible and open, can work with anyone, and are professional; they feel that sharing boundaries is a weakness that can affect their future career. For example, P22 said,

> *Unrequired plane travel. Recently, I developed a fear of flying so prefer only to fly if important. No, I cannot share it. Flying is sometimes seen as required for a career in science research.*

Also, some people feel they want to belong to the community, which leads them to cross their Red Area or personal boundaries by acting or behaving against their own rules, norms, and values, as shown and discussed in Chapter 4, rather than sharing this Red Area. This kind of behaviour can provide a significant constraint to the individual's creativity and innovation. Moreover, crossing one's own Red Area consumes energy that can be used to work, as such people may feel uncomfortable, not confident, and less creative, willing to share knowledge, and able to enjoy their work.

Examples from the participants about the importance of sharing Red Areas:

> *PKa2 Raise common issues in the work field.*
>
> *PKa7 Open communication about concerns.*

5.5.4 Sharing Universal Red Areas

The workshop examples of Red Areas from the UK and KSA showed that militant behaviours, such as racism, sexism, and bigotry, were universally eschewed. However, this area was not easy for individuals to define because they were universal in their rejection of these behaviours and often do not explicitly identify them because they take them for granted. However, in life, people may encounter those with such Red Area behaviour at work and must address such people. Technology designed for individuals must address how they can communicate their Red Areas to others.

Some of these Red Areas are hidden in people's minds and do not emerge until confronted with them. For example, undesirable time, media, topics, space, appearance, smell, behaviour, or interaction related to traditions, beliefs, or personality traits may incite negative emotions. Sometimes Green Areas are hidden in one's mind and do not become obvious until they feel the impact from others.

5.5.4 Transforming Red Areas to Green

Some Red Areas can change to Green over time. People's personalities develop and change, based on their experiences and the context around them. However,

contrasts did arise regarding political and personal topics, humour, and alcoholic drinks. For example, alcoholic drinks were in the Red Area for some and the Green for others. Moreover, formalities and uniformities were also an issue between participants. These conflicts occurred in personal interviews and in workshops. For this reason, the challenge is how to design technology that can help a group of diverse members find common ground in their Green Area, rather than entering others' Red Areas.

From the above summaries of the results, HCI researchers should consider possible Red and Green Areas, and Interaction Strategies, to facilitate users and help them overcome possible challenges and enhance motivations while they design a technology for a group of people.

5.5.5 Compassion-Focused Therapy

Psychologists use the three significant emotionregulation systems known as Drive, Threat-Protection, and Contentment (Gilbert, 2009) (discussed in Chapter 4, Section 4.8) in compassion-focused therapy. They argue that the therapy can balance these three systems by the six attributes of compassion:

- Care for well-being: motivate individuals to be more caring about their own well-being and that of others;
- Sensitivity: individuals should develop sensitivity to their needs and feelings as well as to other peoples' feelings and needs;
- Sympathy: motivate individuals to feel sympathy and care towards their own and others' needs and feelings of distress;
- Distress tolerance: enhance individuals' tolerance of their negative feelings and needs rather than avoiding or denying them;
- Empathy: individuals should develop the feeling of empathy by understanding the meaning of another person's world, to see it from their point of view;
- Non-judgement: Being non-judgemental means not condemning, criticizing, shaming, or rejecting one's own and others' feelings and needs.

Hence, it should be considered how HCI can design a technology to act as compassion-focused therapy for group members, so that each member will balance their three systems and feelings about others. Acknowledging an individual's Red and Green Areas before interaction occurs may help individuals prepare themselves for these areas and find common ground that can work as compassion-focused therapy, placing them in the Garden area and avoiding struggling.

The following section provides the conceptual framework developed through the analysis which can act as compassion-focused therapy for group members to balance their three significant emotion regulation systems for a positive mental state to enhance individuals' life satisfaction, improve resilience, and "living well" (Gilbert, 2009). These goals are targets for all organizations and individuals.

5.6 "Seven Technology Design Concepts for Groupware Collaboration" (7TD) Conceptual Framework

As explained in Chapter 4, the author found three areas that should be considered when HCI researchers design technology for groups: Red Area, Green Area, and Interaction Strategies. The aim is to design a technology that helps everyone feel they are working in the Garden, their common ground, rather than in Prison, to avoid feelings of Resistance and Struggle; that is, their Red Area is not touched and they find common ground from entering each other's Green Area. This can be achieved using several design techniques.

Table 14 summarizes the conceptual framework developed from the workshop data to guide the design of technology for a group. The concepts are generalized from the analyzed data, and should be considered when technology is designed for a team/group who will work together.

Table 14: Summary of the "Seven Technology Design Concepts for Groupware Collaboration" Conceptual framework identified through analysis of the interactive workshops in the UK and the KSA

Concept 1: We-Spirit	**We-spirit is a** Green Area and Interaction Strategies design technique **for most of the participants. It is a design technique to promote 'We' rather than 'I', to make**

	group members tolerant towards others. It is an opportunity in technology design for equality, fairness, peace, and non-judgment, to feel they are one unit. In this sense, equality does not mean getting the same thing, but rather getting the right thing for the individuals' needs based on individual ability.
Concept 2: Universal	A simple design is needed that is easy for many individuals to engage with regardless of their surface and deep level of diversity. It should satisfy group needs as well as individuals' needs. The users should not cross their **Red-Area**, while using the technology. It is a **Green Area** and **Interaction Strategy design technique** for most of the participants.
Concept 3: Compassion	Compassion is a **design technique** for promoting **Green Areas and Interaction Strategy** behaviours between group members to be compassionate for themselves as others. This can be done by providing a space that persuades individuals to share their **Red and Green Area** freely, so they can be helpful, supportive, kind, friendly, sympathetic, empathetic, caring, honest, trusted, respectful, responsible, accepting, smiling, listening, and being civil to themselves and others' feelings, emotions and needs.
Concept 4: Expectations	This is a **Green Area** and **Interaction Strategy design technique**. The technology should provide a way or a space to collect knowledge that can make the users' expectations closer to the reality of the task, and also place individuals' **Red Areas and Green Areas BEFORE the group starts to work together**.
Concept 5: Empowerment	This is a **Green Area and Interaction Strategy design technique**. This feature should make the individuals feel they have been recognized and have some authority so that they feel enjoyment, respected, capable and successful as a member of a group, by sharing their **Red** and **Green Areas**. This can be achieved by providing a free space for the individual to put his/her understanding about the task and the objectives, and demonstrate their skills.
Concept 6: Development	This is a **Green Area and Interaction Strategy design technique**. By sharing **Red** and **Green Areas** of the individuals using technology, this can facilitate creativity and

	innovation by facilitating members' openness to change by giving them the freedom and independence to choose their own goals to make the work more exciting and successful.
Concept 7: Protection	This is a **Green Area and Interaction Strategy design technique**. The users should feel that the technology protects their privacy and respects their choices when they share their **Red** and **Green Areas**. The users should feel comfortable, confidant and safe to share and use the technology.

Table 15: The relationship between the two conceptual frameworks: RGS and 7TD

Design Techniques	**Red Area**	**Green Area**	**Interaction Strategies (IS)**
We-Spirit	Thinking about We rather than I can help individuals to overcome some of their Red Areas	Thinking about We rather than I can motivate many positive behaviours	We encourages people to start building their common ground
Universal	Easy for users to share their Red Area regardless of their level of diversity	Easy for users to share their Green Area regardless of their level of diversity	Easy for users to share their Interaction Strategies regardless if their level of diversity
Compassion	Sharing the Red Area can help overcome some of them and avoid interacting in this Area. This can reduce conflict and minimize the disadvantages of the diversity	Sharing the Green Area can motivate many positive behaviours and make building common ground easier. This can maximize the advantages of the diversity	Sharing Interaction Strategies can make building common ground easier and faster
Expectations	Sharing the Red Area can bring expectations closer to reality, which makes people more prepared for experiences	Sharing the Green Area can bring expectations closer to reality, which makes people more prepared for experiences	Sharing Interaction Strategies can bring expectations closer to reality, which makes people more prepared for experiences
Empowerment	Sharing the Red Area makes individuals feel they have been recognized	Sharing the Green Area can make users feel they have some authority that can enhance enjoyment, respect, capability, and success as a member of a group	Sharing Interaction Strategies can lend some authority that can enhance enjoyment, respect, capability, and success as a member of a group

Development	Sharing the Red Area can avoid this area, which constrains creativity and innovation. Also, some of this area can be changed to Green by helping members to develop themselves	Sharing the Green Area can motivate creativity and innovation, helping members to develop themselves	Sharing Interaction Strategies can motivate creativity and innovation, helping members to develop themselves
Protection	The design should protect the privacy of the users when they share their Red Area to avoid conflict and judgment	The design should protect the privacy of the users when they share their Green Area to avoid conflict and judgment	The design should protect the privacy of the users when they share their Interaction Strategies to avoid conflict and judgment

5.6.1 Concept 1: We-Spirit

The We-spirit technology design technique is needed, as illustrated in Table 15. We-spirit was a Green Area and Interaction Strategy design technique for most of the participants. It is design technique to promote 'We' rather than 'I', to make group members tolerant of others. It is an opportunity in the technology design for equality, fairness, peace, and non-judgment, and to feel they are one unit. Equality does not mean getting the same thing, but rather getting the right thing for the individuals' needs based on the individual's ability.

This concept is different from what designers usually do in SNTs, which is designing for the individual, and viewing the technology from the stance of individuals rather than a group as a unit.

Several quotations were chosen from a long list of users' Green Areas and Common Ground Strategies, and they also describe the need for the We-spirit technology design technique as follows.

The We-spirit technology design technique enhances the thoughtfulness of each individual in a group about the we-spirit rather than the self, to make them tolerant of others, as the participants express during the workshops interactions. For example, P6 said:

P6 Hallway chats, any kind of interaction that shows we're a group.

P11 Illustrate that working as a group not as individuals can gain more benefit.

P11 In group work, allow pairs to contribute, not individuals, as this provides larger profits.

5.6.2 Concept 2: Universal

The results showed that humans are diverse in many ways. The technology design for a group should as much as possible be universal to meet and satisfy group needs, as well as individuals' needs. Users should not cross their Red Area while using the technology. The author collected data from diverse individuals from two countries – the UK and the KSA – to inform the potential design for a technology to be universal, to enhance the ability of group members to effectively collaborate. In this thesis, universal design does not mean taking into consideration all possible individuals' needs, such as the blind; rather, it means that technology design should be easy and usable by as large a number of people as possible and not conflict with users' Red Areas. Therefore, as the participants expressed during the workshop interactions and interviews, they sometimes used a technology that is hard to use by non-IT people. For this reason, the group should come up with an online method of interaction that is familiar and able to be used by all group members:

P23: Having an online method of interaction that is agreed on by all members and is used by all.

5.6.3 Concept 3: Compassion

Compassion is a design technique for promoting Green Area and Interaction Strategy behaviours between group members to be compassionate towards all. The technology should promote behaviours in Green Areas between group members as being helpful, supportive, kind, caring, friendly, sympathetic, empathetic, honest, trusted, respectful, responsible, accepting, smiling, listening, and civil. These behaviours make group members feel confidant and comfortable, and enjoy the work, as the participants noted during the interactive workshops. For example, P5 said that engaging socially with the group members made the atmosphere enjoyable and comfortable:

P5 Being able to get on with colleagues socially as well as professionally makes working together more enjoyable + comfortable.

5.6.4 Concept 4: Expectations

The combination of findings of the UK and KSA workshops shows that setting expectations is very important. Therefore, the designer should provide a way to collect knowledge that can help users have realistic expectations about their new experience, such as task, place, and individuals. The technology should provide a way to collect knowledge that can bring the users' expectations closer to the reality of the task and place. For example:

Expectations about task and responsibility:

> *PKa7 Clear tasks and responsibilities.*
>
> *PKa12 SPOCs (single point of contact) or responsibilities distribution.*
>
> *P28 To have clear instruction or framework for the task. This helps me to focus and then expand what we are doing.*

Expectations about individuals and their experiences and skills:

> *PKa17 Asking people to introduce themselves in their group and eventually similar aspects between members will show up.*

Different strategies on how to collect knowledge about individuals' Red/Green Areas:

Some of the participants suggested indirect strategies to express his/her **Red/Green Areas** through telling **stories about his/her good and bad experiences**:

> *P28 Using stories of good and bad experiences to express how I like to work.*
>
> *PKu6 Bring examples from past experience.*
>
> *P25 Sharing experiences about projects to allow us to fulfil expectations and understand each other's experiences.*
>
> *PKa17 Talking about hobbies, interesting skills or good experiences.*

Other participants indicated that it would be preferable to talk about **Red/Green Areas before** starting to work:

P26 At the beginning of the meeting ask about the red lines and the green lines.

PKa5 Every person talking about it for 1 min before we start.

Several participants recommended using new or current **social networking technologies** for each individual to talk or know about their **Red/Green Area.**

P26 Build up Facebook-like profiles with pros and cons of each member that they complete themselves.

PKa4 Check their profiles, LinkedIn and all social media to figure out suitable and common areas.

One of the participants suggested having an anonymous technique for their **Red/Green Area**:

PKa9 Anonymous suggestions or complaints.

The findings also show that it is important to set expectations with regard to organizational policies and behaviour:

PKa1 Knowing who to turn to at work when things go wrong.

PKa2 Discuss external changes in the rules and regulations.

5.6.5 Concept 5: Empowerment

Technology features should make individuals feel they have been recognized and have some authority that can enhance enjoyment, respect, capability, and success as a member of a group. The following are examples from the three different concepts that support empowerment.

Recognition

Green Area for P16 *Recognition of contribution.*

Red Area for P17 *Lack of recognizing individual differences in abilities –which some people require special considerations/support to participate.*

Green Area for P15 *Support for all ideas of work even when it may be outside of the supporter's area interest/knowledge. This is encouraging.*

Authority and Flexibility

> Interaction Strategy for PKa3 *Clear lines for authority and responsibility.*
>
> Green Area for P1 *Dynamic and creative environments where there is freedom of expression and the ability to work/play in an expressive or real way.*
>
> Interaction strategy for P15 *Informal atmosphere: layouts of room assist this. Not people to contribute but give them 'spaces' to do so is useful i.e. encouraging but not forcing participation.*

5.6.6 Concept 6: Development

The technology should facilitate creativity and innovations, helping members change by giving them the freedom and independence to choose their own goals to make the work more exciting and successful.

> *PKa7 Environment that motivates creativity.*
>
> *PKa2 Suggest future changes (not necessarily true ones) to give people ideas and concepts.*
>
> *P22 Not having strict timings. Having strict times for e.g. starting work seems to add a lot of stress to other people lives.*

5.6.7 Concept 7: Protection

Users should feel the technology protects their privacy and security and respects their choices. Many participants said their privacy is located in their Red Area but they did not give examples about their privacy information:

> *PKa7 Demanding private info.*

One of the participants suggested the leader should have confidential information that can then be shared with the rest of the group, when appropriate:

> *PKa12 Group/team lead having personal check ins for confidentiality then communicating to rest of team.*
>
> *PKu4 Report anything that bothers you to the right person who can take an action.*

In this chapter, red areas, green areas and interaction strategies concepts were explored further through a series of interactive workshops conducted in two different countries, the UK and the KSA, involving more than 70 participants from industry and academia. The findings were analyzed to develop conceptualizations underpinning a novel collaboration technology to build a healthy work environment. Consequently, seven design concepts were proposed: We-spirit, Universal, Compassion, Expectations, Empowerment, Development, and Protection.

The next chapter is an exploratory evaluation of novel collaboration technology concepts.

Chapter 6

Exploratory evaluation of novel collaboration technology concepts

This chapter is an exploratory evaluation of the novel collaboration technology concepts developed in Chapters 4 and 5. This will be through the Wizard of Oz method, with the aim of exploring the new design concepts with real users.

6.1 Key concepts underpinning novel SNT functionality

The novel collaboration technology concepts will be used to extend the design of SNTs by adding a new functionality. It aims to reduce time and space, and the overall cost and effort usually consumed by classical preparations by individuals. It also aims to establish a healthy common ground to overcome challenges and enhance trust, interaction, communication, and collaboration between individuals. This will aid and lead to effective KS among a group of new diverse individuals. It can be used for a group of diverse individuals who have similar aims. These individuals can be committee members in organizations who are discussing and preparing work guidelines, or students at a university trying to accomplish coursework.

The proposed novel collaboration technology concepts contribute to the fields of HCI and CSCW as follows:

- These concepts aim to manage diverse group members. They provide facilities to improve diversity management, which is very challenging in the workplace;

- Much of the literature focuses on collaboration in the "during" phase. Hence, research in this thesis explored an under-researched area and contributes to knowledge in this area. It focuses on a different direction from most groupware studies by considering socialising, managing, preparing, and introducing group members before they start to work together physically. Therefore, a new functionality is proposed to extend the design of SNT to satisfy groupware needs. This SNT aims to overcome collaboration and KS challenges, and enhance both explicit and tacit KS and collaboration. This new functionality of SNTs will save the time, space, money, effort, and energy that used to be consumed in the initial period, which used to be defined as the group work cycle of forming, storming, and norming;

- The newly functionality of SNTs aims to make the forming, storming, and norming stages physically short, easy, and different, because participants will initially gather online. In the forming stage, individuals usually try to remain in their comfort zone by behaving in a way that can be accepted by others, and they try to prevent controversy or conflict by avoiding any serious issues and feelings. However, this method is not always successful, and the storming period begins when individuals think behaviour is acceptable but later find it is not. For example, shaking hands is polite and good behaviour to initiate a relationship but shaking hands in several cultures and religions is not acceptable among those of different genders. This situation makes individuals jump to the storming stage immediately without being in the forming stage. Hence, the new system provides space for all individuals in a group to document their Red and Green Areas to establish common ground;

- The system aims to make the storming stage as easy as possible and jump to the norming stage because users will share their norms, values, and rules to work together to prevent possible conflict. This stage in the system will also be different because members will explore others' comfort zones to establish common ground. Members will not feel like winners or losers because the sound of the rules will be "We" as a group instead of "I";

- The system incorporates mechanisms that persuade most of the target people to become involved and collaborate to establish common ground by making the first engagement part of signing into the group. Also, this system will be provided before the work starts, and may satisfy the curiosity to know who will be in the group and what the task is. Furthermore, the design mechanisms aim to address some key issues raised in Grudin (1994);

- The system will contribute to online suggestions or recommendations to allocate users to the right group by answering several questions;

- The system will create a group profile rather than an individual one. This feature makes use of "we" instead of "I" and symbolizes group therapy as well as the compassion-focused theory of universality and

compassion. It establishes the garden area of common ground among members;

- Another feature anonymizes the group profile to help members feel free to express their Red and Green areas. This feature helps persuade and motivate group members to document their areas and feel accepted and respected;

- This is a fair and equal space for each member to express their feelings, share their opinions, and write their rules, so outgoing people will have a limited space and the shy people will feel they can express their ideas. The SNT contains the work aim, the individuals' experiences, and the expectations of rules, norms, and values of working as a group.

6.2 Anonymous Group Profile

The author proposes the concept of an anonymous group profile as a mechanism, which represents the Red and Green areas of a group. This could be constructed and utilized as follows. Participants are individually asked to specify their skills, understanding of the task, and own Red and Green Areas, for the purpose of communicating common ground to the team and helping to identify appropriate strategies. They are assured that their answers will remain anonymous and be presented in an aggregate form. The gathered information is then shown at the level of the group –revealing the team's skills, common set of Red and Green Areas, and any areas of conflict. There is potential for the system to make suggestions for appropriate strategies to establish common ground based on the team's stated preferences (such as specific social activities or how to set up the team's working environment). The team members should have the option to edit their contributions to the team profile (with the overall representation dynamically updating), since it has been noticed that Red and Green Areas may change through the process of collaboration.

Our intention is that the use of the anonymous group profile will encourage participants to share their Green and Red Areas as they would not be attributed specifically to any individual. At the same time, the use of a group, rather than individual presentation of the members' skills and preferences, conveys team spirit and helps to set expectations of how they can work effectively together. Finally, the ability to update individual Red and Green Areas throughout the collaboration

process reflects and supports the development of members and the team as a whole.

Several researchers have studied anonymity (e.g. Kiesler et al., 1984; Kang, 2013; Siegel et al., 1986; Gallupe et al., 1991; Santana,2014; Thi Thao Duyen et al., 2017; Eureka, 2017; Vance et al., 2017), and it has been found that users responded positively to feedback from an anonymous source (Thi Thao Duyen et al., 2017). Moreover, Townsend (2009) found a significant difference between two groups of students, where one group used normal groupware and the other group used groupware that has anonymity feature. Those with the anonymity feature were more comfortable and active than the other group. Furthermore, Ho and McLeod (2008) suggested that anonymity in CMC reduces the fear of isolation and encourages users to be more involved. Additionally, anonymity features can enhance "equalization" (Siegel et al., 1986), protect the privacy of content (Acquisti et al. 2013), and generate new and original ideas (Gallupe et al., 1991).

The next sections are the exploratory evaluation part. They make a contribution by exploring the real-world usage of anonymous group profiles, which is the main novel feature of the proposed SNT. The study reported here aims to understand users' behaviour in the UK and the KSA when used in practice in a Wizard of Oz method involving a Bristol survey, to capture data from the team members and the subsequent manual creation of anonymous group profile pages. Then, it includes material prepared for the evaluation and describes the analytical process applied to data collected during these two studies. It concludes by presenting several possible implications for technology design.

6.3 Exploratory evaluation procedure

The author organized and managed the studies in both countries. In each workshop in the UK and KSA, the studies started with a PowerPoint presentation that gave a brief description of the study background and the broad approach to the studies. The approach was a simple online interaction as an SNT for group members to socialize, sharing their possible motivations and challenges before they met physically. The aim was to help them collaborate more effectively. Furthermore, the author explained to participants the three main concepts: Red area, Green area, and Strategies. Finally, the Wizard of Oz method was used for both exploratory evaluation studies. Participants completed several exercises using the Bristol online survey tools. More detail is presented in the following sections.

6.3.1 Exploratory evaluation studies in the UK and KSA

The aim of the coming section is to study the main concepts that emerged from previous studies. The design concepts are We-spirit, Universal, Compassion, Expectations, Empowerment, Development, and Protection.

The first exploratory evaluation in the UK aimed to evaluate the four main questions asked and designed as part of signing into the system to persuade people to write down their Green and Red Areas. These questions needed to be formed carefully to most effectively persuade collaborative interactions between group members as well as enhanced KS. The second exploratory evaluation in the KSA aimed to evaluate the questions alongside the "Anonymous Group Profile". The exploratory evaluation entailed several steps in the two countries (Figure 7).

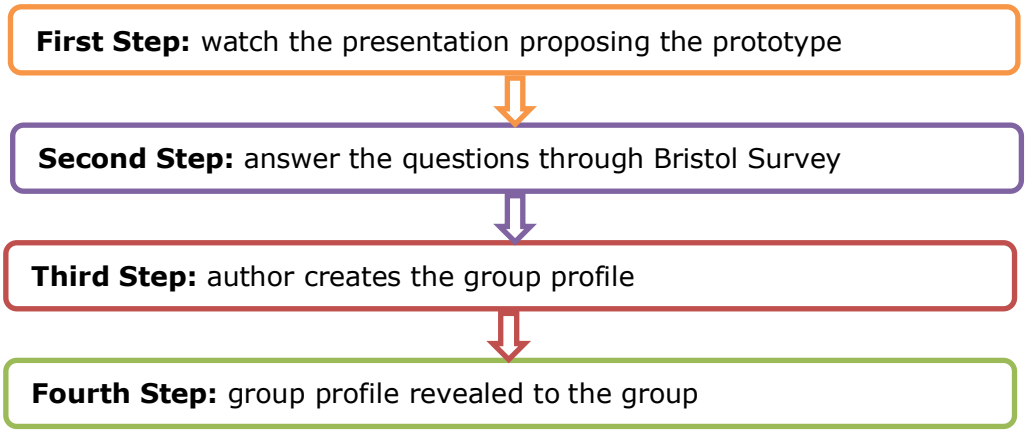


Figure 7: The steps that people worked through during exploratory evaluation studies

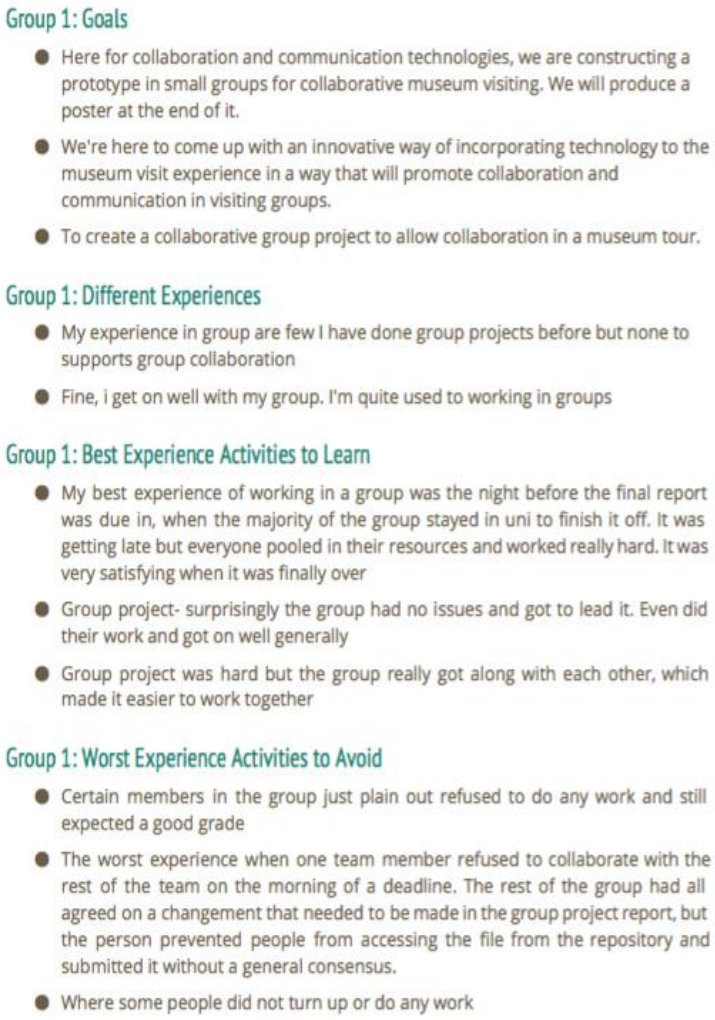
6.3.2 Wizard of Oz method

Although in a real system a profile would be created algorithmically, for the purposes of this PhD the Wizard of Oz method was used to allow for rapid exploration of key issues.

6.3.2.1 Data collection plan in the UK and KSA

The author created a Bristol survey of five questions: four main questions and a fifth to request new topics for inclusion in the future. These surveys were designed to ask participants to answer questions during and after the lecture. Then, using Google Docs the author manually created visualizations of the group profile, as shown in Figure 8, and e-mailed these team profiles to each group. In the team

profile, the author offered participants vouchers for time spent in interviews; these were conducted to discuss their experiences with the suggested design system.



Group 1: Goals

- Here for collaboration and communication technologies, we are constructing a prototype in small groups for collaborative museum visiting. We will produce a poster at the end of it.
- We're here to come up with an innovative way of incorporating technology to the museum visit experience in a way that will promote collaboration and communication in visiting groups.
- To create a collaborative group project to allow collaboration in a museum tour.

Group 1: Different Experiences

- My experience in group are few I have done group projects before but none to supports group collaboration
- Fine, i get on well with my group. I'm quite used to working in groups

Group 1: Best Experience Activities to Learn

- My best experience of working in a group was the night before the final report was due in, when the majority of the group stayed in uni to finish it off. It was getting late but everyone pooled in their resources and worked really hard. It was very satisfying when it was finally over
- Group project- surprisingly the group had no issues and got to lead it. Even did their work and got on well generally
- Group project was hard but the group really got along with each other, which made it easier to work together

Group 1: Worst Experience Activities to Avoid

- Certain members in the group just plain out refused to do any work and still expected a good grade
- The worst experience when one team member refused to collaborate with the rest of the team on the morning of a deadline. The rest of the group had all agreed on a changement that needed to be made in the group project report, but the person prevented people from accessing the file from the repository and submitted it without a general consensus.
- Where some people did not turn up or do any work

Figure 8: Group Profile, designed by the author during the exploratory evaluation study in the UK

Members were informed that their answers would be entirely anonymous and that no other team member would be able to connect the comment with names, leaving participants free to answer questions and apply the three concepts: We-spirit, Universal, and Protection. The answers to the four questions from all team members were gathered and presented in the team profile. The five questions were:

- Why are we here? Talk about the task and its aim.
- How do you fit in? Talk about your experience.
- What was your best experience working in a group? Why was it so great?

- What was your worst experience working in a group? Why was it so bad?
- Please think about other topics you think it would be good to discuss with your group members. (Optional)

6.3.2.2 Aim of the study

The purpose of conducting the study was to evaluate whether the questions did indeed fulfil the author's intentions:

Question 1: Why are we here? Talk about the task and its aim: Expectations and development. The first question asked users to explain whether their expectations were realistic about the task aim and objectives, place, and other team members. The goal was to develop an understanding of the varying views and expectations of each group member about the project/task aims and objectives.

Question 2: How do you fit in? Talk about your experience: Development and expectations. The second question aimed to facilitate creativity and innovation, giving group members the freedom and independence to choose their own goals to make the work more exciting and successful. This success may occur if group members know the main aims and objectives of the task and considerations of the available knowledge, experiences, and skills of the group members, enabling them to use these attributes effectively and enhance the exchange among members.

Question 3: What was your best experience working in a group? Why was it so great? Empowerment. The third question aimed to make individuals feel they were recognized and had some authority, so that they could feel enjoyment, respect, capability, and success as a member of a group. The format gave group members equal opportunities to write freely and document their Green Areas.

Question 4: What was your worst experience working in a group? Why was it so bad? Compassion. The fourth question aimed to promote particular behaviours among group members: honesty, loyalty, trust, sensitivity, helpfulness, empathy, forgiveness, sympathy, and honesty in recognizing their own and others' feelings, emotions, and needs. It was important to give group members equal opportunities to write freely and document their Red Areas.

Question 5: Please think about other topics you think it would be better to discuss with your group members. (Optional). The fifth question was optional because it asked if members had additional topics they thought important to discuss with their group members.

The intention was to provide the benefits listed below. Studies described in this chapter were intended to evaluate whether these benefits occurred.

- **Build and exchange knowledge** about the task and people regarding skills, experiences, rules, boundaries, motivations, and expectations.
- **Make reasonable expectations,** clarifying the task so people could avoid misunderstandings in the initial meetings and have realistic expectations.
- **Easier to manage (Empowerment)** was accomplished by knowing the task, people's skills, experiences, rules, boundaries, motivations, and expectations, to make managing the plan and process easier.
- **Resolve possible issues (Development)** involved building knowledge about the people and tasks to make any possible issues easier to resolve.
- **Relationship and trust building (Compassion)** entailed asking people's opinions to build trust and a relationship.
- **Saving** time, effort, money, space, and energy that initial meetings used to consume.
- **Persuading people**, through the team profile, to accept and respect each other's rules, boundaries, and motivations. The SNT works like a common ground area that contains everyone's constraints and motivations. This area enhances the ability of group members to work effectively in their Garden.

6.4 Exploratory evaluation studies in the UK

The real-life case exploratory evaluation in the UK was with an undergraduate class at the University of Nottingham, School of Computer Science. The aim of the study was to examine and test the four questions asked to group members to pass through the two stages of their group work cycle: norming and forming.

6.4.1 Participants in the real-life case in the UK

As said before in Chapter 2, in this thesis the focus is on deep-surface diversity users. The design was used alongside the group coursework to support collaboration between group members. The coursework was for the course Collaboration and Communication Technologies (G53CCT). Participants were chosen because they are deep-surface diverse individuals learning about collaboration and communication technologies used between people. The class had 29 students, who were divided into nine groups for the coursework by the course convener. The design was sent to all students using the university academic forum, Moodle, with a link to the Bristol Survey to answer the five questions and students were encouraged to answer these questions during the class. Moodle was used in this study to communicate with participants. The lecturer communicates with students and sends them tasks through Moodle. Then, Moodle was also used to remind students to answer the questions. Using this method, only 11 responses resulted from 29 students; however, when personal e-mails were sent to each one, a total of 20 participants responded. Thus, a personal e-mail using the participant's name can encourage engagement with the study.

6.4.2 Group task for the real-life case in the UK

The coursework task was to create a prototype and make a poster about a collaborative visit to a museum. The detailed task, taken from the lecturer and assigned to students, was to design and build a prototype of a collaborative visiting system for a museum/cultural heritage site. The task was to design a system that specifically considered groups of visitors and supported communication and collaboration among them. The system could fall under any one (or a combination) of areas in the space/time matrix.

Students had to consider relevant theories and concepts covered in the module. If they supported visitors who were very different from each other, then issues such as awareness, communication, feedback, and feedthrough were of importance. Participants needed to think about issues related to supporting different roles and transitions, as well as the social, technological, spatial, and temporal considerations raised by the interaction-design framework.

6.4.3 UK results and analysis of the exploratory evaluation

The five questions were answered by 20 participants, with varying levels of detail. For each question, I presupposed that one theme would be the focus of the answer, but unexpected answers emerged.

6.4.3.1 Question 1: Why are we here? Talk about the task and its aim

This question asked participants to write their understanding and expectations about the task's details and aim. The varying answers from participants provided different aspects and details about the task, based on participants' thinking and experiences. For this question, for example, some participants were task-centric, whereas others were learning/skills-centric. Examples follow.

Task-centric answers

Most of 17 the participants were task-centric. In general, participants gave a brief description of their task. Very few answers were detailed about the task and its aim. Some responses follow:

> *Aim to create a museum visiting collaborative experience aim. To do this we are prototyping a computer system that will enable this.*

> *To come up with several feasible prototypes to allow for collaborative work in a museum setting.*

Learning/skills-centric answers

Only three participants gave skills-centric answers. They understood the questions differently, and wrote about what they would gain in skills from the task rather than talking about the task itself, which was also useful information. For example,

> *To continue to increase our group collaboration skills and to be able to work in a group more effectively to produce a deliverable.*

> *The aim of the task is to understand collaborative techniques and how they can be utilized to improve group work.*

Unexpected answers

Only one participant did not understand the question:

> *Why are we-where? What task? What aim? Not sure I can answer this without knowing the context of the question.*

6.4.3.2 Question 2: How do you fit in? Talk about your experience

For Question 2, 20 participants responded. The aim of asking the question was to persuade participants to write about their personal skills and experiences that relate to the task, to show how they can fit in. However, participants' answers varied regarding the detail. Some wrote about their collaborative skills whereas others wrote about particular skills. Examples follow.

Collaborative skills

Some participants described general skills about which they had experience in collaborating with others:

> *Fine, I get on well with my group. I'm quite used to working in groups.*

> *I have completed two previous large group projects in my first and second year and so have experience working with others towards a common goal.*

However, one participant tried to inform the group that he/she was quiet but worked well with the group:

> *Creating a prototype – I fit into groups quite well but am relatively quiet.*

In contrast, the following participant did not give very general skills that he/she had in computer science.

> *I'm doing the course so I guess that's how I fit in? I don't have experience in designing collaboration technologies but I study computer science.*

Some participants gave a very brief statement of their experiences. For example,

I've done similar projects before, its just a case of following a spec.

My experience in groups is limited. I have done group projects before but none to support group collaboration.

Particular skills

Some participant answers described a particular skill, such as being good at generating ideas:

I am part of the group, I am here to give ideas and help team members in figuring out the answer to the task and design a prototype after discussing ideas.

I fit in by proposing ideas that can be the foundation of a great idea. Or at least what I think is a great idea and we can all find that out through putting our minds together.

Answered after the coursework finished

The following responses seem to have been given after the participants finished the task because they described what they did rather than their skills and experiences. Some responses follow:

As a member of the group, I have helped on every section carried out so far. I have helped to brainstorm ideas that could be used for the system as well as making valuable contributions to both the poster and the prototype.

Since all team members have good interpersonal skills, it's very missing word to communicate and make progress. So far we developed a prototyped which looks really good, so I feel that gained experience working in a group made a great impact on a task.

The following quotation was from a participant who gave specific ideas proposed in the coursework:

According to the task, I provided some ideas in terms of making the product seems more socialized and convenient when in the

same time same place. When using an APP called WeChat, which is really popular in China, the QR code has a particular aim when people want to join a group chat, or add a new friend. Thus, considering this, QR code was used in our task.

Unexpected answers

Only two participants gave unexpected answers:

Fit in with what regards? I feel like this question isn't very clear on what it's asking.

Honestly don't know what to say.

6.4.3.3 Question 3: What was your best experience working in a group? Why was it so great?

For the 20 responses for Question 3, the aim was to gain specific examples of the best project as well as describe some good practices when working in a group. Participants gave a great deal of information about their best experiences but did not give examples or details about their personal preference to work in a group, which this question intended. For example, for this question a participant talked in general about knowing the exact work assigned to each member:

Working as part of a development team professionally, the job is a lot easier when everyone knows exactly what they have to do.

Two participants gave facts about one good experience on a particular course, without explaining why it was a positive experience:

First year module G51REQ

G51REQ – We did the work well, together and ahead of the deadlines.

Other participants talked about the advantage of working with a group led to these positive feelings:

> *Second year group project –surprisingly I had no issues with my team and got to lead it. Even did their work and got on well in general.*

> *My best experience would be the group project in second year, as group leader I had the task of organizing the group and myself to fit in with multiple deadlines and deliverables, which was tricky but very rewarding*.

Reason for group success

Most participants were eager to give a few examples of behaviours and practices that made for group success. For example, group meetings, good communication, being sociable, preparation, dedication, working hard, organization, good mix of ideas and opinions, discussion, opportunity to learn from others, working as a pair on a single computer, and working together on the same parts of a system. For example:

> *Best user experience was leading a raid team of 20 people on World of War Craft. Consistently turning up to three raids a week for 3-hour periods in order to defeat challenging bosses. Preparation, dedication and organization was required. It was a large-scale success, everyone enjoyed their time there and the atmosphere was second to none. We also killed all the bosses we wanted to.*

> *My best experience in a group was when I got assigned a role with someone else and we could work together on the same parts of a system as it allowed me to learn things that I did not know and for me to teach the other member, some things that I knew and they did not. It allowed us to share our knowledge and learn a lot quicker.*

Only two participants talked about their current experience of working on the task because they did it after they started working together.

> *The discussion about application function. Because in this process, we shared ideas with others and agreed or disagreed with others' ideas. Especially, when we talk about whether this app need Voice Guide. I agree because it can reduce users'*

time; however, others said that it can make the system more complex and it is not necessary.

Working as a pair on a single computer with one observing the computer work and the other doing the computer work. This allowed for work to be done much more efficiently. I think we are making good progress and meeting our defined goals. I hope the refinement process of our prototype will go well.

6.4.3.4 Question 4: What was your worst experience working in a group? Why was it so bad?

From their answers, participants understood this question very well. They gave specific examples of a project as well as the disadvantages of working with a group. The aim of this question was to develop group norms, values, and rules with regard to things to avoid when working with group members. Therefore, more examples and details were needed to clarify their Red Areas. Most of their Red Areas related to members but a few related to personal preferences. They all gave detailed answers, with some examples in the Red Area, as follows. Most Red Areas related to the other members rather than themselves, as mentioned before, and most talked about one thing but used different explanations.

Uneven workload

All participants considered working with slackers as their Red Area but used different ways to explain this:

G52GRP –a couple of the members of the group were slackers and never did the work they said they would –delaying the whole project.

Group project –bad because some people were continually absent, and some of us did more work than others.

Also, several behaviours were placed in Red Areas, such as the following:

Poor communication, collaboration, and organization

Group project that involved very little organization. No communication between the team and little cliques were

created. Alienated and isolated from the team, when work was attempted was disregarded. No real focus or direction for the team and the group leader was very fractured and didn't advise what everyone should be doing. Wished I had taken the lead role.

The worst experience I had when working in a group was when one team member refused to collaborate with the rest of the team on the morning of a deadline. The rest of the group had all agreed on a challenge that needed to be made in the group project report, but the person prevented people from accessing the file from the repository and submitted it without a general consensus.

Diversity in their experiences, opinions, and skills

Sometimes opinion differs, hence we have to combine ideas and create or expand current functionality, which is not a problem. I think time is a key thing making work good, so I hope we are gonna meet our goals.

Anytime group activities or participation is forced and not organic or naturally encouraged. If members are constantly working outside of their skillset it becomes frustrating.

Working with friends

This was a very interesting point in the workshop studies, where working with friends was in participants' Green Area, not their Red Area.

Second year HCI module. We had to find our own groups. We therefore created a group within friends. That resulted in not being able to choose a leader and no one was managing the overall progress. Also, no one was giving and monitoring individual contribution. Meetings were rare and we mostly worked individually and couldn't physically share ideas and feedback. When we finished our parts of work it was late in the process when it appeared that it didn't quite work well together.

Timing issues

> *Before each meeting, we should make an appointment time. However, it may difficult since we are on different majors and different things.*

> *Organizing meetings was particularly difficult, partly due to time constraints and other commitments.*

Only one participant talked about his personal undesirable time, which was working in the early morning or on a task when other responsibilities impinged:

> *I find it difficult to work on group coursework near the deadlines of any other coursework. As well as this, I struggle to work effectively very early in the morning.*

Contribution not recognized

One participant's Red Area was when his work was not recognized by others:

> *My worst experience was when a group did not recognize that I did any work even when I wrote most of the report for a given task at that time.*

Only one participant talked about the task rather than the group members or behaviours:

> *Documentation of one part of a group coursework; it was the first time we had actually worked together and we spent a really long time gathered round one screen writing and rewriting a simple paragraph of text.*

6.4.3.5 Question 5: Please think about other topics you think it would be better to discuss with your group members (optional). The author asked a fifth question with the option to answer; 8 participants answered this question.

Some of these answers related to Red Areas and others to both Red and Green Areas. For the Green Area, the first answer talked about good practice as group members needed frequent meetings:

> *Need more group meetings to get started on actually doing some work.*

Participants expressed the need for proper communication and collaboration:

> *We should probably talk about our paper prototypes and ideas.*

> *How about talking about the interactive map and making it more interactive?*

For the Green and Red Area, there were the following responses:

> *Expectations –don't be late, all do our fair share of the work etc.*

> *We should probably talk about our paper prototypes and ideas.*

One participant described good communication, collaboration, and giving honest feedback about work, as well as updating others:

> *If you think you are going to be late, if you are unsure what it is you're meant to be doing, if you have been given a task you're not good at (e.g. Designing a logo when you're not comfortable with Photoshop etc.).*

For the Red Area, a participant said,

> *I do not like speaking in presentations.*

Another participant did not understand the question but gave an interesting response:

> *I don't understand this question? But I would like to have more updates about how the prototype is progressing.*

6.4.4 Interview findings

A personal e-mail was sent to all participants, inviting them to take part in an interview; two responded. The aim of these interviews was to gain feedback and knowledge about the concept.

Results and analysis from the two interviews

Three themes emerged from detailed interviews of about an hour each:

- Good user-experience features
- Bad user-experience features
- Improving suggestions

Table 17 gives examples and quotations from interviews with the two participants. The experiences of the two interviewed participants were quite positive. They were very interested in the system, finding it unique. They said they certainly could use it in the future. They thought it would be useful to enhance communication and collaboration among group members as well as to create and assign tasks among those in the group. They suggested improving the questions to be more direct and specific. Also, the questions can be differentiated by task. The drawback of this study was that most participants delayed using the system until the end of the coursework due to lack of time.

Table 16: Interview analysis for the exploratory evaluation study in the UK

Good features	Bad features	Suggestions
Give information about the system's aim	The aim includes information that is not organized	Bullet point precise information
Making the question answer as part of signing in	Not clear and direct questions need time to be answered	Direct specific detailed questions needed
Four questions are a good number	Fixed questions	Make some of the questions editable by the creator of the group members to change them based on the task
Group Profile	Personal Profile	No need for a personal profile
The use of the system is good	Use the system for more purposes	Use to allocate group members

In sum, the evaluation was general about participants' user experiences and the usability of the system. The prototyped system needed several improvements for better usability and user experiences. However, the two participants were quite enthusiastic about the anonymous group profile. They found it to be unique and different from other SNTs they used. They said the group profile makes them think about 'We' rather than 'I'. During the interview, participants were asked about how the personal profile should look. Participants said the system could be used in the

future to enhance communication and collaboration among group members as well as to create and complete assignments in the group. Their suggestions were:

- The questions should be more direct and specific;
- The questions can be edited, based on the task;
- Use the system to form groups based on similarities;
- Format any information as bullet points.

6.4.5 Discussion of the UK exploratory evaluation studies

The study in the UK was conducted in two parts. In the first part, the Wizard of Oz method was used to examine the four questions. In the second part, two interviews with participants provided feedback about the four questions. Below is the discussion of the results from the two parts.

How to improve the questions

This exploratory evaluation helped reveal knowledge that can be used to improve the four questions. Using questions in the technology design as a persuasion tool and making these answers part of signing up to the system is challenging because answers may vary widely. However, next is an examination of the questions and how they could be formatted to be more effective as a tool.

Question 1: Why are we here? Talk about the task and its aim

The answers to Question 1 draw a complete picture of the task, providing very important factors to document expectations and understanding about the task and therefore avoid misunderstandings and add clarification for completing the task. The question needed to be modified to encourage participants to provide more detailed answers and focus more on the specifics of the task. Also, the question should be asked in a more specific way. For example, tell your group members about your understanding and expectations about the task or project goals and objectives.

Question 2: How do you fit in? Talk about your experience

Each group member needs an opportunity to explain their beliefs about which skills and experiences would be most useful for the project, and to understand the same information from others. This knowledge will help them establish how they will work

together. To motivate group members to write in greater detail, the question could be modified to encourage group members to tell others about which of their skills and experiences will add to the project and to the group.

Question 3: What was your best experience working in a group? Why was it so great?

This question aimed to prepare individuals better to move on with the task. This question provides space for people to feel comfortable and confident to enhance their motivation by giving each other their Green Areas, allowing them to work with a group effectively. The question needed to be improved to help group members write about their personal preferences and establish their group work constitution. For example, "Tell your group members what your best experiences and practices have been when working with a group; think about the factors and expected behaviours that can help members enjoy working together".

Question 4: What was your worst experience working in a group? Why was it so bad?

This question aimed to provide space for people to feel comfortable and confident writing about their possible personal barriers and rules, to help them overcome the challenges and provocations working effectively with a group. From the analysis of this answer, this question also needed to be improved to help group members write more about their personal rules, so they can be documented and respected by others. For example, question four could read, "Tell your group members what your worst experiences and practices were when working with a group; think about the factors (personal and cultural) that make it difficult and challenging to share knowledge among members".

Question 5: Please think about other topics you think it would be better to discuss with your group members (optional).

This question was optional. However, the goal was to know any additional topics members would like to talk about with their group members. The answers to this question revealed no new topics that would cause modifications to the previous questions. However, this question needed to be improved to help group members understand it clearly and write about other topics that might be important to discuss before the initial meeting. For example, please tell your group members about other topics you think it would be good to discuss before you start working together.

6.5 Exploratory evaluation studies in the KSA

For this study, several iterations were made to the questions, as suggested from the previous study mentioned before. The study was conducted in one KSA University in Jeddah, the King Abdul-Aziz University Business School in the course Management of Information Systems. The following subsections explain the studies and results in detail.

6.5.1 Participants in a real-life case in the KSA

As said before in Chapter 2, the thesis's focus was on deep-surface diversity users. The course Management of Information Systems in the Business School had 22 female students studying on an all-female campus at King Abdul-Aziz University. It is the norm in most Saudi schools that men and women do not mix in classes. These students came from different departments in a business school, and most were in their third year of college. They did not know each other well because this course is a general course for all business school departments. Hence, these participants were chosen based on their diversity and worked together for the first time.

6.5.2 Group task of the real-life case in the KSA

The task was an authentic group work task, planned by the course lecturer. Each group was assigned a case study to analyze from their textbook. They were asked to apply what they had learned from the lecturer when they were analyzing the case study. The task was suitable for this study because it was group work that required communication, collaboration, and KS to accomplish a task. However, the duration of the coursework was only one week, which was insufficient time for participants to meet several times. Thus, students met each other only once, physically, and then worked together using the online technology, WhatsApp.

6.5.3 The aim of the real-life case in the KSA

The second evaluation study was needed to study the effect of rephrasing questions from the first study, and to explore the use of the group profile. The system was designed based on the seven design concepts proposed in Chapter 5: we-spirit, universal, compassion, expectations, empowerment, development, and protection. The real-life case study in the KSA also aimed to evaluate these seven design concepts and understand participants' use of the system.

6.5.4 Process of the real-life case in the KSA

The following is a description of the process of the real-life case in the KSA.

Firstly, students enrolled in the study by attending two lectures. These lectures, planned by the author, explained the plan, details, and goals of the study. The concepts were explained in detail so the students understood their roles in the evolution of the study.

Secondly, students were allocated to groups, although they had not worked with each other previously. Seven groups were formed, each containing three students, except one group which had four.

Thirdly, the online technology WhatsApp was used for communication and for further explanations related to the study.

Fourthly, the study had a single task: students were to answer the questions in Arabic or English, whenever it was convenient to explain their answers. The task was to answer the survey used in the real-life case in the UK, but the five questions were edited, as suggested in the results from the real-life case in the UK. This survey had five questions, four of which were compulsory. The first question related to the task goals. The second related to skills they could use to complete the task. The third related to Green Areas, and the fourth to Red. The fifth, which was optional, related to any new topics they would like to add or discuss with their group members.

Fifthly, before allocating the groups, the task was sent by e-mail to all participants using the Bristol Survey.

Sixthly, after the answers were received from the task, participants were allocated to groups, ensuring group members had not worked together before. Group profiles were made from the answers and sent to the groups and participants by e-mail. The author asked them to check their e-mail before mentioning anything to group members. After a day, group members' names were sent to them by WhatsApp so that they could start work.

Seventhly, the group work took one week to complete, and after this three days were allocated for the interview. Participants were interviewed individually using semi-structured interviews, which were recorded and translated into English. During the interviews, participants were shown the group profile as a reminder.

6.5.5 Results and analysis of the real-life case in the KSA

The 22 participants were formed into seven groups in this study. All answered the questions for both tasks in Arabic, because their English was insufficient to conduct the study and describe their Red and Green Areas easily. In total, 14 students were interviewed in Arabic. Five students had not read the group profile, which was essential to the study, so their interviews were short. Three students were not interviewed because they did not come to the arranged interview.

6.5.5.1 Why five participants did not read the group profile

The five students who did not read their personal profile were asked why. Three of them thought they were open minded and very flexible and did not have enough time to complete the task. For example, P3 said:

> *I did not read the group profile since it will not change how I will act with new people, as I am very flexible and friendly.*

The other participants felt the system should be used only when the task was long or complex. P5 said,

> *I did not read the group profile because it is more for a big and complex project that will take a long time.*

However, one participant believed the system would not have any benefits because all group members had one goal to achieve. P7 said,

> *I did not read the group profile because it will not change anything, we all want to gain marks so we will work and submit the work even if I do not like the girls' behaviour or they do not like me. We are in the end students who have one goal, which is to gain marks whatever the situation, so we will move on to get the marks.*

6.5.5.2 General feedback about the system

Most participants thought they would use the system to help in their future work. However, they believed it would work better for long or complex tasks. For example, P1 said,

I really like it and I will definitely use it in the future.

I think also that system will have more effect on people who work together for a longer time. Our task took less than a week.

6.5.5.3 Results and analysis of the answers

In general, answers were similar to those expected, as they met most of the aims of the questions. Some answers showed that participants did not fully understand the main aim of the system or the questions. However, the results of this second study in the KSA were more relevant than in the UK study. The following subheadings detail the results and analysis of the four questions.

Question 1: Tell your group members about your understanding and expectations of the task or project goals and objectives.

Twenty two responses accrued for Question 1. From the data and as described before, because people can have different perceptions of the task, they may perceive the question differently. In general, most participants wrote the same descriptions about their task. They copied and pasted the task questions. They provided no detailed answers about the task and its aim. In contrast, four participants used their own words to describe the task and explained it very briefly. It seemed participants did not want to make an effort and spend time rewriting the task, based on their understanding. However, a few responses indicated participants did not understand the purpose of the question. For example, P3G7 said,

I hope we will be the best group and we will do the best work and everyone will be happy.

Question 2: Tell your group members how you fit in? Tell your group members about your skills and experiences that can add to the projects and to your group members.

The 22 responses for the second question varied. Some wrote about skills unrelated to the task. For example, P2G4 wrote,

I can work with PowerPoint in a perfect and easy way.

Others described various skills for working in a group. For example, P1G7 said,

I know how to write English very well.

In contrast, some participants wrote their skills related to the task itself. For example, P3G7 said,

I like to work with a group and I am good at communication.

P4G7 wrote,

I like my work to be creative, not normal.

Question 3: Tell your group members what your best experiences and practices were when working with a group. Think about the factors and expected behaviour that can make members work and enjoy working together while enhancing your knowledge sharing.

The 22 responses for the third question were as intended. Some answers described general and expected behaviours. Some wrote only words such as cooperation and honest. However, most participants wrote about their Green Areas, and others added their feelings when good behaviours occur. For example, P2G1 said,

Helping each other in a group makes me feel happy and relaxed to do my best to do the work.

Motivate different opinions and give constructive feedback.

P1G2 said,

Wearing professional clothes, talking politely, making eye contact and listening to others.

Question 4: Tell your group members, what were your worst experiences and practices working with a group; think about the factors (personal and cultural) that made members' work difficult and challenged the ability to share knowledge between them?

The 22 responses for the fourth question were as intended. While 20 participants' answers were broad, such as selfish behaviour, some provided details. For example, P2G2 wrote,

Irresponsible and leaving the work to one individual.

P3G1 said,

> *Interrupt me while I am talking, use a mobile phone when I am talking, talk to others while I am talking, being late.*

In contrast, a few students wrote about their general Red Areas, unrelated to this task, such as talking about shaking hands between men and women, even though they were only working with women.

6.5.5.4 Feedback about questions from the interviews

Most participants thought the questions were not direct or clear enough. They preferred detailed, direct questions and thought the questions should relate to the task. For example, P11 said,

> *I like the system but I think the questions are not suitable for our task and environment.*

P21 wrote,

> *I prefer if the questions were more direct, something like 'what can annoy you when you work with a group?'.*

One participant thought unclear answers could make the group members afraid rather than prepared. For example, P16 wrote,

> *I was afraid since one of them wrote that she likes a professional relationship, clothes and behaviour. I really do not like to be a very professional person; I really like to be friendly, but when I met them I could not know who wrote that. They were very friendly and I think she missed what she actually meant about professional.*

Some suggested adding more detail, such as the goal of each question, to encourage people to engage with the system more.

6.5.6 Interview Analysis

This study aimed to evaluate the seven design concepts: we-spirit, universal, compassion, expectations, empowerment, development, and protection. This design was used to enhance collaborative interactions between group members.

New items to consider were when the entire group met at the beginning, and then worked online, because time and place were quite critical. Furthermore, it seemed participants wanted to spend the least amount of time using the system.

Table 17 presents the concepts and example quotations.

Table 17: Results of the Real-Life Case in the KSA

The concept	Example Quote
We-Spirit	**P16**: I really like it and it makes me think about others and respect more. It helps me to build trust, be confident and feel comfortable. **P2**: I really like the group profile, I thought that we should discuss it with each other, but no one discussed any points. All of them remembered and took into consideration what was written in the group profile. **P13**: One of the best experiences was dividing the tasks equally between the group members. That really made me think and work hard to do that correctly since it is her right. **P4**: The questions took 10 minutes to finish and I was not sure how this could be useful. But after I read the group profile I felt it worth spending some effort in the beginning to save time and space and to build your trust and confidence and be comfortable. **P20**: I do not think we need a personal profile; what can I put about myself professionally I can write it in the group profile.
Universal	**P14**: I like the system but I think the questions are not suitable for our task and environment. **P19**: I prefer if the questions were more direct something like 'what can annoy you when you work with group?'.
Compassion	**P2**: It builds a bit of fear since I like to be late and the other people want to be on time, but that made me more responsible to be on time. **P7**: I really like it and it made me think about others and respect more. It helps me to build trust, be confident and feel comfortable. It makes my expectations close to reality. **P10:** If you do not have Red Area you do not have a personality. Every individual has to have these barriers and areas to protect him/herself physically and emotionally. Most of these areas are the expected behavior from others. When you expect something, this does not mean all the cultures or people know about these expectations. There are several certain universal Red Areas for many people, such as racism and sexism, but many people still interfere in these areas.
Expectations	**P1**: I feel confidant and relaxed since my expectations are met. **P4**: It makes my expectations close to reality.
Empowerment	**P2**: I really like the group profile; I thought that we should discuss it with each other, but no one discussed any points.

	All of them remembered and took into consideration what was written in the group profile. **P11**: In the beginning, I was annoyed to work with people I do not know, but using this system motivated me to be more open and respectful, and I would like to work in the future with different people. I have learned a lot from them. **P14:** I really like it. All my group members wrote that they do not like to have a leader. I find it amazing that I found common ground before I even met my group members, which really motivated me to work with my group members effectively.
Development	**P15**: I found the questions are great and ask about everything; just I hoped it was more direct not broad. **P12**: I used to be late but after I found lateness was the worst experience, I encouraged myself to be on time.
Protection	**P13**: What I really liked about the group profile is that being anonymous I can write without thinking about the judgment. **P22**: Actually, I can use it with my friends even to say which of my roles and barriers are broken. I cannot tell them face to face as it will make them upset but an anonymous group profile will make it easier. **P21**: No one asked the others who wrote these answers at all it but kind of respected the privacy.

We-Spirit Concept

From the interviews, the participants' feelings about we-spirit increased when they read their group profile. Most participants expressed that by reading their Anonymous Group Profile, they thought about "we" rather than "I" or "she." This realization made the written role more acceptable. They felt a sense of equality and tolerance for others and themselves. However, no one in any group asked who wrote these roles or discussed the group profile. Participants only considered when they met and worked together, but they were curious to know the group profile. All participants mentioned that they did not like the personal profiles. They said the group profile contained everything professional people should know about them.

Universal Concept

In this study**,** universal referred to the opportunity for all group members to write their personal rules as group rules. Participants expressed that the system is easy and straightforward to use. They mentioned during the interviews that some people provided many details whereas others wrote very briefly. Some participants held concerns about whether they had answered correctly. Therefore the questions need to be clearer and provide guidance on the level of detail required.

Compassion Concept

Some participants said the group profile made them feel compassionate, sympathetic, sensitive, caring, empathetic, and honest. Participants mentioned that reading the group profile made them feel more understanding, respectful, and able to build trust.

Expectations Concept

All participants expressed that the system built their initial trust, confidence, and comfort, because the group profile provided some expectations. Moreover, all participants thought they were in groups based on their answers, because they found themselves quite relaxed to work with people for the first time. One participant said,

> *When I know that I will work with people that I am not used to working with, I start to be wary. My marks are always high, but after I read the group profile my expectations changed and I started to be optimistic. Actually, they were the best group I have ever met. I hope I can work with them again.*

Empowerment Concept

Some students mentioned that it was worth the effort, time, and energy to use the system. One participant mentioned that one of her group profile rules was fairness. This role empowered her to be as fair as she could. She tried her best to divide the work in a fair way. One participant said,

> *I was disappointed when you told us that we would work with a group that we had never worked with, but after reading the group profile I started to be confident and now I am extremely happy to work with anyone.*

The group profile seemed to empower the student to change her view and work with people with whom she was not used to working.

Development Concept

The group profile gave participants some freedom. For example, one of the participants said,

> *This system made me be on time when I am usually late, since one of the rules was 'being on time'. I do not want them to know that I did not write this rule.*

The group profile persuaded her to be the person that the group wanted, which developed her skills to learn and be on time. Another participant said,

> *I really love this system because for the first time I worked with a group without a group leader, and thank you that you put me with the people who do not like a group leader.*

The researcher did not allocate the groups based on their answers but it seemed they thought they were put in groups of similar people and thus believed they could work easily with that group.

Protection concept

All participants were happy about the notion of anonymity. They found it exciting and respectful for others.

6.6 Conclusion

The system aims to enhance collaborative interactions among group members and save the time, space, energy, and money that used to be consumed during collaborative effort. However, from participants' answers to the questions and interviews, the users always preferred to make minimal effort to use the system.

In general, in the evolution of this study, the design for the seven concepts was effective. However, this is the first study on this SNT, conducted only with women. Additional studies need to evaluate the system and the design concept. Some participants said this system can best be used for very diverse environments, and this aspect could be evaluated in the future. In this study, all participants felt no need for a personal profile, but this too can be questioned further in additional studies.

This series of evaluations aimed to explore and understand more about the concepts, and make a contribution around real-world usage of anonymous group profiles, which is the main novel feature of the proposed SNT. Moreover, this pair of real-life case studies in the UK and the KSA aimed to explore various results and requirements collected from these two different countries. The first evaluation was

in the UK with an undergraduate class at the University of Nottingham, School of Computer Science. The second evaluation was in the KSA with an undergraduate class at the University of King Abdul-Aziz, Jeddah School of Business. Although both studies were conducted with undergraduate students, the UK class had men and women, whereas in the KSA only female students participated. It is the norm in the Saudi education system that male and female students do not mix.

The author faced several issues during these evaluations which led to lessons learn. First, in the UK, students use e-mail and portals to communicate more often than KSA students, who prefer WhatsApp. Therefore, the researcher tried to find the best way to communicate with participants. This was a challenge because the group profile was sent through e-mail and the author asked them to check their e-mail. Thus, in the KSA, some participants did not see their group profile before they started working together. Second, participants in the KSA chose to use Arabic to complete their task and the author had to give two lectures to translate and explain the exercise and the prototype for them so they could express their feelings more freely in their native language. This use of first language provided greater depth to the data because each participant used their own language to express their feelings freely.

Results from both studies were similar, although the evaluation tasks dissimilar. The UK exploratory evaluation tested the questions, whereas the KSA study tested most of the system. However, there were common evaluation results for the questions as well as unexpected answers in the UK, more so than in the KSA. This was perhaps because the questions were improved for the KSA study. Also, both groups of participant talked briefly, without detailed answers. Furthermore, participants in both countries wrote the same kinds of answers, talking about particular skills that were unrelated to the task, perhaps due to the kinds of personalities and how they understood the focus of the questions.

Conducting studies in two countries was quite time and effort consuming. However, the data collected are worthwhile because they show the potential of group profiles for many diverse individuals in these two countries. The next chapter will discuss the main contributions of this thesis and propose a low fidelity prototype design that builds on the two concept framework and the initial prototype studies and findings.

Chapter 7

Discussion

This chapter discusses the key findings and theoretical contributions (concepts, models), as well as the relationship between the findings and the models. Moreover, it suggests how these findings can be put in practice in the future through software development.

The aim of this thesis was to understand collaborative interactions in diverse teams to inform the design of a technology that supports and enhances the ability of a group of diverse individuals who will work together for the first time by interacting and collaborating.

The main contributions of this research are two novel conceptual frameworks, which are grounded in qualitative data to inform technology design. They also offer a new perspective on a topic previously studied by other researchers regarding challenges, motivations, and strategies for collaborative interactions in challenging situations.

The author reviewed the literature relevant to this study, focusing on *diversity* and exploring its aspects in groups; however, to dig deeper into the issues, the researcher decided to employ qualitative research to understand more about the experience of working within a diverse group. Therefore, as reported in Chapter 4, qualitative studies involving semi-structured interviews were conducted with ten diverse participants, who represented challenging cases of working in a group, to deepen understanding of the context. Based on the literature review in Chapter 2 and the study findings presented in Chapter 4, the **RGS conceptual framework** was established. The **RGS conceptual framework** presents a novel, simple way of understanding and structuring the possible challenges as Red Areas, the motivations as Green Areas, and the strategies as Interaction Strategies for collaborative interactions in challenging situations. It is hoped that the HCI designer will take into consideration this conceptual framework when designing technologies for collaborative work.

In Chapter 5, the second conceptual framework was introduced from a series of studies, which are a set of interactive workshops located in the UK and KSA. The author chose very different countries to obtain most of the data, in order to understand more about the conceptual framework and to establish the requirements. The studies involved more than 70 participants, which resulted in a total of 363 examples accrued in the Red Area, 369 examples in the Green Area, and 360 examples of Interaction Strategies. Consequently, **"Seven Technology Design Concepts for Groupware Collaboration" (7TD) Conceptual**

Framework were proposed: we-spirit, universal, compassion, expectations, empowerment, development, and protection.

This conceptual framework helped identify key categories of Red and Green Areas, and group Interaction Strategies that focus on work process, group behaviour and the use of technologies. Therefore, the results reflect how designers of collaborative technologies might draw upon these concepts to scaffold diversity management in these groups.

The **7TD Conceptual Framework** is similar to the compassion-focused therapy used by psychologists. They use the three significant emotion regulation systems: Drive system, Threat Protection system, and Contentment system (Gilbert, 2009), as discussed before. They argue that therapy can balance these three systems by the six attributes of compassion.

Workshop interactive participants said they learned about themselves and revealed new things in their minds which motivated them to write but not to share sometimes. They need a system that can guide and persuade them to think about themselves.

Chapter 6 reported and explored more about the concepts and makes a contribution around real world usage of anonymous group profiles. This is the main novel feature of the proposed SNT to aid team members to prepare themselves and interact with the other members to build their common ground.

Finally, this chapter discussed how everything that has been learned through the thesis work – encapsulated through the two frameworks and the lessons learned through the exploratory evaluations in Chapter 6 – can be put into practice by the proposed design to aid collaboration in diverse teams. However, a full prototype has been developed as supplementary material and is included as a digital appendix.

7.1 Focus on the Period before Collaboration

The interview and workshop results showed that each participant experienced circumstances which might negatively impact collaboration, in the "Red Area", or might make them feel more comfortable and relaxed, in the "Green Area". The question, therefore, is how to help a group of diverse members to find common ground in their Green Areas and avoid, rather than impinge, on the Red Areas of

others (or even cross their own Red Areas, as the found in the study reported in Chapter 4). Therefore, this research suggests that it is important to focus on the period *before* collaboration actually starts by introducing a phase of social interaction during which participants can share their Green and Red Areas with each other. Workshop findings presented in Chapter 5 show that participants were willing to share the majority of their Green and Red Areas with others.

This thesis provides support for, and will potentially shorten, the period of the early formation stages as identified in Tuckman's five stage group behaviour model, comprising: forming (individuals get together to learn about each other), storming (members leave their comfort zone and try to set rules to stop conflict), norming (agreement stage during which the group determines rules of engagement), performing (group starts to be effective in meeting goals), and adjourning (process of ending the group structure).

The sharing of Green and Red Areas could be supported at the organizational level by establishing it as a routine part of the process of assembling dynamic teams. This could be supplemented by the development of guidelines and rules for the effective organization of groups. Much of this could be supported by digital technologies, which would guide people through the setup and launch of such dynamic groups. A digital technology was chosen for several reasons, as discussed in Section 2.13 in Chapter 2. Using an online technology, space, time, cost, and effort can be saved. Also, it helps people with social anxiety to interact more effectively. Additionally, many individuals prefer CMC rather than face-to-face communication, and the combination of online and face-to-face communication improves informal relationships and socialization, which in turn improves the quality of learning and achievement. On the other hand, existing SNTs may not be a good choice for people who will collaborate for the first time and care about their privacy.

Moreover, as we discussed in Chapter 2, Tuckman developed a team model to show the process individuals go through to accomplish a task. In this model, the earlier the stage, the longer the time taken to reach agreement or different decisions. Moreover, each stage builds on the previous one and skips any step which will affect the team performance negatively. Therefore, stages need different features of technology design to satisfy users' needs. In this thesis, the proposed technology aims to shorten the period of the earlier stages to save the time, space, money, effort, and energy used in these earlier stages. Figure 9 below shows a scenario of members not using technology. From the studies and the figure, we can see that

the user needs a tool to help them shorten the earlier stages and make it easy for them before they start working together. This area needs more attention from researchers.

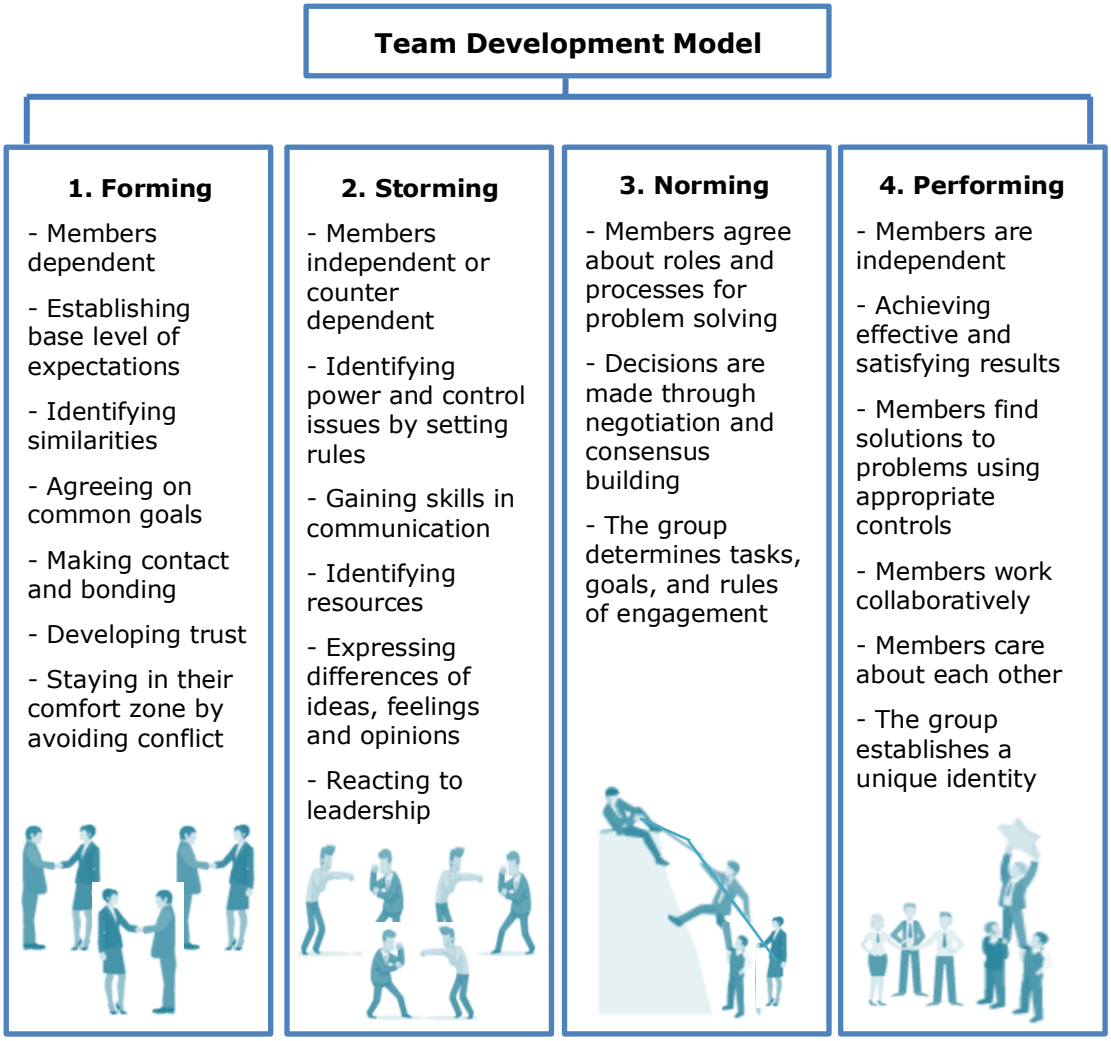


Figure 9: The scenario of the members without using technology

7.2 Strategic use of SNTs

SNTs can let team members share Green and Red Areas both prior to working collectively and while they collaborate. In Chapter 4, the interviews revealed that some participants already try to learn about others through SNTs to understand how to interact with them better. Others chose SNTs to educate fellow students about their culture and beliefs in order to side-step some of the emotional strains that can exist in face-to-face interaction. The workshop findings in Chapter 5 show that use of technology is one of a set of key strategies to find common ground, to facilitate inductions and communication between team members, and find common

areas by checking SNT profiles. Furthermore, participants are willing to share a wider range of Red and Green Areas online than face-to-face, as this is seen as less awkward.

Based on the findings, the author suggests some important qualities that social network technology support should embody. The technology should promote a feeling of 'we spirit' rather than 'I,' so participants feel they are part of the same unit. At the same time, it needs to satisfy individual needs too. It should help set expectations so that participants have a realistic understanding of the task and each other, and provide opportunity for development to reflect how these evolve over time. Finally, the system needs to protect the privacy of the group members to enable everyone to feel comfortable with sharing all of their Red and Green Areas.

Existing SNTs such as Facebook and LinkedIn are, therefore, not suitable to satisfy the requirements for sharing Red and Green Areas and establishing common ground between new team members. They provide individual user profiles that are aimed at a wide audience. It has been suggested that new functionality needs to be developed (either as part of existing SNTs or as a standalone) that is particularly aimed at supporting the period of team formation while following the principles outlined above. The following sections outline one such potential development.

7.3 Suggested Design

The requirements gathered from users through the various studies discussed in Chapters 4-6 reveal the need to extend the design of an SNT that can help group members overcome some of their challenges and enhance their motivation. This need can be met through various existing SNTs such as Facebook, but a number of limitations arise, as discussed in Section 7.2 and Chapter 2, Section 2.14. Hence, a "We" SNT was designed to fulfil the requirements established earlier in this thesis.

The proposed technology focuses on a different direction from most groupware studies, by concentrating on socializing, preparing, and introducing group members before they physically start to work together. It is an SNT designed as a groupware system to help overcome possible challenges, and enhance motivation before collaborating physically. Table 18 represents the conceptual framework developed in Chapter 5 and the design features of the technology to enhance collaborative interaction between group members.

Table 18: The relationship between the two-conceptual frameworks, RGS and 7TD, and the design features of the technology, to enhance collaborative interaction and knowledge sharing between group members

Design Techniques	Red Area	Green Area	Interaction Strategies (CGS)	Design Features
We-Spirit	Thinking about We rather than I can help individuals to overcome some of their Red Areas	Thinking about We rather than I can motivate many positive behaviors	We help people start building common ground	Design Group Profile rather than personal profile
Universal	Easy for users to share their Red Areas, regardless of their level of diversity	Easy for users to share their Green Areas, regardless of their level of diversity	Easy for users to share their Interaction Strategies, regardless of their level of diversity	Simplify the use of the system and guide the users. Design Group Profile rather than personal profile
Compassion	Sharing the Red Areas can help them overcome some of them and avoid interacting in this area. This can reduce conflict and minimize the disadvantages of the diversity	Sharing the Green Areas can motivate positive behavior and make building common ground easier. This can maximize the advantages of the diversity	Sharing Interaction Strategies can make building common ground easier and faster	Provide fair and equal space to share and document their Red and Green Areas, and persuade them to do so by giving examples
Expectations	Sharing the Red Area can make the expectations closer to reality, which makes people more prepared for the experience	Sharing the Green Area can make the expectations closer to reality, which makes people more prepared for the experience	Sharing the Interaction Strategies can make the expectations closer to the reality, which makes people more prepared for the experience	Providing space that can help to develop an understanding of the different views and expectations of each group member about the project aims and objectives
Empowerment	Sharing the Red Area makes individuals feel they have been recognized	Sharing the Green Area can makes users feel they have some authority that can enhance enjoyment, respect, capability, and success as a	Sharing the Interaction Strategies can have some authority that can enhance enjoyment, respect, capability, and success as a	Providing space that can give fair and equal opportunities to share freely, document their Green Areas, and persuade them to do so

		member of a group	member of a group	by giving examples
Development	Sharing the Red Areas can avoid impacting on an area which constrains creativity and innovation. Also, some of this area can be changed to Green by helping members to develop themselves	Sharing the Green Area can motivate creativity and innovation, helping members to develop themselves	Sharing the Interaction Strategies can motivate creativity and innovation, helping members to develop themselves	Group discussion provides space that can help the group know the aims and objectives of the task. They should know the required experiences and skills of the group to use them effectively and enhance exchange between each other
Protection	The design should protect the privacy of users when they share their Red Area to avoid conflict and judgment	The design should protect the privacy of users when they share their Green Area to avoid conflict and judgment	The design should protect the privacy of users when they share their Interaction Strategies to avoid conflict and judgment	Make the Group Profile **Anonymous**

Anonymous Group Profile

As discussed in Chapter 6, Section 6.3, the anonymous group profile is proposed as a mechanism, to represent the Red and Green Areas of a group to establish their working common ground (Garden). This could be utilized by asking the users individually and anonymously to specify their own Red and Green Areas for the purpose of communicating common ground to the team and helping to identify appropriate collaboration strategies that suit all the group members. Potentially, the system will establish common ground based on the team's stated preferences (such as specific social activities or how to set up the team's working environment). The team members have the option to edit their contributions to the team profile (with the overall representation dynamically updating), as we have seen that Red and Green Areas may change through the process of collaboration or if there is overlap between the Red and Green Areas of the members, as seen from the studies in Chapters 4 and 5.

The intention of the anonymous group profile is to encourage participants to share their Green and Red Areas more, because they would not be attributed specifically

to any individual. At the same time, the Green and Red Areas for the whole group are shown on the group profile, to motivate users to take them into consideration. Finally, the ability to update individual Red and Green Areas throughout the collaboration process reflects and supports the development of the members and team as a whole.

The proposal of an anonymous group profile opens up a number of directions for future research. The proposal needs to be evaluated with different teams in different contexts to find a form that can be used to assess its value to members, exploring how most effectively to gather input and represent the outcome to teams in practice. There are further questions of if/how to integrate the group profile feature with existing systems and if/how individual answers or the group profile might become available to management. There is potential to maximize team composition based on the Red and Green Areas of individuals, but the likelihood of members being honest may be reduced if they feel this could be used as part of performance assessment.

On-line system

One workshop interactive participant in Chapter 5 said they had learned about themselves and that new things had been revealed from their minds which motivated them to write but not to share sometimes. They thus need a system that can guide and persuade them to think about themselves.

Acknowledging an individual's Green and Red Areas before they interact may help other individuals to prepare for these areas and find common ground, which can work as compassion-focused therapy and place the participants in the Garden area, to avoid struggle.

The developed conceptual framework can act as compassion-focused therapy for group members to balance their three significant emotion regulation systems for a positive mental state to enhance individuals' life satisfaction, improve resilience, and facilitate "living well" (Gilbert, 2009). These goals are the targets for all organizations and individuals. The concepts are generalized from the raw data—it is their Green Area and Interaction Strategies which are used to avoid possible Red Areas. These concepts should be considered when groupware is being designed for a team/group that will work together.

When a group is chosen to accomplish a task, the manager or one of the group members could ask them to sign into the 'We' system to make their forming, storming and norming stages shorter, easier and better by saving the time, space, money, effort, and energy consumed in these stages.

The website's welcome page is displayed. The entries on this page describe the main objectives of the system, and create an account or log in if the users already have an account. Each individual in a group has to create an account. To do this, there are two main steps to creating an account. When the user fills in their first name, surname, and e-mail, and chooses a password and clicks to 'create an account', the system takes them to the main page.

In Chapter 6, the evaluation studies results show that participants need to understand the clear purpose of the system before they can use it. Therefore, Figure 10 shows an example which can be a suggestion of how to educate the user about the system before they use it. This interface represents an extended design by including a new functionality to SNTs for groupware. The aim of this interface is to explain to the user the aim of the system to enhance their motivation to use the system. It contains the main design concepts as well as icons for creating a team, signing up, and logging in. The user can click on the new concepts and a pop up window is displayed with the meaning of the concept, as shown in Figure 11.



Figure 10: The system Interface



Figure 11: Meaning of the new concepts

After the users log in or create a new a count, the system will take them to the main page that could look like figure (12).

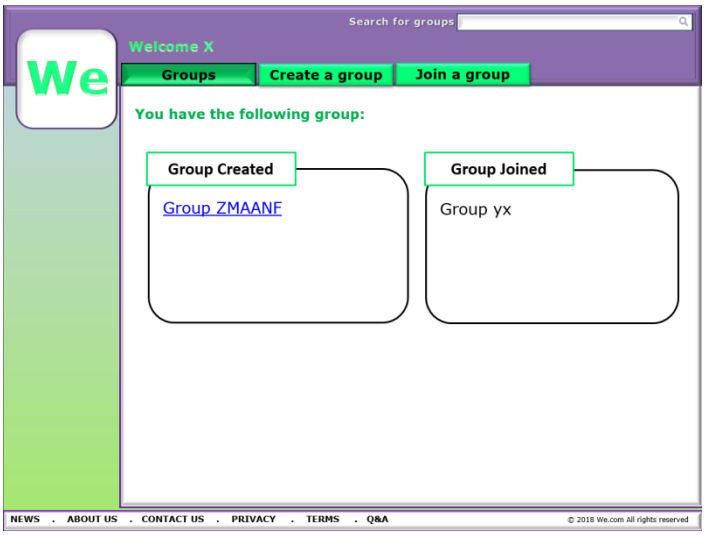


Figure 12: The main page of the system after logging in or creating an account

Since the system is for groupware, in the main navigation in the interface there are three tabs: Groups, Create a group, Join a group. Clicking any tab opens it and show details about the tab. In the Group tabs, there are two lists of groups represented by a name and optionally a logo. The first lists the groups that the user has created, while the second is the list of groups the user has joined.

By clicking on the tab 'Create a group', the system opens the details that should be filled in to create a group, as shown in Figure 13. The group code has to be

unique and this code will be shared between the group members to join their group profile when they click the join group tab, as in Figure 14. Also, in response to the participants' request during the exploratory evaluation (reported in Chapter 6), the option was added for the creator of the group to add questions for the group members to get some feedback, to prepare training, or to manage a plan, such as asking about group members' skills and experiences.

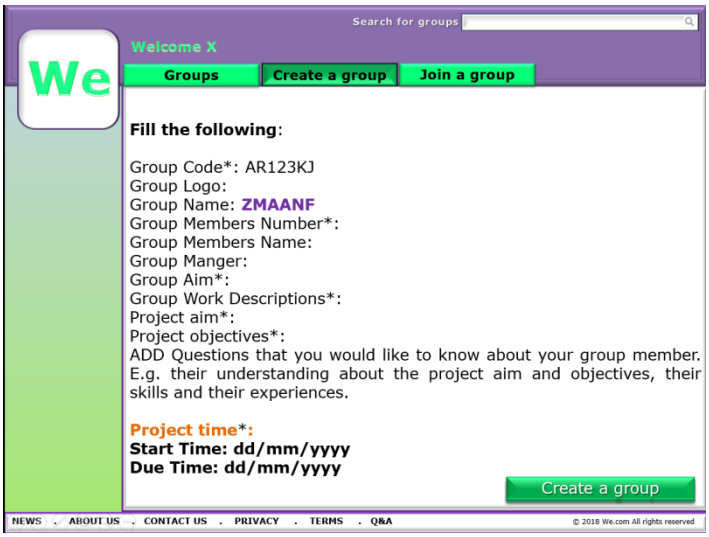


Figure 13: Create a group Interface

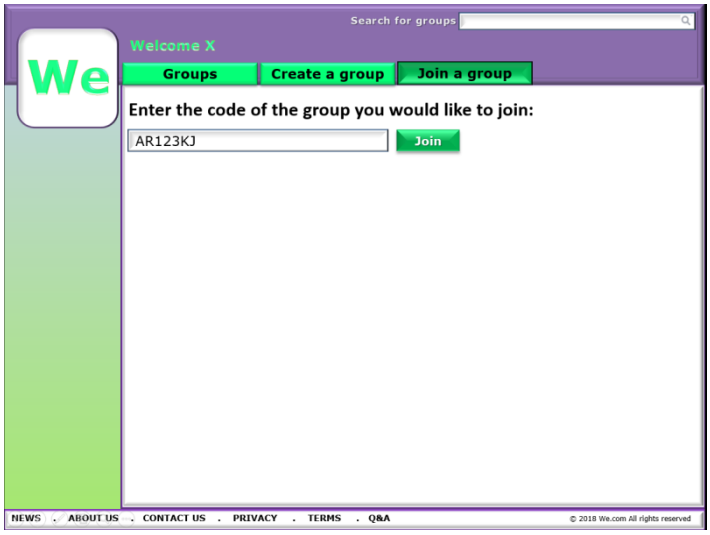


Figure 14: Join a group interface

When the users 'Create an account' or 'Join a group' the system takes them to the main page of the group, as seen in Figure 15, but they cannot open the Garden (the anonymous group profile) and Group Discussion until they fill in their Green and Red Areas, as seen in Figure 17. This strategy of design persuades them to share their Green and Red Areas to find their common ground. The interface has another navigation menu on the left side containing four tabs: Green Area, Red Area, Garden, and Group discussion. The users can edit the group details if they

have created the group, or the creator makes the options free for any group members to edit the details, as seen in Figure 16.

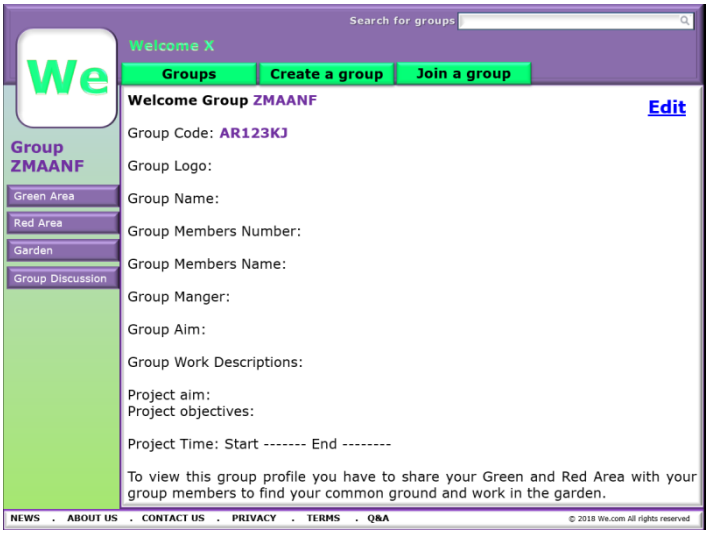


Figure 15: One of the group pages

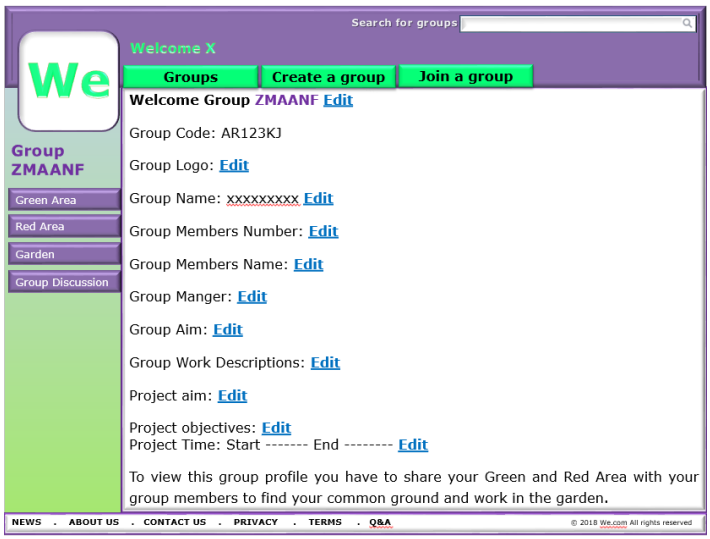


Figure 16: Edit the group page

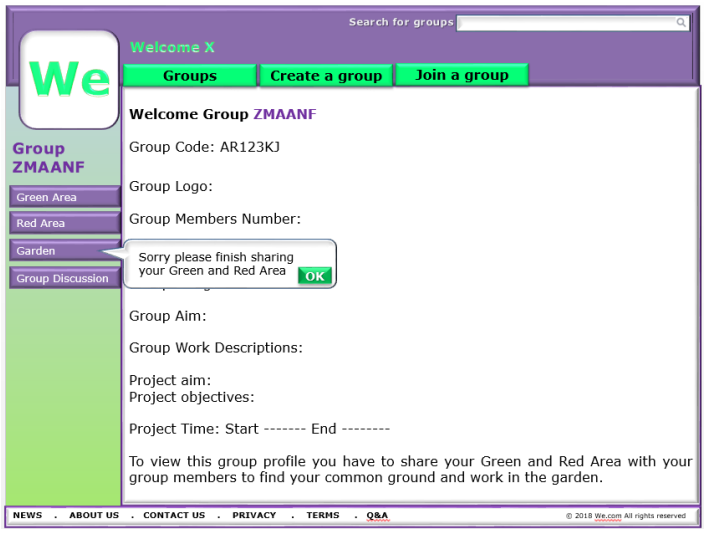


Figure 17: Message to guide the users

Before users can view the Garden for their group work, they must first complete their own Green and Red Areas, choosing which to fill in first. However, in Chapter 5, during the interactive workshops, participants expressed that sharing Green Areas was enjoyable, easier and faster. Therefore, in the design, the Green Area tab comes first to encourage them to fill this in quickly and motivate them to take the next step, which is sharing their Red Areas.

Figures 18-20 represent an example of the Green Area tab. The first screen gives the meaning of the Green Area and shows the different categories of this area, based on the findings from the study reported in Chapter 5. Examples are given for each category to make the use of the system simpler and easer, involving small steps, as the participants suggested in Chapter 6, to have a quick and easy way of specifying category. These are also aimed at making the users aware of these areas, as they can be unconscious of them or taken for granted. After the user finishes all the Green Area categories, they can add more if they wish. Then they click next.

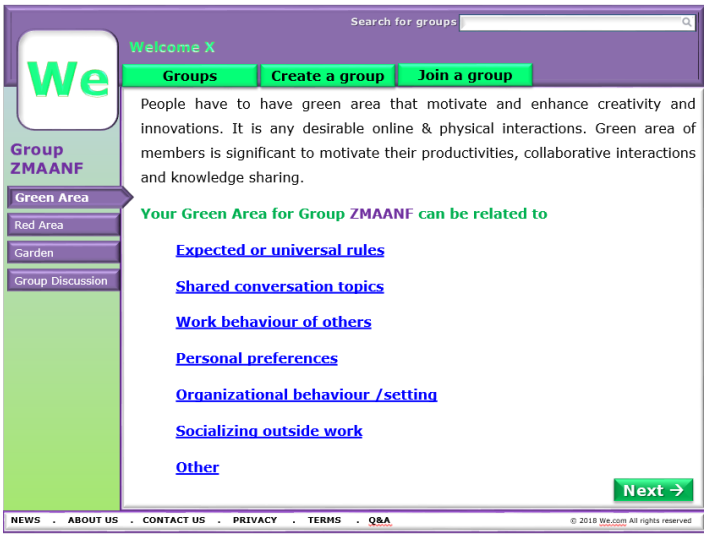


Figure 18: The Green Area

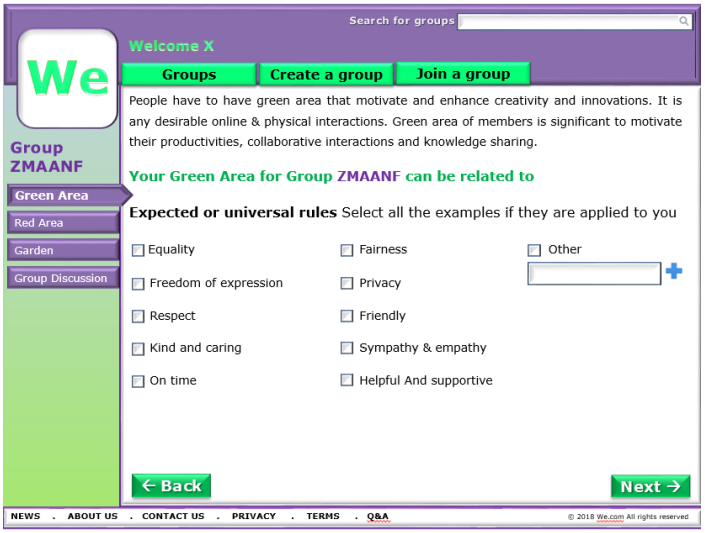


Figure 19: The first category of the Green Area

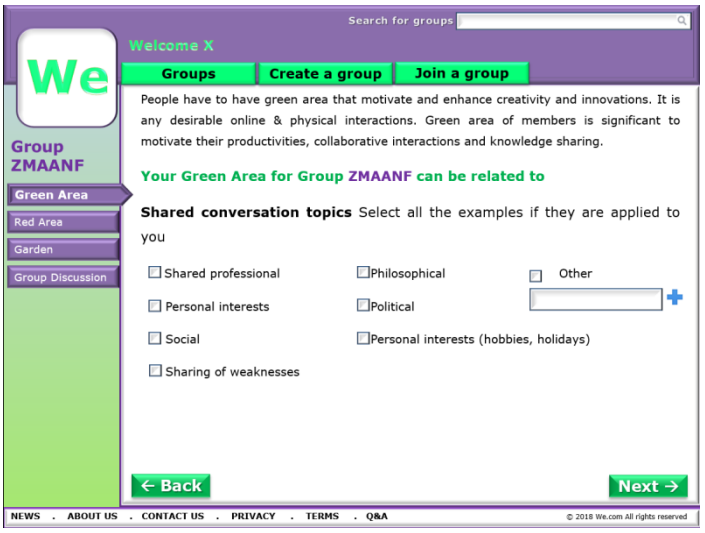


Figure 20: The second category of the Green Area

During the next step the users share their Red Areas, as shown in Figures 21-22. The top of the screen gives the meaning of the Red Area and the categories of these areas are also based on the study in Chapter 5. Similarly, as for the Green Areas, these examples are given to make the use of the system simpler and easier, and the small steps persuade users to be compassionate about themselves and then about others. After the user has finished all the categories, they can add more if they wish. Then they click the finish icon. Once the user clicks this icon, two pages appear –the Garden, and Create a group.

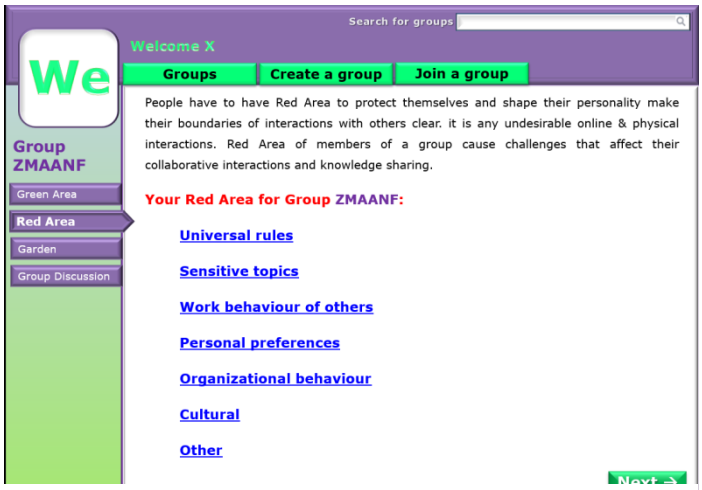


Figure 20: The Red Area

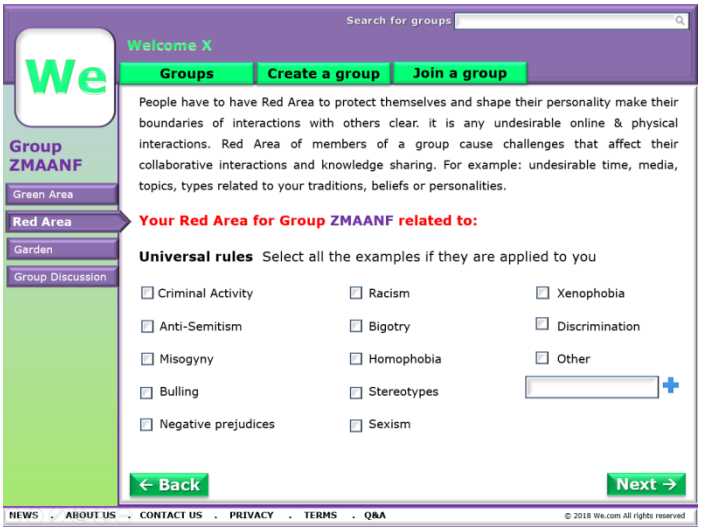


Figure 21: The first category –Red Area

The Garden represents an anonymous group profile for establishing common areas, topics, activities, knowledge, strengths, weaknesses, sports, hobbies, difficulties, abilities, worries or anything else the users as group members can share with others, as seen in Figures 23-24. The Garden should make the users' expectations similar to reality and help them prepare themselves for these expectations. The

aim is to make members feel confidant and comfortable, and to enjoy the work, to enhance creativity and innovation.

The Garden (the anonymous group profile) includes three different parts. The first and third parts are inside the Garden. The first part represents all the Green Area examples chosen by the group members as a whole. These examples are represented in numbers and when the user clicks the number the example will appear. The second part is the rules for working in this Garden, and these rules comprise the group's Red Area. The rules are presented outside of the Garden as they are not part of the Green Area. The third part is the warning area inside the Garden. This area represents the conflict between the Red and Green Areas between group members. Users as a group can see their own and the group's Red and Green Areas visualized, and can edit their Red and Green Areas whenever they wish. The warning area appears automatically if there is a conflict between a Green Area for someone and a Red Area for another.

Figure 25 represents the group discussion page, which is based on the findings in Chapter 6. The participants ask if there is a discussion page to improve understanding of some of the Green and Red Areas, and give an opportunity for group members to ask any questions that can help them to work effectively.

The next chapter concludes this thesis and reflects on the studies, findings, and analyses described in previous chapters.

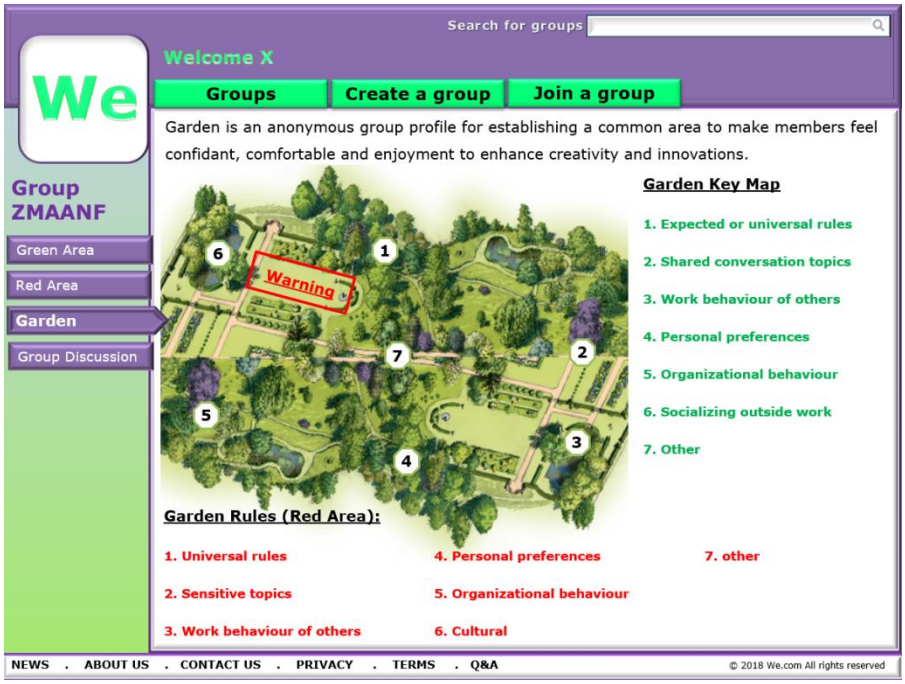


Figure 22: The Garden Interface

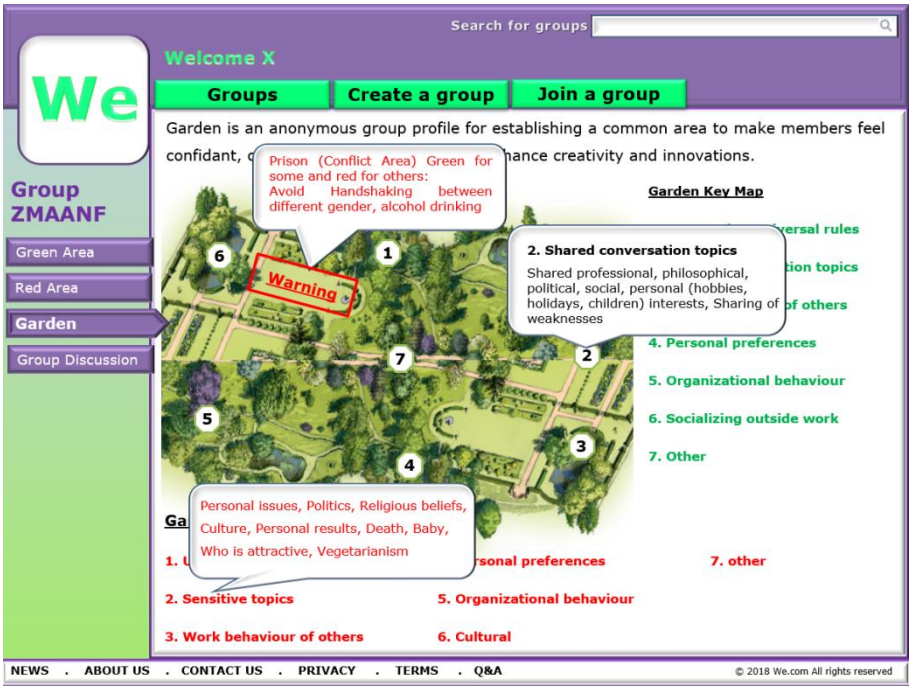


Figure 23: The Second Garden Interface

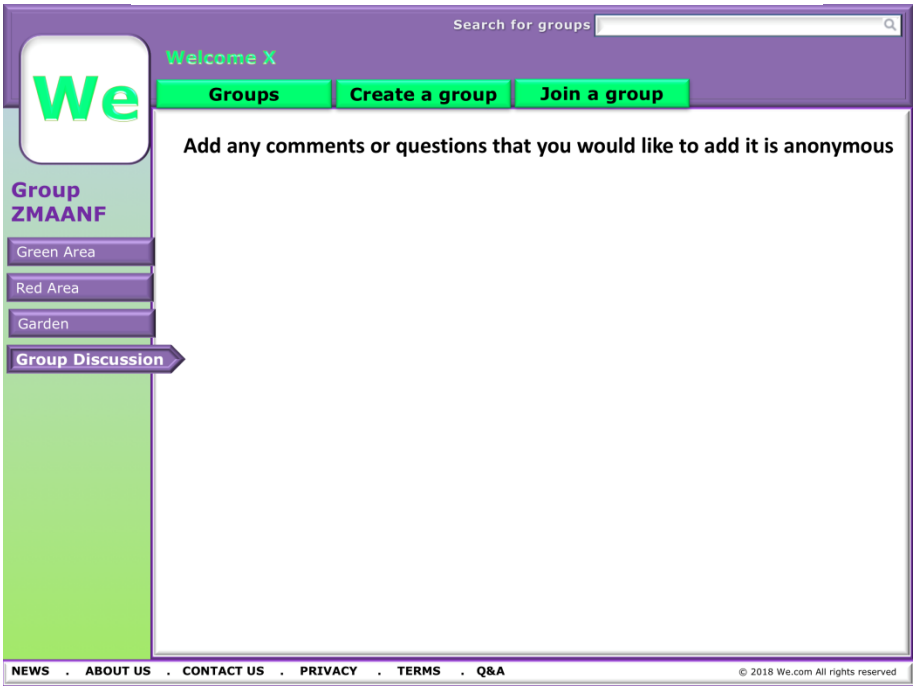


Figure 24: Group Discussion Interface

Chapter 8

Conclusion and reflections

The aim of this chapter is to conclude this thesis and reflect on the studies, findings, and analyses described in previous chapters. This chapter starts with a summary of the chapters presented in this thesis, considering the contributions of each. Then, it presents a discussion of the concepts explored in previous chapters. This discussion aims to reflect the knowledge developed from the study process as presented in the thesis. The combined knowledge helps to discern how to extend the design of SNTs that can enhance collaborative interactions between group members. Finally, this chapter concludes with some reflections on the progression of research in this thesis, indicating the strengths and limitations of the methods used.

8.1 Summary of the work and its contributions

Decades of studies related to diversity and group work have been conducted in various fields. Chapter 2 contributed a detailed literature review of relevant studies in various fields. Then, this thesis made contributions on several topics defined in Chapter 3.

Chapter 4 explained the first exploratory study, which aimed to explore more about diverse group members' challenges, motivations, and interaction strategies for finding common ground. This chapter described three main concepts developed to understand interactions between group members: the Red Area, Green Area, and Interaction Strategies to find common ground. These concepts are novel, especially in the context of work on technologies to support collaboration. Chapter 5 describes the workshops undertaken in the UK and KSA, representing more examples of the three previously mentioned. These examples helped in understanding and developing a seven concept design for group members to enhance effective collaborative interaction. The seven design concepts are: we-spirit, universal, compassion, expectations, empowerment, development, and protection. Chapter 6 illustrated the suggested design based on these seven concepts, and sought to evaluate them. It also represented the series of exploratory evaluation studies in the UK and KSA. Chapter 7 discussed the main contributions of this thesis and proposed the design that builds on the two concept framework and the suggested design.

8.2 Research contributions and impact

Chapter One discussed the following research questions and aim:

The aim of the PhD is to understand collaborative interactions between team members with deep-level diversity to inform the design of technology that would enhance the ability of diverse individuals who will work together for the first time to interact and collaborate.

To address the overall aim, the following research questions are considered:

- How can we better understand and categorize the possible challenges, motivations, and strategies experienced by diverse team members in order to inform technology design?
- Based on these findings, how can we design technology to support diverse individuals who will work together for the first time to establish common ground and begin to interact collaboratively?

Thus, the investigation was conducted to fulfil the following objectives:

- Investigate the literatures in various fields related to diversity and team/group to collect requirements and find design opportunities.
- Identify a suitable target group of participants to investigate the research questions through qualitative studies.
- Undertake a user-centred design of a technology that employs the literature and study findings to support teamwork between diverse individuals.

These research questions were investigated in Chapter Two as well as in the section on challenging case qualitative studies, in Chapter four, which explored the challenges, motivations and interaction strategies for group of diverse individuals. The review of the literature identified several benefits, motivations and challenges that a group of diverse individuals may face or have when they collaborate and share knowledge. These benefits, motivations and challenges are summarized in Table Three, Chapter Two.

Chapter Four of this thesis explored in depth the challenges, motivations and interaction strategies for collaboration in diverse teams and designed a social networking online technology for interaction, networking, experience sharing, informal relationships, and building trust between individuals to enhance collaborative interactions between new diverse members in a group.

This thesis explores the period before the work starts between the diverse teams, and identifies several different kinds of possible challenges, motivations and

strategies that diverse individuals may face or use during their group work, which have not been identified and used before in technology design.

This thesis has identified several topics which are significant for the understanding of several possible situations in the group work. For example, challenges or motivations related to their culture, religion, personality, social activities and/or work cultures. These data and findings have wider implications in the field of HCI research, as they demonstrate the interpretation of different fields in technology design elements.

The main contributions of this research are two novel conceptual frameworks, which are grounded in qualitative data to inform technology design. There is also a new perspective on a previously studied topic regarding challenges, motivations, and strategies for collaborative interactions in challenging situations.

The RGS conceptual framework is a set of themes which widen the understanding and labelling of possible challenges or the "Red Area", motivations and challenges or the "Green Area", and "Interaction Strategies" for collaborative interactions in challenging situations. This conceptual framework gives an overall understanding of the collaborative interactions for a technology designer to take into consideration before designing any technology for collaborative work.

This thesis identified significant topics to understand possible situations in group work such as challenges or motivations related to members' cultures, religions, personalities, social activities, or work cultures. These data and findings have wider implications in the field of HCI research. Moreover, this thesis demonstrates the integration of interpretations from various fields into technology-design elements.

The second conceptual framework is a set of themes that produced seven design techniques for collaborative work: we-spirit, universal, compassion, expectations, empowerment, development, and protection. These techniques were driven by the first conceptual design aimed to aid and guide a technology designer with the design of SNTs.

In addition, this research finds out that there is a significant need for studying and aiding individuals who will work with diverse groups before they meet with the group members. They need to prepare themselves in the best way to interact with the other members and to build common ground that helps them to be creative and innovative in their work.

In addition to using this group profile, Chapters 4-6 cover a series of studies that revealed useful data that can be considered contributions by themselves. Furthermore, these data illustrate the broader picture to understand the possible challenges, motivations, and Interaction Strategies that can be applied in any collaborative interaction between diverse group members. Finally, this thesis suggests a technology design based on the anonymous group profile rather than individuals' profiles.

Exploratory studies to document challenges, motivations and strategies for collaboration in challenging cases:

This thesis documents some specific challenges between diverse groups during their collaboration. Moreover, it documents some tactics adopted by the participants to overcome their challenges. From these data, this thesis also contributes by developing the three key concepts of Red Area, Green Area, and Interaction Strategies to establish common ground, and the Prison Struggle, or Resistance.

For example, in Chapter 4, the most interesting two challenges are gender interaction traditions and modesty or physical symbols. These challenges were hard to overcome as they considered by the author to be Red Areas for these participants. Different Interaction Strategies to overcome or manage these challenges are used, such as behave against their culture and belief. These people felt bad and stressed, so they are in the Prison Struggle or Resistance.

However, one participant chose to inform individuals about it by using SNTs to avoid face to face interactions, since the topic was sensitive. The technology helped the participant to save time and space, since she wrote it in her free time and they read it in their free time, when time is critical during collaboration work. Moreover, the participant overcame the language barrier since she had time to correct grammar and spilling mistakes and choose the right language to explain it in a way that would not offend her colleagues. This participant felt great and enjoyed her course and exchanged tacit knowledge with her group members as they had collaborated in the Garden area and they had found common ground with their colleagues by interacting in each other's Green Area.

Interactive workshops leading to design concepts for novel groupware collaboration technology:

Chapter 5 makes a contribution through confirmatory evidence for the appropriateness of these concepts. It also presents a new conceptual framework to support the design of a social networking technology to enhance KS and collaborative interactions between group members. This consists of seven concepts derived from data collected through workshops with participants. The conceptual framework consists of we-spirit, universal, compassion, expectations, empowerment, development, and protection.

For example, drinking alcohol is a Green Area for some participants but for others a Red Area. If these participants were in one group, this could be an issue. To overcome this issue, the first step is to know and expect that there is a conflict with alcohol drinking. The second step is to provide an alternative drink. These steps can make individuals in a group feel protected and compassionate, which helps to make collaborative interaction and knowledge sharing easier.

Exploratory evaluation of novel collaboration technology concepts:

This thesis contributes to the HCI by the design of "The Anonymous Group Profile". This design has been evaluated by how people interacted with the design, with the questions, and with the group profile. The evaluations in both countries gave almost the same result. Participants felt comfortable and confident when they were using it. However, they preferred to make the minimum effort and needed more information on the benefits of using the system. The participants expressed their feelings and said that using the system made them feel these concepts: we-spirit, universal, compassion, expectations, empowerment, development, and protection. However, they said that it could be a very useful system for a group who will work together for a long time on a big project.

8.3 Reflections, and limitations encountered

This thesis is structured into eight chapters, and for each chapter some limitations and problems were encountered.

Literature review

This chapter reviewed literature relevant to this study in different disciplines such as computer science, business and psychology. Interdisciplinary studies are tricky and it can be hard to find target literature that can add to the current research.

However, having a background in some of the disciplines and asking professionals can help the researcher to make better choices when the literature. It is very time consuming to read, understand and evaluate work on a topic in a different discipline, but it does provide a wide overview of the research topic and a deeper understanding of the topic, and assists the researcher to design a methodology to dig deeper into the topic.

Methodology

This chapter provides an outline of the approaches and methods used in this thesis. Designing a methodology for research is not easy when the topic is complicated, such as diverse group members. However, choosing to study challenging cases was the right choice since it helped the researcher to better understand the full picture and analyze the data in a way that can help the researcher to give meaning to his/her data. However, it is not easy to find and study since the participants in challenging cases do not have time to participate. To solve this problem, the author started by establishing common ground with challenging case participants to encourage them to take part in this study. Then, these participants were asked to encourage other participants to be part of the study. Moreover, it is a time-consuming methodology but worth it since it produces rich data and you do not need many participants for this.

Exploratory studies

This chapter presents data collected from ten participants who talked about their experiences to represent "challenging cases" about working with diverse groups, giving different examples of the challenges, motivations, and strategies used to find their common ground. Using challenging cases and qualitative research methods is very effective and useful to collect valuable data. Challenging cases are very useful in understanding the depth of real issues. Semi-structured interviews talking about their experiences were also very informative since there are no specific questions. However, this study needs a good arrangement to make the participants feel relaxed and confident talking about their private information freely without any pressure. Two important issues need to be considered. Firstly, the researcher has to ensure that the data are anonymous to protect the participants if they talk about their experiences and private information. Secondly, a suitably quiet and comfortable place for both the researcher and the participant is necessary to improve the quality of data.

Interactive workshops

This chapter presents the results of the workshops in the UK and KSA regarding the three main concepts revealed in the last chapter. This was a time consuming study since it is in two very different countries. The researcher should understand the environment and participants before starting to research. This understanding can aid them to take the right decision about when, how, with whom, and where to perform the study. Studying the environment is also important. Furthermore, choosing the language that the participant feels comfortable with is important in order to express to express their feelings while they are talking about their experiences. This was not taken into consideration in this study but in the evolutions the researcher chose to translate and do the study in the participants' native language. When conducting research with the public, several aspects need to be taken into consideration. For example, in the study in the KSA, there were few males involved in the study. This is because in the KSA it is not easy for women to go to a male campus to conduct a study. The researcher tried to perform one study in the mixed environment at Unilever to obtain some data from male participants. However, in the UK, most of the workshop data were from males since the majority of the computer science staff and students are males. Moreover, the questions about the individuals' Red Area were tricky for some people, who wanted to show that they are flexible and open minded. If there are any Red Areas, they can overcome these areas easily. The researcher tried to explain to these people that it is not normal if individuals have no Red Areas. The Red Area is tricky since some of these areas can cause trouble for individuals. To protect individuals and encourage them to provide the author with their private Red Area, several things had taken into consideration, such as anonymizing the data.

Exploratory evaluation

This chapter explored and evaluated the novel collaboration technology concepts that were developed in Chapters 4-5 in two real world cases in the UK and KSA. Wizard of Oz was used since the quickest, cheapest and most effective design to evaluate the concept is always the correct decision. It is effective for evaluating a concept. Since the concepts were revealed from the study in two countries, it is a good idea to do the same process in the evaluation to see if there are needs or problems related to just one country. Using Arabic in this study in the KSA made the participant comfortable and confident enough to express their feelings.

8.4 Recommendations for future work

The limitations encountered in this thesis need to be taken into consideration in future research related to the same issues. All studies are exploratory and initial studies. Further studies are needed to fully explore and understand the role of the three concepts in social networking technology design. This thesis represents a new mechanism in social networking technologies, which is the "Anonymous Group Profile". This represents seven design concepts for group members and is the first step towards a new kind of social networking technology that focuses on "we" rather than "I".

Future HCI studies are needed to further investigate the concept of the "Anonymous Group Profile" and its impact on the individuals in a group including:

- Finding out more features needed to create the anonymous group profile
- Finding out more features needed to represent the conceptual framework more
- Expanding the evaluation with more different types of users such as mixed gender and skills
- Expanding the evaluation with more different settings and sectors of collaborative projects
- Exploring how these studies might differ in between settings
- Expanding the evaluation with a larger and longer project
- Implementing the studies in different countries using the same real case, for example, Unilever, in several different countries.

8.5 Closing remarks

This thesis contributes to the research related to diverse group members. It proposes the different challenges experienced by group members, which can be represented in the personal Red Area, the individuals' motivations as Green Areas, and Interactions as Strategies for establishing common ground. These three concepts can be used in different ways to enhance interaction between diverse group members.

In this thesis, these three concepts are used to reveal seven design concepts for supporting diverse group members before they start their work. These seven design concepts of we-spirit, universal, compassion, expectations, empowerment, development and protection represent the conceptual framework grounded in the

evidence from the data collected. Moreover, the conceptual framework is presented with the specific intention of informing the design work for social SNTs for diverse group members.

Based on this conceptual framework, the concept of an "Anonymous Group Profile" was proposed as a mechanism to enhance collaboration and KS. A design was created to demonstrate this concept and was evaluated in real world settings to gain insight on how it could be operationalized in practice. It is suggested that a fruitful direction for future research would be to investigate the concept of an "Anonymous Group Profile" with a wider range of users and in diverse sectors.

References

Ackerman, M. S., Dachtera, J., Pipek, V., and Wulf, V. (2013). 'Sharing knowledge and expertise: The CSCW view of knowledge management'. Computer Supported Cooperative Work, 22, 531–573

Ackerman, Mark S. and Christine Halverson. (2003). 'Sharing Expertise: The Next Step for Knowledge Management'. Wulf, Volker and Marlene Huysman (eds.), Social Capital and Information Technology. MIT Press

Acquisti, A., John, L., & Loewenstein, G. 2013. "What Is Privacy Worth?" The Journal of Legal Studies (42:2), pp. 249-274.

Adams, J. Hayes, J. and Hopson, B. (1976). Transition - Understanding and Managing Personal Change, London, Martin Robertson

Ajmera, J., Ahn, H., Nagarajan, M., Verma, A., Contractor, A., Dill, S., and Denesuk, M. (2013). 'A CRM system for social media: challenges and experiences'. the 22nd international conference on World Wide Web, Published by ACM Digital Library

Ardichvili, A. (2008) 'Learning and Knowledge Sharing in Virtual Communities of Practice' Motivators, Barriers, and Enablers. (ADHR), 10, 541–54

Arthur J.B. and Huntley, C.L., (2005). 'Ramping up the organizational learning curve: Assessing the impact of deliberate learning on organizational performance under gainsharing'. Academy of Management Journal, 48 (6), 1159–1170

Babcock P. (2004). 'Shedding light on knowledge management'. HR Magazine, 49 (5), 46–50

Barbour, R. (2007). Doing Focus Groups. London: SAGE Publications. 174

Bardzell, J. (2011). 'Interaction criticism: An introduction to the practice'. Interacting with Computers 23 (6), 604–621

Barnes, John (1954). 'Class and Committees in a Norwegian Island Parish'. Human Relations, (7): 39-58.

Bell, m. P. (2007). Diversity in Organizations. Mason, OH: Thomsin South-Westren

Bercovici, J. (2010). Who coined "social media"? Web pioneers compete for credit. Retrieved from http://blogs.forbes.com/jeffbercovici/2010/12/09/who-coined-social-media-web-pioneers-compete-for-credit/ [June, 17 2013]

Berg, B. L., Lune, H., and Lune, H. (2004). Qualitative research methods for the social sciences, vol. 5. Boston, MA: Pearson.

Bhatt, G., Gupta, J.N.D. and Kitchens, F. (2005). 'An exploratory study of groupware uses in the knowledge management process', Journal of Enterprise Information Management, vol. 18 (1/2), 28–46

Bim, S. A., Leitão, C. F., and de Souza, C. S. (2007). 'The challenge of teaching hci qualitative evaluation methods: a case study on the communicability evaluation method'

Bjørn P.; ESBENSEN M.; JENSEN R. and MATTHIESEN S. (2014), 'Does Distance Still Matter? Revisiting the CSCW Fundamentals on Distributed Collaboration'. Transactions on Computer-Human Interaction, 21, (5), Article 27, ACM

Bowers, C. A., Pharmer, J. A., and Salas, E. (2000). 'When member homogeneity is needed in work teams: A meta-analysis'. Small Group Research, 31(3), 305-327

Burke, M., and Kraut, R. (2014). 'Growing closer on Facebook: Changes in tie strength through social network site use'. ACM Conference on Human Factors in Computing Systems, 4187– 4196

Cassell, C., and Symon, G. (Eds.). (2004). Essential guide to qualitative methods in organizational research. Sage

Chen I.Y.L. (2007). 'The factors influencing members' continuance intentions in professional virtual communities — A longitudinal study'. Journal of Information Science, 33 (4), 451–46

Chiu C.-M., Hsu M.-H., and Wang E., T. G. (2006). 'Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories'. Decision Support Systems, 42 (3), 1872–1888

Choi, S. Y., Lee, H., and Yoo, Y. (2010). 'The impact of information technology and transactive memory systems on knowledge sharing, application and team performance: A field study'. MIS Quarterly, 34, 855–870

Clark, H. H., (1996). 'Using Language'. Cambridge University Press

Coenen, T., Kenis, D., Van Damme, C., & Mat- thys, E. (2006). 'Knowledge Sharing over Social Networking Systems: Architecture, Usage Patterns and Their Application'. In R. Meersman, Z. Tari, P. Herrero, et al. (Eds.), OTM Workshops 2006, LNCS 4277, 189-198. Springer-Verlag

Collins C.J., and Smith K.G. (2006). 'Knowledge exchange and combination: The role of human resource practices in the performance of high-technology firms'. Academy of Management Journal, 49 (3), 544–560

Cox, J. T. (1991). 'The multicultural organization'. Academy of Management Executive, 5(2): 34-47.

Cox, T. H. (2001). Creating the multicultural organization: A strategy for capturing the power of diversity. San Francisco, CA: Jossey-Bass.

Cox, T. H. Jr. (1993). Cultural Diversity in Organizations: Theory, Research & Practice. San Francisco: Berrett Koehler.

Cross, L. C., R., Lesser, E., and Levin, D. Z. (2003). 'Nurturing interpersonal trust in knowledge-sharing networks'. The Academy of Management Executive, 17 (4), 64−77

Daft, RL and Lengel, RH (1986). 'Organizational information requirements, media richness and structural design'. Management Science 32(5), 554-571

de Sá, M., and Carriço, L. (2006). 'Low-fi prototyping for mobile devices'. CHI'06 extended abstracts on Human factors in computing systems (pp. 694-699). ACM

Delfino, M., Manca, S., and Persico, D. (2005). 'Harmonizing the online and face-to-face components in a blended course on educational technology'. Paper presented at The Course on Educational Technology of the SSIS.

Dennis, A. R., Fuller, R. M., & Valacich, J. S. (2008). 'Media, tasks, and communication processes: A theory of media synchronicity'. MIS Quarterly, 32, 575–600

Dennis, AR and Kinney, ST (1998). 'Testing media richness theory in the new media: the effects of cues, feedback, and task equivocality'. Information Systems Research 9(3), 256-274

Dennis, AR, Wixom, BH and Vandenberg, RJ (2001). 'Understanding fit and appropriation effects in group support systems via meta-analysis'. Management Information Systems Quarterly 25(2), 167-193

DeSanctis, G., and Gallupe, R. B. (1987). 'A foundation for the study of group decision support systems'. Management Science, 33, 589–609

DeSanctis, Gerardine, and Marshall Scott Poole, (1994). 'Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory'. Organization Science 5, no. 2 (1994): 121–147

Dietz-Uhler B. and Bishop Clark C. (2001). 'The use of computer-mediated communication to enhance subsequent face-to-face discussions'. Computers in Human Behavior, 17 (3), 269–283

Dix, A., Rodden, T., Davies, N., Trevor, J., Friday, A., and Palfreyman, K. (2000). 'Exploiting space and location as a design framework for interactive mobile systems'. ACM Transactions on Computer-Human Interaction (TOCHI), 7, 285–321

Ely, R. J., and Thomas, D. A. (2001). 'Cultural diversity at work: The effects of diversity perspectives on work group processes and outcomes'. Administrative Science Quarterly, 46, 229–273

Emanuel, E. J., Wendler, D., & Grady, C. (2000). 'What makes clinical research ethical? Jama', 283(20), 2701-2711

Etzkowitz, H. (2003). 'Research groups as 'quasi-firms': the invention of the entrepreneurial university'. Research policy, 32(1), 109-121

Eureka Foong, Steven P. Dow, Brian P. Bailey, Elizabeth M. Gerber (2017), Online Feedback Exchange: A Framework for Understanding the Socio-Psychological Factors, CHI Conference on Human Factors in Computing Systems, Denver, Colorado, USA

Flewitt, R. (2005). 'Conducting research with young children: Some ethical considerations'. Early Child Development and Care, 175(6), 553-565

Fogg, 2003 B. J. Fogg, (2003). Persuasive Technology: Using Computers to Change What We Think and Do: Morgan Kaufmann

Fogg, B. (2009). 'A behavior model for persuasive design'. 4th International Conference on Persuasive Technology, Claremont, California

Fogg, B. J. (1998). 'Persuasive computers: Perspectives and research directions'. Proceedings of the Conference on Human Factors in Computing Systems. CHI98, Los Angeles, USA

Friedman L, Stern H, Brown GG, et al. (2008). 'Test-retest and between-site reliability in a multi-centre fMRI study, Human Brain Mapping', vol. 298. 958-72

Fuks, H., Raposo, A. B., Gerosa, M. A., and Lucena, C. J. P. (2005). 'Applying the 3C model to groupware development'. International Journal of Cooperative Information Systems, 14, 299–328

Gallupe, R. B., Bastianutti, L. M., & Cooper, W. H. (1991). Unblocking brainstorms. Journal of Applied Psychology, 76(1), 137-142.

Gibbs, J. L., Ellison, N. B., and Heino, R. D. (2006). 'Self-presentation in online personals: The role of anticipated future interaction, self-disclosure, and perceived success in Internet dating'. Communication Research, 33, 152–177

Gilbert. P. (2009). 'Introducing compassion-focused therapy'. Advances in Psychiatric Treatment, 15, 199–208

Goodhue, D.L., and R. L. Thompson (1995). 'Task-technology Fit and Individual Performance'. MIS Quarterly 19(2), pp. 213-236

Grant, K. A. (2007). 'Tacit knowledge revisited—We can still learn from Polanyi'. The Electronic Journal of Knowledge Management, 5, 173–180

Grubbs Hoy, M., and Milne, G. (2010). 'Gender differences in privacy-related measures for young adult Facebook users'. Journal of Interactive Advertising, 10(2), 28–45

Grudin, J. (1994). 'Groupware and social dynamics: Eight challenges for developers'. Communications of the ACM, 35(92), 92–105

Grudin, J., and Poltrock, S. E. (1997). 'Computer-supported cooperative work and groupware'. In M. Zelkowitz (Ed.), Advances in Computers. 45, 269–32. Cambridge, MA: Academic Press.

Gruman J. A., Saks A. M., and Zweig D. I. (2006). 'Organizational socialization tactics and newcomer proactive behaviours: An integrative study'. Journal of Vocational Behavior, 69, 90–104

Guion, L. A., Diehl, D. C., and McDonald, D. (2001). Conducting an in-depth Interview. Retrieved from http://greenmedicine.ie/school/images/Library/Conducting%20An%20In%20Depth%20Interview.pdf [June, 15 2015]

Hackman, J. R. (1987). The design of work teams. In J. W. Lorsch (Ed.), Handbook of organizational behaviour. Englewood Cliffs, NJ: Prentice Hall. 315–342

Hackman, J. R. (1990). Groups that work (and those that don't): Creating conditions for effective teamwork. San Francisco, CA: Jossey-Bass

Hackman, J. R., & Morris, C. G. (1975). 'Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration'. In L. Berkowitz (Ed.), Advances in experimental social psychology. 8, 1–55. New York, NY: Academic Press

Haldin-Herrgard, T. (2000). 'Difficulties in diffusion of tacit knowledge in organizations'. Journal of Intellectual Capital, 1, 357–365

Harrison, D. A., Price, K. H., and Bell, M. P. (1998). 'Beyond relational demography: Time and the effects of surface- and deep-level diversity on work group cohesion'. Academy of Management Journal, 41, 96–107

Haughton, B. (2008). 'Identifying diversity and cohesion in small group interaction'. International Journal of Diversity in Organizations, Communities and Nations, 8(6), 57–66

Hekler, E. B., Klasnja, P., Froehlich, J. E., and Buman, M. P. (2013). 'Mind the theoretical gap: Interpreting, using, and developing behavioral theory in HCI research'. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. 3307–3316. New York, NY: ACM

Hendriks, P. (1999). 'Why share knowledge? The influence of ICT on the motivation for knowledge sharing'. Knowledge and Process Management, 6, 91–100

Herring, S. (2004). 'Slouching toward the ordinary: Current trends in computer-mediated communication'. New Media and Society, 6, 26–36

Ho, S S, McLeod D M. (2008). Social-psychological influences on opinion expression in face-to-face and computer-mediated communication, Communication Research, vol. 35 (pg. 190-207)

Hudson, S., Fogarty, J., Atkeson, C., Avrahami, D., Forlizzi, J., Kiesler, S., Yang, J. (2003). 'Predicting human interruptibility with sensors: A Wizard of Oz feasibility study'. In Proceedings of the SIGCHI Conference on Human factors in computing systems 257–264. New York, NY: ACM

Hudson, S., Fogarty, J., Atkeson, C., Avrahami, D., Forlizzi, J., Kiesler, S., ... and Yang, J. (2003). 'Predicting human interruptibility with sensors: a Wizard of Oz feasibility study'. In Proceedings of the SIGCHI conference on Human factors in computing systems. 257-264 ACM

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., and Jundt, D. (2005). 'Teams in organizations: From input-process-output models to IMOI models'. Annual Review of Psychology, 56, 517–543

Irani, L., Vertesi, J., Dourish, P., Philip, K., and Grinter, R. E. (2010). 'Postcolonial computing: A lens on design and development'. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. 1311–1320. New York, NY: ACM

Jabareen, Y. R. (2009). Building a conceptual framework: Philosophy, definitions, and procedure. International Journal of Qualitative Methods, 8, 49–62. Retrieved from: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.468 .7232&rep=rep1&type=pdf [August, 11, 2015]

Jackson, S. E., Brett, J. F., Sessa, V. I. Cooper, D. M., Julin, J. A., and Peyronnin, K. (1991). 'Some differences make a difference: Individual dissimilarity and group heterogeneity as correlates of recruitment, promotions, and turnover'. Journal of Applied Psychology, 7, 675–689

Jackson, S. E., May, K. E., and Whitney, K. (1995). 'Understanding the dynamics of diversity in decision making teams'. In R. A. Guzzo & E. Salas (Eds.), Team decision making effectiveness in organizations 204–261. San Francisco, CA: Jossey-Bass

Jeffrey M. Rzeszotarski and Meredith and Ringel Morris (2014). 'Estimating the social costs of friendsourcing'. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. Toronto, Ontario, Canada

Jones G. R. (1986). 'Socialization tactics, self-efficacy, and newcomers' adjustments to organizations'. Academy of Management Journal, 29, 262–279

Joshi, A., and Roh, H. (2007). 'Context matters: A multilevel framework for work team diversity research'. In J. J. Martocchi (Ed.), Research in Personnel and Human Resources Management 26: 1-48. Oxford, England: Elsevier.

Kang, Ruogu, Stephanie Brown, and Sara Kiesler. 2013. "Why Do People Seek Anonymity on the Internet? Informing Policy and Design." In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2657–66. New York: Association for Computing Machinery.

Kaplan, A. M. and Haenlein, M. (2010). 'Users of the world, unite! The challenges and opportunities of Social Media'. Business Horizons. 53, 59-68.

Kappen, L., Wehbe, R., Gregory, J., Stepchenko, D., and Nacke, E. (2013). 'Exploring social interaction in co-located multiplayer games'. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. 1119–1124. New York, NY: ACM

Kiesler, S., Siegel, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. American Psychologist, 39(10), 1123-1134

Klimoski, R. J., and Mohammed, S. (1994). 'Team mental model: Construct or metaphor?' Journal of Management, 20, 403–437

Kochan, T., Bezrukova, K., Ely, R., Jackson, S., Joshi, A., Jehn, K., … Thomas, D. (2003). 'The effects of diversity on business performance: Report of the diversity research network'. Human Resource Management, 42, 3–21

Konrad, A. and Linnehan F. (1995). 'Formalized HRM structures: Coordinating equal employment opportunity or concealing organizational practices?' Academy of Management Journal, 38, 787–820

Kossek E.E. and Pichler S. (2006). 'EEO and the management of diversity P'. Boxell, J. Purcell, P.M. Wright (Eds.), Handbook of human resource management, Oxford University Press, Oxford. 251–272

Kozlowski, S. W. J., and Bell, B. S. (2003). 'Work groups and teams in organizations'. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), Handbook of psychology. Industrial and Organizational Psychology 12, 333–375. New York, NY: Wiley

Kozlowski, S. W. J., Gully, S. M., Nason, E. R., and Smith, E. M. (1999). 'Developing adaptive teams: A theory of compilation and performance across levels and time'. In D. R. Ilgen & E. D. Pulakos (Eds.), The changing nature of work performance: Implications for staffing, personnel actions, and development 240-292. San Francisco: Jossey-Bass.

Kra, Pa1; Drozd, Filip; and Olsen, Elin (2009). 'ePsychology: Designing eory-Based Health Promotion Interventions'. Communications of the Association for Information Systems: 24, Article 24

Kvale, S., and Brinkmann, S. (2009). Interviews: Learning the craft of qualitative research interviewing. Los Angeles, CA: Sage.

Lai, J. Y., and Yang, M. C. (2009). 'Introducing user centered design to mid-career professionals: Experiences to build upon. In Proceedings of the International Association of Societies of Design Research 577–586. New York, NY: ACM. Retrieved from http://web.mit.edu/~mcyang/www/papers/2009-lai-iasdr.pdf [August, 16.2015]

Lampe, C., Vitak, J., Gray, R., and Ellison, N. B. (2012). 'Perceptions of Facebook's Value as an Information Source'. ACM Conference 3195-3204. Austin, Session: With a Little Help from My Friends.

Lauring, J., and Selmer, J. (2012). 'Knowledge sharing in diverse organizations'. Human Resource Management Journal, 22, 89–105

Lester, S. (1999). 'An introduction to phenomenological research'. Retrieved October 8, 2016, from https://www.rgs.org/NR/rdonlyres/F50603E0-41AF-4B15-9C84-BA7E4DE8CB4F/0/Seaweedphenomenologyresearch.pdf [July, 13.2015]

Levine, J. M., and Moreland, R. L. (1990). Progress in small group research. Annual Review of Psychology, 41, 585-634

Lim, Y. K., Pangam, A., Periyasami, S., and Aneja, S. (2006). 'Comparative analysis of high-and low-fidelity prototypes for more valid usability evaluations of mobile devices'. In Proceedings of the 4th Nordic conference on Human-computer interaction: changing roles 291-300. ACM

Lim, Y. K., Pangam, A., Periyasami, S., and Aneja, S. (2006). 'Comparative analysis of high-and low-fidelity prototypes for more valid usability evaluations of mobile devices'. In Proceedings of the 4th Nordic conference on Human-Computer Interaction: Changing Role 291–300. New York, NY: ACM

Loden, M., and Rosener, J. B. (1991). Workforce America! Managing employee diversity as a vital resource. Burr Ridge, IL: Irwin.

Mäkelä, K., Salonen, E. P., Turunen, M., Hakulinen, J., and Raisamo, R. (2001). 'Conducting a Wizard of Oz experiment on a ubiquitous computing system doorman'. In Proceedings of the International Workshop on Information Presentation and Natural Multimodal Dialogue 115–119. Verona, Italy. Retrieved from https://pdfs.semanticscholar.org/5cb8/9e2b546d194888945a3b1fb68478119c5eed.pdf [August, 14. 2015]

Matheson, K. (1991). 'Social cues in computer-mediated negotiations: Gender makes a difference'. Computers in Human Behavior, 7: 137–145

McKenna, K. Y. A., Green, A. S., and Gleason, M. E. J. (2002). 'Relationship formation on the Internet: What's the big attraction?' Journal of Social Issues, 58(2), 9–31

Mehra, A., Dixon, A., Brass, D., and Robertson, B. (2006). 'The social network ties of group leaders: Implications for group performance and leader reputation'. Organization Science, 17, 64–79

Mesmer-Magnus, J. R., and DeChurch, L. A. (2009). 'Information sharing and team performance: A meta-analysis'. Journal of Applied Psychology, 94, 535–546

Milliken, F. J., and Martins, L. L. (1996). 'Searching for common threads: Understanding the multiple effects of diversity in organizational groups'. Academy of Management Review, 21, 402–433

Minbaeva, D. B. (2007). 'Knowledge transfer in multinational corporations'. Management International Review, 47, 567–593

Morgan, B. B., Salas, E., and Glickman, A. S. (1993). 'An analysis of team evolution and maturation'. Journal of General Psychology, 120, 277-291

Neale, M., Northcraft, G. B., and Jehn, K. A. (1999). 'Exploring Pandora's box: The impact of diversity and conflict on work group performance'. Performance Improvement Quarterly, 12(1), 113–126

Nonaka and H. Takeuchi, (1995). The knowledge-creating company. New York: Oxford University Press

Oberg K. (1960). Culture shock: Adjustment to new cultural environment. Practical Anthropologist, 7, 177–182

Ohsawa, S., and Matsuo, Y. (2013). 'Like Prediction: Modeling Like Counts by Bridging Facebook Pages with Linked Data'. International World Wide Web Conference Committee. ACM Conference. 541-548

Oinas-Kukkonen, Harri and Harjumaa, Marja (2009). 'Persuasive Systems Design: Key Issues, Process Model, and System Features'. Communications of the Association for Information Systems: Vol. 24, Article 28.

Olsen, J. E., & Martins, L. L. (2012). 'Understanding organizational diversity management programs: A theoretical framework and directions for future research'. Journal of Organizational Behavior, 33, 1168–1187.

Olson, G. M. and Olson, J. S. (2000). 'Distance matters'. Human-Computer Interaction, 15, 139-178.

Panahi, S., Watson, J., and Partridge, H. (2012). 'Social media and tacit knowledge sharing: Developing a conceptual model'. World Academy of Science, Engineering and Technology, 64, 1095–1102

Panahi, S., Watson, J., and Partridge, H. (2013). 'Towards tacit knowledge sharing over social web tools'. Journal of Knowledge Management, 17, 379–397

Paris, C., Salas. E., and Cannon-Bowers J. (2000). 'Teamwork in multi-person systems: A review and analysis'. Ergonomics, 43, 1052–1075

Patrick, H. A., and Kumar, V. R. (2012). Managing workplace diversity: Issues and challenges. Sage Open. 1–15

Paul, S., Samarah, I. M., Seetharam, P., and Mykytyn, P. P., Jr. (2005). 'An empirical investigation of collaborative conflict management style in group support system- based global virtual teams'. Journal of Management Information Systems, 21, 185–222

Powell, A., Piccoli, G., and Ives, B. (2004). 'Virtual teams: A review of the current literature and directions for further research'. In Database for Advances in Information Systems, 35, 6–36

Putnam, C., Rose, E., Johnson, E. J., and Kolko, B. (2009). 'Adapting user-centered design methods to design for diverse populations'. Information Technologies & International Development, 5(4), 51–73

QAA/HEA Education for Sustainable Development Group. (2012). 'Education for sustainable development: Guidance for UK higher education providers'. Sage Publications, 9(1), 117–119

Rajmil, L., Herdman, M., de Sanmamed, M. J. F., Detmar, S., Bruil, J., and Ravens-Sieberer, U. (2004). 'Generic health-related quality of life instruments in children and adolescents: A qualitative analysis of content'. The Journal of Adolescent Health, 34, 37–45

Reagans R., and McEvily B. (2003). 'Network structure and knowledge transfer: The effects of cohesion and range'. Administrative Science Quarterly, 48, 240–267

Riege, A. (2005), 'Three-dozen knowledge-sharing barriers managers must consider'. Journal of Knowledge Management, 9(3), 18–35

Rijamampianina, R. (1999). Developing core competence through multicultural learning. Boca Raton, FL: Universal.

Rijamampianina, R., and Carmichael, T. (2005). 'A pragmatic and holistic approach to managing diversity'. Problems and Perspectives in Management, 3(1), 109–117

Robert, L. P., Denis, A. R., and Hung, Y. T. C. (2009). 'Individual swift trust and knowledge-based trust in face-to-face and virtual team members'. Journal of Management Information Systems, 26(2), 241-279.

Robinson, John d. and James, larry c. (2003). Diversity in Human Interactions: The Tapestry of America. New York: Oxford University Press, Inc

Robson, C., Hearst, M. A., Kau, C., and Pierce, J. (2013). 'Comparing the Use of Social Networking and Traditional Media Channels for Promoting Citizen Science'. ACM Conference. San Antonio: Citizen Science. 1463-1468

Rose, K. 2013, UK Social Media Statistics for 2013. http://www.rosemcgrory.co.uk/2013/01/08/uk-social-media-statistics-for-2013/ [10/07/2013]

Rowe, F. (2014). 'What literature review is not: Diversity, boundaries and recommendations'. European Journal of Information Systems, 23, 241–255

Saks, A. M., Uggerslev, K. L., and Fassina, N. E. (2007). 'Socialization tactics and newcomer adjustment: A metaanalytic review and test of a model'. Journal of Vocational Behavior, 70, 413–446

Saldaña, J. (2013). The coding manual for qualitative researchers. Thousand Oaks, CA: Sage.

Santana, A. D. (2014). Virtuous or vitriolic: The effect of anonymity on civility in online newspaper reader comment boards. Journalism Practice, 8 (1), 18–33.

Savicki, M., Kelley, M., and Oesterreich E. (1999). 'Judgments of gender in computer-mediated communication'. Computers in Human Behavior, 15, 185–194

Savicki, V., and Kelley, M. (2000). 'Computer mediated communication: Gender and group composition'. Cyberpsychology & Behavior, 3, 817–826

Schneider, B. (1987). The people make the place. Personnel Psychology, 40, 437-453.

Schwartz, S. H., Caprara, G. V., and Vecchione, M. (2010). 'Basic personal values, core political values, and voting: A longitudinal analysis'. Political Psychology, 31, 424–425

Sefelin, R., Tscheligi, M., and Giller, V. (2003). 'Paper prototyping—What is it good for?: A comparison of paper- and computer-based low-fidelity prototyping'. In Extended Abstracts on Human Factors in Computing Systems. 778–779 New York, NY: ACM

Selamat, M. H., and Choudrie, J. (2004). 'The diffusion of tacit knowledge and its implications on information systems: The role of meta-abilities'. Journal of Knowledge Management, 8, 128–139

Shen, J., Chanda, A., D'Netto, B., and Monga, M. (2009). 'Managing diversity through human resource management: An international perspective and conceptual framework'. The International Journal of Human Resource Management, 20, 235–251

Shen, Z., Lyytinen, K., and Yoo, Y. (2014). 'Time and information technology in teams: A review of empirical research and future research directions'. European Journal of Information Systems, 24, 492–518

Siegel, J., Dubrovsky, V., Kiesler, S., & McGuire, T. W. (1986). Group processes in computer-mediated communication. Organizational Behavior and Human Decision Processes, 37(2), 157-187.

Smith, C. 2013 "(Augest 2013) 'How Many People Use the Top Social Media, Apps & Services?'. http://expandedramblings.com/index.php/resource-how-many-people-use-the-top-social-media/ [10/07/2013]

Smith, J. A. (Ed.). (2007). Qualitative psychology: A practical guide to research methods. Thousand Oaks, CA: Sage.

Spiliotopoulos, T., and Oakley, I. (2013). 'Understanding Motivations for Facebook Use: Usage Metrics, Network Structure, and Privacy'. In proceedings of ACM CHI 2013, Paris, France.

Stenmark, D. (2000). 'Leveraging tacit organizational knowledge'. Journal of Management Information Systems, 17, 9–24

Tajfel, H. Turner J.C. . (1986), 'The social identity theory of intergroup behaviour' S. Worchel, L.W. Austin (Eds.), Psychology of intergroup relations, Nelson-Hall, Chicago 7–24

Tajfel, H., and Turner, J. C. (1979). 'An integrative theory of intergroup conflict'. The social psychology of intergroup relations?, 33, 47.

Terzis, S. and Nixon, P. 1999, Building the next generation groupware: A survey of groupware and its impact on the virtual enterprise.

Thi Thao Duyen T. Nguyen, Thomas Garncarz, Felicia Ng, Laura A. Dabbish, Steven P. Dow, (2017). Fruitful Feedback: Positive Affective Language and Source Anonymity Improve Critique Reception and Work Outcomes, ACM Conference on Computer Supported Cooperative Work and Social Computing (CSCW), Portland, Oregon, USA

Townsend G. (2009) Using a groupware system in CS1 to engage introverted students. Conference Proceedings of ITiCSE, July 6-9, Paris, France,16-20.

Treem and Leonardi, (2012), 'Social media use in organizations: Exploring the affordances of visibility, editability, persistence, and association' Communication Yearbook, 36, 143–189

Triandis HC, Suh EM. (2002). 'Cultural influences on personality'. Annual Review Psychol. 53, 133– 60

Tuckman, B. W. (1965). 'Developmental sequence in small groups'. Psychological Bulletin, 63, 384- 399

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D. and Wetherell, M. S. (1987). Rediscovering the social group: A self-categorization theory. Oxford and New York: Basil Blackwell.

UK Council for International Student Affairs. (2013). International student statistics: UK higher education. https://institutions .ukcisa.org.uk/Info-for-universities-colleges--schools/Policy-research --statistics/Research--statistics/International-students-in-UK-HE/ [January 20 2014]

Van Maanen, J., & Schein, E. H. (1979). Toward a theory of organizational socialization. Greenwich, CT: JAI Press

Vance A, Lowry PB and Wilson D (2017) Using trust and anonymity to expand the use of anonymizing systems that improve security across organizations and nations. Security Journal 30(3), 979–999

Walker, M., Takayama, L., & Landay, J. A. (2002). 'High-fidelity or low-fidelity, paper or computer? Choosing attributes when testing web prototypes'. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting. 46, 661–665. Thousand Oaks, CA: Sage

Wang, S., & Noe, R. A. (2010). 'Knowledge sharing: A review and directions for future research'. Human Resource Management Review, 20, 115–131

Wang, Y., Norcie, G., Komanduri, S., Acquisti, A., Leon, P. G., & Cranor, L. F. (2011). 'I regretted the minute I pressed share: A qualitative study of regrets on Facebook'. In Proceedings of the 2011 Symposium on Usable Privacy and Security (SOUPS). New York, NY: ACM Press.

Wasko, M. M., & Faraj, S. (2005). 'Why should I share? Examining social capital and knowledge contribution in electronic networks of practice'. MIS Quarterly, 29, 35–57

Wegge, J., Roth, C., Neubach, B., Schmidt, K., & Kanfer, R. (2008). 'Age and gender diversity as determinants of performance and health in a public organization: The role of task complexity and group size'. Journal of Applied Psychology, 93, 1301

West, M. A., Tjosvold, D., & Smith, K. G. (2005). The essentials of teamworking. Chichester, England: Wiley.

Williams, K. Y., & O'Reilly, C. A. III. (1998). 'Demography and diversity in organizations: A review of forty years of research'. In B. M. Staw & R. Sutton (Eds.), Research in organizational behaviour. 20, 77–140. Greenwich, CT: JAI Press.

Woodruff, A., Augustin, S., & Foucault, B. (2007). 'Sabbath day home automation: It's like mixing technology and religion'. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. 527–536. New York, NY: ACM

Wyche, S. P., & Griner, R. E. (2009). 'Extraordinary computing: Religion as a lens for reconsidering the home'. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. 749–758. New York, NY: ACM

Yalom, I. D. (2005). Theory and practice of group psychotherapy (5th ed.). New York, NY: Basic Books.

Zhang, X., Chen, Z., Vogel, D., Yuan, M., & Guo, C. (2010). 'Knowledge Sharing Reward Dynamics in Knowledge Management Systems: Game Theory-Based Empirical Validation'. Human Factors and Ergonomics in Manufacturing, 20, 101–121.

Zhang, X., de Pablos, P., & Zhang, Y. (2012). 'The Relationship between Incentives, Explicit and Tacit Knowledge Contribution in Online Engineering Education Project'. International Journal of Engineering Education, 28, 1341–1346.

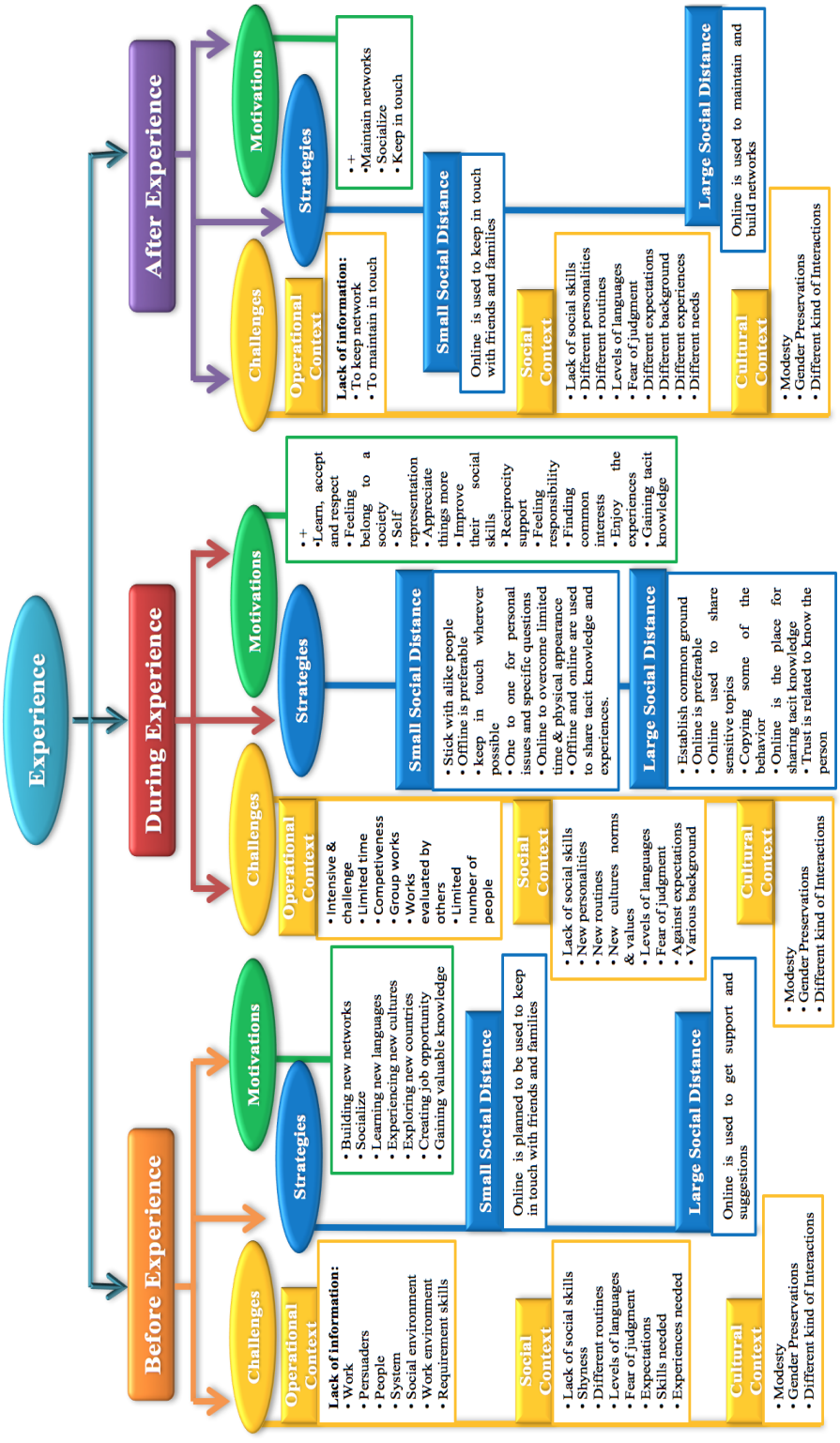
Zhao Xuan, Salehi Niloufar, Naranjit Sasha, Alwaalan Sara, Voida Stephen, Cosley Dan, (2013), 'The many faces of Facebook: experiencing social media as performance, exhibition, and personal archive'. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Paris, France

Zheng Pei, Ni Lionel M., (2006), Smart Phone and Next Generation Mobile Computing

Zigurs Ilze, Buckland Bonnie K., (1998), 'A theory of task/technology fit and group support systems effectiveness'. MIS Quarterly, 22(3), 313-334

Appendences

Appendix 1.
Interviews analysis



Appendix 2.

Workshops results and analysis in the UK

Red Area in the UK

Table 19 provides examples of the red area in the UK.

Red Area	Quote
Prejudice against individuals or groups such as: **- Racism,** **- Bigotry,** **- Bulling,** **- Sexism,** **- Xenophobic,** **- Homophobic,** **- Misogynistic,** **- Minority Inclusivity,** **- Discrimination** **- Anti-Semitic,** **- Negative prejudices** **- Stereotypes**	**P29** "Racist jokes or comments" **P1** "Militant discussions or conversations (i.e. racism, sexism, bigotry)" **P5** "Making inappropriate jokes – sexist, racist, or others" **P19** "Casual racism/sexist banter" **P2** "I would not like to have to tolerate behaviours such as bulling of others" P5 "Treating people differently if they are in a gender/race minority" **P2** "I would not like to have to tolerate behaviours such as bulling of others or discrimination on the basis of gender or race" **P17** "Xenophobic, homophobic, misogynistic jokes and comments" **P13** "Sexist and/or misogynist behaviour" **P30** "any racist, anti-Semitic comments, accusations or actions. (face to face, in any introductions to the collaboration)" **P16** (Previous experiment) Discrimination based on nationality and negative prejudices. Stereotyping. **P13** "Issues related to my home country is stereotype that are completely absolute" **P17** "Insulting and hostile comments, attempting to convince someone that other people are 'the enemy' or 'bad people'" **P8** "I have very strong beliefs in terms of inclusivity + find it almost impossible to communicate with someone if I know to be racist or hold very right-wing views which are so very different to mine"
Lack of respect: **- Impolite,** **- Aggressive** **- Gossip,** **- Shouting,** **- Pushing,** **- Swearing,** **- Not listening,** **- Sarcasm,** **- Loud music,** **- noise,**	**P15** "Group work. Personality's dominatiry or being disrespectful to opinions of others (physical). In a destructive way i.e. saying ideas are bad but offering no alternatives. Having to manage such a personality in a group is hard" **P24** Communicate with impolite people. **P27** Aggressive behaviour. Sharing through Social media, face to face via humor. **P28** "Gossip, particularly on other members of the group behind their focus. If a member of the group starts gossiping, I would change the topic i.e. face to face, one to one" **P14** "Shouting, pushing" **P27** "bad language. "Swear words". Face to face in break time via humour. Social Media "same"

	P17 "Lack of conversation turn taking – interrupting others, not allowing them to speak, talking constantly without breaks" **P15** Group work. Personality's dominatiry or being disrespectful to opinions of others (physical). In a destructive way i.e. saying ideas are bad but offering no alternatives. Having to manage such a personality in a group is hard. **P6** "Dismissive behaviour => attacking or engaging with another person's argument because of that person's personality" **P5** "Not listening" **P23** "Sarcasm: example made of fun when suggesting solutions/proposing plans. No, I cannot share it I feel vulnerable, exposed to further ridicule" **P28** Loud music or noise in my work experience. When it appears, as I think is polite to consider others.
Criminal activity	**P25** "Criminal activity"
Sensitive topics considered by the participants: **- Personal issues,** **- Politics,** **- Beliefs,** **- Mother death,** **- Baby,** **- Attractive people** **- Vegetarianism**	**P24** "Talk about very personal topic" **P12** "Politics! I find I get on with people but then find that they feel really strongly about political positions I disagree with. Ignorance is bliss!" **P29** "The topic of religion. (Different religious views) everyone has unique and distinct beliefs and as people will not be open to challenging beliefs then discussing this is rather pointless. May lead to argument/conflict. I would mention this red area to the group when such conversation starts" **P24** "Talk about sensitive topics. No, I cannot share it Because I think this "sensitive" topic is quite crucial and it should not be discussed with people who do not protect your communication" **P18** "Topic – excessive discussion of vegetarianism" **P29** the topic of religion. (Different religious views) everyone has unique and distinct beliefs and as people will not be open to challenging beliefs then discussing this is rather pointless. May lead to argument/conflict. I would mention this red-area to the group when such conversation starts. **P3** Being in a very religious setting (e.g. church/mosque) makes me feel uncomfortable. **P5** Compromising beliefs in order to fit in, not cause trouble or be seen as a 'killjoy'. **P13** Stories involving baby or/and mother's death **P12** Politics! I find I get on with people but then find that they feel really strongly about political positions I disagree with. Ignorance is bliss! **P3** Middle East Politics: talking about Palestine/Israel conflict with westerns often makes me feel uneasy as /I feel I need to hold back my actual beliefs on the issue to avoid confrontation. **P12** "Depending on who with conversation about significant others or people who we find attractive. Problematic because I am gay"

Time: **- No punctual,** **- Lunch time meetings** **- Evening meetings,** **- Outside work times**	**P26** Not being on time. Face to face again politely joke about myself being punctual and coming before the meeting. **P10** I have to get out of the department at lunchtime to get fresh air. Lunchtime meetings make me feel really uncomfortable. **20** Skype meetings in the evening for projects (especially during family dinner time) **P19** Expecting response outside work times.
Personalities related: **- Interaction beyond a handshake,** **- Phone call,** **- Talking to someone who is intelligent than her/his** **- Asking questions in large group,** **- Speaking to people standing up,** **- Plane travel,** **- Meeting talk,** **- Quite offices,** **- Personal space** **- Social activities as Party games/team building** **- Joke,** **- Appropriate dress**	**P26** "People who use the phone while we are in a meeting. Face to face, I think it is rude to ignore your meeting for something that can wait until the meeting finishes" **P4** Phone calls **P8** I dislike phone calls + much papers emails or text which gives me time to prepare what to say. **P25** "I find it difficult to speak with others who I feel are much more intelligent than myself. Yes, I spoke with someone else in my office about this and they seemed to feel the same way" **P19** "Hugs, kisses, physical interaction beyond a handshake- i am English after all" **P3** Asking questions/comments in large group after presentation for example. **P8** I am quite short so I dislike speaking to a group of people when we are all standing up as it makes me feel self-conscious. **P22** Unrequired plane travel. Recently, developed a fear of flying so prefer only to fly if important. No, I cannot share it. Flying is sometimes seen as required for a carrier in science research. **P10** I'm not good at having to force myself into meetings to talk. So, having to do so makes me really uncomfortable. I really don't like working on projects like that. **P25** Quite offices. I find it very difficult to talk to others in the office when it is particularly quite. **P23** Personal space (example handshakes, sitting too close). (Both genders) No, I cannot share it I feel awkward about discussing it as it is a trivial matter to most people. **P4** Party games/team building exercises. **P5** "Engaging in lots of 'banter'" **P27** "Appropriate dress. People will think, I think I am better than them"
Personal work behaviour: **- Competition** **- Extremely positive people** **- Facial expressions** **- Unhygienic behaviour or smells**	**P21** Extreme competition and lack of team work spirit **P23** Extremely positive people who do not voluntarily participate in activities. **P26** "Slackers, people who do not work and rely on others to finish their work or generate ideas" **P23** Facial expressions especially when they seem mocking or negative. **P30** unhygienic behaviour or smells (this is too personal and sometimes very subjective - if it is too bad and effecting the work then I would find a way to discuss it face to face carefully)

Language: **- Public speaking,** **- Talking in their native** **- Different language**	**P21** Language; I have not experienced any kind of sarcasim for my English by native but by non-native speakers. Also, sometimes I am not that comfortable with my level of English. **P21** People talking in their native, non-English language. **P25** I find public speaking difficult. **P22** Working in a country with a very different culture/language than I am used to. (Because of social isolation). Yes, I can share it, During the first meeting, whether face-to-face or online **P4** Non-native speakers. I feel restricted in my ability to use (and misuse) language and humour.
Style of Discussion: **- Not important,** **- Disagree,** **- Immediate response,** **- No respond,** **- One-way interactions,** **- Manipulation** **- Dominating** **- Defensive,** **- Lies,** **- Self-marketing,** **- Out of the focus,** **- With strangers** **- Judgment**	**P23** hard to make progress in a discussion (especially work related) when I can't easily without feeling bad tell someone that I disagree with them. **P5** Giving talks that are less important. **P18** Little space for discussion i.e. wellbeing **P20** Expectations of immediate response to email e.g. a reminder only a few hours after initial email was sent **P23** Not responding to communications and requiring me to chase up on it. **P1** Interactions that are one-way and do not promote the value of discussion (radio vs redclit). **P23** Talkative people who manipulate conversations. **P16** Objectionable/loud personalities dominating discussions. **P3** Dealing with people who are very defensive. **P6** "Interactional conscious lies (more of a red flag really)" **P6** "Extreme self-marketing (portraying an un-reflected good image of oneself)" **P26** "Wasting time talking about other issues that are not related to the meeting. Try to politely shift the topic back to the meeting as we all allocated time from our schedules to be in the meeting" **P3** "Starting up conversations with strangers, even in the context of a networking event. I feel like I'm intruding and that they want me to leave" **P1** Interaction that focus on the judgment of those less able or environments that that are restrictive of such.
Organizational behaviour: **- Control or influence** **- Lack of recognizing individual differences** **- No spaces for creativity** **- Organizational rules**	**P2** I would not like to be preventive from following up a particular research idea or direction-academe autonomy is important to me. **P17** Lack of recognizing individual differences in abilities – which some people require special considerations / support to participate. **P1** Interaction that focus on the judgment of those less able or environments that that are restrictive of such. **P1** Spaces that do not allow expression of creativity or incaution (i.e. female structures). **P2** I struggled with the university asking me to donate many of its fund-raising campaign.

Food/Drink: **- No caffeine** **- Drinking alcoholic**	**P26** Drinking in business lunch/dinner. I politely apologize in person and tell them that I will order a non-alcoholic drink. **P2** I would struggle in an environment without regular caffeine.
Online technology: **- Share everything,** **- Loading screens,** **- Webpages adverts,** **- Elitist speech,**	**P24** Share everything of my everyday life online. **P11** Loading screens when the next screen is just input. **P11** Trying to close adverts on webpages. **P** Elitist speech and behaviour in online groups "you can only play if you here a certain fear old gye".

Table 19: Red Area examples in the UK

Green Area in the UK

Green Area	Quote
Environment context: **- Music** **- New technologies** **- quiet** **- small group**	**P1** Environments where music is playing or instruments are present. **P1** Places where technology is clearly present and in use, particularly new technology. **P22** Having a quiet working environment. **P3** Being in a small group. 4-5 people max. The more familiar they are the better. Group can be larger if some close friends are around.
Organizational behaviour**:** **- support creativity** **- freedom of expression** **- bring similar people together** **- bring different culture** **- visible opportunities and support** **- social and enjoyable environment** **- fairness and equality** **- We as a group** **- help** **- flexibility** **- informal settings** **- encouraging but not forcing** **- multidisciplinary collaboration language boundaries** **- recognition of contribution** **- listening** **- feedback**	**P1** Dynamic and creative environments where there is freedom of expression and the ability to work/play in an expressive or real way. **P21** Having the same or similar mentally with the rest of the group, having able to express myself freely, without being afraid of social conventions or political correctness. **P1** Interactions that bring together people with vast cultural differences. **P5** Being invited to join in discussion or contribute. **P6** Visible opportunities to support others – sharing knowledge in the office afford reflection on my own understanding. **P5** Being able to get on with colleagues socially as well as professionally makes working together more enjoyable + comfortable. **P5** Giving everyone in a discussion equal time to contribute. **P6** "Hallway Chats" any kind of interaction that shows we're a group. **P6** Feeling free to help as well. **P13** Some degree of flexibility in regard to how when and where I am doing my work. **P2** Relative to this – informal settings such as cafes (caffeine again!). **P15** Informal atmosphere: layouts of room assists this. Not people to contribute but give them 'spaces' to do so is useful i.e. encouraging but not forcing participation.

- clear task and instructions **- clear agenda** **- expectations close to the reality**	**P15** Multidisciplinary collaboration brings energy + new perspectives to a problem – but disciplinary language boundaries can be a challenge. **P16** Recognition of contribution. **P16** Feedback. Constructive. **P22** Having managers that are available to talk with regularly. **P28** to have clear instruction or framework for the task. This helps me to focus and then expand what we are doing. **P26** Knowing the main purpose of the meeting so we do not shift to other issue and prioritize the tasks. **P23** Organization and structured work, clear agendas. **P25** Having some knowledge of what to expect. For example, knowing what the activities will be and the general plan.
Personal work behaviour: **- Smiling** **- physically comfortable** **- Hummer** **- down to earth person** **- friendly personality** **- Involving** **- Respect Privacy** **- feeling comfortable** **- interested in not interrupted** **- Open** **- a lot of communication** **- pairs to contribute, not individuals** **- trust** **- non-judging** **- less competitive** **- contribute a fair amount of work** **- equality** **- familiar people** **- motivating group** **- supportive and constructive** **- enthusiasm** **- creative approach** **- Eye contact** **- Listening** **- Open mindedness** **- Critical not negative** **- Honesty** **- respect** **- Understanding**	**P15** Smiling – this provides cease science if we are nerves about our ideas/contributions. **P30** feeling physically comfortable with someone. Female single environment I cannot share that. **P2** Humour and laughter are very important to me (but also quite dangerous in social situations with unfamiliar strangers can alienate people). Hummer is interesting here because it deliberately transgresses formal boundaries e.g. focusing on taboo subjects or making fun of someone – playful teasing. This is an important fact of human social bonding, but also are fright with difficulties in cross-cultural settings. **P8** I am a down to earth person + like to make the people I am communicating with more comfortable. I therefore get on myself with people of a similar mind-sets, who like to have a laugh and don't think too much of themselves. **P24** Meet people from my culture or even other cultures but who has nice friendly personality. **P3** Being talked to: I feel very comfortable if someone comes up to me to talk. I feel very positive when someone asks for help. **P5** Being allowed to keep things private. **P29** Everyone feeling comfortable to contact each other than everyone contacting the group leader. **P8** I like feeling that someone is interested in what I have to say, so if they ask me questions this is good. Especially if I am not interrupted. **P16** Open and frank communication. **P28** A lot of communication, in order to know what people, think, encourages me to share more knowledge too. **P11** In group work, allow pairs to contribute, not individuals, as this provides a larger of profits. **P13** Having the feeling that I don't have to prove myself in front of others constantly. **P16** Non-judging, less competitive discussions. **P16** Non-judging, less competitive discussions.

- organizing tasks **- focusing on the task**	**P22** Working with people that contribute a fair amount of work to a shared project. **P23** Equality in effort and responsibilities shared. **P25** Working with people I already know or am already familiar with **P26** Working with motivating group, because they bring up a positive energy to the environment. **P28** Supportive and constructive work environment, someone telling me off or being aggressive makes me freeze and unable to function at all, let alone work. Opposite is my red area **P14** Enthusiasm about the topic. **P30** creative approach. **P14** Eye contact, body facing me, not too far away. **P14** Listening - remembering name. **P15** Open mindedness = people not dismiss. All perspectives because they are different but embracing. **P17** Being able to be critical of ideas without that being seen as negative. **P29** Honesty. Feeling comfortable to voice our opinions. **P17** People being receptive to suggestions from others and trying to find improvements to them. **P17** Understanding how my work contributes to the work of the group. **P26** Collectively setting up deadline and distributing tasks, this helps me feel safe as I really like organizing my tasks. **P28** in meetings, focusing on the task at hand and saving the socializing for after. It makes me frustrated, if we are not utilising the time together efficiently. **P8** I find interacting with strangers much easier when my husband is with me + find I talk a lot more when he is present.
Time: **- Strict timings** **- Advance agreed meeting times** **- Have limited time** **- punctual**	**P22** Not having strict timings. Having strict times for e.g. starting work seems to add a lot of stress into other people lives. **P23** Advance agreed meeting times and locations to enable me to sort out my schedule. **P17** Others being aware that I have other commitments and limited time. **P29** Completing work on time. It would move the progress or the project more efficient.
Sharing topics: **- weaknesses** **- professional,** **- political** **- philosophical** **- interests** **- history** **- Common knowledge to talk about**	**P11** Sharing of weaknesses. **P30** shared professional, political, social or philosophical interests **P27** Knowing I have something in common with the people. (Common knowledge). Why: It put me at ease, because I know we have something to talk about. **P17** Conversation about topics unrelated to the work that is being collaborated on. **P7** Shared history.
Clothes:	**P22** Not being required to wear a suit as this can make me feel more nervous.

- No suit clothes **- Less formal clothe**	**P25** Less formal meetings (e.g. clothing).
Non-work environment socializing: **- attending a football match** **- a walk with people** **- Doing exercise**	**P11** Socialising with people in non-work environment. **P8** so attending a football match makes me feel confident so I ever find myself talking and laughing with strangers as we are all there to support the team. **P10** I would like to go for a walk with people at lunchtimes to help people relax and stay healthy. **P19** Doing exercise with people
Technology: **- Email use** **- Online interaction** **- SNTs**	**P8** I prefer to email people at work rather than phone – it gives me the time to prepare what to say. **P23** Having an online method of interaction that is agreed on by all members and is used by all. **P12** Online social media messaging.
Food/Drink: **- Caffeine** **- Food sharing** **- Sharing Alcohol**	**P2** Relative to this – informal settings such as cafes (caffeine again!). **P2** Sharing food – pleasurable + suitable. Eating in a place often make humans feel comfortable. **P3** Pub/Bar. Alcohol reduces my inhibition and allows me to be more open and cross red area from before. Works better if the other person is also drinking. **P19** Drinking/eating out
Working or having relatives	**P8** I find interacting with strangers much easier when my husband is with me + find I talk a lot more when he is present.

Table 20: Green Area examples in the UK

Interaction Strategies in the UK

Interaction Strategies	Quote
Group member behaviour: **- open discussions** **- sharing common things** **- talking one-to-one** **- informal interaction** **- informal meeting** **- informal place** **- ask questions** **- enthusiasm** **- listening** **- interaction in a green area** **- social events** **- informal relationships** **- helpful**	**P3** Social interaction in a green area setting that allows different people to share personnel experiences and allows you to know how to interact with them at work. **P1** Open discussions around general themes/ideas. **P5** Talking one-to-one with people rather them always being in a group. **P1** Sharing common things (interests, approaches). **P7** Informal interaction. **P8** Meeting outside of a formal environment sometimes helps – so maybe away from the usual place of work for instance. **P8** Ask questions of others – try to make sure people are not being ignored. I am usually good at including others where maybe others are missing them out at the conversation. **P14** Empathizing on another person. Enthusiasm is contagious of you for the other person. **P16** Discussion – listening. **P11** Identifying non-work relationships to discuss. **P9** Be as helpful as you can.

- setting common ground **- acceptance** **- break the ice** **- share unique stuff** **- civil** **- respect** **- speed dating** **- shared funny or weird fact about themselves** **- not to interrupt and understand what the other person**	**P28** Setting common ground rules at the beginning of a project or collaboration to find out and tell what, but also how other people like working. **P16** Acceptance – learning to live with it, at least in public. **P29** If someone delays his or her work more than once telling that person that this is not acceptable. **P15** Introductions to each other to break the ice. **P25** Sharing experiences with about projects to allow us to fulfil expectations and understand each other's experiences. **P1** Bringing something unique (each participant) to a group. **P6** If someone makes an honest effort, so will I. **P14** Be civil even in the worst case. **P13** (mutual) respect. **P30** using a 'speed dating' approach to discuss common ground **P26** Let the group share their backgrounds by saying a funny or weird fact about themselves. **P21** Enhancing mutual respect; before stating my ideas, I try to listen or even motivate others to discuss their own ideas. I always try to find interesting bits on their ideas and promote them. **P29** When someone disagrees or proposes something entirely different, not to interrupt and understand what the other person is saying. **P27** Spend more time with the group or person. (Social events). **P24** Finally, I would try to communicate e.g. to invite my friend to a coffee, or just to communicate via "telephone". **P14** Openness of ideas, not being suspicious.
Topic: **- live, background** **- breaking red area** **- not interacting well** **- contact details** **- interests** **- music, film** **- goals** **- interest** **- expectations** **- experiences** **- played music together** **- nationalities, traditions** **- red area** **- green area** **- common ground rules** **- preferable work**	**P5** Small talk about where we live, their background, etc. **P17** Talking about group members who are not interacting well or who are breaking 'red area'. **P29** Everyone having each other's contact details. **P19** Gone out drinking, talked about interests, music, film or whatever. **P6** Goals asking what people's interactions/goals/interest/expectations or poll are with regards to the project. **P25** Sharing experiences with about projects to allow us to fulfil expectations and understand each other's experiences. **P21** Show interest in different nationalities, what are their traditions what do we have in common. **P2** We played music together in the FAST project (a research project about music and in which people are musicians). **P26** At the beginning of the meeting ask about the red areas and the green area. **P28** Setting common ground rules at the beginning of a project or collaboration to find out and tell what, but also how other people like working.

- crossing a red area together	**P22** Learn (or already know) about the other persons cultural background. **P7** Crossing a red area together can become green area.
Language: **- Simplify language**	**P22** with non-native speakers: use progressively more simple language until you find common words you can both understand.
Background music	**P17** Background music – putting on music that can be discussed on top of the work being done.
Work procedure: **- one team** **- deciding on members' responsibilities** **- make use of the first meeting** **- honest feedback** **- flexible time/space** **- managing ideas** **- explain terminologies** **- documentation** **- teaching their area of expertise** **- third party to solve issues** **- pressures or push** **- catch up progress and difficulties for each** **- do not be impulsive** **- the difficulties** **- regular meetings** **- discuss future work** **- create bonding experience** **- too formal can create barriers** **- share good and bad experience to send indirect message about individuals preferences.** **- make a link between work** **- act as the organiser** **- divide the work based on people abilities**	**P10** If people from two genders are working together on a project. I deliberately encourage them to think of themselves as a project team rather than two separate teams. **P23** Deciding early on members' responsibilities. **P23** Using first meeting to establish goals and set out a plan for the projects. **P17** Thinking about the context around the work being done – especially teaching about the surrounding social environment and other people not directly involved in the collaboration. **P29** If someone delays his or her work more than once telling that person that this is not acceptable. **P1** Flexible or open working patterns to help to overcome time/space differences. **P15** Managing ideas democratically – not dismissing ideas but navigating through them to find best ones – not being scared as a group to dismiss certain ideas – but equally marginalising the originator. **P22** When dealing with people from other fields remember they will not understand everything and be happy to explain terms (hopefully they do the same). **P3** Documentation is very useful to put everyone on the same page. **P15** Attribution of ideas to the originator in a positive way. **P18** Collaborative problem solving – i.e. doing things together not just having meetings. **P3** In interdisciplinary projects we often hold initial summaries where each person gives a teaching style lecture about their area of expertise. **P27** Ask a third party to help with the situation. (Co-worker). **P6** Pressures or push, asking what the structural /environmental/etc. pressure is on participate in the project. **P13** An effort to learn about the other without being patronizing or appearing to 'nosy'. **P23** At the beginning of the meetings, every member talks about their work and progress and difficulties. This aided in building appreciation of other effort and work. **P9** Do not rush into doing a job unless you know for sure what and how it can/should be done. (Do not be impulsive). **P17** Talking about the difficulties you are having with the work. **P23** Having regular meetings on fixed time scales (e.g. every week).

	P30 setting up meetings to discuss future work. **P8** Sometimes it is good to be honest about a different situation – often no one wants to admit something is making them feel uncomfortable but bringing it up + being open helps everyone. **P2** We have made public performance and exhibition with people. It is very difficult and challenging to make something work for an on-site at a theatre old gallery, but it is also a bonding experience. **P25** Thing to remain disciplined and not too formal – avoid building any barriers. **P28** Using stories of good and bad experiences to express how I like to work. **P21** Get to know their work, by doing that, I try to create a nice professional climate. It is even better when I can relate my work to their or vice versa. **P10** I often act as the organiser to make sure that projects keep moving forwards effectively. **P22** Splitting up the work based on people abilities. For one project, we had a couple of good programmers and a couple of good writers so we split the technical work and reports up.
Joke changing the topic by humour	**P12** Make jokes **P29**.Changing the topic of the conversation or react with humour if the topic of the religion causes me or it is a racist joke.
Share food Technology**:** **- create online group** **- email introductions** **- Use SNTs to give pros and cons of each member** **- Use email to address the group not individuals (indirect message)** **- LinkedIn**	**P8** In general, sharing food tends to be a good 'social'. **P23** Establishing an online group for communications. **P30** email introductions. **P26** Build up Facebook-like profiles with pros and cons of each member that they fill themselves. **P27** Send a group message via email or some such thing addressing the group and not individuals, because it is impersonal and have time (indirect message) to write. **P30** using LinkedIn

Table 21: Interaction Strategies examples in the UK

Appendix 2

Workshops results and analysis in the KSA

Red Area in the KSA

Table 22 provides examples and participant quotations of the red area in the KSA. The quotations come from participants choosing from multiple choice questions about if they would share these red areas and how. The quotes can appear in multiple places if they are related to many categories and can be used as an example for a category.

Red Area	Quote
"Expected or universal rules or boundaries**:** **- sexual harassment** **- insulting Islam, Muslims.** **- bullying** **- religion abusing** **- discrimination**	**PKa3** "Sexual harassment" I can share it using online **PKa7** "insulting Islam or even Muslims." "I can share it face to face **PKa5** "Bullying" "I can share it face to face" **PK3a** "Religion abusing" "I can share it face to face" **PKg9** "Taking off my veil" "people have different views and this is my personal view I do not have to share it with others" **PKa9** "Intimate relationships", I cannot share it "Complicate things and makes uncomfortable environment"
Unacceptable personal behaviour: **- cheating** **- jealous** **- drugs** **- hygiene** **- unreliable** **- slackers** **- unsafe behaviour** **- domination and control** **- arrogance** **- cursing** **- eye contact in weird way** **- ask personal questions** **- carless** **- sarcasm and unnecessary humour** **- taking other things** **- checking other mobile**	**PKa9** "Cheating" I cannot share it "Due to value and principle foundation" **PKa8** "Jealous" "I can share it face to face **PKU4** "eye contact in weird way" online sharing **PKa10** "Drugs" I can share it "Face to face, Social media, Email" **PKa13** "Bad body smells" I cannot share it "I feel it is a personal choice that does not concern me" **PKu2** "unreliable" I would share with the person face to face or via email **PKa14** "Depending on one member of the group to do all the work that is assigned for the group to finish" "Face to face in any meeting if I saw this team work violation happening." **PKu3** "Any unsafe behavior (like throwing stuff)" "Face to face" **PKg3** "Domination and control" share it by email **PKg8** "arrogance" I cannot share it **PKu9** "cursing using improper words" I will share it **PKU4** "eye contact in weird way" online sharing **PKa17** "Personal questions regarding my appearance or behaviours, such as Why do I wear Hijab?

	Why can't share a glass of wine? ... etc" "I can't tell people that please stop asking me questions!! Not polite I guess" **PKg7** "working in a careless way and submit useless work" "I feel shy to tell her that your work is useless" **PKa13** "Sarcasm and unnecessary humour" "I feel it is a personal characteristic and it is difficult for me to describe how offensive this behaviour might be" **PKu1** "taking my things or checking my mobile even if I was sitting right next to it" just tell them right away to stop
Time: **- punctual,** **- contact during weekend,**	**PKa12** "Arriving late to meetings/work" "Again goes back to if reporting to me yes immediately and separately with person directly If not reporting to me I would make a comment if consistent behaviour to meetings and escalate to line manager if necessary" **PKa1** "Contact during weekend", I can share it "Coe of practice/ staff handbook somehow. It's tricky though when post is in senior management so may be clarification in job description."
Lack of respect: **- rude,** **- using bad language** **- noises,** **- interruption,** **- disrespect,** **- shouting** **- belittling** **- harassment** **- not respecting personal space** **- not listening** **- gossips** **- criticism** **- laughing out loud** **- arrogant**	**PKu2** "People who are rude" "I would share with the person face to face or via email about the importance of following process. It would be in private in an unofficial one to one meeting or private email. If that didn't work I would mention it in a group" **PKu1** "Too many noises without consideration of people working" "I just choose to ware my headphones" **PKu1** "using bad language around me" I can share it one to one. **PKu3** "Interruption while speaking" "ace to face. but being careful because this might create clashes or negative energy" **PKu10** "Disrespect" "one to one and in key meetings" **PKu5** "using vulgar words in an expression." Not for sharing "people might over-react over this matter." **PKa8** "Shouting" I cannot share it "Respect people is required" **PK5a** "Belittling" I can share it face to face **PKa1** "Staring inappropriately and making comments on shape, height, beauty, or looks (excluding clean comment on say fashion)" I can share it "In handbook or code of practice there are many rules against harassment." **PKu6** "Not respecting personal space." "To avoid sensitivity & embarrassment and, in a way, in an effort to be part of the group & get a sense of belonging. If behavior is consistent, I usually step away." **PKg5** "talk to each other while I am talking" "in the first meeting"

	PKa7 "Gossips" I can share it in the break time **PKg9** "Criticism" "during the meetings I will share this" **PKa14** "Laughing out loud" "Because I can't control people by my rules. I can try to avoid sitting with a person as much possible as I can instead of imposing rules on him\her" **PKu2** "people who are arrogant" "I might try to mention it in a non-straight forward way. Would not be blunt about it so I don't offend the person" **PKg2** "the people who do not listen very well which is very important for any success" "face to face"
Personal red area**:** **- using mobile phone** **- eating while talking** **- wearing sun glasses** **- chewing gum** **- flowery perfume** **- music** **- brining children to the work** **- cracking knuckles** **- too much movement** **- not wearing shoes** **- cosmetic surgeries** **- asking too much** **- taking about themselves too much** **- avoiding eye-contact** **- quiet environment** **- crowded offices** **- casual behaviour** **- personal contacts only email** **- working in work place only** **- working with mix gender** **- gender Favouritism** **- too much interaction** **- grocery shopping** **- watching media provoke emotions** **- cooking** **- smoking odour** **- superficial**	**PKg1** "using the mobile phone during the meeting" "face to face in the first meeting" **PKg3** "Eating while talking" "email" **PKg3** "taking to me while she is wearing her sun glasses" "email" **PKg8** "I really do not like Flowery perfume" "I cannot share it, it is my problem" **PKg13** "Brining children to the work" "I cannot share that" **PKg10** "music" "yes, I believe music is forbidden" **PKg6** "Chewing gum" I will share it in indirect way **PKg16** "Cracking knuckles" "I cannot share it, it is a personal thing" **PKg16** "too much movement make me feel uncomfortable" face to face **PKu1** "not wearing shoes" "I will not tell them how they should look like in work, they are adults they should know." **PKa14** "kissing on cheeks" I can share it "Face to face; one to one. I tell the closest member to me that I don't like this way of greeting and prefer shaking hands only; assuming that this member will carry out this information to the rest of the group members." **PKa2** "Casual behavior" I cannot share it "Some people may be offended as if I am back stabbing them or that I don't like them" **PKa4** "Cosmetic surgeries" I cannot share it "Some could be advocates" **PKa5** "Asking about very" I can share it "face to face" **PKg3** "Taking about themselves too much" "I cannot tell her to stop taking about herself" **PKg4** "Avoiding eye-contact when I'm talking." in the first meeting" "Avoiding eye-contact when I'm talking." in the first meeting" **PKg4** "I don't like working on quiet environment" **PKg4** "Crowded offices" in the first meeting" in the first meeting" **PKg15** "I do not like to give my personal contacts only my email to contact each other" "I cannot say that so they will have judged me and say that I am very struck person"

	PKg15 "I prefer only to work and have meetings in the workspaces I do not like to go outside such as café" "I cannot say that so they will have judged me and say that I am very struck person" **PKg9** "Being with a male in one office make me feel uncomfortable" "I cannot share it, it is my personality" **PKu2** "Gender Favouritism" I cannot share it "its subjective & a sensitive topic" **PKa14** "Too much interaction" "Some people over interact unintentionally, so avoiding any misunderstanding, I try to avoid any person who interact too much by going back to my work; telling her\him that I have to go because I'm busy is enough to cut this unimportant interaction." **PKa4** "Grocery shopping" I can share it face to face **PKa6** "Watching media that can provoke certain emotions like fear or misery" I cannot share it "Because I don't like to show these emotions in public" **PKa4** "Cooking" I cannot share it "Not important and not adding value" **PKa13** "Smoking" "I think during break time I can approach people and mention how smoking affects people sitting around the smoker so I feel it is my right to ask the smoker to stop smoking **PKu6** "coming to office with a heavy smoking odour" "This can be casually shared, not necessarily as an official statement directed to a certain person. It could be part of a conversation about preferences... etc" **PKu2** "People who are superficial" "People might get offended by my comment and superficiality is subjective"
Work-related Personal Behaviour: **- don't follow process** **- dressing unprofessionally** **- sending email not calling** **- short termed thinking and personal agendas** **- frustration** **- not fair**	**PKu10** "Vague requests and not being transparent" I will share it "whenever encountered" **PKa12** "Dressing unprofessionally" I cannot share it has to come from her or direct line managers if they're not members from my team reporting to me" **PKu2** "People who don't follow process" "I would share with the person face to face or via email about the importance of following process. It would be in private in an unofficial one to one meeting or private email" **PKu3** "Sending long emails instead of just calling" "Face to face" **PKu10** "Short termed thinking and personal agendas" I will share it "whenever encountered" **PK8a** "Frustration" I cannot share it "Can't success with frustration" **PK4a** "NOT Equal treatment" I cannot share it "Many have opposite opinion"

Beliefs Rules: **- shaking hands,** **- physical contact,** **- drinking alcohol,** **- requiring me to take off my hijab,** **- space between genders**	**PKA10** "Shaking hands" I can share it "in the first meeting" **PKu6** "I usually ask pardon of the other person "Male colleague" who extends his hand to shake & greet me, for not being able to shake hands. However, it is certainly embarrassing for me & the other person as well. So, it is better that male colleagues understand the common etiquette for not approaching ladies unless the ladies extend their hands." **PKa2** "Touching or shaking hands, drinking alcohol, sobbing about personal problems, gossiping" I cannot share it "The people who don't mind will get offended" **PKa13** "Physical contact" I cannot share it "I feel awkward talking about it. People ask for reasons and I am not comfortable talking about it them as it might offend some people" **PKa15** "drinking alcohol" I cannot share religion **PKa13** "Physical contact" I cannot share it "I feel awkward talking about it. People ask for reasons and I am not comfortable talking about it them as it might offend some people" **PKa7** "requiring me to take off my hijab" I can share it face to face in the first meeting **PKu5** "sitting too close from the other gender" "Not to cause any embarrassments sometimes"
Organizational Behaviour: **- unappreciative leader** **- bad manger** **- bad management**	**PKa3** "Unappreciative leader" I cannot share it "They will think I am being a baby" **PKg9** "Bad manger and management" "share it during meetings indirect way"
Topics: **- talking about political issues** **- norms** **- religion** **- war** **- culture** **- personal** **- results, marks** **- inappropriate sharing materials**	**PKa17** "Political issues, such as Why are women in my country not allowed to drive a car? Why do my people believe in capital punishment?" I cannot share it "I can't tell people that please stop asking me questions!! Not polite I guess." **PKa4** "Rebelling on norms / inconsideration" I cannot share it "Very debatable" **PKa9** "Religion point of views" I cannot share it "Very sensitive issue that may cause conflicts among people" **PKa10** "War" I can share it "Face to face, Social media, Email" **PKa17** "Questions related to some cultural traditions, such as "I heard that people in your country have arranged marriages, are you going to marry in that way? "Men in your country can marry 4 women are you happy to share your husband?"!! I can share it using social media." **PKa6** "Talking about personal information that won't add any value" I cannot share it "I feel it won't add value and it's my personal information" **PKa6** "I can share it "Asking questions about the results of certain examination that's done during the course"

	PKu6 "displaying pictures that portrays a semi-nude female in a formal meeting (as part of a formal presentation)." "in a group meeting led by HR to openly share every 1s opinion about this subject"

Table 22: Red Area examples in the KSA

Green Area in the KSA

Green Area Examples	Quote
Environments context: **- relaxed Environment** **- going out with work friends** **- team building event** **- informal social gathering** **- same gender or spouse** **- (no food smell) lunch in the kitchen** **- setting in a mix office** **- listening to music** **- motivates creativity** **- cleanliness** **- no smoking**	**PKu1** "Relaxed Environment" sharing in a group **Pku1** "Going out with work friends regardless of the gender "sharing in a group **Pku2** "Have a team building event" **Pku6** "An invitation to an informal social gathering." "It's weird to ask people for such things. They either should come naturally or not." **Pku4** "working with same gender or married in case of male." Online sharing **Pku7** "Keep lunch in the kitchen/ smelly food away." Official communication should be circulated. **Pku9** "setting in a mix office" **Pka3** "Listening to music" **Pka7** "environment that motivates creativity" **Pka11** "Cleanliness" **Pka11** "No smoking" **PKu4** "working @ companies that put strict rules to protect the employees like unilever." online sharing **PKu4** "having flexible hours" online sharing **PKa1** "Training sessions where all members of team attend and one gets to learn better if personalities than bond for the best of the team." **PKa1** "Familiarizing a new member of the team on everything" **PKa3** "Clear lines for authority and responsibility" **PKa4** "Education lecture" **PKA7** "clear tasks and responsibilities" **PKa9** "Open door policy" **PKa9** "Anonymous suggestions or complains" **PKa14** "Equality and justice" **PKg2** "Quick problem solving" **PKg3** "Consider each individual opinion" **PKg7** "freedom for the individuals to choose their method to do the work" **PKg7** "Frequent update meetings" **PKg8** "Unify the goals for the whole group" **PKg13** "Having a manger or leader" **PKg14** "we should have a clear plan for the work"

	PKg15 Take individual's ideas for the plan and method before the settings "" **PKg17** "Give breaks between tasks" **PKu8** "accepting to meet and take orders from females in charge" **PKu9** "borrowing office staff" **PKu10** "Clarity" **PKu14** "Support, not financially but emotionally." It could be misunderstood as bigging for attention. **PKu10** "Good politics and relationships"
Personal work behaviour: **- daily jokes** **- helpful peers** **- driving with a co-worker** **- shaking Hands** **- smiling** **- open mindedness** **- punctuality** **- introductions about themselves** **- playing games** **- good intentions** **- modesty** **- commitment** **- listening** **- accept different opinions** **- be positive** **- eye contact and good body language** **- adaptions** **- the initiative** **- good collaborative and cooperation's** **- working individually** **- enthusiasm** **- energetic** **- competiveness** **- tolerance** **- disclose mistakes for others** **- responsibility**	**PKa1** "Reaching out people outside of work environment, for schools (parents), for other businesses (investors, advertising companies, other community when holding events)" **PKa2** "Daily jokes Only if we were from the same gender" **PKa2** "Positive enforcement about work" **PKa3** "Helpful peers" **PKa3** "Smiling" **PKa4** "Open mindedness" **PKa4** "Punctuality" **PKa6** "Everybody giving and intro about themselves" **PKa6** "Ice breaker games that's fun and enjoyable" **PKa6** "Informal group chat" **PKa14** "Good intentions" No sharing "It would look like as if I'm expecting the worse from the others and judging them before knowing them." **PKa15** "modesty" **PKa15** "commitment" **PKg1** "Listening" **PKg1** "listen and accept the different point views" **PKg1** "positive thinking" **PKg1** "Eye contact and good body language" **PKg1** "know how to adapt to the new changes" **PKg1** "The initiative" **PKg2** "Good collaborative and cooperation's"

- sharing topics **- interest or general topics** **- social chats** **- behaving in a professional/ appropriate manner, i.e: "No noise and/or loud voice.** **- personal boundaries respect** **- acknowledging females** **- normal joke** **- clarity** **- friendly**	**PKg4** "Working individually. I like to work alone in my own office" **PKg6** "Enthusiasm" **PKg6** "Energetic" **PKg7** "Transparency" **PKg9** "Competiveness to create creativity and innovation" **PKg9** "No routines, I like to change the places always" **PKg11** "forgive for mistakes" **PKg11** "do not disclose mistakes or behaviours to the managers" **PKg12** "Taking responsibility" **PKu1** "taking about same interest or general topics with different gender" **PKu2** "People who I feel share my values" I cannot share it: "It might alienate other people" **PKu1** "being friendly with all co- workers" **PKu1** "driving to work with a co-worker" **PKu2** "People who are transparent" **PKu4** "being with team with gender equalities" online sharing **PKu5** "shaking Hands" any environment **PKu6** "a +ve feedback from some 1" in a group meeting led by HR to openly share every 1s opinion about this subject **PKu7** "Including me in open side talks/ asking for my opinion/ addressing me in social chats... etc." "It should come as naturally not deliberately." **PKu7** "behave in a professional/ appropriate manner, i.e: "No noise and/or loud voice... etc." "It should come naturally and/or stated & governed by the office guidelines." **PKu7** "Have accepted personal communication. "It should come naturally." **PKu8** "personal boundaries" social media sharing **PKu8** "respect" social media sharing **PKu8** "acknowledging females"
Clothes: **- Abide by dress code/ - appropriate office attire** **- Non-uniform**	**PKu7** "Abide by dress code/ appropriate office attire" "It should come naturally and/or stated & governed by the office guidelines." **PKg4** "Not having to wear an unformal" **PKa16** "Tourist journey"
Food/Drink: **- coffee, breakfast, lunch** **- distributing sweets** **- sharing food** **- welcome dinner** **- birthday cake**	**PKu1** "Sharing a cup of coffee or breakfast" **PKu3** "Bringing and distributing sweets" No sharing "It would seem pretty awkward." **PKu5** "sharing food" **PKu5** "going out for lunch" only close colleagues at work **PKu6** "a welcome dinner when joining a work-place" in a group meeting led by HR to openly share every 1s opinion about this subject

	PKu6 "Birthday cake" "it's weird to ask people for such things. They either should come naturally or not."
Sharing topics: **- daily things** **- children** **- life, work, schools** **- following up personal matter** **- personal talk to a limit** **- sharing social updates** **- historical facts** **- politics** **- concerns** **- personal life** **- future plans** **- remembering happy moments** **- hobbies, interesting skills or good experience** **- discussing best holidays,** **- music, food, books, movies, places to visits** **- self-development books or TED talks or articles** **- beliefs**	**PKu4** "talking about daily things" online sharing **PKu5** "Asking about children" **PKu5** "General chats about life, work, schools" **PKu6** "some1 asks you about a personal matter that happened to you before & they're following up on it." "It's weird to ask people for such things. They either should come naturally or not." **PKu9** "some personal talk to a limit not to go deep into private questions." **PKa2** "Sharing social updates in general Usually it would be with single gender so the other gender wouldn't Misinterpret the information **PKa4** "Historical facts" **PKa4** "Politics" Different views and not an interest for many people **PKa7** "open communication about concerns" **PKa9** "Talk about personal life" **PKa16** "Discussing future plans" **PKa16** "Remembering happy moments" No it is a Personal topic **PKa17** "Talking about hobbies, interesting skills or good experience." **PKa17** "Discussing best holidays, music, food, books, movies, places to visits **PKa17** "Sharing interesting materials such as self-development books or TED talks or interesting articles." Social media **PKg2** "ask me about my beliefs and religion"
Technology: **- WhatsApp** **- Online socializing**	**PKa1** "A work colleagues (WhatsApp) group for assuring running smooth work days all informed at once 'during work hours)" **PKa10** "Online socializing"
Time: **Meetings in the weekends**	**PKg19** "Weekend meetings can be a change"

Table 23: Green Area examples in the KSA

Interaction Strategies in the KSA

Strategies	Quote
Organizational behaviour: **- allow people to clash** **- overload them** **- out of their comfort zone** **- rigid rules** **- informal interaction** **- checking satisfactions at the environment**	**PKu3** "Allow people to clash to see how they deal with conflicts" **PKu3** "Overload them and see how they deal with pressure and then release the pressure" **PKu3** "move them out of their comfort zone" **PKu4** "Put rigid rules by the government or ministry of labor with punishment to avoid anything" **PKu2** "Open non-formal conversations"

- Comprehensive mentor training sessions that assured members of the team are aware of each other. **- knowing who to turn to at work environment when things go wrong** **- suggest future changes (not necessarily true ones) to get people ideas**	**PKa1** "Comprehensive mentor training sessions that assured members of the team are aware of each other." **PKa1** "Knowing who to turn to at work environment when things go wrong" **PKa2** "suggest future changes (not necessarily true ones) to get people ideas and concepts" **PKa4** "Open a current incident and very general topic and observe the interactions"
Group member behaviour : **- facial expiration if the red area attacked** **- informal interaction** **- report issues to the right person who can take an action** **- raise common issues** **- understanding** **- family day for the group** **- relying on FACTS not emotions** **- transparency** **- kindness and hardworking** **- they all work together in one meeting room to** **- work in one place to find common grounds** **- avoiding subjectivity** **- discuss external changes rules and regulations** **- make use of the first meeting** **- share training ideas** **- truce and reboot** **- ignoring** **- having mutual agreement** **- defining roles and responsibilities** **- reference to company policy** **- before collaborations do a survey and results are shared w the group** **- group people w common grounds** **- prioritizing** **- decentralization** **- be the idol** **- brainstorming**	**PKu4** "not show an OK face if something cross my red line" **PKu2** "Open non-formal conversations" **PKu4** "putting my own limits so no one will cross it" **PKu4** "Report anything that bother you to the right person who can take an action" **PKa2** "Raise common issues in the work field" **PKu6** "understanding & presenting things with their point of view clearly considered in it." **PKu6** "initiate a family day for the group" **PKa1** "Being am satisfied at the environment in and checking so every year or so before renewing contract." **PKu6** "relying on FACTS & not emotions" **PKa1** "Transparency" **PKa1** "Kindness and hardworking" **PKu5** "they all work together in one meeting room to discover their own common grounds" **PKu6** "Avoiding subjectivity" **PKa2** "Discuss external changes in the rules and regulations" **PKu5** "small introduction for each person on first day of the project" **PKu8** "assigning task specific to each member" **PKa2** "Share training ideas and new courses" **PKa3** "Truce and reboot" **PKa3** "Ignoring" **PKu6** "respect others & avoid escalation" **PKu8** "having mutual agreement" **PKu8** "defining roles and responsibilities" **PKu2** "Have get together outside office" **PKa5** "reference to company policy" **PKa6** Prior to course we fill in a survey and results are shared with the group **PKa6** "Group people w common grounds together like same work department or education background. **PKa6** "Activities for each of this group w similar backgrounds **PKa10** "Prioritizing **PKa10** "Decentralization **PKa12** "Establishing team norms at beg of engagement **Ka7** "comprises when needed"

- establishing team norms **- comprises when needed** **- be the idol** **- regular updates on how the environment feels** **- ask for help** **- sympathy** **- offering help** **- greeting & chat** **- competition for best group performance** **- one to one meeting** **- freedom** **- respect** **- organize** **- patient** **- avoid trouble**	**PKu7** "I try to lead by example & abide by office etiquette in order to get others around me to respect & copy the way I prefer to be treated with." **PKa13** "Having regular updates on how the environment feels like for everyone **PKu2** "Have a weekly informal get together with entire team" **PKa14** "Ask for help from the others to make them feel needed." **PKa14** "Show some sympathy and understanding to what others are going through." **PKa14** "Offer my help **PKa17** "Greeting all group members and have a quick chat with them." Single gender environment **PKa17** "Pushing group members to work together by setting up a competition for best group performance." **PKu5** "one to one meeting with each team member to get to know them more and make it easier to find their common grounds and act accordingly" **PKg1** "Freedom to say your opinion" **PKg1** "respect other opnion" **PKg1** "be organized" **PKg2** "Patient" **PKg4** "I'll avoid trouble by avoiding people who seem like they want to make problem."
Topics: **- ask questions make them open up their thoughts** **- ask questions make them open up their thoughts** **- find common activities** **- learn culture and background of others** **- know their red area** **- know their green area** **- ask open questions** **- share common red area** **- discuss unacceptable act** **- brainstorming** **- listing cons & pros** **- share the reward** **- stories of good and bad experiences** **- expectations** **- work rules** **- avoid religion or political subjects**	**PKa4** "Identify a common area of interest" **PKa4** "Ask questions to others and make them open up their thoughts" **PKa5** "Everyone writing on a board the rules of the meeting" **PKa7** "understand the person culture and background" **PKu4** "putting my own limits so no one will cross it" **PKa7** "understanding their red area" **PKa7** "understanding their green area" **PKa7** "ask open questions" **PKa9** "Publish the common redlines in the orientation tour" **PKa12** Discussing openly when any behaviour was found unacceptable **PKa10** "Brainstorming **PKa10** "Listing advantages and disadvantages **PKa10** "Share the reward **PKu6** "bring examples from past experience" **PKa13** "Talking about expectations" **PKa13** "Discussing house rules and having those set collaboratively" **PKg4** "I will never discuss subjects that could make my relationship bad with anyone like religion related subject or political subjects"

Food/Drink	**PKu2** "Bring food to office or coffee to break ice" **Pku5** "gathering the group for a meal to get to know each other"
Technology: - **online group** **- phone Call** **- email introductions** **- WhatsApp Group** **- SNTs to find common area** **- texting**	PKu1 "online chat" PKa11 "Phone Call" PKa5 "Sending email beforehand" PKg3 "create a WhatsApp group for the team to keep interactions and socializing" PKa4 "Check their profiles, linked in and al social media to figure out the suitable and common area" PKu1 "texting" PKu2 "Add them on Facebook"

Table 24: Interaction Strategies examples in the KSA

Appendix 3.

Research Consent Form

This study involves conducting workshop and focus group with any people to determine behaviour and activities that taken place among diverse people and to evaluate the current interaction between these individuals.

This is to confirm that I agree to take part in this study. I have read the information sheet provided and I understand what is involved.

I understand that I can withdraw at any time without penalty by informing the researcher and my data will be erased from the records.

I confirm that I am over the age of 16 and I give permission for the data collected and recorded to be used in the study and subsequent publications.

Name:

……

Signature:

……

Date:

……

Email:

……

Contact No (Optional):

……

Thank you in advance for your cooperation

Appendix 4.

Information Sheet

Privacy and Confidentiality:

The participant's personal identity will not be made public in discussion or written work. Where it is necessary to refer to the participant then it will be done anonymously in order to preserve the participant's privacy and confidentiality.

Objectives of the Study:

This study is part of a PhD in the Computer Science School at the University of Nottingham. The research will involve an investigation into user behaviours and choices regarding social interaction of different kinds of knowledge sharing. The work will also involve a study of user behaviours patterns in order to identify the drivers and barriers to social interact and enhance knowledge sharing.

This study involves conducting workshop with any public people to determine behaviour and activities that taken place among diverse people and to evaluate the current interaction between these individuals.

The objectives of this study:

- ☐ Identify the challenges that exist between diverse people that can limit social interactions, collaboration and knowledge transfer between them.
- ☐ Identifying the motivations of diverse people to social interact, collaborate and exchange knowledge.
- ☐ Investigate how diverse people use different kind of strategies to overcome their social interacts, collaborate and exchange knowledge challenges.
- ☐ Finding out which of the technologies are necessary features and elements in system that can influence and enhance social interactions, collaboration and knowledge transfer.

Researchers on the study:

Main Researcher:		
Zenah AlKubaisy	Computer Science School	psxza2@nottingham.ac.uk
Supervisors:		
Dr. Stefan Rennick Egglestone	Computer Science School	Stefan.Rennick_Egglestone@nottingham.ac.u
Dr. Boriana Koleva	Computer Science School	k Boriana.Koleva @nottingham.ac.uk
Dr. Suzanne Edinger	Business School	Suzanne.Edinger@nottingham.ac.uk

Use of the data:

The data and quotations from participants will be used by the researchers listed above for the purposes of the PhD and any subsequent publications.

Who has access to the data?

Direct access to the data is limited to the researchers. Copies of it will not be passed onto others.

Storage of the data:

The data will be held in a secure and safe manner in accordance with the Data Protection Act 1998.

Your rights:

Participants are free to withdraw from the research at any time without explanation and without penalty.

Thank you in advance for your cooperation

Appendix 5.

Different Organizations

Academic Organizations

1. University of West London

https://www.uwl.ac.uk/sites/default/files/Departments/About-us/Web/PDF/policies/induction_guide.pdf

2. University of York

http://www.york.ac.uk/admin/hr/employees/new_starters/

3. University of Strathclyde

http://www.strath.ac.uk/media/ps/humanresources/newstaffinductionmaterials/Departmental_Induction_Guidelines_-_Research_Staff.pdf

4. The University of Sheffield

http://www.shef.ac.uk/polopoly_fs/1.107970!/file/WelcomeInductionPack2011-12.pdf

5. University and college union

http://www.ucu.org.uk/media/pdf/d/4/ucu_earlycareersguide.pdf

6. Imperial College London

https://workspace.imperial.ac.uk/newstaff/public/Induction%20-%20Line%20Managers%20Guidance%2002.12.08%20v1.2.2%20for%20PA.pdf

7. Oxford Brookes University

https://www.brookes.ac.uk/services/hr/handbook/recruitment/induction_new_employees/guidelines_induction.html

8. The University of St Andrews

https://www.st-andrews.ac.uk/staff/ppd/universitynewstaffinduction/

9. Eastleigh College

http://www.eastleigh.ac.uk/media/policies/Induction%20Procedure.pdf

10. Bucks New University

http://bucks.ac.uk/content/documents/Human_Resources/guide_to_induction_and_probation_for_new_entrants_august_2012.pdf

11. University of Hull

http://www2.hull.ac.uk/administration/staffinduction/inductiontoolkit.aspx

12. University of Strathclyde

http://www.strath.ac.uk/media/ps/humanresources/newstaffinductionmaterials/Departmental_Induction_Guidelines_-_Research_Staff.pdf

13. The University of Sheffield

http://www.shef.ac.uk/polopoly_fs/1.107970!/file/WelcomeInductionPack2011-12.pdf

14. University and College Union

http://www.ucu.org.uk/media/pdf/d/4/ucu_earlycareersguide.pdf

15. Imperial College London

https://workspace.imperial.ac.uk/newstaff/public/Induction%20-%20Line%20Managers%20Guidance%2002.12.08%20v1.2.2%20for%20PA.pdf

16. The University of Manchester

http://www.manchester.ac.uk/research/researcher-development/

17. The University of Nottingham

https://www.nottingham.ac.uk/academicservices/qualitymanual/researchdegreeprogrammes/induction-and-training.aspx

18. University of Southern California

http://faculty.usc.edu/new/before-you-arrive/, 2015

https://dornsife.usc.edu/orientation/, 2015

19. Cambridge University

http://www.admin.cam.ac.uk/offices/education/support/induction.html

20. University of Edinburgh

http://www.see.ed.ac.uk/drupal/sites/default/files/Academic%20Staff%20and%20Independent%20Research%20Fellows_Induction%20Programme(1).pdf

Medical organizations

1. The Newcastle upon Tyne Hospitals NHS Foundation Trust

http://www.newcastle-hospitals.org.uk/downloads/policies/Personnel/InductionPolicymodifiedFeb08.pdf

2. Tameside Hospital NHS

http://www.tamesidehospital.nhs.uk/Documents/CorporateInductionManual.pdf

3. East London NHS foundation trust

http://www.eastlondon.nhs.uk/About-Us/Freedom-of-Information/Trust-Policies-and-Procedure/Human-Resources-Policies/Induction-Policy-For-New-Staff.pdf

4. Royal Marsden NHS Foundation Trust Policy

http://www.royalmarsden.nhs.uk/SiteCollectionDocuments/foi/induction-policy.pdf

5. Heatherwood & Wexham Park Hospitals Foundation Trust

http://www.heatherwoodandwexham.nhs.uk/sites/default/files/aboutus/foi/tpp421.pdf

6. Rodwell Farm Nursing Home

http://rodwellfarm.co.uk/documents/Public%20Documents/4.0%20Staff%20Employment%20&%20Training/4%20Rodwell%20Staff%20Induction%20Programme.pdf

7. Cambridge University Hospitals

http://www.cuh.org.uk/staff-zone/new-starters-welcome-lounge/induction-programmes/specific-role-induction

8. Bedford Hospital NHS Trust

http://www.bedfordhospital.nhs.uk/working-here/learning-and-development

Government organizations

1. Leicestershire City Council

http://www.leics.gov.uk/retention_of_staff.pdf

2. Lincolnshire City Council

http://www.lincolnshire.gov.uk/upload/public/attachments/978/employee_induction_guidance_checklists.pdf

Business Organizations

1. Quality Assurance Agency for Higher Education (QAA)

http://www.qaa.ac.uk/en/Documents/RecruitmentPolicy-QAA-HR-Policy.pdf

2. Sport and recreation

http://www.sportandrecreation.org.uk/smart-sport/people/workforce/retention/induction

3. Nissan

http://www.nissan-global.com/EN/COMPANY/DIVERSITY/WORK/

4. Samsung

http://www.samsung.com/us/aboutsamsung/sustainability/talentmanagement/download/Employee_Competencies.pdf

6. HP

http://www8.hp.com/uk/en/campaign/graduate/learning-development.html

7. Hitachirail

http://www.hitachirail-eu.com/graduates_107.html

9. Volkswagen

http://www.volkswagen.co.uk/about-us/careers/undergraduate-scheme

11. Businessballs

http://www.businessballs.com/exampleinductionguide.pdf

http://fortune.com/worlds-most-admired-companies/ups-34/

http://www.ukcisa.org.uk/Info-for-universities-colleges--schools/Policy-research--statistics/Research--statistics/International-students-in-UK-HE/, 2015)
http://www.uis.unesco.org/Education/Pages/international-student-flow-viz.aspx, 2015)

Appendix 6.

Exercise: Collecting examples of red areas

Red areas are any undesirable online or\and physical interactions. For example: undesirable time, media, topics, space, behaviour or interaction related to your traditions, beliefs or personalities.

☐ Write down five personal red area

The First Red area:

.....

Can you share this red area with any of your group members?

Yes No If No, Why?

.....

If Yes, how you think it is the best way to share this red area. e.g. online (email, Social Media ...), face to face (in the first meeting, in the break time, one to one or one to group ...)

.....

The Second Red area:

.....

Can you share this red area with any of your group members?

Yes No If No, Why?

.....

If Yes, how you think it is the best way to share this red area. e.g. online (email, Social Media ...), face to face (in the first meeting, in the break time, one to one or one to group)

.....

The Third Red-area:

.....

Can you share this red area with any of your group members?

Yes No If No, Why?

.....

If Yes, how you think it is the best way to share this red area. e.g. online (email, Social Media ...), face to face (in the first meeting, in the break time, one to one or one to group)

The Fourth Red-line:

.....

Can you share this red area with any of your group members?

Yes No If No, Why?

.....

If Yes, how you think it is the best way to share this red area. e.g. online (email, Social Media ...), face to face (in the first meeting, in the break time, one to one or one to group)

.....

The Fifth Red-line:

.....

Can you share this red area with any of your group members?

Yes No If No, Why?

.....

If Yes, how you think it is the best way to share this red area. e.g. online (email, Social Media ...), face to face (in the first meeting, in the break time, one to one or one to group)

.....

Exercise: collecting examples of green lines

Green-areas are any situations that make you feel comfortable; what helps you to enjoy yourself and be open and relaxed.

- ☐ Write down five personal green area

The First Green area:

.....

The Second Green area:

.....

The Third Green area:

.....

The Fourth Green area:

.....

The Fifth Green area:

.....

Finding common ground

Write down five strategies of how you have found common ground in a previous project.

First Strategies:

.....

Second Strategies:

.....

Third Strategies:

.....

Fourth Strategies:

.....

Fifth Strategies:

.....