Examining a potential group work tool for students at the University of Strathclyde.

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This dissertation was submitted in part fulfilment of requirements for the degree of MSc Information Management

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ABSTRACT

This paper presents a case study at the University of Strathclyde, regarding group work in the context of computer supported collaborative learning (CSCL). Group work is a popular and frequently applied teaching methodology in higher education (HE). Therefore, the research examines the challenges students often face and investigates on potential resolutions regarding CSCL.

The aim of this work is to conduct a business analysis regarding enhancements for students during group work, referring to CSCL. The following research questions serve as a guide for the author:

- RQ1: What is the significance of group work in higher education and why?
- RQ2: What are the challenges of group work for students in higher education?
- RQ3: How can the University of Strathclyde support its students to resolve the challenges?

First, the dissertation clarifies the significance of group work in HE and identifies on the challenges for the students. Second, the challenges of group work will be verified and ranked through a students' questionnaire. Furthermore, all currently available IT resources, potentially enhancing group work, are identified during further analysis. Accordingly, 16 software requirements are identified and analysed, supported through eight expert interviews with either technical or teaching background. In the next stage, the researcher presents, how these features are valuable for a student for group work and how they can be put into practice based on the available IT resources.

The dissertation uncovers that group work in HE is well appreciated by employers since it offers the unique opportunity to develop the students' personal transferable skills (PTS). Accordingly, academic institutions acknowledge the demand and encourage group work among all field of studies. Despite the benefit of gaining PTS, group work is a challenge for students. However, the University of Strathclyde aims to create an outstanding student experience and investigates for potential enhancements. With a focus on transparency, coordination, communication, and information sharing, the case study identifies possible ways to resolve the challenges under the premise to use available IT more effectively. During analysis, several functionalities turn out to be available already or with merely a need for different settings or minor software modifications. As the result of the business analysis activity, the 16 potential functionalities can be considered for future development and implementation through the Information Service Directorate (ISD) within the prevailing agile software development environment.

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Furthermore, I would like the participants of the expert interviews (appendix C). Their supportive and uncomplicated approach was impressive and a valuable part of this dissertation.

Thank you.

Contents

List of Tables

List of Figures

List of Abbreviations

Abbreviation	Name
AFP	Assessment and Feedback Policy
C(x)	ID for challenge
CBI	Confederation of British Industry
CIS	Computer and Information Sciences
CSCL	Computer supported collaborative learning
CSCW	Computer supportive corporative work
ECDGEC	European Commission- Directorate- General For Education And Culture
ET 2020	Education & Training 2020
EU	European Union
F-(xxx)v(x)-(x)	ID for functional requirement
HE	Higher education
I(x)	ID for expert interview
IS	Information systems
ISD	Information Services Directorate
M(x)	ID for meeting
MoM	Minutes of meeting
MVP	Minimum viable product
O365	Microsoft Office 365 Pro Plus
PTS	Personal transferable skills
Q(x)	ID for section in student questionnaire
Q(x).(x)	ID for question in student questionnaire
QAA	Quality Assurance Agency for Higher Education
RQ(x)	Research question
SfB	Microsoft Skype For Business
STEP	Strathclyde Teaching Excellence Programme
Strath App	University of Strathclyde App
UK	United Kingdom
UKPSF	UK Professional Standards Framework
UoS	University of Strathclyde
VLE	Virtual learning environment

1. Introduction

The objective of this paper is to explore potential computer supported collaborative learning (CSCL) applications, which could potentially enhance group working experiences of students at the University of Strathclyde. The investigation comprises a reflective case study of a student placement within the Information Services Directorate (ISD). This placement facilitated opportunities for in-depth business analysis and research that forms the basis of the findings of this dissertation.

Group work is a popular and frequently applied teaching methodology not only within the University of Strathclyde but across the entire HE sector. This dissertation will explore the impact of group work on the overall student experience and conclude it is an essential component of HE. Group work is popularly applied in HE because it is a powerful way to develop the personal transferable skills (PTS) of students. However, group working also presents a number of challenges, that will be explored in this paper. To address those challenges and enhance the student experience, the University of Strathclyde, aims to provide potential CSCL solutions, which support students during group work. The baseline analysis and a documentation of possible features in this work are the first steps on this journey.

In order to follow a permanently focused approach during the entire research process, the author follows three research questions as guidance.

- RQ1: What is the significance of group work in higher education and why?
- RQ2: What are the challenges of group work for students in higher education?
- RQ3: How can the University of Strathclyde support its students to resolve the challenges?

After the introduction, the paper will provide a literature review regarding the significance of group work in HE. Furthermore, it will explain the term personal transferable skills (PTS) within the context of group work and why these are linked with employability opportunities. Moreover, the literature review introduces the aspect of computer supported collaborative learning (CSCL) to demonstrate opportunities to resolve the associated challenges. In the next section, the researcher explains the selected research philosophy as well as a justification for the selected data collection methods. Additionally, the derivation of the three research questions is presented. In the analysis sections, the researcher presents the findings from two main data collection methods; a questionnaire for students and a set of expert interviews with stakeholders from technical and pedagogical backgrounds. Furthermore, the organisational context of the University of Strathclyde will be analysed to understand several procedures or mindsets of the university. In the next section, the challenges of group work will be transformed into requirements which potentially

could resolve the challenges of group work for students. The requirements catalogue serves as a detailed documentation of potential resolutions. To explore needs in a real-world context, the author focused on the available IT resources within UoS. Therefore, these findings could enable the University to use their present infrastructure more efficiently while addressing group working challenges. Subsequently, the available resources will be identified and functionalities will be verified. In summary, there will be a conclusion which explains the research limitations and presents a research summary as well as overall findings. Furthermore, the paper will provide a recommendation for further business activities of the ISD and encourage future research on a scientific as well as practical level. In the closing paragraphs, the researcher will give a critical reflection on the research process as well as reconsider the relevance of the overall work, exploring new questions that emerged during the course of the analysis.

2. Literature review

There have been many researchers in the last three decades, who have investigated group work within the academic environment, mainly referred as collaborative learning (Hansen, 2006, Hassanien, 2006, Prichard et al., 2006b, Sparrow, 2012, Laal and Ghodsi, 2012, Barkley, 2014, De Hei et al., 2015).

> *"Collaborative learning is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product."* (Laal and Ghodsi, 2012)

Based on Laalʾs and Ghodsiʾs definition, the literature review addresses the first research question (RQ1) During the literature review, three main stakeholders are in focus: the students, the institutions of higher education (HE), and the potential employers.

The student stakeholders are the focus of this project as they are the target group to benefit from potential enhancements suggested by the project. Furthermore, it is important to comprehend the wider context of the project taking account of also the wider HE sector and potential employers of the graduates.

Therefore, the literature review investigates the widespread use of group work in HE, and the benefits students could experience as part of the group work experience. Moreover, the challenges of group work are identified to provide a balance to the argument. The challenges serve as the scientific background for further steps of the dissertation. In order to strengthen the context, the role of potential employers regarding group work in HE is also explored. Moreover, the researcher sheds some light on the area of computer supported collaborative learning (CSCL).

Additionally, the author gives a brief introduction regarding the aspects requirements engineering process (section 5.1) and agile software development (section 6.4). However, not in section 2. The decision, not to present them in the literature review, is the intention to present the topics and the practical analysis r in one chapter, for a better understanding for the reader.

2.1 Higher education in the European context

"Education & Training 2020 (ET 2020)" promoted by the European Commission is the current European Union (EU) policy since 2009 which serves as a framework for the EU countries for education and training. The ET 2020 addresses the challenge of the permanently evolving market which graduates have to cope with since their career paths are not as predictable as it has been before the globalisation (European_Commission, 2017a). Thus, the ET 2020 framework is the response to the globalised job market regarding education and training. Education and training for future employees will always be the fundament of first- class human resources. Even though, Europe is known as the European domestic market, the responsibility for the education and training systems lies in the hand of each country themselves. However, the ET 2020 is designed to be a forum "[…] for exchanges of best practices, mutual learning, gathering and dissemination of information and evidence of what works, as well as advice and support for policy reforms" (European_Commission, 2017b).

ET 2020 focusses on the development of personal skills. Due to the European route of march, educational institutions of HE need to adapt, and flexibility is required. Historical universities as well as recently founded HE institutions, both need to follow the requirements of the job market to achieve a high degree of employability for their students. Employability of students is the main factor for HE to maintain a well-recognised reputation to the outside. Subsequently, the HE must react to current trends and adapt the pedagogical approaches to providing the curriculum to their students. A working group of the ''European Commission- Directorate- General For Education And Culture'' (EC- DGEC) conducted a peer learning activity in 2016. Under the headline ''Developing future skills in higher education'' (European_Commission, 2016) they focused on the skills expected to be gained from HE. As the preliminary, the Bologna Process in 1992, was the beginning for a standardisation of learning outcomes in the area of European higher education (European_Commission, 2016).

2.2 Personal transferable skills (PTS)

One major aspect of the European education and training environment is to develop and improve personal skills of the students (section 2.1). In literature, the personal skills are referred as personal transferable skills (PTS) (Shah, 2013, Prichard et al., 2006b, Colm et al., 2012).

> *"Personal transferable skills (such as communication, team working, analytical and problem-solving skills) are skills that are, in some way, transferable and potentially applicable in different contexts, and relevant to a variety of different situations. These skills are transferable to outside of one's own field of study, job or task."* (Shah, 2013)

The PTS are a central demand of the dynamic markets. Due to the requirements of employers, employees are requested to maintain a broad skill set to adapt to upcoming situations flexibly. Especially in complex group working tasks many of the PTS must be applied by the students to succeed as a team. Hence, group work activities are a great chance for students to equip themselves with the PTS.

In the next step, the researcher shed some light into the PTS and identified as well as categorised the skills linked to the term PTS. As one result of the EC- DGEC working group the personal skills were categorised into cognitive skills, methodological skills, and social skills (European_Commission, 2016). However, Hassanien applied a different categorisation with behavioural skills, intellectual skills, and organisational skills (Hassanien, 2006). Nevertheless, for further reference, the researcher will adopt the categorisation applied by the European Commission to follow the well- recognised standard.

Cognitive skills are concerning the professionalising of the students' mindset. A critical approach to evaluate situations or scenarios is a valuable skill of group members. An analytical mindset supports the team to ace within complex environments. It is important to apply a reflective mindset for an excellent cooperation and to support each other. An overview of cognitive skills is presented in Table 1 relating to the respective literature.

Skill	**Literature**
Critical thinking	(European_Commission, 2016)
Analytical thinking	(Shah, 2013, European_Commission, 2016)
Creative thinking	(European_Commission, 2016)
Reflective mindset	(Hassanien, 2006, European_Commission, 2016)

Table 1- Cognitive skills

Methodological skills are concerning the approach of students to solve a given task. The ability to find a solution to new and complex tasks and to successfully approach issues within a task is called the problem-solving skill. Due to the required interactions between individuals, communication skills are crucial. Speaking skills, as well as listening skills, are part of communication skills. Another skill students should gain is an efficient time- management. Estimating tasks effort, as well as setting the right priorities are crucial for effective time- management. Hand in hand with the time- management skill goes the effective working skill. Students must comprehend the scope of the task to work productively and reach useful results. When working with other persons, presentation skills are helpful to bring accross personal thoughts or to persuade group members to follow one's opinion. Leadership skills are the ability to lead a team towards a common target and to take responsibility for the high- level outcome of the group work activity. Supporting the leadership skills, organisational skills to secure all necessary tasks will be done are extremely useful. As one aspect, there are the delegation skills, which enables a person to assign other individuals with sub tasks of the group tasks to reach a common goal. Furthermore, goal- setting skills are crucial to progress within the process. By setting sub- outcomes as milestones, the group secure progress towards the ultimate aim. In order to reach the target, decisions on how to reach the high- level goals have to be made. Hence, decision- making skills are a vital part of the group work process. Due to the ongoing digitalisation in the professional environment as well as in the educational environment, it is advantageous to have digital skills as well, i.e. computer skills. An overview of methodological skills is presented in Table 2 relating to the respective literature.

Skill	Literature
Problem solving	(Hansen, 2006, Hassanien, 2006, Gilley and Kerno, 2010, Young and Henquinet, 2000, Prichard et al., 2006a, De Hei et al., 2015, Laal and Ghodsi, 2012, Colm et al., 2012, Spencer-Oatey and Dauber, 2016, Popov et al., 2012, European_Commission, 2016, CBI, 2016)
Communication skills	(Diamond et al., 2011, CBI, 2016, Hansen, 2006, Hassanien, 2006, Andrew, 1997, Young and Henquinet, 2000, Maiden and Perry, 2011, Colm et al., 2012, Spencer-Oatey and Dauber, 2016, European_Commission, 2006, European_Commission, 2016)
Time management	(Hansen, 2006, Gilley and Kerno, 2010, Young and Henquinet, 2000, Popov et al., 2012, European_Commission, 2016)
Self- management	(Hansen, 2006, Gilley and Kerno, 2010, European_Commission, 2006, Spencer-Oatey and Dauber, 2016)
Presentation skills	(Hassanien, 2006, Andrew, 1997)
Leadership skills	(Hassanien, 2006, Gilley and Kerno, 2010, Colm et al., 2012)
Delegation skills	(Hassanien, 2006, Colm et al., 2012)
Digital skills	(Andrew, 1997, European_Commission, 2016, CBI, 2016)
Decision- making	(Gilley and Kerno, 2010, Young and Henquinet, 2000, Popov et al., 2012, European_Commission, 2016)
Goal- setting	(Prichard et al., 2006a)

Table 2- Methodological skills

Social skills are concerning the interaction with the team members as well as the personal behaviour. A team is a

> *"A group of people, nations, etc., who are associated in a particular action or endeavour. Now chiefly: a group of two or more people who work together in a professional capacity, or who collaborate on a particular task."* (OED, 2017)

Working together with other people requires interpersonal skills to understand shared values of cooperation, i.e. honesty or politeness. Furthermore, group members train their team working skills which means, for example, to support and motivate other team members during the activity to commonly reach the best possible result. Moreover, conflict management for situations of the dispute is crucial to focus on the high- level aim of the group and to adhere to a common code of conduct. Due to the rising

internationalisation caused by globalisation, students are expected to have a diversity understanding of for example different cultures and potential connected different perceptions among team members. Additionally, self-awareness is a social skill which enables the individuals to find their value for the team. An overview of social skills is presented in Table 3 relating to the respective literature.

Skill	**Literature**
Interpersonal skills	(Hansen, 2006, Young and Henquinet, 2000, Prichard et al., 2006a, Colm et al., 2012, European_Commission, 2006, De Hei et al., 2015, Rossin and Hyland, 2003)
Team working skills	(Hansen, 2006, Gilley and Kerno, 2010, Andrew, 1997, Young and Henquinet, 2000, Maiden and Perry, 2011, Prichard et al., 2006a, De Hei et al., 2015, Colm et al., 2012, Spencer-Oatey and Dauber, 2016, Popov et al., 2012, Prichard et al., 2006b, Cedefop, 2013, European_Commission, 2006, Diamond et al., 2011, CBI, 2016)
Conflict management	(Maiden and Perry, 2011, Colm et al., 2012, Spencer-Oatey and Dauber, 2016, Popov et al., 2012, European_Commission, 2016, European_Commission, 2006, Diamond et al., 2011)
Diversity understanding	(Hansen, 2006, Young and Henquinet, 2000, Spencer-Oatey and Dauber, 2016, Popov et al., 2012, European_Commission, 2016, European_Commission, 2006, Diamond et al., 2011, CBI, 2016)
Self- awareness	(Prichard et al., 2006a, Spencer-Oatey and Dauber, 2016, Diamond et al., 2011, CBI, 2016)

Table 3- Social skills

However, Sparrow argues that lecturers must acknowledge that the PTS are not necessarily part of the student's skills set (Sparrow, 2012). According to her experience, students should not be asked to successfully conduct group work, without knowing what skills are necessary. Prichard et al. points in the same direction because to be successful, students need to acknowledge the benefit of all PTS, in a view of creating an awareness of the need to train them (Prichard et al., 2006a).

2.3 Benefits of group work

In addition to the PTS (section 2.2), the researcher revealed the benefits of group work from literature, in which the focus lies on the students and not on the other stakeholders, HE or employers. Hassanien divides the benefits into managerial benefits, behavioural benefits and social benefits (Hassanien, 2006). Laar and Ghodsi, on the contrary, divided the benefits into social, psychological and academic benefits (Laal and Ghodsi, 2012). Based on the two viewpoints the researcher applied a categorisation according to either hard or soft benefit. Hard benefits are concerning the positive aspects of group work which can be measured and compared, whereas soft benefits are the positive aspects, which are certainly existing. However, they cannot be measured on hard facts.

When working in groups, productivity can be increased compared to individual work. Obviously, many team members can share tasks and assign task according to ability and therefore can achieve an increased productivity. Whereas the productivity describes the growth of outcome regarding quantities, there is also the aspect of greater quality. Due to the bigger workforce, the group can pay more attention towards quality. Quality improvements are possible because time can be used more efficiently for example. Furthermore, individuals can enrich each other's thinking and bring their personal skills into the group. Team effort enables team members to learn from each other. Furthermore, sub tasks can be divided and assigned according to personal skills. Subsequently, the tasks can potentially be done better and with a higher motivation. Group work requires the application of theoretical knowledge in a practical task. The practical exercise and the ongoing communication with the group members let the team members retain the relevant knowledge longer than exclusively learning theories. An overview of the hard benefits is presented in Table 4 relating to the respective literature.

Benefit	**Literature**
Increase productivity	(Glassop, 2002, Hansen, 2006, Gilley and Kerno, 2010, Young and Henquinet, 2000)
Increase quality	(Forrester and Tashchian, 2010, Hansen, 2006, Hassanien, 2006, Gilley and Kerno, 2010, Glassop, 2002, Laal and Ghodsi, 2012)
Pool knowledge, skill sets, talents, ideas	(Gilley and Kerno, 2010, Hassanien, 2006, Young and Henquinet, 2000, Laal and Ghodsi, 2012)
Divide tasks	(Gilley and Kerno, 2010, Glassop, 2002)
Longer retain of knowledge	(Hassanien, 2006, Hansen, 2006, Young and Henquinet, 2000)

Table 4- Hard benefits

Working in groups of individuals requires social interaction. Subsequently, especially in the environment of HE, group work fosters socialisation among the students. Due to a randomly formed group, students might get in contact with other students outside their social environment, which they would have never met without the group work activity. Carrying this idea even further, this can even create close friendships among students. Additionally, group work gives students valuable experience of the interaction with different people. Acknowledging that people have different viewpoints as well as different opinions is a valuable experience as a human being. Receiving or providing social support enriches the student's experience of group work and brings benefit to the supported student. Due to the sense of solidarity, students might feel more motivated to do a task instead of doing the task individually. An overview of the soft benefits is presented in Table 5 relating to the respective literature.

Benefit	**Literature**
Fosters socialisation	(Hassanien, 2006, Laal and Ghodsi, 2012)
Experience within diverse environment	(Hassanien, 2006, Laal and Ghodsi, 2012, Turner, 2009, Kimmel and Volet, 2012, Diamond et al., 2011)
Social support	(Hassanien, 2006, Hansen, 2006, Young and Henquinet, 2000, Colm et al., 2012)
Friendship	(Spencer-Oatey and Dauber, 2016)
Increased motivation among members	(Hassanien, 2006, Hansen, 2006, Laal and Ghodsi, 2012)

Table 5- Soft benefits

2.4 Challenges of group work

Additional to the PTS (section 2.2) and benefit (section 2.3) for students regarding group work in HE, the researcher has identified common challenges from the literature that students face when they are part of group work activities. Similar to the previous sections 2.2 and 2.3, the section focusses on students and not on the challenges for lecturers or the external employers. In accordance with the identified benefits (section 2.3), the challenges can also be categorised into hard and soft challenges. Hard challenges are challenges which are feasible and can be measured, whereas soft challenges are challenges regarding interpersonal aspects or attitudes or the group members.

One of the main challenges of group working can be understood by exploring the wider area of project management (C1). Project management is commonly used in literature connected to organisational issues

like scheduling group meetings, task responsibilities, and so forth. A popular hard challenge of group work is the communication among the group members. Challenges in communication might be caused due to language problems within the international HE environment. However, on the other hand, it can also be a challenge to reach all group members with the communication. Furthermore, the response times of all team members might be blocked due to one unavailable group member. Moreover, different team members have different preferences for communication(C2) channels, which requires compromise. Due to different courses and different private life of the group members, it can be quite hard to arrange group meetings (C3), suitable for all individual schedules. Additionally, group members might not attend meetings on purpose because they have a low motivation or other priorities. Since a group consists of several minds, it can be time-consuming to find a consensus on certain aspects. Additionally, the increased complexity to make all team members understand and contribute, group work can become time-consuming (C4). The formation (C5) of a group, regarding the students is a challenge. Group allocation can make students upset or demotivate them because they do not like to work with other group members. Moreover, high performing students might be thwarted by low performing students. Due to different abilities of group members, high performing students find it quite hard to achieve good results (C6). Results can be understood as marks as well as the final product, presentation, assignment, and so forth. of the group working activity. Despite the different abilities, the complexity to commonly achieve one target and to rely on the group members makes it a challenge to reach success. An overview of the hard challenges is presented in Table 6 relating to the respective literature.

ID	Challenge	Literature
C1	Project management	(Hansen, 2006, Ashraf, 2004, Spencer-Oatey and Dauber, 2016, Popov et al., 2012)
C2	Communication among group members	(Hassanien, 2006, Spencer-Oatey and Dauber, 2016, Popov et al., 2012, Holt, 2009)
C3	Attendance of group members	(Hassanien, 2006, Turner, 2009)
C4	Time consumption	(Hassanien, 2006, Ashraf, 2004)
C5	Formation of group	(Phil, 2008, Moreno et al., 2012, Thatcher and Patel, 2012)
C6	Achieving good grades/ results	(De Hei et al., 2015, Hansen, 2006)

Table 6- Hard challenges

Soft challenges are at least of the same importance during group work as the hard challenges. Group work activities rely heavily on interpersonal actions as well as on the attitudes of each group member. The most common soft challenge of group work is what the literature refers as free- riding (C7). Free riding is the phenomenon that students rely on the other group members. Free- riding can be regarding knowledge and motivation but mainly regarding contribution. Hence, there are group members who do not contribute or perform as much as other group members do. Regarding the result or the final marking, they might be covered by the group solidarity and must not face the consequences for their attitude. Groups without leadership might struggle to achieve the expected objectives. However, team members commonly refuse the responsibility of the leadership (C8), which is why group work can be challenging too. As a phenomenon of different individuals, different grade expectation (C9) among group members can harm the group work process. Whereas one group member has a high motivation to achieve a good mark, another group member might not have the motivation. Highly motivated members might be disadvantaged and possibly are required to cover work of the low motivated team member as well. Besides different grade motivation, there is also the challenge of different work attitudes (C10) which must be synchronised. Whereas one group member like to work on a steady work amount, other group members might like to work with time pressure and like to procrastinate tasks. Furthermore, attitudes towards the working environment might differ among group members. One member might prefer to work in a community whereas another group member prefers to work in private. However, it is not only the attitude of the group members which can be challenging. It also might be the different opinions regarding a topic or a task (C11). Additionally, there might also be different understandings of the quality, scope, of the task, and so forth. All differences must be harmonised, and people need to be open for compromises to work successfully in group work activities. Due to interpersonal preferences, it commonly happens that group members do not get along well on an interpersonal level (C12). Potential interpersonal conflict affects the overall group work result or at least the process. Due to interpersonal differences, expected professionalism can be missed from time to time. An overview of the soft challenges is presented in Table 7 relating to the respective literature.

ID	Challenge	Literature
C7	Free- riding	(Hassanien, 2006, Hansen, 2006, Ashraf, 2004, Maiden and Perry, 2011, De Hei et al., 2015, Spencer-Oatey and Dauber, 2016, Popov et al., 2012, Turner, 2009)
C8	Lack of leadership	(Hassanien, 2006, Hansen, 2006)
C9	Different grade expectation	(Hassanien, 2006, Popov et al., 2012, Turner, 2009)
C10	Different work attitude	(Hassanien, 2006, Popov et al., 2012, Turner, 2009)
C11	Different understanding of task/ deliverables	(Hassanien, 2006, Spencer-Oatey and Dauber, 2016, Popov et al., 2012, Turner, 2009)
C12	Interpersonal conflicts	(Hansen, 2006, Popov et al., 2012)

Table 7- Soft challenges

2.5 Group work from the employer perspective

In the days of modern economy, organisations continue to decentralise decision making to secure agility in responses to the complex and volatile environment (Young and Henquinet, 2000, Glassop, 2002). Thus, working together becomes one of the biggest challenges in modern time. Therefore, human resources need to be equipped with the right skills to cope with collaborative working environments. For graduates, the future employees, it is crucial to gain the PTS (section 2.2) in order to be prepared for their subsequent career. In the first step of their career, the PTS are essential to impress potential recruiters, and in the second phase, once they are in a job, the PTS support them to act within the professional environment. Fallows and Steven have the same opinion since they say that it is not sufficient for students, to build up academic knowledge only (Fallows and Steven, 2000) because the students need the PTS as well to raise their level of employability. Accordingly, policies and initiatives by the European Commission and Universities have been introduced (section 2.1) around the turn of the millennium, which was followed by the educational institutions (Fallows and Steven, 2000).

By identifying the PTS, students usually acquire during group work (section 2.2), it becomes evident why the economic world encourages the educational world to conduct group work with an educational emphasis. One of the first employability surveys, by Andrew in 1997 identified that team working was one of the generic skills, which are needed in any field and therefore are valuable to any graduate (Andrew, 1997). Additionally, those decentralised team structures of modern companies were investigated by Glassop in 2002. She displayed that the decentralised, team- based structures are beneficially for both

sides, the employer as well as the employee side (Glassop, 2002). Comparing organisations with team structures and without organisation structures, Glassop carved out three major organisational benefits: higher labour productivity, flat hierarchy, and a smaller labour turnover. Similar to the situation of group work in HE, teams can achieve a higher productivity compared to a single person (section 2.3). Furthermore, decentralised structure avoids extreme hierarchy thinking among the staff, which creates a good working atmosphere. Due to the team- based structures, organisation keep the labour turnover rate lower than organisations without a high level of organisation structures. The European Centre for the Development of Vocational Training conducted the ‘‘European employer survey on skill needs’’ in 2012 and published the findings in 2013 (Cedefop, 2013). It is understood as a valuable contribution to link the educational world with the world of the employers. The survey was conducted among nine member-states of the EU with a total number of 8523 participants spread over a wide range of different sectors and company sizes. By investigating on the generic tasks, almost 89.5% of the participants found team working fairly or very important. That is the highest value reached among all skills. Another survey, published by the Association of Graduate Recruiters, found out that the top competence was working collaboratively in a team (Diamond et al., 2011). Additionally, they identified skills, which are important for recruiters and will be gained during group work activities such as communication skills, self-awareness, or presentation skills, all presented in section 2.2. Another survey by the Confederation of British Industry (CBI), focussed on the market of the United Kingdom (UK), mentions among others team working skills, problem- solving, self- management, communication skills, and intercultural awareness as valuable skills to recruiters (CBI, 2016).

Conclusively, HE needs to acknowledge the demand of the professional world of PTS. The HE sector must create the environment and provide support to prepare the students for their future career. Hence, it is the responsibility of the policy makers of the HE sector to adopt the curricula accordingly. However, both aspects must be considered, academic knowledge as well as the skills and ability regarding the PTS. Only through permanent practice and a detailed understanding of the PTS, students can acquire the skills which are required by current recruiters.

2.6 Computer supported collaborative learning (CSCL)

One way to help students and to enhance their group work experience in HE is to provide tools, which facilitate group work. A commonly used approach for the assistance of the students is the computer supported collaborative learning (Tang et al., 2014). In connection with the term CSCL, literature refers to

online collaboration tools (Cheng and Li, 2012), groupware systems (Tang et al., 2014), or collaboration software (Financesonline.com, 2017).

> *"They are applications where users achieve common objectives by performing tasks through computer networks."* (Penichet et al., 2010)

Applications within the context of the CSCL encourage the interaction among students in case the group members are not able to meet face to face. To overcome the physical distances, remote access saves plenty of travelling- time as well as organisation efforts to organise a physical meeting among group members. Furthermore, the applications support students to potentially overcome the challenges, displayed in section 2.4.

There are two aspects on how the students benefit from the use of CSCL applications. On the one hand, the students become familiar with collaboration tools and understand how to use them effectively. The know- how is an additional valuable skill for their future career since collaborative software is a commonly used tool in the professional environment (Väljataga, 2016). On the other side, the students benefit from the functionalitiy itself, because they can work more efficient during group work activities. Potential group work activities via the CSCL applications are e- mail, document sharing, group calendar, and so forth (Financesonline.com, 2017). Penichet identified three pillars of groupware functionalities which are communication, coordination, and information sharing (Penichet et al., 2010).

The permanently evolving market of new collaborative software applications offers many different solutions (Väljataga, 2016). However, HE needs to consider the purchase costs and the benefit of the applications to evaluate which applications to provide for their students.

3. Methodology

The methodology section presents the applied scientific methods which are the foundation of the research process. Additionally, this section justifies the selected methods and gives a strategic context for those methods. The structure is as follows: first the appropriate research philosophy is presented followed by the research strategy within the framework of a case study frame work, next the methodologies for data collection and data analysis will be discussed and the section will end with a conclusion on the methodology.

3.1 Research philosophy

The two popular research philosophies are the Positivism and the Interpretivism. In order to decide which philosophy to follow during the project, the researcher compared both definitions.

> *The Positivism is "a philosophical system recognizing only that which can be scientifically verified or which is capable of logical or mathematical proof, and therefore rejecting metaphysics and theism."* (OUP, 2017)

Contrary to the Positivism, Interpretivism is based on the understanding that there is no ''value- free'' data since the researcher must consider the context in which the data is obtained.

> ''Interpretive research involves the study of social practices in the context in which they occur. This close involvement with the subject of research means that ethnographic techniques and participant observation are favoured as sources of qualitative research evidence.'' (Doolin and McLeod, 2005)

At the beginning of the 1990s, the mainstream information systems (IS) community started to open up for interpretive research techniques instead of exclusively relying on positivist techniques (Walsham, 1995). One can understand that Objectivism was the preferred research philosophy in the IS community since this is a tangible and mechanic nature. However, the IS community created an awareness that the context of the IS plays an important role, i.e. the interaction with the human users. That newly revealed approach of interpreting correlations of tangible and intangible aspects enables researchers to create studies which consider more aspects and are richer in content.

With regards to the dissertation's aim the researcher considers the human interaction with the user interface to conclude from the obtained data (Doolin and McLeod, 2005). This correlation between the user and the IS is the case by finding potential features to enhance group work in HE. Subsequently, the researcher considers not only the users but the enterprise architecture of the IS of the university as well as other stakeholders, i.e. the professional staff of the University of Strathclyde. Even though IS is based on recurrent technical processes, the interacting human users perceive differently depending on each individual (Doolin and McLeod, 2005). Therefore, a case study is set up to investigate on a scenario including people, processes, and behaviours.

3.2 Research strategy

When research is used to create practical results, the concept of action research comes into play. In recent years, action research is commonly applied especially in the environment of education (McNeill, 2005). According to McNeil, research must follow three key concepts which are internalised by the researcher for this paper as well:

- Reliability
- Validity
- Representativeness.

Within the context of research, reliability means that the work is replicable. In other words, if another researcher would apply that data collection method at another time, the results were the same. To ensure the real picture, the key concept of validity comes into action. The researcher must be aware that answers of individuals in for example a questionnaire or an interview is not necessarily reflective of their actual behaviours or actions. The concept of representativeness ensures that the group of participants of the research are typical of others. In the case of this dissertation, the researcher ensures that the participants of the questionnaire and interviews are representing the group of stakeholders they are indicated as (McNeill, 2005).

This dissertation is a case study within the Information Services Directorate(ISD) of the University of Strathclyde. However, for a start, the researcher conducted a literature review investigating on the significance of group work in HE (section 2). In this connection, several different stakeholder viewpoints were considered: the students' view, the HE sector's view, and the potential employer's view on group work.

Additionally, benefits (section 2.3) and challenges for students (section 2.4), arising from group work were identified and served as the fundament for the following steps of that piece of work. In the next step, the researcher gathered qualitative data with the help of ethnography (McNeill, 2005) which will be analysed in detail in section 4. In the end, the researcher gave a conclusion of the case study (section 6).

3.2.1 Research context

The research context compiled from the literature review showed that group work is a widely used teaching methodology (De Hei et al., 2015). Furthermore, there is a clear connection between the demands of the employers on their future employees and the motivation of HE to train their students for

prospects (Spencer-Oatey and Dauber, 2016). Despite the benefits (section 2.3) of group work for students, students are facing challenges (section2.4) during group work as well.

3.2.2 Research problem

Subsequently to the research context, the research problem is to find solutions to resolve the identified challenges in the context of CSCL. A list of the challenges can be found in section 2.4 as well as the verification of those through a questionnaire (4.2). Potential solutions within the CSCL context can be found in section 5.

3.2.3 Research questions

With regards to the research problem, the following research questions (RQ) could be formulated concerning the overall topic of this dissertation:

"Examining a potential group working tool for students at Strathclyde University".

- RQ1: What is the significance of group work in higher education and why?
- RQ2: What are the challenges of group work for students in higher education?
- RQ3: How can the University of Strathclyde support its students to resolve the challenges?

The three research questions were addressed through different data collection methods which will be presented in the following chapter.

3.3 Data collection and data analysis

Since the research involves many subjective opinions and perceptions, qualitative data was obtained mainly. However, small parts of the applied questionnaire collected quantitative data as well. Prevailing qualitative data suits the characteristics of the previously mentioned Interpretivism. For secondary data (McNeill, 2005) the researcher applies a literature review (section 2), which serves as the foundation of the dissertation. For primary data (McNeill, 2005) the researcher applies a questionnaire (section 4.2) for students, expert interviews (section 4.3), and documentary analysis (section 4.1). All four data collection methods are presented in the following sections.

3.3.1 Literature review

The literature review is a data collection method to obtain secondary data. In this dissertation, a narrative literature review is applied, in line with the characteristics of the previously mentioned interpretivism. With the literature review, the researcher addresses RQ1 to investigate on the significance of group work in HE. Furthermore, the theoretical foundation of RQ2 will be addressed to identify common challenges of group work for the students.

The researcher studied work of other researchers to understand what studies have already been conducted in the field of the researcher's interest (McNeill, 2005). Furthermore, it serves as a solid basis for further steps in the dissertation. Besides that, it was the starting point and the theoretical context for the questionnaire for students as well as for the expert interviews. Moreover, the researcher understood what research methods have been applied in the past and could adopt certain approaches for the own work. The literature review of scientific papers is a crucial part of this dissertation since the researcher made use of work which is already done by other researchers to apply it to reality. By reviewing the work, the researcher became more confident for the research design and further steps on the process (McNeill, 2005).

The literature review is a quick way to gather a significant amount of data related to the relevant topic. However, work done by other researchers might be biased or incomplete, which possibly makes the researcher dependent on the scientific competence of the creators of that reviewed pieces of work. Furthermore, the researcher might work selectively and not apply the correct queries or rely on insufficient data bases.

3.3.2 Questionnaire for students

The survey in the form of a questionnaire is a primary data collection method and collects qualitative as well as quantitative data. The questionnaire addresses the RQ2 since it verifies the challenges of group work based on the perception of the participating students. Furthermore, the questionnaire discloses first potential solutions on how to support students during group work, which addresses RQ3.

The researcher conducted the questionnaire for students to verify many findings from the literature review with the actual opinion of current students. The questionnaire was applied by the researcher because many different views regarding aspects provided by the researcher can be collected within a relatively short time (McNeill, 2005). Once the first draft was created, the questionnaire was activated

yet. Before publishing it to the public, the questionnaire was piloted with four test users. After several adjustments and trials, the questionnaire was activated and was released to the public. Due to the testing, the researcher ensured that the questions are understandable and the estimated process time was confirmed. The researcher uses exclusively channels offered by social media to recruit a reasonable number of participants by sharing the link or personally contacting potential participants.

The challenge for the researcher while creating the questionnaire lied in the aimed high level of integrity and simplicity of the questionnaire. Maintaining consistency among all parts of the survey as well as creating a logical flow are aspects, the researcher assured while building the questionnaire (O'Brien and McCay-Peet, 2017).

3.3.3 Expert interviews

The expert interview is a primary data collection method and collects qualitative data. It fits in the picture of the Interpretivism since it collects data on a conversation among individuals and critically evaluates their meanings. The expert interviews are applied to address RQ1 to verify the significance of group work in HE. Furthermore, RQ3 is addressed with the interviews, since best practices for group work are discussed with the experts.

According to Paul et al. ‘‘the interview is a key tool in the business analyst’s toolkit’’ (Paul et al., 2010). Expert interviews are an empirical research because the interviewees access their tacit knowledge or make use of their personal experiences (Bogner et al., 2009). Subsequently, standardised processes, as well as standardised results, are not realistic to apply. Therefore, literature refers to the term semi-structured interviews (McNeill, 2005, Bogner et al., 2009), where the researcher prepares some main questions as well as creates an interview framework, but within the framework the process of the interview is open. The expert interviews were the logical next step after the literature review and the questionnaire. The researcher decided to use expert interviews because of it ‘‘quick, easy, and safe’’ (Bogner et al., 2009) nature in its application and gives a considerable amount of interpretive knowledge in a relatively short time regarding preparation as well as actual interview time. The interviews are divided into two groups: one group of the interviewees have a technical background regarding information systems (IS) and the other group of respondents have a pedagogical background regarding teaching in HE. The selected type of the expert interviews is the systematising expert interview (Bogner et al., 2009), which makes use of the particular knowledge of the experts, derived from practice. When preparing or

analysing the interviews, the thorough consideration of the interviewees institutional – organisational context and the individual's position is important.

The researcher did not tape the interviews but took detailed notes instead. Subsequently, there was no transcript to be created afterwards but an extensive ‘‘minutes of meeting’’. While being part of the student placement within the information service department of the University of Strathclyde, the researcher had short and quick contact channels to communicate and meet with the experts. The project sponsor was very helpful to get in touch with the right experts and agreeing to an expert interview in the following step. The participants were recruited with the help of the snowball sampling method (Bogner et al., 2009) (p. 103). The snowball sampling method is a method where the researcher recruit interviewees following the recommendation of previous interviewees. This approach had a significant benefit for the researcher in two ways: the suggestion of the interviewees providing more insight into a specific topic but also the suggestion of respondents regarding a new topic for the researcher. The new topics were aspects the researcher did not consider himself without the proposals of the interviewees and therefore the snowball sampling method had a significant impact on the research.

3.3.4 Miscellaneous

Thanks to the placement of the researcher in the IS department, the researcher took part in several daily meetings within the department, as well as workshops or other demonstrations and training for the employees regarding certain IS aspects. Through this, the researcher gained a broader understanding of the entire organisation as well as the subjects being central in the respective workshops or meetings.

Furthermore, documentary analysis (Appleton and Cowley, 1997) as a secondary data collection method was applied by the researcher to a relatively small extent. Qualitative data derived from university policies or manuals of IS used within the academic environment were analysed by the researcher to collect more meaningful scientific evidence and to create a wider context for the expert interviews.

3.4 Methodology conclusion

The data analysis part is presented narratively. All three research questions are addressed during the data collection phase. However, some methods address more than one research question. Mainly qualitative data has been collected and evaluated. However, quantitative data is gathered to a small extend through the questionnaire. The ethical clearance was ensured by the departmental ethics committee of the

Computer and Information Science department. The purpose of the ethics approval is to ensure ”[…] that the rights, safety, and well- being of the participants is taken into account at all times” (University_of_Strathclyde, 2015b).

Furthermore, there were two main risks to consider during the project. Since the project is an individual and practical oriented project relating to the University of Strathclyde, there was no comparable studies to aid a high- level analysis. Thus, the research design lies in the hands of the researcher and the suggestions of the project sponsor with an open outcome and no guarantee of a beneficial outcome for the Information Services Directorate. The second risk is that refinements during the research process might occur due to new insights. Due to changing directions during the process, contradictions can occur and force the researcher to iterations. Due to the open-ended research design and the practical nature of the project the risks is a crucial factor to consider while conducting the business analysis activity. A risk mitigation in this context is activation of agile use and techniques to address the constantly evolving nature of requirements and the external environment (Brawley and Graham, 2015).

4. Analysis (business case)

A business case

> ‘‘[…] describes the findings from a business analysis study and presents a recommended course of action for senior management […]” (Paul et al., 2010).

In order to perform the business analysis related to the University of Strathclyde and group work, the researcher had the possibility to be part of a student placement in the ISD. The partnership between the professional services, in particular the ISD, and the researcher materialised since the research of the dissertation might give some benefit for the university as well not only be of benefit to the researcher but for the university. As the researcher investigated on group work in HE in general as a preliminary analysis, RQ3 was of particuar interest for the professional services. The ISD is interested in gaining more insight on how to support students to resolve their challenges within a CSCL environment.

Essentially, the placement enabled the researcher to gain a holistic understanding of the organisational structure of the university and comprehend the high-level responsibilities of the directorates. Subsequently, the placement facilitated the business analysis activity by ‘‘[…] investigating business situations, identifying and evaluating options for improving business systems, defining requirements and

ensuring the effective use of information systems in meeting the needs of the business." (Paul et al., 2010).

Section 4 will therefore analyse the business context of the university in terms of organisational structure, the strategic plan as well as the internal and external policies regarding the assessment of the students. In the following step, the researcher will analyse the questionnaire and the expert interviews. The collected data will be transformed into meaningful data for the research to make conclusions. Subsequently, the researcher will present the analysis of each challenge of group work revealed and verified through the literature review and the students' questionnaire and how the university can support the students to overcome the analysed challenges. The potential solutions for each challenge will be comprehended through the expert interviews mainly. Through the analysis, a requirements catalogue will be developed.

4.1 Business context (University of Strathclyde)

Due to the business context investigations, RQ1 will be addressed, since the environment of HE will be investigated as well as all potential stakeholders.

Analysing the strategic alignment of the university provides the context on the high- level motivation of the university with the relevant objectives, regarding the topic of the dissertation. The internal and external policies will be analysed to understand the framework for student assessment, especially regarding group work, and for the beginning the organisational structure enables the researcher to investigate and communicate at the correct point of contacts.

4.1.1 Organisational structure

The University of Strathclyde organisational structure with Professor Sir Jim McDonald as the principal is divided into the faculties and the professional services. The faculty part consists out of four different faculties: Engineering, Humanities & Social Sciences, Science, and the Strathclyde Business School. The University Secretary and Compliance Officer and the Chief Financial Officer are supervising the nine directorates of the professional services. One of the professional services directorates is the ISD. The ISD is among others responsible for the technical services within the university for all stakeholders, i.e. students or staff. Related to RQ3, the ISD is the corresponding directorate since the following aspects are part of the ISD task area (University_of_Strathclyde, 2017a):

- Collaboration Services
- Corporate Website & Pegasus
    - University of Strathclyde Mobile App (Strath App)
- Development & Innovation
- Myplace.

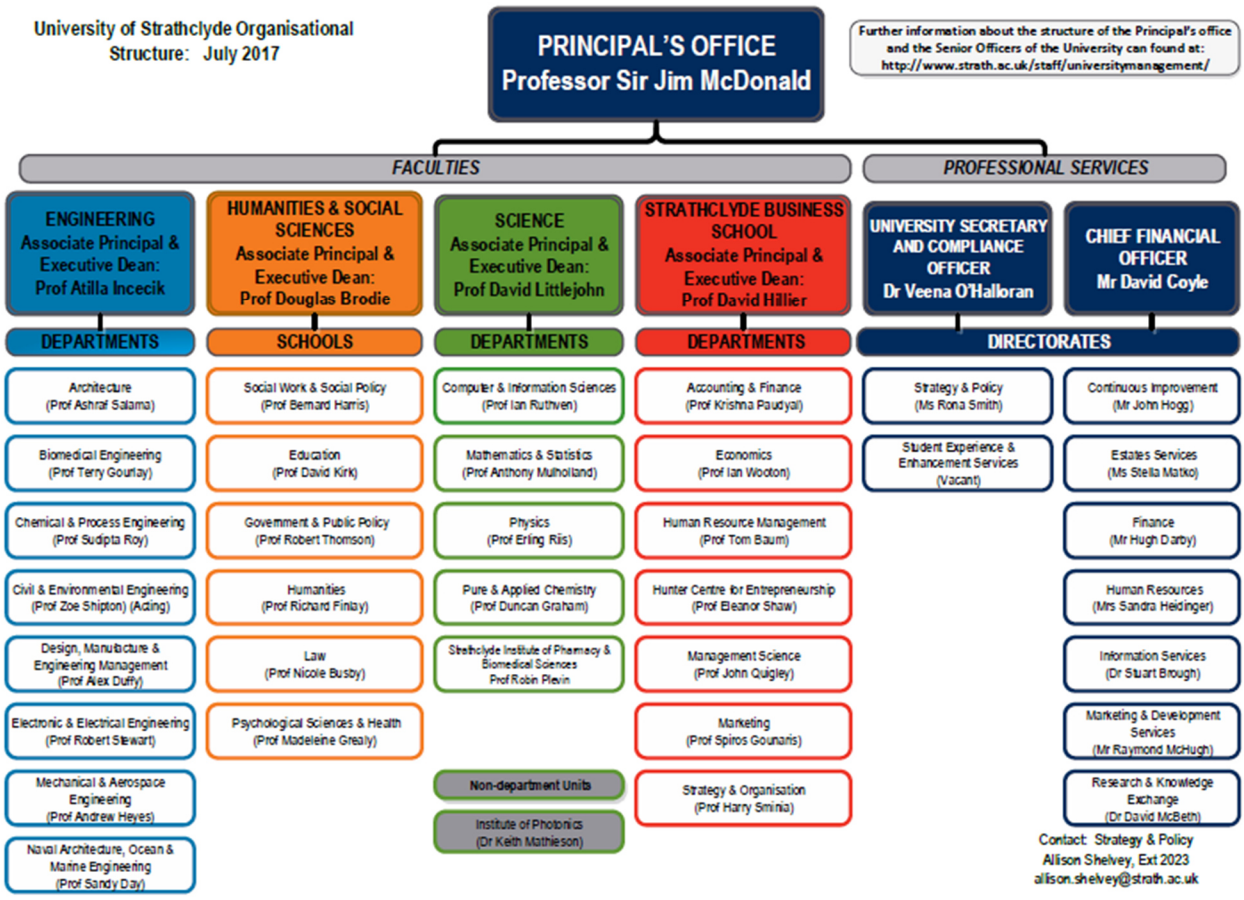

Figure 1- University of Strathclyde Organisational Structure: July 2017

4.1.2 Strategic Plan 2015- 2020

A strategy is

"the direction and scope of an organisation over the longer term.[…]" (Paul et al., 2010)

and serves as an orientation for all business activities and decisions. A strategy is also used to measure performance success after a certain period of time and verify if the organisation is progressing towards the right direction. The core part of the University of Strathclyde's mission statement is to be "the place of useful learning" and part of the university's "Strategic Plan 2015- 2020" is "[…] to develop students,

who are […] work- ready graduates […]" (University_of_Strathclyde, 2014b). According to the strategy, the university picks a practical approach of HE since the focus lies on the future "work- readiness" of the graduates, who can apply the learned PTS in practice.

One of the strategic themes of the strategic plan is to provide an "outstanding student experience"(University_of_Strathclyde, 2014b). To create a great student experience, the university must understand the needs and wishes of the students on the one side, but also must give the correct responses to the needs on the other side. Thus, the strategic plan contains objectives which lead the university to achieve the strategic themes. One of the set targets in the current strategic plan is to provide "an outstanding and distinctive student experience with high-quality student support throughout the learner journey" (University_of_Strathclyde, 2014b). The second objective is to provide "high- quality learning and teaching" (University_of_Strathclyde, 2014b). Both objectives are guidelines on how the university plans to achieve an "outstanding student experience". Furthermore, the University sticks to five common values for all stakeholders: people- oriented, bold, innovative, collaborative, and ambitious. Especially people oriented and collaborative are values which stand in direct connection to group working activities. Next to the "Strategic Plan 2015- 2020", the ISD works according to the "Communications Strategy 2016-2020" (University_of_Strathclyde, 2015a). The ISD strategy is in line with the general strategy but focusses more on the issues of the ISD.

4.1.3 Regulations and frameworks

A strategy enables the complex organisation to act corporately. The University of Strathclyde with more than 20, 000 students and almost 900 teaching staff (University_of_Strathclyde, 2015c) is an organisation, which needs to cope with the internal complexity as well as external factors, i.e. inflicted rules provided by accreditation bodies but also political or legislative of relevance the university. To overcome all those external requirements as well as secure a unified understanding and practice of teaching the University of Strathclyde works according to certain regulations and frameworks. Regarding group work there are three aspects securing a "high-quality learning and teaching" which were identified by the researcher:

- The UK Quality Code for Higher Education- Chapter B3/ B6 (QAA, 2017b)
- Assessment and Feedback Policy (University_of_Strathclyde, 2014a)
- Strathclyde Teaching Excellence Programme (University_of_Strathclyde, 2016b).

The UK Quality Code for Higher Education is considered as effective practice across the sector of HE in the United Kingdom (UK). The quality code is delivered by the "Quality Assurance Agency for Higher

Education" (QAA) (QAA, 2017a) which secures quality standards and fosters improvements in the environment of HE in the UK. Subsequently, the "UK Quality Code for Higher Education" is an external framework, the university must consider or take as a reference for individual and internal policies. Among other aspects, the quality code presents key elements of good academic practice, which in the dissertation are referred to as PTS. For example, "being able to acknowledge the ideas of others […]" (QAA, 2017b) (p.15).

The Assessment and Feedback Policy (AFP) applies to both undergraduate and postgraduate taught programmes and will be adhered to throughout the entire institution. The AFP is the university's response to the new Principles of Assessment and Feedback endorsed by Senate in November 2013 and was carried out by a working group in 2014. The AFP is in line with the previously mentioned "UK Quality Code for Higher Education". Assessment in HE "[…] describes any process that involves the evaluation or appraisal of a student's knowledge, understanding, skills, attitudes or abilities" (University_of_Strathclyde, 2014a). Feedback in HE is "information provided to students on the quality of their performance about assessment criteria, which form the basis of improved student learning"(University_of_Strathclyde, 2014a). As the core part of the AFP four most important principles were introduced which all stakeholders of the University are asked to adhere to. For example principle 1.1 states: "Assessment and feedback activities are designed to foster student engagement, to support students' attainment of knowledge, understanding, and transferable skills" (University_of_Strathclyde, 2014a). Principle 1.1 as one among other proofs that the university's policies foster the development of transferable skills of the students, which are an integral part of group work activities. However, the AFP also takes the responsibilities of the university into consideration. The AFP states that "providing adequate resources, including information technology systems, to support effective practice[…]" (University_of_Strathclyde, 2014a) is one of the responsibilities of the university and ultimately contributes to the starting theme "outstanding student experience".

Additionally, to the internal and external guidelines, the researcher identified the "Strathclyde Teaching Excellence Programme" (STEP) as a central point to provide an "outstanding student experience". The STEP is a "[…] programme to promote, strengthen, and encourage innovation and excellence in teaching and learning" (University_of_Strathclyde, 2016b). The STEP is a staff development programme which supports the staff involved in teaching to improve their skills for feedback and assessment while teaching students. The STEP considers aspects like group work assessments, the use technology to enhance

feedback or other group work features with a central focus on the virtual learning environment (VLE) used at the University of Strathclyde, called “myplace” (University_of_Strathclyde, 2016b).

The programme is in line with the external framework for teaching and supporting in HE, the “UK Professional Standards Framework” (UKPSF). As well as the two policies, previously mentioned, the STEP enables the university to add another tier to the construct to provide an “outstanding student experience”.

4.2 Questionnaire analysis

Due to the questionnaire analysis, RQ2 will be addressed to verify the findings of the literature review. Furthermore, first aspects of the RQ3 will be disclosed and rated.

The questionnaire’s purpose was to verify the group work challenges for students, presented in the literature review. The concept was created by the researcher, whereby the work of Hassanien (Hassanien, 2006) was used as a backing of the high-level structure. During the development phase, the researcher always scrutinised whether the comprehensibility was assured as well as that the respondents would not spend more time than five minutes on average to process the entire questionnaire. The reason for that motivation is the personal experience of the researcher to lose interest in questionnaires which require much time quickly. Questionnaires which involve much reading, complex thinking or are difficult to follow, consume much time of the respondent. Hence, the questions were kept as short and straightforward as possible.

Before the questionnaire was created, the researcher piloted the draft with 4 test users to evaluate the questionnaire. It was discussed whether the three core concepts of validity, reliability, and representativeness, explained in section 2.2, were followed successfully throughout the entire questionnaire. After the refinements regarding the questionnaire were concluded the survey was released to the public.

The targeted group of participants were students only since the questionnaire investigated on group work experience of students in HE. Hence, the very first question (Q1.1) of the questionnaire was the only question which contained a “skip logic”, which in the case of a negative reply lead the participant straight to the end of the questionnaire. Furthermore, Q1.1 did not allow the participants to skip. Thus, the researcher made sure, that only students were participating in the study. In total, the questionnaire was actively online for 22 days with a total of 69 respondents. Four participants did not reply to the first

question, and another eleven participants replied with ‘‘no’’ to the question whether they currently are a student or not (Q1.1). Subsequently, there were 54 valid respondents, and 50 of them completed 100% of the questionnaire. However, the four incomplete responses were considered during analysis as well, to the degree, they were completed. More than ¾ of the respondents processed the entire questionnaire within five minutes or less, which was the aim of the researcher.

Researchers distinguish between factual data and attitudinal data (McNeill, 2005)(p. 57) which can be collected from questionnaires. Factual data is the verifiable truth, and attitudinal or behavioural data is the data which is based on the respondents’ opinion, experiences, or their actions. While analysing the data, the researcher was aware of the fact that the questionnaire was self- reported and therefore the collected data is a matter of the participants’ integrity since the data can be biased or incomplete (O'Brien and McCay-Peet, 2017). The questionnaire is an 18- question questionnaire and consists out of 3 sections:

- Section 1: Demographics (Q1),
- Section 2: Experience with group work in higher education and the student's general attitude towards group work (Q2), and
- Section 3: group work challenges and enhancements of the student experience during group work (Q3).

All questions were either rating questions, multiple choice questions or ‘‘Likert scale’’ questions (McNeill, 2005)(p. 38). These three types are closed questions, which means that the participants selected out of given answer options, instead of writing the answer themselves (McNeill, 2005). Merely the last option in some of the questions called ‘‘other’’ gave the opportunity to insert own text, in case the researcher did not provide the desired answer. According to O’Brien et al. the most reliable results of rating scales have seven categories, but five categories are commonly used in rating questions (O'Brien and McCay-Peet, 2017). In order to keep the processing time as short as possible for the participants, five categories were applied. Besides rating and multiple-choice questions, there was one question where the respondent had to apply ‘‘Likert scales’’ to create comparative data (McNeill, 2005). Except for the first question (Q1.1), all other questions could be skipped at the will of the respondents.

4.2.1 Questionnaire- Section 1

Section 1 exclusively asked for characteristics of the respondents, thus factual data. Demographic questions allowed the researcher to identify meaningful groups of respondents, which revealed potential

tendencies. Furthermore, it enabled the researcher to characterise the group of participants which provides a context to this questionnaire and creates reliability (section 3.2). In addition to the gender (Q1.2) and age of the participants (Q1.3), the questionnaire asked whether the participants were undergraduate or postgraduate students (Q1.4) and what field of studies they are studying at the moment (Q1.5).

The analysis of section 1 showed that the participants were almost equally spread among female and male participants and more than 80% were between 18 and 27 years old which is a reasonable range for most students. 2/3 of the participants were postgraduate students, which might be caused by the participant's recruitment since the social environment of the researcher consists mainly out of postgraduate students. However, undergraduate students are still an assessable part of the study with almost 1/3 of the total number of respondents. The field of studies was to 50% linked to business studies since that term includes a high number of different studies. Especially, questions Q1.4 and Q1.5 will be relevant for the University of Strathclyde, since some aspects of the organisation differ between the postgraduate or undergraduate students (Q1.4) as well as between faculties (Q1.5). As a consequence, cross tabulations were used during analysis.

4.2.2 Questionnaire- Section 2

Section 2 collected some factual data regarding the experience of the students with group work (Q2.1, Q2.2, Q2.3) and refers to the literature review section (section 2). With the help of the first three questions of section 2, the researcher found out, whether the participants have made an individual experience with group work. The results served as the basis for the following questions, collecting attitudinal data due to rating questions. A striking question regarding the attitude towards group work was how much they agree with the statement: ‘‘I like group work’’ (Q2.4). Based on that substantial reply the researcher was able to conclude on the following questions with the help of cross tabulations. Derived from the discussion in the literature review, Q2.5 verified, whether the participants considered group work to create a benefit regarding their transferable skills or not. Questions Q2.6 and Q2.7 focused on the quality of the outcome generated during group work, whether they perceive group work as beneficial or not.

The analysis of section 2 showed that more than 90% of the participants had experiences with group work in general (Q2.1) which was also graded (Q2.2). Subsequently, the researcher can confirm that group work is a commonly used pedagogical method in HE. The frequency of occurrence of group work was for more

than 98% of the participants regularly per semester (Q2.3). Most of the students experienced 1-2 group working projects per semester whereupon business students tend to face slightly more group working projects compared to the other fields of studies. There was no noticeable variation between undergraduate and postgraduate students regarding the frequency of occurrence. The questions whether students like group work or not (Q2.4) showed that opinions between students are varying in this question a lot. Approximately 55% percent replied that they liked group work, whereas 30% of the students replied they did not like group work. Regarding question Q2.4 there was no tendency considering faculties or level of studies. Regarding the transferable skills (Q2.5), all students agreed that group work is useful for their future career. However, for over 70% it is extremely or very helpful to their careers, which shows that many students see the benefits group working tasks implicate. Interestingly, the researcher identified a tendency (75% to 63%) that postgraduate students appreciate group work, as a chance to improve transferable skills, slightly more than undergraduates. That tendency might be caused by the higher possibility that postgraduate students might already have working experience or have less time towards the start of the working life and following are more concerned with their future life. 65% of the participants thought that they could achieve satisfying outcomes through group work (Q2.6). However, using cross tabulations 86% of those participants who responded that they like group work (Q2.4) said that satisfying outcomes could be achieved. Only 19% of those, who stated that they do not like group work agreed regarding the satisfying result. Subsequently, a possible conclusion why people do not like group work is that in their opinion they cannot reach satisfying results through group work. Regarding the question, whether better results can be achieved in a group than individually (Q2.7) the highest number of responses were in the middle rating. In other words, the majority of respondents were not able to decide whether this was a true or false statement. The second highest value was at ‘‘probably yes’’ which gives the impression that many students approach group working tasks optimistically.

4.2.3 Questionnaire- Section 3

Section 3 collected data through a ‘‘Likert scale’’ question, multiple choice questions as well as rating questions. The Likert scale question provided all challenges of group work, previously revealed by the researcher through literature review and asked the respondents to rate twelve challenges of group work from ‘‘not challenging’’ to ‘‘extremely challenging’’ (3.1). The result of Q3.1 enabled the researcher to compare all challenges and rank them according to significance for the students. The next two questions investigated on what features and applications which were used by students during group work to cope

with the task (Q3.2, Q3.3). The following question suggested potential functions, enhancing the group work experience, which could be selected by multiple choices (Q3.4). The suggested potential functions were derived from software and applications for group work, already existing in the market. Since this project is conducted in collaboration with the University of Strathclyde, a reasonable question was if students prefer to use features, which are provided by the University instead of using external third-party solutions (Q3.5). The final question of the questionnaire asked on the behaviour of the students, on how they would prefer to use potential group working tools, either as a smartphone app, a desktop version or to have the option of both simultaneously (Q3.6).

The analysis of section 3 showed that the top three challenges for students during group work are unequal contribution of group members, time consumption of group work activities, and project management activities, i.e. time planning or meeting scheduling (Q3.1). However, unequal contribution by team members is the highest value with a relatively big gap to the second challenge. In literature, this phenomenon is described as free- riding (Maiden and Perry, 2011). Furthermore, the result shows that soft challenges as explained in the literature review are popular among the top challenges (3 soft challenges among top 5 challenges), which is the proof that group work is a highly sensitive issue regarding interpersonal intercourse among group members. The standard deviation of each challenge shows how widely all ratings are spread on the rating scale. A relatively high standard deviation value means that students think controversially about the challenge and a low value means that students perceive that challenge relatively similar. By the calculated standard deviation of task Q3.1, a common challenge among all students is that group work is time-consuming (lowest standard deviation value among all challenges). The challenge of different work attitudes among group members made it under the top 3 challenges, however, has the highest standard deviation. That means that the participants felt very different about the different work attitudes but rated it relatively heavy in either one or the other direction. There is no noticeable tendency based on the standard deviation between soft and hard challenges. The complete ranking of all twelve challenges will be evaluated at a later stage of the dissertation. Skype for Business and Slack where the third-party software solutions commonly used among students, whereas Slack was exclusively used by postgraduate students (Q3.2). Social media was the number one tool for students, applied during group work with more than 90% (Q3.3). On the next places in the ranking were an instant messenger, a document sharing feature, and any collaborative writing feature. Social media was slightly more popular among undergraduates, whereas any instant messenger and a document sharing feature was slightly more popular among postgraduate students. However, these four are the most popular one, since there is a significant drop in the values after those. Considering possible additional functions, which

could enhance the group work experience for students, the top aspect was to book a meeting room (64%) (Q3.4). However, postgraduate students required this more than undergraduate students (74% to 40%). Second place in the ranking was to visualise task responsibilities according to group members (58%), so the students would feel more committed, and the group had an opportunity to present it to the lecturer regarding grading procedures. Regarding this feature as well, postgraduates would appreciate that aspect more than undergraduates (66% to 40%). To monitor the contribution of group members (54%) was ranked on the third place because the students liked the idea to have a record of what each group member has contributed in preparation for a fair grading. Peer evaluation (40%) was rated on the fourth place which is a similar issue to the third place. The next question delivered controversial results on if the students prefer to use third party solutions for their group work or would prefer to use solutions, provided by the university (Q3.5). The ratings of ‘‘agree’’ and ‘‘not agree’’ are almost equally distributed, which allows no conclusion on that questions. Nevertheless, undergraduates tend to have a tendency to rather agree to that question and postgraduates tend to rather disagree with that question. The question whether a potential solution should be a mobile application, a desktop version or a both was answered relatively distinct (Q3.6). 2/3 of the participants would prefer to have a solution, which works as a desktop version as well as a mobile app. Interestingly there are more undergraduate students, which would be happy with a mobile app solution only.

4.3 Expert interviews analysis

Through the expert interviews, RQ1 was addressed and confirmed the findings from the literature regarding the significance of group work. Furthermore, the expert interviews will address RQ3 to find out, potential enhancements via software solutions as well as identify best practices.

The snowball sampling (Bogner et al., 2009) method led the researcher to undertake eight expert interviews in total. The interviews are divided into two categories, technical interviews, and pedagogical interviews. The category depended on the content and the participant. In the technical interviews, the researcher analysed and learned aspects regarding the technical possibilities the university could potentially use to support students during group work. Interviewees for the technical interviews were staff members from the ISD, engaged with the current VLE, the Strath App, and other services currently provided by the university. In the pedagogical interviews, the researcher discussed with experts who have a background as a lecturer at the University of Strathclyde. The pedagogical interviews were used to learn more about common challenges in group work from the perspective of a lecturer as well as an evaluation

of the teaching context. Furthermore, the researcher identified best practices regarding certain challenges of group work for students.

An overview about all interviews can be found in Table 8 and a summary of the interviews are presented in chapter 4.3.1 and 4.3.2. All the interview partners were cooperative and facilitated the interviews efficient, which let the researcher quickly process and investigate the questions. The technical interviews will be presented on a high level first since the gained knowledge from the interviews will be applied in section 5. However, the pedagogical interviews will be present the best practices of group work and furthermore individual opinions will be compared.

ID	Date	Participants	Name	Category
I1	21.07.2017	Agnes Branny	SfB- understanding	technical
I2	21.07.2017	Michael Aherne, Michael Hughes	"myplace"- understanding	technical
I3	25.07.2017	Debbie Willison	Pedagogical framework of group work	pedagogical
I4	27.07.2017	Conor McBride	Lecturer view I	pedagogical
I5	31.07.2017	Mark Dunlop	Lecturer view II	pedagogical
I6	01.08.2017	Russell Matthews	Lecturer view III	pedagogical
I7	02.08.2017	Donna Brawley	Wrap- up	technical
I8	07.08.2017	Christopher Wilson, Robert Greer	University of Strathclyde App	technical

Table 8- Overview expert interviews

4.3.1 Technical interviews

The first interview was with Agnes Branny (I1), project co- Ordinator in the department Programme Management Office. One of Agnes current projects was to introduce Microsoft Skype For Business (SfB) (University_of_Strathclyde, 2017c) to the entire staff of the University of Strathclyde. Including the research students, the project comprises approximately 6500 people, which were enabled to use SfB. SfB is a tool for collaborative communication and has valuable features for collaborative working. It is offered

as a Microsoft application, depending on the agreed license of the customer. The purpose of the interview was to find out, whether it was possible to enable all students at the University to use SfB. Without diving too deep into details, Agnes explained that all professional staff and research students have an Email account based on a Microsoft Exchange license (Microsoft_Corporation, 2017a). Microsoft Exchange is a server providing an email account and a calendar to its users. Taught students, in contrast, have an Email account based on a Microsoft Office 365 ProPlus (O365) license (University_of_Strathclyde, 2017b). O365, on the contrary, offers more applications to the user than only email and calendaring, but also the commonly used Microsoft Office applications, i. e. Word, Excel, or Powerpoint (Microsoft_Corporation, 2017b). The reason why professional users and student users are set up on different licenses, even though the university is one organisation is the costs. To save expenses, the university provides Email accounts based on O365 for the students and Microsoft Exchange to the professional staff users. However, O365 students' version of SfB does not operate smoothly with the SfB application based on Exchange. Therefore, for the present student users are not able to use SfB on via the University license of O365.

- The main message of the interview I1 was that SfB is a valuable tool for collaborative working due to its multiple features. Furthermore, it would be possible to offer SfB to students. However, it was connected with a significant increase in licenses costs, depending on potential negotiations.

The second interview was with Michael Aherne, and Michael Hughes (I2), both Senior Applications Analysts and Developers in the department IS Business Systems. Together they are the responsible developers for the VLE ‘‘myplace’’ currently used at the University of Strathclyde. ‘‘myplace’’ is a learning environment which is based on the open source software for online learning, ‘‘moodle’’ (Moodle_Pty_Ltd, 2017b), and was introduced at the University of Strathclyde in 2008. Since ‘‘myplace’’ is the central medium, students, as well as lecturers, use to cope with daily university routine, the researcher investigated on how group work could be supported via ‘‘myplace’’ as well. Initially ‘‘myplace’’ was used to push information from the lecturer side to the student's site in the form of lecture slides, assignment tasks, or feedback and grades for assignment.

However, after the presentation of ‘‘myplace’’ and its feature and the use of a demo user provided the interviewees, the researcher saw a high potential for support group working features via ‘‘myplace’’. Additionally, there is the fact that ‘‘moodle’’ is an open source platform, and the two developers saw themselves able to develop features according to a detailed request.

- The main message of the interview I2 was that ‘‘myplace’’ is a flexible tool, which can be used in many different possible ways. However, it is utilized for the communication between lecturers and students and not only among students during group work because any activity on ‘‘myplace’’ involves the lecturer.

The third technical was with Robert Greer and Christopher Wilson (I8), working in the department of IS Business Systems. Both are responsible for the ‘‘The University of Strathclyde Mobile App’’ (University_of_Strathclyde, 2017d). The app is built on an ‘‘Ionic Framework’’ (Drifty_Co, 2017) which is an open source framework to create mobile apps. During the interview, the researcher discussed the significance of a mobile app in today’s society but also in the context of the University of Strathclyde.

- The main message of interview I8 was that the Strath App is rather a tool to facilitate the students lifes’ with many features by providing all kinds of information useful for all stakeholders. However, the purpose of the app is not to foster interaction among students and other students or lecturers and students and therefore is not dedicated to enhancing group work. As a compromise, it offers a ‘‘myplace’’ integration which leads the users to the VLE for potential group work.

The last technical interview was with the project sponsor Donna Brawley (I7). Donna is working in the department IS Business Systems and is the Collaboration Service Manager. The interview with her was at the end of the business analysis activity and served as a good wrap up. Furthermore, it was important for the researcher to define the scope and the focus on a high level with the project sponsor. Moreover, Donna explained how the project fits into the agile project management approach, currently applied in the ISD. Additionally, she discussed the holistic view regarding student experience, which should be the ultimate concern of the University.

- The main message of Interview I7 was that the research process and the intermediate findings, where according to the expectation to the project sponsor. Furthermore, Donna provided a good overall picture, where the business analysis activity received a real context.

4.3.2 Pedagogical interviews

Since the interviews were semi- structured interviews, the researcher prepared a couple of questions and besides that stimulated a discussion about best practices for group work in HE. First, the individual aspects

of all interviews will be presented and in the second part, the responses for the shared questions will be compared.

The first pedagogical interview was with Dr Debbie Willison (I3), who is a principal teaching fellow at the pure and applied chemistry department on the faculty of science at the University of Strathclyde. Furthermore, Debbie is the Vice Dean Academic for the Faculty of Science, and her research areas lie around pedagogical development. Due to Debbie's experience as a lecturer as well as her high-level activity within the environment of HE as a vice dean, the researcher requested an interview with her. For the researcher, Debbie was a suitable interview partner because she had the knowledge about teaching frameworks, policies, or lecturer training at the university. Debbie introduced the STEP training programme, which was previously explained in section 4.1.3, to the researcher which facilitated the teaching strategy analysis. Additionally, she mentioned the AFP, presented in section 4.1.3 as well, which provides the framework for education. Furthermore, she emphasised her opinion that the focus in postgraduate studies should lie in the mission to prepare the students for their future career at best. Independent of faculty or field of studies, students need to improve professional skills, which group work is certainly one of them.

The second pedagogical interview was with Dr Conor McBride (I4), who is a reader at the Computer and Information Sciences (CIS) department on the faculty of science at the University of Strathclyde. Conor won several awards for innovative learning, which was the reasons for the lecturer to request an interview. While talking about group work, Conor said he liked the aspect that group work always happened, even though it is not a group work activity. Informal group work shows the solidarity among students, but on the other hand, solidarity is not always as high as Conor would expect during assessed group work activities. In Conor's opinion, this phenomenon is caused because the students are highly grade driven and are more self-centred as soon as tasks are graded. Furthermore, it is the responsibility of the lecturer to create the perfect conditions for group work. The scope of the task, as well as the size of the groups, have to be adequate, and the task needs to offer the possibilities to break it down into sub-tasks which are parallelisable.

The third pedagogical interview partner was suggested by Conor, which is why the researcher requested an interview with Dr Mark Dunlop (I5). Mark is a senior lecturer in the CIS department at the University of Strathclyde. Mark created a peer assessment feature which is filled out by the students after every group work assignment to enable Mark to give a fair grade according to the contribution to the group work. This feature is based on a PHP form, which is then uploaded into a data base. The students are asked to rate

the personal performance as well the performance of every group member. Based on an algorithm the filled-out form provides a score per every student, which the teacher can take into consideration when grading all team members. Other lecturers partly use the peer assessment tool at the CIS department.

The fourth pedagogical interview was with Dr Russell Matthews (I6), who is a lecturer in the Hunter Centre for Entrepreneurship at the University of Strathclyde. Michael Hughes, one of the ‘‘myplace’’ developer (I2), recommended him because Russell had some previous inquiries regarding ‘‘myplace’’. Russell’s concern about group work is that the lecturer needs transparency about the group work contributions by members. Contrary to Mark, Russell does not think about an evaluation process within the group but rather an evidence of every single group meeting. Subsequently, he would not face the risk of interpersonally biased member evaluations but can evaluate objectively based on actual contribution. His vision would be to fill in a template on a weekly basis, for example within the VLE, which gives evidence of what has been done. Furthermore, he would provide an incentive of 5% for the total grade under the assumption that the feedback has constantly been provided every single week. If this evidence was incomplete or not provided weekly by the group, the total grade cannot be better than 95%.

As part of the interviews, the researcher prepared a few questions, which were asked to all interviewees. First, the researcher wanted to find out whether group work is a common practice in their lectures and what their motivation was to conduct group work. Subsequently, the first two questions were:

- Are you conducting group work on a regular basis in your classes?
- Why are you conducting group work?

All interviewed lecturers, except Conor (I4), are conducting group work on a regular basis in the classes they teach. Conor is currently not teaching classes where, according to his understanding, group work would fit as a suitable pedagogical method. Conor is currently teaching computer programming, where the students learn how to code. Despite the current situation he used to conduct group work, and will potentially conduct group work again if the lecturer content is suitable. There were two motivations why the lecturers conducted group work. On the one hand side, they make use of the practical aspect of group work, which requires students to apply the theory in practice. On the contrary side, they all referred to the transferable skills, which students need to exercise to become a work- ready graduate.

Furthermore, all interviewees agreed on the fact, that successful group work activities are the responsibility of the lecturer to a certain extent. Providing tasks, suitable for group work and suggesting a suitable size of groups regarding the task is crucial. Furthermore, it is important to make the students

understand in advance what the deliverables, as well as the marking criteria, is. During all interviews, the researcher identified a conflict of interest for the lectures. On the one hand side, they want to invest effort and time in teaching and making the group work experience outstanding for the students. On the contrary, the organisation of the University forces the staff to invest even more effort into researching and publishing papers, which ultimately cut off time for teaching.

Identifying the challenges which can be actively influenced by the behaviour of the lecturer (C3, C5, C7), the researcher addressed those challenges in the second part of the questions. However, the level of interference by the lecturer in the group work process is decided by the lecturers, individually. When asked regarding the interference, all lectures concordantly responded that they do not interfere the group process. All lecturers offer support if support is actively requested. Otherwise, the lecturers prefer not to be involved. Nevertheless, it was a common sense among the lecturers that all students had to be aware of the marking criteria as well as the task before the actual start.

Regarding the challenge of group formation (C5) with the lecturers, there were two aspects to discuss. The first aspect was whether the groups should be allocated by the students themselves, by the lecturer or by random choice. Practical experience showed that is the most efficient way for the lecturers is to let the students allocate themselves into groups. However, Conor and Mark elucidated that there are some group work activities where they want to assign the teams as the lecturer. Allocating teams by the lecturer can be done following two different approaches: balanced teams or equal ability teams. The entire course divided into teams which are potentially able to reach equal results are the balanced teams. However, dragging all students toward the middle to achieve the average regarding the group performance is not the best practice of the lecturers. All did not like the idea to bring the high performing students in the situation of a handicapped race, where they had to carry the low performing students through the activity. Subsequently, they preferred the option of equal ability teams, where the students can work at eye level according to their abilities.

Individual marks rather than marks evenly distributed among group members is the best practice among the interviewees of marking group work activities. However, lecturers follow different approaches to reach a fair marking. Russell follows the idea to achieve a fair marking for the students by understanding evidence of the weekly group process, whereas Conor and Mark prefer to achieve fair marking with the help of a peer assessment. While both approaches tackle the challenge of free- riding (C7), Russell request for transparency tackles the attendance of group work (C3) as well.

The last aspect of each interview was about the VLE ‘‘myplace’’. The researcher was investigating if they made use of it, if they are advanced users and if the interviewees were aware of feature supporting group work. Since ‘‘myplace’’ is part of the STEP, all teachers are aware of the learning platform. However, it is not being used equally among the lecturers. While all lecturers use it as a communication channel from the lecturer to the students, individual approaches are selected to share class material or to post assignments of the students. The siding of ‘‘myplace’’ occurs when the lecturer is looking for features, which is not provided via ‘‘myplace’’ or simply because the lecturer is used to work with an external solution rather than the ‘‘myplace’’ solution.

4.4 Meetings

Due to the placement in the ISD, the researcher had the possibility to attend several workshops additionally to the interviews. Even though the workshops did not have a direct impact on the dissertation, they provided an excellent context for the work and gave specific benefit on particular areas of interest for the researcher.

ID	Date	Participants	Name
M1	18.07.2017	Donna Brawley, Emily Lawty, Michael Hughes, Christopher Wilson	Mobile App meeting
M2	19.07.2017	John Palmer & Graham Christie	SfB- Live Demonstration
M3	26.07.2017	Alistair Campbell	Myplace- getting started
M4	27.07.2017	Donna Brawley, Emily Lawty	Online student content Review Workshop - Part 1
M5	28.07.2017	Donna Brawley, Emily Lawty	Online student content Review Workshop - Part 1

Table 9- Overview ISD meetings

At the beginning of the placement, the researcher was invited to take part in the Mobile App Meeting (M1) hosted by Donna, the Collaborations Services Manager. During the weekly meeting, the participants discuss the general status of the constantly evolving Strath App and verify the interaction with the Communications Co- Ordinator (Emily Lawty) and the VLE ‘‘myplace’’ (Michael Hughes). The meeting gave a valuable insight into the interaction between all the different stakeholders.

Furthermore, the researcher had the possibility to take part in staff training workshops for both, SfB (M2) as well as for ‘‘myplace’’ (M3). The opportunity to participate in this was great since the researcher as a student gained a detailed understanding of both applications from a professional staff respectively a lecturer’s point of view. Without the placement and the support of the Collaborations manager, this

opportunity would have never existed. Equipped with a thorough understanding of both applications, the researcher could go on into further analysis.

Towards the end of the researcher was invited for a two-day workshop hosted by Emily and Donna regarding the project to modernise the entire online appearance of the University of Strathclyde. This workshop made the researcher understand how agile project management is applied in real life and how to prioritise sprints.

5. Challenges and potential solutions

In section 5 the researcher addresses the RQ3. RQ3 will be answered regarding two aspects. First, the researcher presents what features can support the students to face the challenges during group work. As a result of the analysis, a requirements catalogue was created. Moreover, an overview is presented how to match the requirements to one or more of the identified challenges from section 2.4.

Second, the researcher presents potential possibilities to put the requirements into practice, focussing on the available resources. As an expressed request of the project sponsor, the business analysis activity was expected to focus on the available resources. Focussing on the available resources means to work more effectively as well as saving costs.

However, due to the expert interviews in section 4.3, a question of principle raised.

- *What is the motivation of the University of Strathclyde, to provide technical features to improve the group work experience for the students?*

On the one side, offering support to the students in any form is one of the main intent of the University. However, on the other hand the University of Strathclyde is a is a charitable body and is restricted by costs. Subsequently, a cost- benefit analysis will always be a crucial deciding factor. Based on the unanimous opinion during all expert interviews, the benefit of the University providing certain feature regarding group work is an improved transparency respectively evidence of the complete group working process for the lecturers.

5.1 Requirements engineering process

A requirement is

> *"a feature that the business users need the new system to provide."* (Paul et al., 2010)

The requirements engineering process is a structured approach towards software development (Paul et al., 2010). The requirements engineering process consists out of the requirements elicitation, requirements analysis, requirements validation, requirements documentation, and the requirements management (figure 2). Due to the project definition of scope the researcher will cover the requirements elicitation, the requirements analysis, and the requirements documentation and will not focus on the other aspects. During the requirements elicitation, the researcher understood the project context and comprehended the needs of the student- users. During an extensive data gathering, a requirements list (appendix D.1) was created by the researcher which listed all potential requirements expressed by the users. However, the list does not have any analysis. During the analysis, the researcher verified the feasibility of the requirements, summarised different wordings but similar meanings, and made sure that there was no overlapping among requirements. As part of the analysis, the researcher also checked the relations between the requirements and comprehended the requirements based on the challenges for group work. Ultimately, the analysed and filtered requirements are documented in the requirements catalogue (appendix D.2), which will serve as the following steps of this requirement engineering project.

However, this requirements engineering is slightly different to the literature and was modified by the researcher. Due to the expectations of the project sponsor, the nature of a project within a charitable organisation, and the limited time the researcher adjusted the requirements engineering process. Furthermore, the researcher mainly focussed on the software resources which are already available. Instead of creating or buying new solutions, the expectation was to use the already available resources more effectively. Furthermore, one intention of the project was to verify whether to provide the solutions as the University of Strathclyde to the students, even though the required functionality already existed provided by a third party.

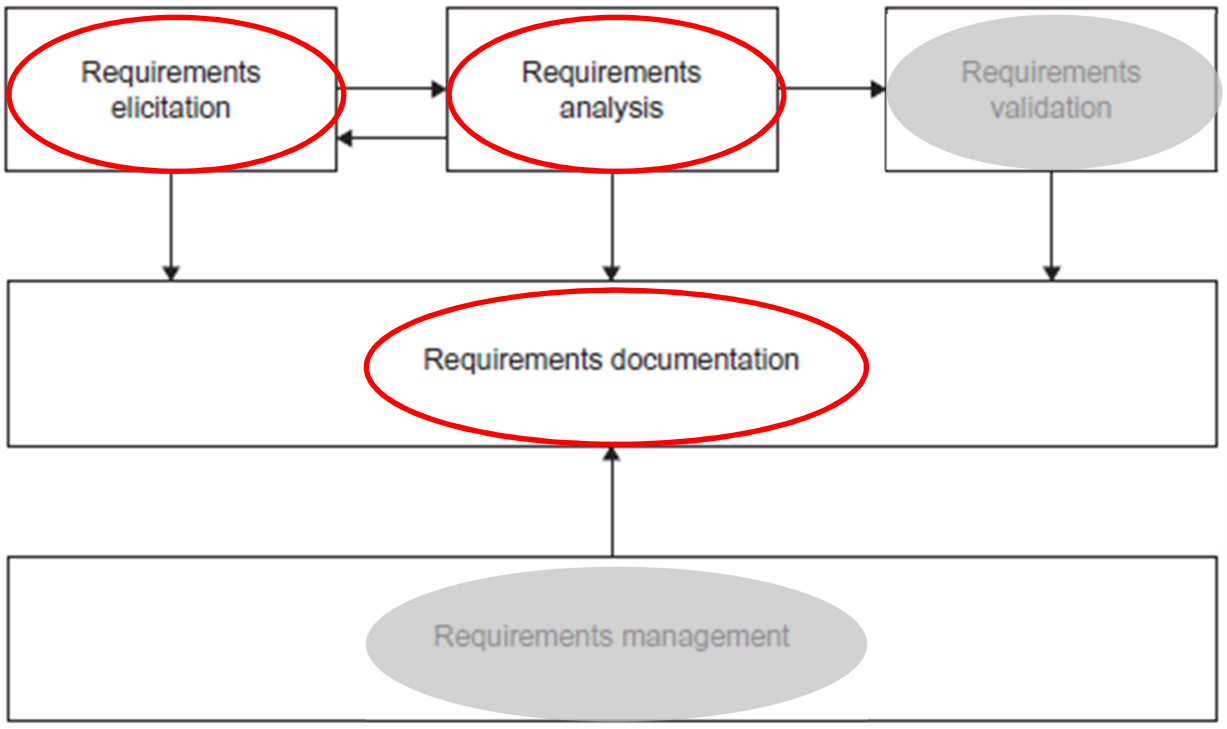

Figure 2- Requirements Engineering Process (Paul et al., 2010, page 152)

The challenges of group work for students in HE have been identified from the literature (section 2.4) and verified through the questionnaire for students (section 4.2). During the analysis phase of the project, the researcher gained much valuable information from previous researchers, opinions of experts, as well as the view of the project sponsor. Therefore, the researcher listed all potential remedies as requirements in a so-called requirement list. The requirement list can be found in appendix D.1. During the entire project time, the researcher listed up 54 requirements in the requirements list. However, after analyzing the requirements catalogue was created with a total of 16 requirements, which can be found in appendix D.2.

Table 10 presents all the requirements, identified by a unique ID and a high- level name, which indicates the functionality. In the third column, each requirement is allocated to one of the three most important pillars of collaborative software. The three categories were identified and presented in section 2.6 (Penichet et al., 2010). Furthermore, the table shows if the feature is already existing. In this column, it does not matter if it exists as part of the University portfolio or in the context of an external CSCL application. In the following column, it is presented, in what application the researcher found the target feature, and ultimately it displays, whether this function is already available to the students of the University of Strathclyde.

All the 16 requirements are already available at the market of the CSCL application. Therefore, no new inventions have to be done, only minor adjustments. Moreover, there are 5/16 requirements fully available to the students already, which was not clear to the researcher at the beginning of this business activity. 8/16 requirements were allocated to the category coordination, which shows that half of the requirements are potentially improving the coordination during a group work project. 5/16 are allocated to information sharing and 3/16 to communication. Furthermore, all listed requirements are functional requirements which are why all IDs start with a capital F.

> *"A requirement that is concerned with a function that the system should provide, i.e. what the system needs to do." (Paul et al., 2010)*

A detailed explanation and analysis of every single requirement can be found in appendix D.2.

ID	Name	Category	Existing	Application	Available via University of Strathclyde
F-001v1-0	Book a room (mobile)	Coordination	Yes	telepen	No
F-002v1-0	Peer review	Coordination	Yes	"myplace"	Yes
F-003v1-0	Task management	Coordination	Yes	Microsoft Planner	No
F-004v1-0	Meeting schedule	Coordination	Yes	Microsoft Outlook Calendar	No
F-005v1-0	Contact management	Coordination	Yes	Microsoft People, "myplace"	Yes
F-006v1-0	Group allocation	Coordination	Yes	"myplace"	Yes
F-007v1-0	Push notifications	Communication	Yes	"myplace", Strath App	No
F-008v1-0	Audio/ video conferencing	Communication	Yes	Skype for Business	No
F-009v1-0	Messenger	Communication	Yes	Whatsapp, iMessage	No
F-010v1-0	Calendar	Coordination	Yes	Microsoft Outlook Calendar	Yes
F-011v1-0	Grading	Information sharing	Yes	"myplace"	Yes
F-012v1-0	Brainstorming	Information sharing	Yes	Group Scribbles	No
F-013v1-0	Content Management	Information sharing	Yes	google drive	No
F-014v1-0	Collaborative document editing	Information sharing	Yes	google docs	No
F-015v1-0	Workflow statistics	Information sharing	Yes	google drive	No
F-016v1-0	Member status	Coordination	Yes	Skype for Business	No

Table 10- Overview requirements catalogue

In the next stage, the elicited requirements were matched with the challenges of group work, to comprehend the purpose of each requirement. Due to the matching of the requirements with the challenges, a matrix (figure 3) was created serving as an overview how to resolve which challenge. Furthermore, it indicates the significance of each requirement, since it shows how many challenges can be improved with the help of each single requirement. Derived from the sums of each requirement, potential prioritisation can be suggested. However, the different significances of each challenge for the students must be considered, as well as the cost- benefit analysis.

The matrix can be read in two ways. Either to see which and how many requirements are resolving one specific challenge or seeing how many and which challenges get improved by one specific requirement. Due to the cost pressure, the University of Strathclyde faces, the researcher wants to find out how many challenges of group work can be entirely or partly resolved by just one specific requirement. According to the cost approach, the requirement ‘‘task management’’ (F-003v1-0) is the requirement which improves, not necessarily completely resolves, the most challenges with seven challenges. ‘‘Peer review’’ (F-002v1-0) and ‘‘contact management’’ (F-005v1-0) are ranked on the second place when summing up the important challenges. Ranked on a third place, there are ‘‘meeting schedule’’ (F-004v1-0), ‘‘group allocation’’ (F-006v1-0) and ‘‘content management’’ (F-013v1-0) with four relevant challenges. Thus, a possible prioritisation of the requirements could look like the following:

1.	Task management	F-003v1-0
2.	Peer review	F-002v1-0
	Contact management	F-005v1-0
3.	Meeting schedule	F-004v1-0
	Group allocation	F-006v1-0
	Content Management	F-013v1-0

However, this prioritisation is only an indication, since it does not consider fundamental aspects like development costs, development time, or development complexity.

	Challenge	Project management	Communication among group members	Attendance of group members	Time consumption	Formation of group	Achieving good grades/ results	Free- riding	Lack of leadership	Different grade expectation	Different work attitude	Different understanding of task/ deliverables	Interpersonal conflicts	
Requirement	**ID**	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	
Book a room (mobile)	F-001v1-0				X									1
Peer review	F-002v1-0						X	X	X	X			X	5
Task management	F-003v1-0	X	X		X			X		X	X	X		7
Meeting schedule	F-004v1-0	X		X	X						X			4
Contact management	F-005v1-0	X	X	X		X					X			5
Group allocation	F-006v1-0					X		X			X		X	4
Push notifications	F-007v1-0		X											1
Audio/ video conferencing	F-008v1-0		X											1
Messenger	F-009v1-0		X											1
Calendar	F-010v1-0	X		X	X									3
Grading	F-011v1-0													0
Brainstorming	F-012v1-0											X		1
Content Management	F-013v1-0	X			X					X		X		4
Collaborative document editing	F-014v1-0		X		X							X		3
Workflow statistics	F-015v1-0						X	X			X			3
Member status	F-016v1-0	X												1
	count	6	6	3	6	2	2	4	1	3	5	4	2	

Figure 3- Challenge & requirement overview

5.2 Transfer of requirements into practice

Addressing the second part of RQ3, the researcher accesses the findings of the previous stages, i.e. expert interviews, or requirements catalogue. Due to the explained expectations of the project sponsor the researcher focussed on the available resources for the students first and only if there was no potential, referred to 3rd party providers. The available software resources, related to group work, are:

- Virtual learning environment, ‘‘myplace’’
- Microsoft Office 365 Pro Plus
- Strath App.

However, it is worth to mention, that there are many more interesting and promising solutions existing, but they do involve additional costs. Promising examples are Microsoft services as Microsoft Teams, Microsoft Skype for Business, or Microsoft Planner which hypothesise great potential for group work. However, they are currently not part of the existing licence for O365 or access is not permitted by the UoS due to strategic decisions (Microsoft_Corporation, 2017b).

5.2.1 Virtual learning environment, “myplace”

‘‘myplace’’ Is the currently used VLE at the University of Strathclyde. ‘‘myplace’’ is a web- based platform which is used to access teaching material, uploading assignments and many more aspects related to the regular education routine between a student and the lecturer (University_of_Strathclyde, 2017e). The ‘‘moodle’’ platform enables the university to structure the classes but also provides an infrastructure which can be used to build applications of software packages on top of it (Brine et al., 2007). Due to the two most important roles student user and lecturer user, authorisations are defined. All users are assigned to their relevant classes. For students, it is the classes which they are attending and for lecturers the classes which they teach. Subsequently, cohorts can be created by assigning user ID for to different classes, faculties, or other characteristics. While students can only access the provided materials and features, the lecturer user has the authorisation to set up the class. Setting up a class with all content and other potential functionalities are the responsibility of every lecturer. Therefore, students must work with the content, structure, and taste defined by the lecturer. Subsequently, the set ups of classes might differ a lot among the lecturers. By logging in with their user account, student users as well as lecturer user, only see their relevant classes. A class is structured into an unlimited quantity of sections, which can be named and displayed at the will of the lecturer. The sections are animated by adding either resources, i.e.

presentations or books, or by adding an activity, i.e. assignment upload or a group forum. The activities in ‘‘myplace’’ are functionalities of which certain activities can support group work as well. Since ‘‘myplace’’, based on ‘‘moodle’’, is an open source platform, the functionalities of the VLE are constantly evolving. Following there is an immense number of activities existing. However, there is a selected collection of useful activities available on ‘‘myplace’’. Out of this default collection, every lecturer can select, which activities to apply. However, this basic default selection is not all. There is much more. The following activities from the default collection could among others enrich the group work experience for the students:

- Chat Activity (Moodle_Pty_Ltd, 2017a)
    - The chat activity provides a real-time synchronous discussion in class.
- Choice Activity (Moodle_Pty_Ltd, 2016a)
    - The choice activity provides the possibility to set up polls and let the students select out of some possibilities. This activity is useful for votes of any kind, i.e. meeting schedule or topic selection.
- Forum Activity (Moodle_Pty_Ltd, 2016b)
    - The forum activity offers a discussion within a class in the form of a thread. Postings can be directly commented or rated by the other forum participants.
- Group Choice Activity (Moodle_Pty_Ltd, 2016a)
    - The group choice provides the possibility to form groups by themselves. The lecturer sets the maximum and a minimum number of participants.
- Workshop Activity (Moodle_Pty_Ltd, 2017c)
    - The workshop- activity is a peer assessment functionality where student rate their performance based on given criteria and they rate all their group members on the same criteria.
- Wiki Activity (Moodle_Pty_Ltd, 2015)
    - The wiki activity offers the possibility to create an individual page, where all class participants collaboratively create content, i.e. upload a document, or post a text or a web link.

However again, the lecturer decides what resources and what activities are made available in every single class and the students have no voice in that decision.

Furthermore, it is important to acknowledge that all activities which are provided via the VLE, enable the lecturer to monitor all actions within the activities. In other words, the lecturer has access to all communications or log data among the group members and can monitor all activities within the class. According to the expectations of the interviewed lecturers, the aspect of the monitoring lecturer will cause two behaviours of the students. On the one hand side, the students will project the truth within these activities rather than record the truth. In other words, the students will act on how they suppose the lecturer expects them to act, rather than act normally. On the other hand, the group will most likely start a parallel discussion outside the VLE, so the lecturer cannot monitor the communication within the group. The external communication will rather be the truth of the group working process than the one on the VLE. Subsequently, lecturers only activate the mentioned activities, in case they want to monitor the process. As discussed in the pedagogical interviews, most lecturers do not want to get involved in the group working process, which explains, why the activities on "myplace" are rarely activated by the lecturers.

During analysis, the researcher found out, that the activities on "myplace" are created for the cohort of one entire class. Subsequently, it would not be possible to use the presented activities on the level of a group cohort within a class. However, this is an issue which could potentially be fixed with the help of the in-house developers mentioned in I2.

5.2.2 Microsoft Office 365 Pro Plus

As referred to in section 4.3.1, each student at the University of Strathclyde has a user account for Microsoft Office 365. Besides the common Microsoft Office applications like Microsoft Word, Excel, or Powerpoint the students have an Email account with Microsoft Outlook. Furthermore, there is a calendar application which can be used among all students. Meetings can be created, and responses by all invited people can be requested to either confirm or decline the suggested meeting. The requests will be sent via Email to the users. The calendar entries can be customised with alerts and calendar entries for a potential phone calendar are created, which can be added to each's calendar with one click only.

However, SfB is part of the current O365 license as well as Microsoft Teams but is currently blocked by the university's global administrator to use for taught students. SfB is blocked due to the problematic interoperability between SfB on Microsoft Exchange and SfB on O365. However, this challenge can be overcome at a later point of the time (according to I1). Microsoft Teams is "[…] a digital hub for

collaborative communication […]" (Microsoft_Corporation, 2017b). However, it is a strategic decision of the UoS, to block this service for the student user for the moment. According to the Senior Applications Analyst and Developer James Everett, the decision should be reviewed (appendix E3). Unfortunately, there researcher did have not enough time, to investigate on this issue.

5.2.3 University of Strathclyde App

In the IT Survey from the University of Strathclyde in December 2016, the "Student Surveys Team" found out that 98% of the 2688 total participants had a smart phone (University_of_Strathclyde, 2016a). 98% of the Strathclyde students is the right to exist and to put effort and resources into the development of the Strath App. However, the app only plays an under part in the context of students' assessment and interaction among each other or with the lecturers. The Strath App serves as a convenient source of information to support students with information on and off campus. When analysing the available features of the app (University_of_Strathclyde, 2017d), there is a clear tendency to rather serve as a guide to retrieve information instead of serving as a tool to interact with other stakeholders..

As discussed at the beginning of this chapter, one aspect must be considered when thinking about potential features. The reasons why the University would decide to provide group work feature would be transparency and evidence, supporting the lecturers to achieve a fair grading. The medium for the interaction between students and lecturers for assessment is the VLE "myplace". However, during the expert interviews, the experts did not see a reason to provide solutions in-house via the Strath App, as it is already for use at third party providers. Particularly in the interviews I2, I4, I8 the expert opinions where to save effort and resources, once suitable and performing solutions are existing and not to copy existing features. Since many features are existing already on "myplace" or O365, there is also no need for redundant features regarding the Strath App. As mentioned at the beginning of chapter 5, there is a high potential that students prefer to use external solutions, knowing that the lecturer cannot monitor the process.

During the app devolvement, the project team needs to consider the high- level purpose of the mobile app to serve as a portable source of information. Currently, the Strath app acts as an entrance gate to "myplace", meaning that the user can use a "myplace" link which leads the user directly to myplace via the mobile browser, but not the Strath App itself. The link underlines the clear allocation of features that the Strath App rather serves as a useful passive source of information but for assessed interaction

between students and lecturers, which need to give evidence for activities, the VLE ‘‘myplace’’ comes into place.

6. Conclusion

Section 6 provides a summary of the findings of this dissertation. It presents all three research questions and provides answers to those based on the analysis's conclusions. Moreover, section 6 discusses specific aspects of the findings and explains the high- level relevance of the work. Furthermore, the researcher recommends future work in terms of research as well as with regard to practical work. Finally, the researcher provides a critical reflection on the work, after the business analysis activity was completed.

The dissertation was a case study since the researcher conducted a business analysis activity during a student placement in the ISD of the University of Strathclyde. In the analysis, the researcher wanted to investigate on potential collaborative computer based tool, which could enhance the group work experience of the students. Hence, the title of the study is: “Examining a potential group work tool for students at the University of Strathclyde.” While investigating the potentials, three research questions guided the researcher:

- RQ1: What is the significance of group work in higher education and why?
- RQ2: What are the challenges of group work for students in higher education?
- RQ3: How can the University of Strathclyde support its students to resolve the challenges?

6.1 Research limitations

During the 12- weeks dissertation phase the author had to set the scope of the project in coordination with the project sponsor. Therefore, the researcher focused on the available resources during the analysis. Due to the purpose of the dissertation, purchasing a ‘‘one- size- fits- all’’ external collaboration software package was not an option for the author. Hence, expanding the licence for Microsoft Office, for example, was not considered further, even though it could also enhance group work. However, the identification of potential solutions based on the available resources was always related to group work for students. Even though, there is a potential need to enhance group work teaching for lecturers as well.

Furthermore, the identification of potential solutions is merely the selected aspects of requirements engineering process, which is requirements elicitation, analysis, and documentation. Possible validation or actual design of concepts or even development are not matters of the dissertation.

6.2 Research summary

The dissertation began with an introduction (section 1) and an extended literature review (section 2) regarding group work in HE. To address the RQ1, the researcher wanted to find out why group work is a popular pedagogical teaching method in HE. At first, the relevant stakeholders to analyse were identified. The students as the users, the HE sector as the institutional context, and the employers as the potential beneficiary of well- equipped students. In the course of the literature review the ET 2020, the current EU policy on education and training, was identified and analysed (section 2.1). As the main driver for group works the core part of the ET 2020 is to focus on the development of the personal transferable skills (PTS) of the students (section 2.2). The PTS are the skills which students should strive to have because they can be applied in all different scenarios, outside the usual context or experiences and support them to master given tasks. Furthermore, the researcher identified potential benefits of group work for students (section2.3) as well as the challenges (section 2.4), which were used as the foundation of the students' survey in the next section. The final part of the literature review was an introduction to the CSCL (section 2.6), which is the scientific background of the collaborative computer based tools, which potentially support students during group work.

In the second section, the selected research methods (section 3) were presented and justified by the researcher to follow the approach of the dissertation. Furthermore, the researcher presented how the chosen research philosophy, provided a background for all selected research methods.

The third part was a questionnaire for students (section 4.2), which verified three aspects of group work. On the one hand, it investigated how popular group work is in higher education (RQ1) and on the other hand it verified and ranked the challenges (RQ2), which were identified in the literature. Moreover, the survey investigated briefly potential software features (RQ3), which could enhance the group work experience of students in HE.

Full of all the collected data from the literature and the questionnaire, the researcher conducted eight expert interviews (section 4.3) to collect more useful data to address the research questions. The semi-structured interviews were divided into two kinds of interviews; technical interviews and pedagogical

interviews. The technical interviews focused on the feasibility of potential software aspects for group work (RQ3) and the pedagogical interviews were used to collect data on best practices of group work (RQ1) as well as individual approaches towards the challenges of group work (RQ2). Additionally, the researcher presented the participation on several workshops (section 4.4) within the ISD, to present his practical experiences regarding possible software solutions (RQ3).

Following to the analysis of the collected data, the researcher conducted a modified form of requirements engineering (section 5.1) to formulate potential functionalities for group work. As a result of that activity, the researcher created a requirements catalogue. While the requirements engineering process, the researcher focused mainly on the available resources (section 5.2) of the university, to follow the constraint of low available investments volumes of the university. Moreover, the researcher matched the requirements with the challenges of group work to create a simple approach to prioritise the development of the requirements.

6.3 Research findings

Through the business analysis activity, the researcher can confirm that group work is a popularly used pedagogical method. Among others, it fosters the development of the PTS of the involved students. Regarding the future career of the students, the development of the PTS turned out to be the biggest benefit of group work, since well- developed PTS are a significant argument for recruiters to employ graduates. Due to the demand of the employers, the HE sector strives to conduct group work in regular and short periods to create a high degree of employability of their graduates.

The students confirmed the identified challenges (section 2.4) from the literature review through the questionnaire (section 4.2), which means that a group work activity in education is a complex method. To distinguish the challenges, the researcher applied categories; soft challenges (table 7) and hard challenges (table 6) which turned out to be equally distributed. However, the soft challenges are challenges which are caused by interpersonal actions or different attitudes among group members. Following, the soft challenges seemed difficult to resolve with the help of CSCL applications. Nevertheless, the researcher approached the soft challenges mainly with features which provided evidence for fair marking, since computer applications cannot resolve challenges regarding attitudes or interpersonal difficulties.

Based on the gained knowledge from the data collection methods, the researcher generated 16 requirements (table 10), which support the students during group work and are analysed detailed in the

requirements catalogue (Appendix D.2). The requirements were categorised into coordination, communication, and information sharing, which was dominated by coordination requirements. The high amount of coordination requirements (50%) reflects the nature of the majority of challenges, which concern the coordination of the groups rather than content or communication challenges.

However, due to the analysis, the researcher identified all available resources of the University of Strathclyde and their boundaries in regarding group working. The available resources (section 5.2) for students were the VLE "myplace", O365, and the Strath App, which can be applied during group work to resolve one or the other challenge. However, not all of the requirements were possible to cover with the available resources only. Furthermore, the researcher discovered five of the identified requirements were already possible to use (table 10) due to the already available resources.

6.3.1 Discussion of research question

Ultimately this sections explicitly answers the three research questions question by question.

RQ1: What is the significance of group work in higher education and why?

Based on the results of the questionnaire as well as the expert interviews, group work in higher education is a popular pedagogical tool for teaching. The development of the students' PTS is the main benefit of group work and therefore drives the lecturers to conduct group work on a regular and frequent basis. Ultimately, the PTS are a vital factor to increase the employability of the graduates which is the aim of both; HE as well as students.

RQ2: What are the challenges of group work for students in higher education?

The challenges of group work can be categorised into hard challenges and soft challenges. Identified through the literature review and verified by the students through the questionnaire the challenges can be found as an overview in table 11. However, the questionnaire showed that the challenges have different weightings according to the students' perception.

ID	Name	Type of challenge
C1	Project management	Hard
C2	Communication among group members	Hard
C3	Attendance of group members	Hard
C4	Time consumption	Hard
C5	Formation of group	Hard
C6	Achieving good grades/ results	Hard
C7	Free- riding	Soft
C8	Lack of leadership	Soft
C9	Different grade expectation	Soft
C10	Different work attitude	Soft
C11	Different understanding of task/ deliverables	Soft
C12	Interpersonal conflicts	Soft

Table 11- Overview challenges of group work

- RQ3: How can the University of Strathclyde support its students to resolve the challenges?

Within the environment of CSCL, the university does provide some features which facilitate group work (table 10). However, the requirements catalogue in Appendix D.2 provides a detailed insight, what features the University of Strathclyde could provide to facilitate group work for the students. The aspects the University of Strathclyde can cover to improve are the fundamental functionalities CSCL, according to Penichet et al., can offer communication, coordination, and information sharing.

During the expert interviews, the author found out that besides Penichetʾs core functionalities, there is an important need for transparency and evidence of the group work process. If the transparency and evidence can be transferred to the lecturer via CSCL application, fair marking can be achieved and many related soft challenges can be solved.

Transparency and evidence of the group work process for the lecturers is, according to the pedagogical expert interviews (section 4.3), a vital motivation for the University to provide software. If the lecturers had the chance to receive evidence of the group work process, i.e. meetings, intermediate findings, contribution per group member, and so forth, it was a crucial benefit for the university side. Evidence is a

benefit for the lecturers because a fair marking and evaluation of the group members is one of their biggest challenge during group work. If this benefit is not given, the lecturers see no point in providing additional features.

6.3.2 Personal impressions during analysis

During analysis, the researcher uncovered aspects which were not scientifically measured but could be of interest for further studies. However, the author feels there is still relevance even though there currently exists no proof. During the expert interviews, many potential approaches were placated by the cost-benefit analysis. Hence, it became apparent that the organisation is restricted by costs, as every organisation but especially for the University of Strathclyde, the costs seemed a key limitation.

Another aspect that attracted the attention of the researcher was the impression that students, as well as lecturers, are not aware of all available resources. The unawareness could be due to the complexity of the organisations with different licenses of software products depending on the user groups. Furthermore, there are cases were based on the license software products should be available, but due to strategic decisions by the university, the products are not activated for use, i.e. Microsoft Teams. In the case of the VLE, ‘‘myplace’’ the lecturers are responsible for the setup of the classes. Hence, it is important that lecturers be aware of all features ‘‘myplace’’ has to offer and could potentially enhance group work. However, the researcher had the impression that not all lecturers are expert users of ‘‘myplace’’, despite support being available from the ISD. Lack of awareness of all resources for group working also seems to be a key concern for the student users. Postgraduate students, for example, which are spending only 12 months at the university, might not have a sufficient overview of what resources are available or not.

6.4 Recommendation for future sprints

Since the project was only the first step towards potential enhancements of group work, the author would like to give some recommendations to the ISD. Identifying the challenges and possible solutions to those is the first step. Based on the solutions in the form of requirements, the ISD can plan the actual development phase.

The ISD of the University of Strathclyde follows the Agile project management approach (Brawley and Graham, 2015). One essential characteristic of agile, which distinguishes itself from the static waterfall approach is that it is an iterative approach. A significant advantage to creating results quick and dynamic

is the focus on an incremental delivery of the product. The preliminary products within the incremental products are called ‘‘minimum viable product’’(MVP) (Brawley and Graham, 2015). Each iteration is done in so-called sprints which are time slots between one and four weeks and which brings the MVP a bit closer to the final ultimate product. The advantages are a flexible and quick software development, which enables the team to quickly react to changes and enable to user to use a preliminary version in the meantime, the MVP, instead of making the user wait until the finished product and not providing any support in any way to the user in the interim.

Therefore, each requirement could be assigned to a sprint. Those sprints should be analysed regarding a prioritisation and ranked into short-term, medium- turn, and long-term sprints. The prioritisation should be performed by a good mix of different stakeholders, i.e. technical developers and analysts, but also strategic and management employees. The work, covered by this dissertation to get a clear impression for general orientation can then be considered as ‘‘Sprint 0’’.

As a second recommendation, the author suggests to introduce a regular reviewing process of the available product, since the external contractors do develop new products. A provider like telepen or Microsoft should regularly be reviewed to verify if there are new possible solutions to any of the challenges.

6.5 Recommendations for future research

For future research questions will be presented which arise during the business analysis. The aspects can be divided into practical, specific future research as well as scientific generalised future research.

For scientific future research, the researcher recommends focussing on the following aspects:

A) What is the motivation of a university to provide collaborative software, even though the features are already existing externally?

This question was created during the expert interviews. If the university invests into the development of software applications, there is the need for a tangible benefit to justify the costs and potential efforts in future support. One potential benefit was the ability to have insight into the group work process during as a lecturer to evaluate and mark fairly. However, this might cause a second parallel group work process, externally, so the lecturer cannot monitor what is happening. Furthermore, the monitored application

rather shows the projected truths; the students are willing to show to the lecturers than the recorded ‘‘true truth.’’

B) How can the mobile app of the University be included into potential group work features?

Currently, the mobile app rather serves as a source of information, then a tool for interaction among students. Therefore, it would be interesting to find ways make use of the app and if the potential users would like to use it.

For future practical research, the researcher recommends to focus on the following aspects:

C) Are students and lecturers aware of all available resources? How can the University of Strathclyde improve the awareness?

Aspect C rise from the impression of the researcher that there is not a high awareness in general, of what possibilities regarding collaboration software is available. Subsequently, available resources which most likely are with costs for the university are not used effectively by its potential users.

D) Investigate on the user experience of the available resources for students and lecturers.

Another potential research for future would be to find out, whether students might refuse using the available resources due to the user experience and prefer to use external collaboration software, provided by third party providers.

6.6 Research reflection

The initial goal of the project was to find out if the University of Strathclyde could provide a group work tool based on CSCL to enhance the group work experience. However, there are three aspects the researcher reflects on regarding the process of and outcome of the dissertation.

Even though, the title of the work refers to a group work tool, the researcher invested the research time on a more broader level. Following, the outcome of the work is not focussed on one specific aspect but shows many requirements, which would enhance the group work experiences. At the beginning of th project, the researcher was not aware of the complexity and had no practical expierence in such a project. Therefore, the author decided to conduct a so-called ‘‘Sprint 0’’ instead of doing one of the following sprints first.

Due to the practical nature of the project, the researcher had to modify the requirements engineering process. The requirements engineering process normally focuses on software development for features which are not available. However, in the case of the project some requirements were existing already and therefore, should not have been part of the requirements catalogue. Nevertheless, the researcher wanted to present the analysis of the requirements, even though they were existing.

Regarding the research methods, the process of the questionnaire showed to have some weaknesses. The questionnaire was created at an early stage of the research, to reach as many participants as possible over a long period. Unfortunately, the researcher did not have the depth of understanding. Therefore, content which could have been evaluated by the students was not included in the survey because it was not available at that point of time. Regarding the participant recruiting, the researcher decided to recruit any current students to reach a higher number of participants. Therefore, the participants were not only students of the University of Strathclyde, even though the project was specifically focussing on the University of Strathclyde. Additionally, there was no question in the survey, which asked for the name of the current university. Subsequently, the researcher could not filter the Strathclyde participants in the results of the questionnaire. With a total of 50 complete student replies, the sample size could be bigger to have a sufficient indication.

6.7 Research relevance

The project was initially planned as a collaborative opportunity for students and staff to explore the topic of group work and associated IT applications. As per the identified requirements (section 5.1), the author anticipates the findings will meet the expectation of the project sponsor.

The analysis of the significance of group work encourages the lecturers to further focus on the development of the PTS of the students, even though it might be connected to challenges during marking or requires much time. However, the encouragement is not exhaustive.

Furthermore, this dissertation serves as ‘‘Sprint 0’’ and is the starting point for further discussions. The expert interviews with the lecturers, raised an essential aspect for all further researches related to the topic:

> Is there any benefit for the University to provide tools, even though they cannot monitor what is happening inside the tool? Would students behave the same way, if they knew they are monitored by the lecturer?

It is one significant achievement of the research to foster the evaluation of this aspect first, before spending effort in further steps.

Nevertheless, improvements for group work will increase the student's experience, which is the aim of the University of Strathclyde. An excellent student experience improves reputation of the University of Strathclyde. Moreover, a more efficient group work marking procedure, for example, saves the lecturers time, which they can then use to work more on their research which is a vital part of their job. The first step towards this direction is done with this dissertation.

Finally, the work encourages the ISD to permanently verify and challenge the status quo. As identified by the researcher, new developed software enters the market and should be reviewed. A first step in identifying Microsoft Teams, which should be available to the students' users without ay additional costs is done. Subsequently it can be discussed, why it is regulated by the UoS.

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Appendices

A. Ethics

A.1 Application form

Ethics Approval System

You are Theodor Geist (IM2016 - 201679483)

Return to Main

Application ID: 605

Title of research: Examining a potential group working tool for students at Strathclyde University

Summary of research (short overview of the background and aims of this study):

The high-level research question is: What software features can enhance students group work experience?

The challenges faced by students during group work will be identified in the literature review and verified with the help of a student's questionnaire.

Due to analysis of existing software, solutions for the challenges will be considered.

Due to requirements engineering the researcher will list all requirements and verify the feasibility of these features with the help of expert interviews, in cooperation with the Information Services Directorate, University of Strathclyde.

In the conclusion the researcher will give a consolidated overview about potential features, taking feasibility and priorities into consideration.

How will participants be recruited?

The questionnaire will be for students only, since this work investigates on group work in a higher education environment.

Following students will be asked to answer the questionnaires. People will be recruited through social media, flyers and emails. The researcher understands, that existing mailing lists from the university cannot be misused for the questionnaire purposes.

Furthermore the Collaboration Service Manager of the University of Strathclyde currently verifies the possibility of posting a "MyPlace" notification. This is reasonable, since ultimately it is for University purposes.

The experts for the interviews are all part of the team of the Information Services Directorate and following employees of the University. Interviews will be arranged with the help of the project sponsor/ Collaboration Service Manager of the University of Strathclyde.
Depending on the intermediate results focus groups will be conducted. Participants will be current students of the University of Strathclyde and will be asked personally by the researcher to voluntarily join.

How will consent be demonstrated? Either upload or include here a copy of the consent form/instructions issued to participants.
PDF File: View document
In the case of online questionnaires consent will be demonstrated by completing the questionnaire. Participants will not be required to complete all questions on the form or to submit the form if they begin to complete it.
Each questionnaire will have a short introduction which explains the purpose of the questionnaire so they will be informed before proceeding.

For the interviews and focus groups, please find the attachment.

What will the participants be told about the proposed research study? Either upload or include a copy of the briefing notes issued to participants.
PDF File: View document
In all cases participants will be given a brief overview of the project.
They will be told about the particular task of the study i.e. verifying the challenges of group work.
In all cases the participants will be informed that participation is voluntary and that they can withdraw at anytime.

As I explained in a previuos email, you cannot say 'This investigation was granted ethical approval by the University of Strathclyde Ethics Committee.
If you have any questions/concerns, during or after the investigation, or wish to contact an independent person to whom any questions may be directed or further information may be sought from, please contact:
Secretary to the University Ethics Committee Research & Knowledge Exchange Services University of Strathclyde Graham Hills Building 50 George Street Glasgow G1 1QE

Telephone: 0141 548 3707 '

What will participants be expected to do? Either upload or include a copy of the instructions issued to participants along with a copy of or link to the survey, interview script or task description you intend to carry out. Please also confirm (where appropriate) that your supervisor has seen and approved both your planned study and this associated ethics application.
PDF File: None.

For the questionnaire, participants will be asked to give information about their previous experience regarding group work, especially the challenges of group work.
The questionnaire will be created in cooperation with the project sponsor project sponsor/ Collaboration Service Manager of the University of Strathclyde.
In the interviews, the participants will be asked questions regarding the technical solutions i.e. myplace, Strathclyde Apps in order to conduct a feasibility study. The participant responses will be audio recorded and transcribed.
In the focus groups, the results of the survey and interview will be discussed with the participants. The result will be a prioritization of the investigated requirements.

What data will be collected and how will it be captured and stored? In particular indicate how adherence to the Data Protection Act will be guaranteed and how participant confidentiality will be handled.
Qualitative and quantitative data will be collected. (students questionnaire, expert interview, students focus group)

Since this investigation is of interest of the Information Services Directorate, University of Strathclyde, the data and analysis will be stored by the department after the project is done.
As employees of the University of Strathclyde, they will act according to the regulations of the University of Strathclyde.
The researcher will store all relevant information, transcripts, audio files, analysis of data, etc. on the personal device, and will not make use of any cloud services.
The personal device will not be left unattended and is additionally secured by a password and an internet security program.
Additional to the personal device of the researcher, the data will also be stored on the university' s H drive (\\its-hdrive1.ds.strath.ac.uk\hdrive\49).

How will the data be processed? (e.g. analysed, reported, visualised, integrated with other data, etc.)

The project will have a mix of quantitative and qualitative data.

Qualitative data is analyzed using thematic analysis.

For the quantitative data the researcher will have a number of variables.

Standard statistical analysis and hypothesis testing will be performed and visualized by the researcher.

How and when will data be disposed of?

Once the results of the dissertation are officially published, all stored data will be given to the Information Services Directorate since the analysis can be of use for further attempts of

the department to improve the students learning experience.

The department will decide upon appropriate storage and dissemination of material gathered during the project.

On conclusion of the project the data will be deleted completely from the researchers personal device and Uni H drive.

A.2 Consent form

Consent Form

Name of department: Computer and Information Sciences

Title of the study: Examining a potential group working tool for students at Strathclyde University

- I confirm that I have read and understood the information sheet for the above project and the researcher has answered any queries to my satisfaction.
- I understand that my participation is voluntary and that I am free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any consequences. If I exercise my right to withdraw and I don't want my data to be used, any data which have been collected from me will be destroyed.
- I understand that I can withdraw from the study any personal data (i.e. data which identify me personally) at any time.
- I understand that anonymised data (i.e. .data which do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the investigation will remain confidential and no information that identifies me will be made publicly available.
- I consent to being a participant in the project

(PRINT NAME)	
Signature of Participant:	Date:

A.3 Participant information sheet

Participant Information Sheet

Name of department: Computer and Information Sciences

Title of the study: Examining a potential group working tool for students at Strathclyde University

Introduction

My name is Theodor Geist and I am currently studying the postgraduate programme Msc Information Management at the University of Strathclyde. Email address: theodor.geist.2016@uni.strath.ac.uk

What is the purpose of this investigation?

The aim of this investigation is to find out the challenges of group work and how to overcome those with the help of a group working tool. This research is conducted since group working is a popular part of the learning experience in higher education.

Do you have to take part?

Participation in this research is voluntary and you can refuse to participate or withdraw without detriment.

What will you do in the project?

You are asked to be the expert in a semi- structured interview with the researcher.

Why have you been invited to take part?

Group work in higher education will be investigated in this study. Subsequently, it is important to come up with innovative solutions to foster group work.

What are the potential risks to you in taking part?

There are no risks regarding your participation.

What happens to the information in the project?

Your information will be kept confidential, and all data will be retained by the Information Services Directorate, University of Strathclyde on final completion of the dissertation.

The University of Strathclyde is registered with the Information Commissioner's Office who implements the Data Protection Act 1998. All personal data on participants will be processed in accordance with the provisions of the Data Protection Act 1998.

Thank you for reading this information – please ask any questions if you are unsure about what is written here.

What happens next?

If you are happy to be involved you will need to sign a consent form to confirm this. This will not be attached to the information in your interview, and will be kept confidentially in a separate location.

If you are not happy to be involved- thank you for your attention.

The results of this study will be published in the final report of my dissertation.

Researcher contact details:

Theodor Geist

Postgraduate student

Email: theodor.geist.2016@uni.strath.ac.uk

Chief Investigator details:

Dr Martin Halvey

Course Director MSc/PgDip Information Management

Telephone: +44 (0)141 548 3595

Email: martin.halvey@strath.ac.uk

This investigation was granted ethical approval by the Departmental Ethics Committee (Computer and Information Science).

If you have any questions/concerns, during or after the investigation, or wish to contact an independent person to whom any questions may be directed or further information may be sought from, please contact:

Departmental Ethics Committee (Computer and Information Science):

Professor Ian Ruthven

Head of Department- Computer and Information Science

Telephone: +44 (0)141 548 4527

Email: ian.ruthven@strath.ac.uk

Chief Investigator details:

Dr Martin Halvey

Course Director MSc/PgDip Information Management

Telephone: +44 (0)141 548 3595

Email: martin.halvey@strath.ac.uk

B. Questionnaire

B.1 Timeline

Date	Action
26.06.2017	Ethics approval
24.06.2017	Developing the questionnaire, discussing with four test users
28.06.2017	End of test phase
29.06.2017	Start
29.06.2017	Participant recruitment via Facebook
30.06.2017	via Facebook groups
	Survey Exchange
	https://www.facebook.com/groups/students.survey.exchange/?notif_t=group_r2j_approved&notif_id=1498766333408819
	The Research Survey Exchange Group
	https://www.facebook.com/groups/1376853029260212/?notif_t=group_r2j_approved&notif_id=1498754415952771
20.07.2017	End

B.2 Online questionnaire (hard copy)

Group Work Survey

Introduction

This survey is being conducted as part of the dissertation of the course MSc Information Management, at the University of Strathclyde, Glasgow. *Title of the dissertation: "Examining a potential group working tool for students at Strathclyde University"* The survey aims to collect information on the challenges of group work for students. Please note that your participation in the survey is voluntary and you can withdraw from it at any time. All information collected via this survey will be kept confidential and anonymous. All data will be retained by the Information Services Directorate, University of Strathclyde on final completion of the dissertation. The survey will take only 5-10 minutes and consists out of three sections.

Thank you for your time and assistance with this project.

This survey has been approved by the Department of Computer and Information Sciences, University of Strathclyde Ethics Committee - Application ID. 605. For any questions regarding the survey, please contact the researcher Theodor Geist (theodor.geist.2016@uni.strath.ac.uk) or *his supervisor Dr Martin Halvey (martin.halvey@strath.ac.uk)*.

End of Block

Section 1

Section 1 The first section aims to collect general information about the participants.

Q1.1 This survey aims at students only. Are you a student? *(This is the only response which will be forced in the entire survey, to make sure the participants are students only)*

- ○ Yes
- ○ No

Skip To: End of Survey If Q1.1 = No (2)

Page Break

Q1.2 Please indicate your gender.

- ○ Male
- ○ Female
- ○ Other
- ○ Prefer not to say

Q1.3 Please indicate your age.

- ○ under 18
- ○ 18-22
- ○ 23-27
- ○ 28-32
- ○ 33- 37
- ○ 38 or older

Q1.4 Please indicate your current or targeted education level. (please choose the most recent)

- ○ University Undergraduate (BA, BSc or equivalent)
- ○ University Postgraduate (PG-Dip, Msc, MBA, PHD, or other)

Q1.5 Please indicate your faculty/ university department.

- ○ Engineering
- ○ Humanities & Social Sciences
- ○ Science
- ○ Business
- ○ Other (please specify) _____

End of Block

Section 2

Section 2 The second section aims to collect information on the experience of the participants with group work.

Q2.1 Do you have experience with group work in higher education?

- ○ Yes
- ○ No

Q2.2 Have you ever been part of a group work project, which was graded?

- ○ Yes
- ○ No

Q2.3 How many group working projects do you have per semester on average?

- ○ None
- ○ 1-2 projects
- ○ 3-4 projects
- ○ One per module
- ○ I don't know

Q2.4 Please indicate how much you agree with the following statement:" I like group work."

- ○ Strongly agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

Q2.5 How useful is group work to develop skills for your future job?

- ○ Extremely useful
- ○ Very useful
- ○ Moderately useful
- ○ Slightly useful
- ○ Not at all useful

Q2.6 Do you agree that you can achieve a satisfying outcome (i.e. result, product, essay, etc.) with group work in general?

- ○ Strongly agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

Q2.7 Do you agree that you can achieve better results in a group **than individually**?

- ○ Definitely yes
- ○ Probably yes
- ○ Might or might not
- ○ Probably not
- ○ Definitely not

End of Block

Section 3

Section 3 The third section aims to collect information on the challenges of group work. Challenges of group work identified in literature will be verified by the participants opinion.

Q3.1 When working in groups, the following aspects are a challenge: *(Use the slider from 0-5)*

Project management (i.e. time- management, plan meetings, etc.)	
Communication among group members	
Attendance of group members	
Group work is time consuming	
Composition of the group members	
Achieving good grades	
Unequal contribution of group members	
Lack of leadership	
Different grade motivation among group members	
Different work attitudes	
Different understanding of task/ deliverables	
Interpersonal conflicts	

Q3.2 Have a look at the examples of collaboration software solutions mainly for business purposes. Please indicate the ones you used during group work activities in university. *(multiple answers possible)*

- [ ] Slack
- [ ] Trello
- [ ] Podio
- [ ] Skype for Business
- [ ] Asana
- [ ] Ryver
- [ ] G Suite

- [ ] Wrike
- [ ] Others (please specify) _____

Q3.3 Please indicate what you have used during your previous group work experiences. *(multiple answers possible)*

- [ ] Social media (i.e. Facebook)
- [ ] Online meetings (i.e. Skype)
- [ ] Messenger (i.e. Whatsapp, iMessage, etc.)
- [ ] Collaborative document-writing (i.e. Google docs)
- [ ] Document sharing (i.e. Dropbox)
- [ ] Meeting organiser (i.e. Doodle)
- [ ] Wikis
- [ ] Others (please specify) _____

Q3.4 What additional functions, would you like to handle via collaboration software. *(multiple answers possible)*

- [ ] Monitor meeting attendance of group members
- [ ] Monitor contribution of group members
- [ ] Visualisation of task responsibilities
- [ ] Enable tutor to check the contribution of group members
- [ ] Peer evaluation
- [ ] Feedback every group meeting in form of a "traffic light system"

- [ ] Book a room
- [ ] Compose groups by inviting people to join a certain group
- [ ] Look up contact details from a list of class participants
- [ ] Others (please specify) _____

Q3.5 Please indicate how much you agree with the following statement: „I prefer to use collaborative tools provided by the university, instead of other third-party tools like Facebook, Google Docs, or Doodle"

- ○ Strongly agree
- ○ Agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Disagree
- ○ Strongly disagree

Q3.6 Final question: prefer collaboration tools in form of:

- ○ A smartphone app
- ○ A desktop version
- ○ Both (smartphone app and desktop version)

End of Block

B.3 Overview questions

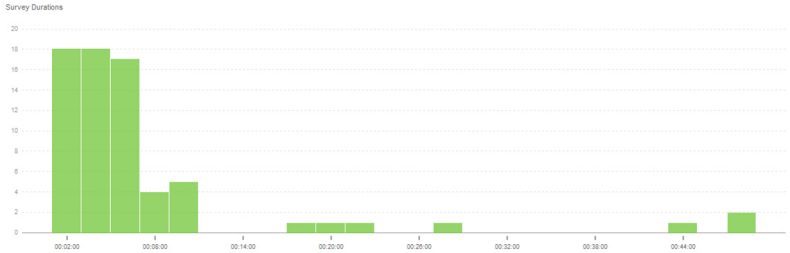
ID	Question
Q1.1	This survey aims at students only. Are you a student?
Q1.2	Please indicate your gender.
Q1.3	Please indicate your age.
Q1.4	Please indicate your current or targeted education level.
Q1.5	Please indicate your faculty/ university department.
Q2.1	Do you have experience with group work in higher education?
Q2.2	Have you ever been part of a group work project, which was graded?
Q2.3	How many group working projects do you have per semester on average?
Q2.4	Please indicate how much you agree with the following statement: " I like group work."
Q2.5	How useful is group work to develop skills for your future job?
Q2.6	Do you agree that you can achieve a satisfying outcome (i.e. result, product, essay, etc.) with g...
Q2.7	Do you agree that you can achieve better results in a group than individually?
Q3.1	When working in groups, the following aspects are a challenge: (Use the slider from 0-5)
Q3.2	Have a look at the examples of collaboration software solutions mainly for business purposes.
Q3.3	Please indicate what you have used during your previous group work experiences.
Q3.4	What additional functions, would you like to handle via collaboration software.
Q3.5	Please indicate how much you agree with the following statement: "I prefer to use collaborative t...
Q3.6	Final question I prefer collaboration tools in form of:

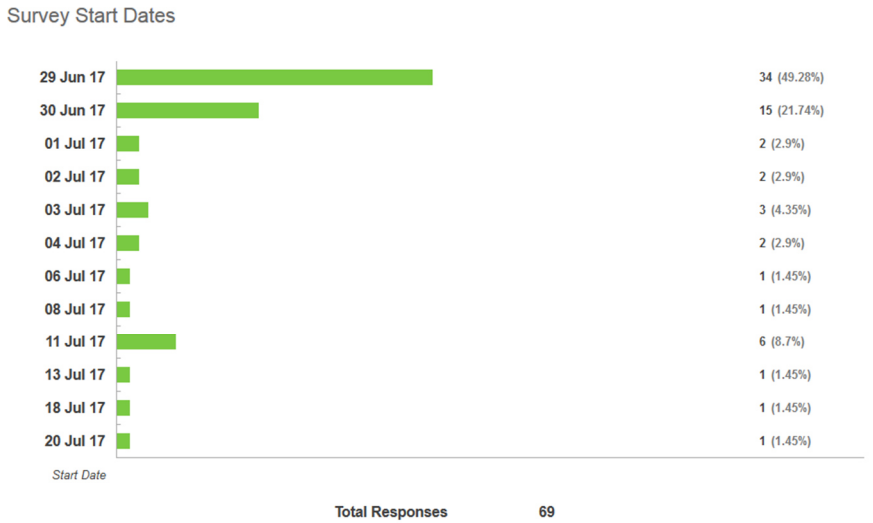
Demographics

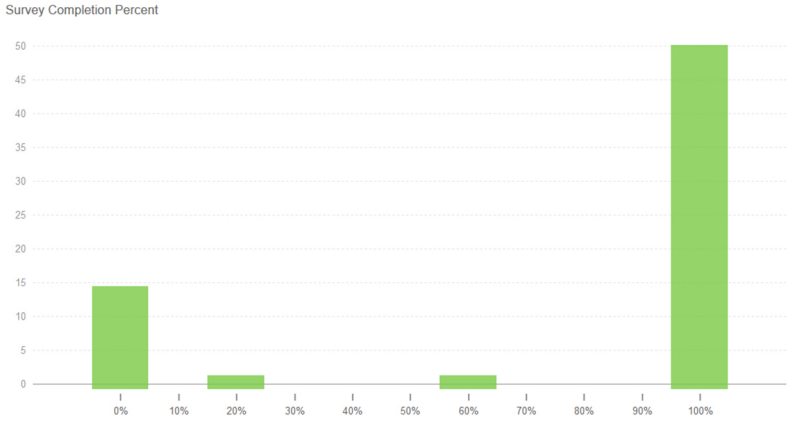
Experience & attitude

Challenges & enhancements

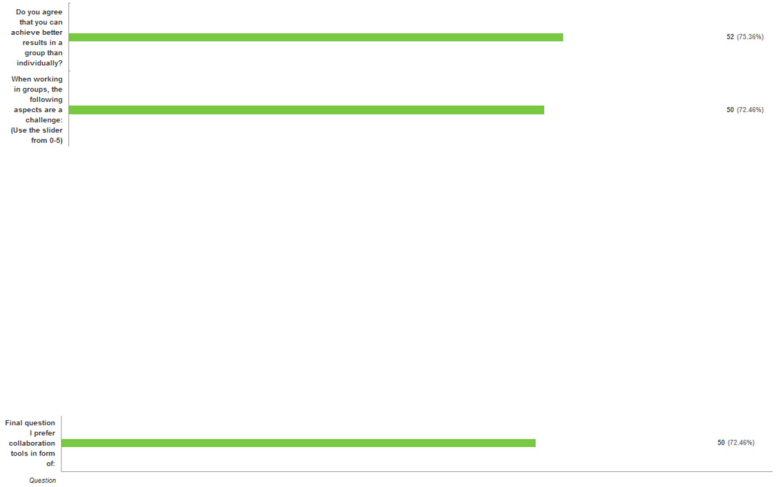
B.4 Metadata

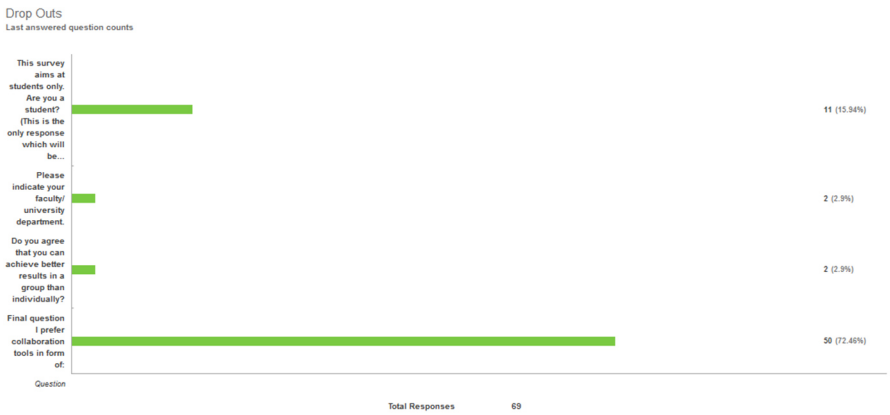

Survey Durations
00:02:00
00:08:00
00:14:00
00:20:00
00:26:00
00:32:00
00:38:00
00:44:00


Survey Start Dates
29 Jun 17 34 (49.28%)
30 Jun 17 15 (21.74%)
01 Jul 17 2 (2.9%)
02 Jul 17 2 (2.9%)
03 Jul 17 3 (4.35%)
04 Jul 17 2 (2.9%)
06 Jul 17 1 (1.45%)
08 Jul 17 1 (1.45%)
11 Jul 17 6 (8.7%)
13 Jul 17 1 (1.45%)
18 Jul 17 1 (1.45%)
20 Jul 17 1 (1.45%)
Start Date
Total Responses 69


Survey Completion Percent
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%


Question Response Rates
This survey aims at students only. Are you a student? (This is the only response which will be... 65 (84.2%)
Please indicate your gender. 54 (78.26%)
Please indicate your age. 54 (78.26%)
Please indicate your current or targeted education level. (please choose the most recent) 54 (78.26%)
Please indicate your faculty/ university department. 54 (78.26%)
Do you have experience with group work in higher education? 52 (75.36%)


Do you agree that you can achieve better results in a group than individually?
52 (75.36%)
When working in groups, the following aspects are a challenge: (Use the slider from 0-5)
50 (72.46%)
Final question I prefer collaboration tools in form of:
50 (72.46%)
Question


Drop Outs
Last answered question counts
This survey aims at students only. Are you a student? (This is the only response which will be...
11 (15.94%)
Please indicate your faculty/ university department.
2 (2.9%)
Do you agree that you can achieve better results in a group than individually?
2 (2.9%)
Final question I prefer collaboration tools in form of:
50 (72.46%)
Question
Total Responses 69

B.5 Analysis

General

	Total number of active intentions	69	
	Number of zero responses		4
	Total number of		11
	Valid responses	**54**	
	Complete responses	50	

talk about that and meta data

ID		#	%	Count	Comments
Q1.2	**Please indicate your gender.**			54	
	Male	29	53.7%		almost equally distributed
	Female	25	46.3%		
	Other	0	0.0%		
	Prefer not to say	0	0.0%		
Q1.3	**Please indicate your age.**			54	
	under 18	0	0.0%		
	18-22	8	14.8%		only above 18
	23-27	36	66.7%		23-27 the majority with 2/3
	28-32	7	13.0%		because 2/3 are postgraduates and that is the typical age
	33-37	2	3.7%		
	38 or older	1	1.9%		

Q1.4	**Please indicate your current or targeted education level. (please choose the most recent)**			54	
	Undergraduate	17	31.5%		possibly because researcher knows more postgraduates
	Postgraduate	37	68.5%		2/3 are postgraduates
Q1.5	**Please indicate your faculty/ university department.**			54	
	Engineering	3	5.6%		
	Humanities & Social Sciences	9	16.7%		Business are 1/2 because it's a popular field to study
	Science	13	24.1%		Science and business is the social environmet of researcher
	Business	27	50.0%		
	Other	2	3.7%		
	Industrial Design Engineering				
	Teaching				
Q2.1	**Do you have experience with group work in higher education?**			52	
	Yes	49	94.2%		Almost everyone have experience in group work in HE
	No	3	5.8%		

Q2.2	**Have you ever been part of a group work project, which was graded?**			52	
	Yes	47	90.4%		More than 90% are also graded
	No	5	9.6%		
Q2.3	**How many group working projects do you have per semester on average?**			52	
	None	1	1.9%		almost 2/3 have 1-2 group projects per semster
	1-2 projects	34	65.4%		shows it is popular and used on a regular basis in every semeste
	3-4 projects	13	25.0%		whereat there is a tendency that business studies have 3-4 per
	one/ module	4	7.7%		No difference to see between undergraduate or postgraduate
	I don't know	0	0.0%		
Q2.4	**Please indicate how much you agree with the following statement: " I like group work."**			52	
	Strongly agree	4	7.7%		more than 55% agree to the statement: "I like group work"
	Somewhat agree	25	48.1%		Almost 1/3 disagree
	Neither agree nor disagree	7	13.5%		not as positive as you would hope
	Somewhat disagree	15	28.8%		no difference between undergraduates and postgraduates
	Strongly disagree	1	1.9%		

Q2.5	**How useful is group work to develop skills for your future job?**			52	
	Extremely useful	6	11.5%		all participants agree on the fact that it gives useful skills for future
	Very useful	31	59.6%		over 70% say it is extremely or very useful
	Moderately useful	14	26.9%		postgraduates tend to rate this more useful than undergraduates
	Slightly useful	1	1.9%		75% to 63% say that its extremely or very useful
	Not at all useful	0	0.0%		
Q2.6	**Do you agree that you can achieve a satisfying outcome (i.e. result, product, essay, etc.) with g...**			52	
	Strongly agree	5	9.6%		65% agree that they can achieve a satisfying outcome
	Somewhat agree	29	55.8%		only 17% do not agree
	Neither agree nor disagree	9	17.3%		86% of the people who said I like group work agreed and only 19% not
	Somewhat disagree	9	17.3%		following it gives an indication why people do not like group work
	Strongly disagree	0	0.0%		no difference between undergraduate or postgraduate
Q2.7	**Do you agree that you can achieve better results in a group than individually?**			52	
	Definitely yes	1	1.9%		interesting that maximum value is by might or might not/ neutral value
	Probably yes	18	34.6%		second best value is probably yes which gives an optimistic impression
	Might or might not	19	36.5%		
	Probably not	10	19.2%		
	Definitely not	4	7.7%		

Q3.1 **When working in groups, the following aspects are a challenge: (Use the slider from 0-5)** 50

Field	Minimum	Maximum	Mean		Std Deviation	Count
Unequal contribution of group members	1	5	3.86		1.08	50
Group work is time consuming	1	5	3.62	6%	0.89	50
Different work attitudes	0	5	3.56	2%	1.24	50
Project management (i.e. time- managem	1	5	3.4	4%	1	50
Different grade motivation among group	0	5	3.2	6%	1.22	50
Different understanding of task/ delivera	0	5	3.12	3%	1.14	50
Communication among group members	1	5	3.04	3%	1.18	50
Attendance of group members	0	5	2.94	3%	1.21	50
Composition of the group members	0	5	2.92	1%	1.07	50
Achieving good grades	0	5	2.82	3%	1.26	50
Interpersonal conflicts	0	5	2.52	11%	1.14	50
Lack of leadership	1	5	2.48	2%	1.19	50

Q3.2 **Have a look at the examples of collaboration software solutions mainly for business purposes. Please indicate the ones you used during group work activities in university. (multiple answers possible)** 50

Slack	8	16.0%
Trello	4	8.0%
Podio	2	4.0%
Skype for Business	17	34.0%
Asana	1	2.0%
Ryver	0	0.0%
G Suite	4	8.0%
Wrike	1	2.0%
Others (please specify)	17	34.0%

Facebook and Email provider
SharePoint and Office365
Google Drive
myplace (university platform)
Mumble
Spss

Skype is the top used tool, among undergraduates as well as postgraduates
Second is slack which was only ticked by postgraduates

Q3.3	**Please indicate what you have used during your previous group work experiences. (multiple answers possible)**			50
	Social media (i.e. Facebook)	46	92.0%	
	Document sharing (i.e. Dropbox)	37	74.0%	92% use social media for group work
	Messenger (i.e. Whatsapp, iMessage, etc.	41	82.0%	82% use a kind of messenger
	Others (please specify)	0	0.0%	74% document sharing
	Wikis	3	6.0%	62% for collaborative writing
	Online meetings (i.e. Skype)	14	28.0%	after top 4 is a big drop
	Collaborative document-writing (i.e. Goo	31	62.0%	all undergraduates use social media for group work whereas its only 89% of post
	Meeting organiser (i.e. Doodle)	8	16.0%	Messenger and document sharing are slightly more popular among post than under
Q3.4	**What additional functions, would you like to handle via collaboration software. (multiple answers possible)**			50
	Book a room	32	64.0%	64% book a room (74% to 40% postgraduates wish it more)
	Monitor meeting attendance of group members	19	38.0%	58% for visualisation of task responsibilities (66% to 40% postgraduates wish it more)
	Monitor contribution of group members	27	54.0%	54% monitor contributions
	Feedback every group meeting in form of a "traffic light system"	9	18.0%	40% peer evaluation (biggest difference between post and under 51% to 13%)
	Compose groups by inviting people to join a certain group	13	26.0%	
	Look up contact details from a list of class participants	19	38.0%	
	Enable tutor to check the contribution of group members	18	36.0%	
	Visualisation of task responsibilities	29	58.0%	
	Peer evaluation	20	40.0%	
	Others (please specify)	1	2.0%	

Q3.5	**Please indicate how much you agree with the following statement: "I prefer to use collaborative tools provided by the university, instead of other third party tools like Facebook, Google Docs, or Doodle"**			50	
	Strongly agree	4	8.0%	8	almost equally distributed between agree and not agree
	Agree	13	26.0%	34	somehat and neither nor are 46%
	Somewhat agree	4	8.0%		the rest is more allocated to agree 34% to 20%
	Neither agree nor disagree	10	20.0%		undergraduates have more tendence to agree
	Somewhat disagree	9	18.0%		undergraduates to rather disagree on that question
	Disagree	8	16.0%	34	
	Strongly disagree	2	4.0%	4	
Q3.6	I prefer collaboration tools in form of:			50	
	a smartphone app	9	18%		2/3 would prefer both and there is no difference between smartphone or destktop
	a desktop version	8	16%		40% undergraduates to 9% postgraduates want a smartphone app only
	both	33	66%		51% undergraduates to 71% postgraduates want both lof them parallel

B.6 Cross tabs

		Please indicate your gender.					Please indicate your age.							Please indicate your current or targeted			Please indicate your faculty/ university department.						
		Male	Female	Prefer not to say	Other	Total	under 18	18-22	23-27	28-32	33- 37	38 or older	Total	Undergraduate University (BA, BSc or equivalent)	PHD, or other Dip, Msc, MBA, Postgraduate (PG-)	Total	Engineering	Humanities & Social Sciences	Science	Business	Other (please specify)	Total	
Do you have experience with group work in higher education?	Yes	26	23	0	0	49	0	7	34	5	2	1	49	14	35	49	3	8	12	24	2	49	
	No	1	2	0	0	3	0	1	1	1	0	0	3	2	1	3	0	1	1	1	0	3	
	Total	27	25	0	0	52	0	8	35	6	2	1	52	16	36	52	3	9	13	25	2	52	
Have you ever been part of a group work project, which was graded?	Yes	24	23	0	0	47	0	7	33	4	2	1	47	14	33	47	2	8	11	24	2	47	
	No	3	2	0	0	5	0	1	2	2	0	0	5	2	3	5	1	1	2	1	0	5	
	Total	27	25	0	0	52	0	8	35	6	2	1	52	16	36	52	3	9	13	25	2	52	
How many group working projects do you have per semester on average?	None	0	1	0	0	1	0	0	0	1	0	0	1	0	1	1	0	0	1	0	0	1	
	1-2 projects	18	16	0	0	34	0	7	21	4	1	1	34	10	24	34	1	7	10	15	1	34	
	3-4 projects	8	5	0	0	13	0	1	11	1	0	0	13	4	9	13	2	2	1	7	1	13	
	One per module	1	3	0	0	4	0	0	3	0	1	0	4	2	2	4	0	0	1	3	0	4	
	I don't know	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total	27	25	0	0	52	0	8	35	6	2	1	52	16	36	52	3	9	13	25	2	52	
Please indicate how much you agree with the following statement: " I like group work."	Strongly agree	1	3	0	0	4	0	0	3	1	0	0	4	1	3	4	1	0	1	2	0	4	
	Somewhat agree	15	10	0	0	25	0	3	18	2	1	1	25	8	17	25	1	2	8	12	2	25	
	Neither agree nor disagree	6	1	0	0	7	0	2	5	0	0	0	7	3	4	7	1	2	0	4	0	7	
	Somewhat disagree	5	10	0	0	15	0	3	8	3	1	0	15	4	11	15	0	5	4	6	0	15	
	Strongly disagree	0	1	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	0	1	0	1	
	Total	27	25	0	0	52	0	8	35	6	2	1	52	16	36	52	3	9	13	25	2	52	
How useful is group work to develop skills for your future job?	Extremely useful	3	3	0	0	6	0	0	5	1	0	0	6	2	4	6	2	0	2	2	0	6	
	Very useful	18	13	0	0	31	0	5	21	3	2	0	31	8	23	31	0	6	6	18	1	31	
	Moderately useful	6	8	0	0	14	0	3	8	2	0	1	14	6	8	14	1	3	4	5	1	14	
	Slightly useful	0	1	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	1	0	0	1	
	Not at all useful	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total	27	25	0	0	52	0	8	35	6	2	1	52	16	36	52	3	9	13	25	2	52	
Do you agree that you can achieve a satisfying outcome (i.e. result, product, essay, etc.) with g...	Strongly agree	2	3	0	0	5	0	2	3	0	0	0	5	2	3	5	1	0	1	2	1	5	
	Somewhat agree	16	13	0	0	29	0	2	22	3	2	0	29	8	21	29	2	6	7	13	1	29	
	Neither agree nor disagree	6	3	0	0	9	0	2	4	2	0	1	9	2	7	9	0	1	3	5	0	9	
	Somewhat disagree	3	6	0	0	9	0	2	6	1	0	0	9	4	5	9	0	2	2	5	0	9	
	Strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total	27	25	0	0	52	0	8	35	6	2	1	52	16	36	52	3	9	13	25	2	52	
Do you agree that you can achieve better results in a group than individually?	Definitely yes	1	0	0	0	1	0	0	1	0	0	0	1	0	1	1	1	0	0	0	0	1	
	Probably yes	9	9	0	0	18	0	2	11	4	0	1	18	8	10	18	1	4	5	7	1	18	
	Might or might not	10	9	0	0	19	0	3	14	0	2	0	19	4	15	19	1	2	3	12	1	19	
	Probably not	6	4	0	0	10	0	2	7	1	0	0	10	3	7	10	0	2	4	4	0	10	
	Definitely not	1	3	0	0	4	0	1	2	1	0	0	4	1	3	4	0	1	1	2	0	4	
	Total	27	25	0	0	52	0	8	35	6	2	1	52	16	36	52	3	9	13	25	2	52	

	Slack	6	2	0	0	8	0	0	4	2	1	1	8	0	8	8	1	0	6	1	0	8
Have a look at the examples of collaboration software solutions mainly for business purposes. Ple...	Trello	3	1	0	0	4	0	0	4	0	0	0	4	1	3	4	1	0	1	2	0	4
	Podio	1	1	0	0	2	0	0	2	0	0	0	2	0	2	2	0	0	1	1	0	2
	Skype for Business	13	4	0	0	17	0	4	11	2	0	0	17	6	11	17	1	1	5	10	0	17
	Asana	1	0	0	0	1	0	0	1	0	0	0	1	0	1	1	0	1	0	0	0	1
	Ryver	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	G Suite	2	2	0	0	4	0	2	1	1	0	0	4	2	2	4	0	1	1	2	0	4
	Wrike	1	0	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	0	1	0	1
	Others (please specify)	7	10	0	0	17	0	1	15	1	0	0	17	5	12	17	1	4	2	9	1	17
	Total	24	17	0	0	41	0	7	27	5	1	1	41	12	29	41	2	7	11	20	1	41
Please indicate what you have used during your previous group work experiences. (multiple answers...	Social media (i.e. Facebook)	23	23	0	0	46	0	8	31	4	2	1	46	15	31	46	2	9	11	22	2	46
	Document sharing (i.e. Dropbox)	21	16	0	0	37	0	4	26	4	2	1	37	7	30	37	2	5	10	18	2	37
	Messenger (i.e. Whatsapp, iMessage, etc.)	24	17	0	0	41	0	7	27	4	2	1	41	10	31	41	1	7	9	22	2	41
	Others (please specify)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wikis	2	1	0	0	3	0	1	0	2	0	0	3	1	2	3	0	1	2	0	0	3
	Online meetings (i.e. Skype)	10	4	0	0	14	0	3	8	2	1	0	14	3	11	14	2	0	4	8	0	14
	Collaborative document-writing (i.e. Google docs)	15	16	0	0	31	0	5	20	4	1	1	31	9	22	31	2	3	9	16	1	31
	Meeting organiser (i.e. Doodle)	4	4	0	0	8	0	0	7	0	0	1	8	2	6	8	0	1	2	4	1	8
	Total	27	23	0	0	50	0	8	33	6	2	1	50	15	35	50	3	9	12	24	2	50
What additional functions, would you like to handle via collaboration software. (multiple answers...	Book a room	16	16	0	0	32	0	3	22	6	1	0	32	6	26	32	1	3	9	17	2	32
	Monitor meeting attendance of group members	8	11	0	0	19	0	3	13	3	0	0	19	7	12	19	0	6	4	8	1	19
	Monitor contribution of group members	13	14	0	0	27	0	3	19	3	2	0	27	6	21	27	2	3	7	14	1	27
	Feedback every group meeting in form of a "traffic light system"	4	5	0	0	9	0	0	8	1	0	0	9	3	6	9	1	1	3	4	0	9
	Compose groups by inviting people to join a certain group	7	6	0	0	13	0	0	11	2	0	0	13	3	10	13	1	2	5	5	0	13
	Look up contact details from a list of class participants	10	9	0	0	19	0	2	13	4	0	0	19	4	15	19	0	3	7	9	0	19
	Enable tutor to check the contribution of group members	7	11	0	0	18	0	2	13	1	1	1	18	5	13	18	1	2	4	10	1	18
	Visualisation of task responsibilities	16	13	0	0	29	0	2	19	5	2	1	29	6	23	29	0	2	8	17	2	29
	Peer evaluation	12	8	0	0	20	0	1	13	3	2	1	20	2	18	20	0	2	7	11	0	20
	Others (please specify)	0	1	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0	0	1	0	1
	Total	27	23	0	0	50	0	8	33	6	2	1	50	15	35	50	3	9	12	24	2	50
Please indicate how much you agree with the following statement: "I prefer to use collaborative t...	Strongly agree	1	3	0	0	4	0	1	3	0	0	0	4	1	3	4	0	0	1	2	1	4
	Agree	10	3	0	0	13	0	3	8	2	0	0	13	6	7	13	2	3	2	6	0	13
	Somewhat agree	2	2	0	0	4	0	0	3	0	1	0	4	0	4	4	0	0	2	2	0	4
	Neither agree nor disagree	3	7	0	0	10	0	0	9	1	0	0	10	3	7	10	1	4	2	3	0	10
	Somewhat disagree	5	4	0	0	9	0	1	6	2	0	0	9	3	6	9	0	1	2	6	0	9
	Disagree	5	3	0	0	8	0	2	3	1	1	1	8	2	6	8	0	1	3	4	0	8
	Strongly disagree	1	1	0	0	2	0	1	1	0	0	0	2	0	2	2	0	0	0	1	1	2
	Total	27	23	0	0	50	0	8	33	6	2	1	50	15	35	50	3	9	12	24	2	50
Final question I prefer collaboration tools in form of:	A smartphone app	4	5	0	0	9	0	3	6	0	0	0	9	6	3	9	2	2	1	4	0	9
	A desktop version	3	5	0	0	8	0	1	6	1	0	0	8	1	7	8	1	2	0	4	1	8
	Both (smartphone app and desktop version)	20	13	0	0	33	0	4	21	5	2	1	33	8	25	33	0	5	11	16	1	33
	Total	27	23	0	0	50	0	8	33	6	2	1	50	15	35	50	3	9	12	24	2	50

Please indicate how much you agree with the following statement: " I like group work."	How useful is group work to develop skills for your future job?						Do you agree that you can achieve a satisfying outcome (i.e. result, product, essay, etc.) with g...						Do you agree that you can achieve better results in a group than individually?					
	Extremely useful	Very useful	Moderately useful	Slightly useful	Not at all useful	Total	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Total	Definitely yes	Probably yes	Might or might not	Probably not	Definitely not	Total
Strongly agree	3	1	0	0	0	4	1	3	0	0	0	4	0	2	2	0	0	4
Somewhat agree	3	16	6	0	0	25	4	17	3	1	0	25	1	9	11	4	0	25
	21%	59%	21%	0%	0%	100%	17%	69%	10%	3%	0%	100%	3%	38%	45%	14%	0%	100%
Neither agree nor disagree	0	5	2	0	0	7	0	6	1	0	0	7	0	4	3	0	0	7
Somewhat disagree	0	9	5	1	0	15	0	3	4	8	0	15	0	3	3	6	3	15
Strongly disagree	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	1	1
	0%	56%	38%	6%	0%	100%	0%	19%	31%	50%	0%	100%	0%	19%	19%	38%	25%	100%
Total	6	31	14	1	0	52	5	29	9	9	0	52	1	18	19	10	4	52

Please indicate your current or targeted education level. (please choose the most recent)	Do you have experience with group work in higher educatio			Have you ever been part of a group work project, which			How many group working projects do you have per semester on average?						Please indicate how much you agree with the following statement: " I like group work."						How useful is group work to develop skills for your future job?						Do you agree that you can achieve a satisfying outcome (i.e. result, product, essay, etc.) with g...						Do you agree that you can achieve better results in a group than individually?					
	Yes	No	Total	Yes	No	Total	None	1-2 projects	3-4 projects	One per module	I don't know	Total	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Total	Extremely useful	Very useful	Moderately useful	Slightly useful	Not at all useful	Total	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Total	Definitely yes	Probably yes	Might or might not	Probably not	Definitely not	Total
University Undergraduate (BA, BSc or equivalent)	14	2	16	14	2	16	0	10	4	2	0	16	1	8	3	4	0	16	2	8	6	0	0	16	2	8	2	4	0	16	0	8	4	3	1	16
	88%	13%	100%	88%	13%	100%	0%	63%	25%	13%	0%	100%	6%	50%	19%	25%	0%	100%	13%	50%	38%	0%	0%	100%	13%	50%	13%	25%	0%	100%	0%	50%	25%	19%	6%	100%
University Postgraduate (PG-Dip, Msc, MBA, PHD, or other)	35	1	36	33	3	36	1	24	9	2	0	36	3	17	4	11	1	36	4	23	8	1	0	36	3	21	7	5	0	36	1	10	15	7	3	36
	97%	3%	100%	92%	8%	100%	3%	67%	25%	6%	0%	100%	8%	47%	11%	31%	3%	100%	11%	64%	22%	3%	0%	100%	8%	58%	19%	14%	0%	100%	3%	28%	42%	19%	8%	100%
Total	49	3	52	47	5	52	1	34	13	4	0	52	4	25	7	15	1	52	6	31	14	1	0	52	5	29	9	9	0	52	1	18	19	10	4	52

		Have a look at the examples of collaboration software solutions mainly for business purposes. Ple...										Please indicate what you have used during your previous group work experiences. (multiple answers...									What additional functions, would you like to handle via collaboration software. (multiple answers...										Please indicate how much you agree with the following statement: "I prefer to use collaborative t...							Final question I prefer collaboration tools in form of:			
		Slack	Trello	Podio	Skype for Business	Asana	Ryver	G Suite	Wrike	Others (please specify)	Total	Social media (i.e. Facebook)	Dropbox	Document sharing (i.e. IMessage, etc.)	Messenger (i.e. Whatsapp,	Others (please specify)	Wikis	Skype)	Online meetings (i.e.	Collaborative document writing (i.e. Google docs)	Meeting organiser (i.e. Doodle)	Total	Book a room	Monitor meeting attendance of group	Monitor contribution of group members	meeting in form of a "traffic	Feedback every group	people to join a certain	Compose groups by inviting	a list of class participants	Look up contact details from	contribution of group	Enable tutor to check the	responsibilities	Visualisation of task	Peer evaluation	Others (please specify)	Total	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree	Total	A smartphone app	A desktop version	Both (smartphone app and desktop version)	Total
Please indicate your current or targeted education level. (please choose the most recent)	University Undergraduate (BA, BSc or equivalent)	0	1	0	6	0	0	2	0	5	12	15	7	10	0	1	3	9	2	15	6	7	6	3	3	4	5	6	2	1	15	1	6	0	3	3	2	0	15	6	1	8	15
		0%	8%	0%	50%	0%	0%	17%	0%	42%	100%	100%	47%	67%	0%	7%	20%	60%	13%	100%	40%	47%	40%	20%	20%	27%	33%	40%	13%	7%	100%	7%	40%	0%	20%	20%	13%	0%	100%	40%	7%	53%	100%
	University Postgraduate (PG-Dip, Msc, MBA, PHD, or other)	8	3	2	11	1	0	2	1	12	29	31	30	31	0	2	11	22	6	35	26	12	21	6	10	15	13	23	18	0	35	3	7	4	7	6	6	2	35	3	7	25	35
		28%	10%	7%	38%	3%	0%	7%	3%	41%	100%	89%	86%	89%	0%	6%	31%	63%	17%	100%	74%	34%	60%	17%	29%	43%	37%	66%	51%	0%	100%	9%	20%	11%	20%	17%	17%	6%	100%	9%	20%	71%	100%
	Total	8	4	2	17	1	0	4	1	17	41	46	37	41	0	3	14	31	8	50	32	19	27	9	13	19	18	29	20	1	50	4	13	4	10	9	8	2	50	9	8	33	50

		How many group working projects do you have per semester on average?					
		None	1-2 projects	3-4 projects	One per module	I don't know	Total
Please indicate your faculty/ university department.	Engineering	0	1	2	0	0	3
	Humanities & Social Sciences	0	7	2	0	0	9
	Science	1	10	1	1	0	13
	Business	0	15	7	3	0	25
	Other (please specify)	0	1	1	0	0	2
	Total	1	34	13	4	0	52

		How many group working projects do you have per semester on average?					
		None	1-2 projects	3-4 projects	One per module	I don't know	Total
Please indicate your faculty/ university d	Engineering	0%	33%	67%	0%	0%	
	Humanities & Social Sciences	0%	78%	22%	0%	0%	
	Science	8%	77%	8%	8%	0%	
	Business	0%	60%	28%	12%	0%	
	Other (please specify)	0%	50%	50%	0%	0%	
	Total	2%	65%	25%	8%	0%	

		How many group working projects do you have per semester on average?					
		None	1-2 projects	3-4 projects	One per module	I don't know	Total
Please indicate your current or targeted education level. (please choose the most recent)	University Undergraduate (BA, BSc or equivalent)	0	10	4	2	0	16
	University Postgraduate (PG-Dip, Msc, MBA, PHD, or other)	1	24	9	2	0	36
	Total	1	34	13	4	0	52

		How many group working projects do you have per semester on average?					
		None	1-2 projects	3-4 projects	One per module	I don't know	Total
Please indicate your current or targeted education level. (please choose the most recent)	University Undergraduate (BA, BSc or equivalent)	0%	63%	25%	13%	0%	100%
	University Postgraduate (PG-Dip, Msc, MBA, PHD, or other)	3%	67%	25%	6%	0%	100%
	Total	2%	65%	25%	8%	0%	100%

C. Interviews and meetings

ID	Date	Participants	Name	Category	MOM	Overview	Consent Form signed
M1	18.07.2017	Donna Brawley, Emily Lawty, Michael Hughes, Christopher Wilson	Mobile App meeting	technical	Yes	No	No
M2	19.07.2017	John Palmer & Graham Christie	SfB- Live Demonstration	technical	Yes	No	No
I1	21.07.2017	Agnes Branny	SfB- understanding	technical	Yes	Yes	Yes
I2	21.07.2017	Michael Aherne, Michael Hughes	Myplace- understanding	technical	Yes	Yes	Yes
I3	25.07.2017	Debbie Willison	Pedagogical framework of group work	pedagogical	Yes	Yes	Yes
M3	26.07.2017	Alistair Campbell	Myplace- getting started	technical	Yes	No	No
I4	27.07.2017	Conor McBride	Lecturer view I	pedagogical	Yes	Yes	Yes
M4	27.07.2017	Donna Brawley, Emily Lawty	Content Review Workshop - Part 1	technical	Yes	No	No
M5	28.07.2017	Donna Brawley, Emily Lawty	Content Review Workshop - Part 2	technical	Yes	No	No
I5	31.07.2017	Mark Dunlop	Lecturer view II	pedagogical	Yes	Yes	Yes
I6	01.08.2017	Russell Matthews	Lecturer view III	pedagogical	Yes	Yes	Yes
I7	02.08.2017	Donna Brawley	Wrap- up	technical	Yes	Yes	Yes
I8	07.08.2017	Christopher Wilson, Robert Greer	Strathclyde App	technical	Yes	Yes	Yes

C.1 I1

Interview Notes				
SfB- understanding				
Interviewer:	Date:	Start time:	End time:	Duration:
Theodor Geist	21.07.2017	09:30	10:15	45 min
Interview ID			I1	
Interviewee name			Agnes Branny	
Department			Programme Management Office	
Interviewee job title			Project Co- Ordinator	
Interviewee contact telephone number			+44(0)1415482716	
Interviewee contact E- Mail address			agnes.branny@strath.ac.uk	
Initial purpose of interview			SfB is a tool for collaborative communication and has valuable features for collaborative working. As a "strategic project", the University of Strathclyde is enabling the entire professional staff of the university with SfB. The interview is used to verify, whether it is possible to provide SfB to the students as well.	
Main notes from interview			- startegic project of the university to enable 6500 people - staff and research students' accounts are based on Microsoft Exchange - taught students' accounts are based on Microsoft Office 365 --> that is the main reason why it is not possible yet, to provide all students with SfB	
New thoughts due to the interview			- talk to the department IS Infrastructure (Ronnie Gibson & Allen Woods) to find out more of the interrelation between O365 and Exchange	

Minutes- of -meeting → SfB- understanding

- Agnes is part of project since Apr 2016
- Strathclyde consist out of staff and 4 main faculties
    - Faculties have their own decision power
- Projects which cover all faculties and staff are called "strategic projects"
    - SfB is a strategic project
- There has been a survey among staff members on how they communicate
- Based on the existing costs, Agnes estimated costs per year per head of an additional £ 7
- Project focusses on 6500 people (staff and postgraduate research students)
- Plans for afterwards:
    - 25% go straight ahead
    - 75% wait until they must use SfB
    - Dedicated person per every department has been assigned to move the project forward after rolling out
- Staff Microsoft accounts are based on Microsoft Exchange and students are based on Microsoft Office 365
    - This is the main reason, why SfB is not provided yet to the students as well
    - All employees had to be moved to O365 in that case
    - Money and effort issue
    - SfB on O365 and SfB on exchange do not work with each other.

C.2 I2

Interview Notes				
Myplace- understanding				
Interviewer:	Date:	Start time:	End time:	Duration:
Theodor Geist	21.07.2017	10:30	12:00	90 min
Interview ID			I2	
Interviewee name			Michael Aherne	Michael Hughes
Department			IS Business Systems	IS Business Systems
Interviewee job title			Senior Applications Analyst/Developer	Senior Applications Analyst/Developer
Interviewee contact telephone number			+44 (0)141 548 4425	+44 (0)141 548 3905
Interviewee contact E- Mail address			michael.aherne@strath.ac.uk	michaelhughes@strath.ac.uk
Initial purpose of interview			The University of Strathclyde is working with moodle as the virtual learning environment (VLE). The interviewer wants to verify, in what ways, moodle can help to provide a better group work experience to the students.	
Main notes from interview			- moodle can provide almost any feature, either already existing or developed- to- order by the developers of the - lecturers are responsible to set up their page on myplace for their subject - following, they decide on how the page is structured or what feature will be made available - only makes sense to provide features if lecturer needs evidence - the main idea of moodle is to share content and provide evidence for the lecturer on the work of students - launchpad logic for external software/ programmes is best practice - visualisation of structure of moodle and of decision process "how/ if to provide group working features for a group" - contact Russel Matthews from Entrepreneurship Studies - use demo class to explain all default available features	
New thoughts due to the interview			- Should students or lecturers decide on how to do group	

Minutes- of- meeting → Myplace- understanding

- In 2008 different VLE's were reviewed
- Decision for moodle since it is an open source product and very flexible
- Michael Aherne and Michael Hughes are responsible for that and therefore experienced developers
- According to their understanding it is "a bag of tools" rather than a solution and it is not a polished product
- Moodle has plenty of tools available but it is the lecturers' responsibility to set up the page for each classes
    - Following the lecturer decides what feature to make available and what not
    - Should students or lecturers decide on how to do group work?!
    - Moodle only provides tools, if lecturer wants evidence for something
    - Not providing tools without a purpose of the lecturer
    - Feedback from students to lecturer is important
    - Find out what issues lecturers have with group work
- The main idea of moodle is to share content and provide evidence for the lecturer on the work of students
    - Not just to provide tools, to give students possibilities without a purpose for the lecturer
- Structure
    - Category- class- sections (topics)- activities or resources
    - Many categories are possible
    - Group work tool would be in sections as an activity
    - Pay attention to context one class with respect to other class with deadlines or similar things
- Many group work tools are existing
    - Peer evaluation
    - Attendance
    - Forum
    - Wiki
    - Poll
    - Chat
    - Etc.
- Demo.moodle.net → demo user
- Michaels offer trainings to lecturers but this opportunity is not always used
- Give inside on "blended learning"
- Decision process
    - Visualize
- Use moodle as launchpad for i.e. O365, google docs or SfB
- "learning enhancement community"
    - Howard Ramsey
- "information strategy community"
- Russel Matthews
    - Entrepreneur
    - App on group work

C.3 I3

Interview Notes				
Pedagogical framework of group work				
Interviewer:	Date:	Start time:	End time:	Duration:
Theodor Geist	25.07.2017	10:00	10:30	30 min

Interview ID	I3
Interviewee name	Dr Debbie Willison
Department	Pure and Applied Chemistry/ Vice Dean Academic for the Faculty of Science
Interviewee job title	Principal Teaching Fellow
Interviewee contact telephone number	+44 (0)141 548 3281
Interviewee contact E- Mail address	d.willison@strath.ac.uk
Initial purpose of interview	Since Debbie's current research interests lie in the area of pedagogical development, the researcher wants to interview her, to learn more about the universities view of motiviation. Investigating on teaching guidelines regarding group work, etc.
Main notes from interview	- conflict of interests for lecturers since first priority is research not teaching - STEP (Strathclyde Teaching Excellence Programme) for lecturers on University of Strathclyde - enhance focus on future requirements, especially in postgraduate studies - together with John Levine, planning to introduce "Learning Technologist" - SPELT worth a look
New thoughts due to the interview	

Minutes- of- meeting → Pedagogical framework of group work

- Conflict of interest of providing first class lectures and proceeding in research for lecturers
    - Research is what gets you promoted
- Engineering big in group work
- STEP- (Strathclyde Teaching Excellence Program) → teaching certificate for lecturers
    - Only for new lecturers
- Debbie's opinion is to create awareness of what business world requires than only focusing on study content
    - Since postgraduate studies are mainly for increase job opportunities
    - This is how you help the students
    - Transferable skills
    - Gave a course in her department (Pure and Applied Chemistry) on global implications, ethics, culture, business, group building, etc.
- Student transition
    - Transitioning in- transitioning through- transitioning out
- QA → teaching excellence framework
- Personal development planning → framework
- Together with John Levine, planning to introduce "Learning Technologist"
- SPELT → case studies

C.4 I4

Interview Notes				
Lecturer view I				
Interviewer:	Date:	Start time:	End time:	Duration:
Theodor Geist	27.07.2017	15:00	16:00	60 min
Interview ID			I4	
Interviewee name			Dr Conor McBride	
Department			Computer and Information Sciences	
Interviewee job title			Reader	
Interviewee contact telephone number			+44 (0)141 548 3172	
Interviewee contact E- Mail address			conor.mcbride@strath.ac.uk	
Initial purpose of interview			Conor is lecturer in the computer science department of Strathclyde University and won several rewards for innovative learning. Therefore, it is interesting to learn more about his thoughts regarding group work in higher education.	
Main notes from interview			- informal group work always happens problem: not everyone understand/ solves problems --> freeriding happens actively as well as passively - size of group and task has big impact on group success, as well as group composition - work has to be parallizable - not much sense to create functionalities which are already existing - students will then project truth rather than record truth as soon as lecturer is involved contact Mark Dunlop for group assessment tool	
New thoughts due to the interview				

Minutes- of- meeting → Lecturer view I

- He is not doing group work since teaching programming
- Group work has to fit the content
- Group work for Conor is applying skills
- Informal group work always happens
- Problem: not always the case that everyone understands and solves the problem or contributes equally in the group
- Size of group is important, so it fits to work load
- Work has to be parallelizable for all group members
- Group composition is crucial
    - Either balanced team
    - Or equal ability teams
- Assessment of all group members
    - Always human component for both: lecturer assessment as well as peer evaluation
- Students need to understand the assessment mechanisms in advance
- Student solidarity is smaller than Conor thought
- Not using myplace
    - All he does is to link via myplace
    - Uses get it for coding exercises and collaborative document writing
- In group work it is important to make visible what every individual student has contributed, so they feel more committed and lecturer can grade better
- Not much benefits in creating functionalities, which are already out there
- Issues regarding polished version as soon as lecturer is involved and real platform like parallel on facebook, where teacher cannot see what is happening
    - Anything on university solution will be ‘‘projection of truth’’ rather than ‘‘recording of truth’’
- Contact Mark Dunlop, since he built a tool for peer assessment in group work
- Take all challenges from literature review and show best practices based on all interviews

C.5 I5

Interview Notes				
Lecturer view II				
Interviewer:	Date:	Start time:	End time:	Duration:
Theodor Geist	31.07.2017	12:00	13:00	60 min

Interview ID	I5
Interviewee name	Dr Mark Dunlop
Department	Computer and Information Sciences
Interviewee job title	Senior Lecturer
Interviewee contact telephone number	+44 (0)141 548 3497
Interviewee contact E- Mail address	mark.dunlop@strath.ac.uk
Initial purpose of interview	Since Conor recommended me to contact Mark for his self-created peer assessment tool, it is interesting to learn more about that tool, as well as Marks thoughts about group work.
Main notes from interview	- group assessment tool see attachments - rate your personal performance with paragraph and then rate your team members with grades on criteria, (3rd part with paragraph for each member would be nice) - some literature suggest to let group suggest the criteria --> in practice it is done by Mark - myplace function on group allocation is nice - offers support during group work but not actively involves
New thoughts due to the interview	

Minutes- of- meeting → Lecturer view II

- Group assessment
    - Rate your personal performance
    - Rate group members performance
- Assessment criteria must be clear before beginning of task
    - Some literature suggests to let group members suggest criteria
        - Takes too much time, Mark is providing it
- Group assessment TOOL
    - Part A
        - Paragraph about myself
    - Part B
        - Rating of group members, but only in total and not per criteria
        - Mark would like to change that
    - (Part C)
        - Could also be a paragraph for every group member
- Result of the tool is a strong indication and can be adjusted manually
- Creates a big data base php
- Knows that myplace feature exists but never checked it out
- Uses myplace for slide sharing, uploads, grades and notification
- Forums are great according to him
- Convinced that during group work, grades should be given individually and not per group
- He does not put his head in groups during process, only provides support on request
- Group composition is challenge
    - ‘‘Equal ability group’’
        - High performer in one group and low performer in other group
        - Favourite of mark
        - Think about other approach to allocate equally
            - Not a handicap race
            - Point is to get the best collaboration
    - Best practice is self-allocation in terms of effort and time
        - Solution via myplace is great

C.6 I6

Interview Notes				
Lecturer view III				
Interviewer:	Date:	Start time:	End time:	Duration:
Theodor Geist	01.08.2017	10:00	11:00	60 min

Interview ID	I6
Interviewee name	Dr Russell Matthews
Department	Hunter Centre for Entrepreneurship
Interviewee job title	Lecturer
Interviewee contact telephone number	+44 (0)141 548 3964
Interviewee contact E- Mail address	russell.matthews@strath.ac.uk
Initial purpose of interview	To contact Russell was suggested by Michael Hughes and Donna Brawely. He is an innovative teacher and does a lot of group work. His thoughts will be interesting and valuable for the dissertation.
Main notes from interview	- students always tell their problems to late to teachers - evidence of meetings, contribution, etc is the most important --> transparency - transparency could be rewarded with a 5 point incentive - for example group has to log in some data on myplace which give evidence of interim targets, if it is well maintained, group will get 5 points - like Debbie, priority 1 is research and not teaching --> bot to much time and thoughts into group work - does not use my place himself, since secretary of department is doing that - good students are flagships and should be supported - not pulling everyone to middle - is offering support but not actively - mentions that he could also tell many positive aspects but the researcher only asked him for challenging aspects
New thoughts due to the interview	

Minutes- of- meeting → Lecturer view III

- Peer assessment
    - Evidence of meetings
    - Gives you also a rope to hang yourself
        - Since you could deal with issues like unfair treated students by group members etc.
- Students always tell their problems too late to lecturer
- If group doesn't work, you work it out yourself → like in real life
- For him consistency of response, processes and input is crucial
- Transparency of groups for further assessment by filling out a weekly record form
    - Incentive for group to have like 5 points for filling out properly
- Again: lecturer have conflict of interest, since publishing research is what promotes them, teaching is second on priority
- Russell uses myplace but not directly since department is doing it for him
- Is open or maybe even hoping for support via myplace
- Agrees that as soon lecturer is involved it will be projection of truth
- Is offering support but prefers not to step into group work process
- Group allocation
    - Practical: randomly or self-allocation
    - Equal ability groups vs balanced groups
        - If you drag everyone in the middle is not good
        - Good students are flagships of university (success in future career leads back to university) → focus on them and make them even better
- All interviews about problems
    - Lecturers could have talked hours on positive things group work gives them

C.7 I7

Interview Notes				
Wrap- up				
Interviewer:	Date:	Start time:	End time:	Duration:
Theodor Geist	02.08.2017	14:00	14:45	45 min

Interview ID	I7
Interviewee name	Donna Brawley
Department	IS Business Systems
Interviewee job title	Collaboration Services Manager
Interviewee contact telephone number	+44 (0)141 548 4175
Interviewee contact E- Mail address	donna.brawley@strath.ac.uk
Initial purpose of interview	Donna is my project sponsor for this project. Subsequently, it is important to have a final wrap- up meeting to present my findings and intermediate results and verify if I am still going in the right direction.
Main notes from interview	- focus on problem statement - talk to chris for mock- ups - book a room --> have a look at telepen - agile with MVP - create solutions for challenges to then take them to requirements catalogue - root cause analysis
New thoughts due to the interview	

Minutes- of- meeting → Wrap- up

- Is problem statement same as research question?
    - Formulate it in analysis
        - See example in Donna's presentation
    - Focus on answering that question and not everything
    - Consider making better for lecturer as well as students
- Talk to Chris for mock up
    - Group work or booking room
        - Visualization
- Book a room (Emily & Chris)
    - API costs £ 5000
    - Company telepen
        - Offers more solutions
        - Not in every building. Only in library in 6 rooms so far
            - keypad
    - Solutions for all rooms will require a public tender as soon as it reaches a certain level of costs
- Agile
    - Explain and show when it makes sense to apply and when not
        - Use Minimum Viable Product to explain
    - Show MVP for short term (peer assessment), medium term and long term (book a room system for all rooms and all stakeholders)
    - MVP can be piloted first for testing with limited amount of people i.e. only postgraduates, or only CIS students, etc.
    - Rank all of possible sprints
- New building → group working rooms not decided yet
- Shortage of employees are also issue for all potential improvements
- Need to formulate solution for all challenges (requirements catalogue)
    - Then can order the sprints
- Root cause analysis
    - Show chain reaction how it all ends up in student experience (university driver) eventually
    - What comes with group work
    - If you can improve group work → what are the benefits (Context diagram)

C.8 I8

Interview Notes				
Strathclyde App				
Interviewer:	Date:	Start time:	End time:	Duration:
Theodor Geist	07.08.2017	14:00	14:45	45 min
Interview ID			I8	
Interviewee name			Robert Greer	Christopher Wilson
Department			IS Business Systems	IS Business Systems
Interviewee job title			Applications Analyst/ Developer	Front End Web Designer
Interviewee contact telephone number			+44 (0)141 548 4821	+44 (0)141 548 3992
Interviewee contact E- Mail address			robert.greer@strath.ac.uk	christopher.wilson@strath.ac.
Initial purpose of interview			"The University of Strathclyde app gives you instant, real-time access to campus resources and information" (University_of_Strathclyde, 2017b). Subsequently, the researcher investigates, what potential features of the app, could support the students during group wok.	
Main notes from interview			- "book a room" mockups - Peer evaluation possible, but would not solve the initial problem - service integration like on myplace - push notifications per group possible - why would a user rather use the app then myplace? - everything which involves lecturer should be on myplace - pegaus - myplace- app	
New thoughts due to the interview				

Minutes- of- meeting → Strathclyde App

- Book a room
    - Cost use benefit
- Peer evaluation
    - Same problem like in my place
        - Teacher have to make it available
    - Why would students rather do it in the app than on myplace?
        - Probably there is no reason
        - Design for small screen is a challenge
- Service integration
    - Content is not for social media
        - Public available or privat
        - Content is hidden by login
    - For i.e. google docs it could be ‘‘entrance ’’like myplace solution
- Push notifications
    - API myplace → APP
        - Need to identify user and the group (mechanism for that)
    - Push notifications so far only via
        - Myplace
        - Oracle through app team
            - No user interface yet
- Messenger
    - Database development
    - Ad hoc group
- Most things are existing on myplace and therefore its nonsense to put in app
    - Again all what’s for evidence for lecturers should be on official VLE
    - For other stuff, university does not want to get involved and therefore not providing it
- Pegasus- myplace- app
    - Show connection
    - Pegasus for administrative functions
- Mention gap analysis during requirements

C.9 M1

Minutes- of- meeting → Mobile App Meeting

- Moodle user group
- Group work spaces planning- Emily
    - Infrastructure
    - Room booking
    - Room checking in
- Classical processes of group work
    - Physical & digital
    - What tools
- Moodle → SfB
- Ashraf → Architecture planning (see his presentation)
- Distance learning → physical space
- Anna scanned student ID with little gadget which can be used for meetings to check in and proof attendance

C.10 M2

Minutes- of- meeting → Knowledge sharing session

- Show presence (traffic light system)
- Name, email, DS username – they all work
- Desktop sharing
    - Also includes control (can type on other desktop)
    - Same software is not required
        - Like photo editing
- "consumer skype" and SfB is not working well with each other
- → discuss pro & con between "face to face "and "skype" conversation/ discussion
- Consumer skype can have 25 participants vs SfB 250 participants
    - 25 enough for group work
- Other features
    - White board
    - Poll
    - Q&A
- Check learning page on Strathclyde website

C.11 M3

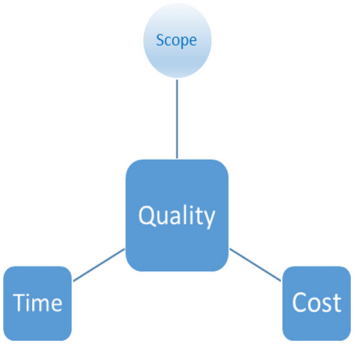
Minutes- of- meeting → Myplace- getting started

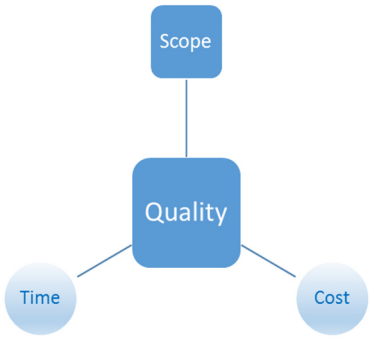
- Activity is an interaction with students
- Not only among students → lecturer always involved
- Moodle and blackboard are main players
- SEE scratch diagram on notes
- Moodle in Strathclyde since August 2000
- Read support pages on website
- Use test class to find out more about tools

C.12 M4 & M5

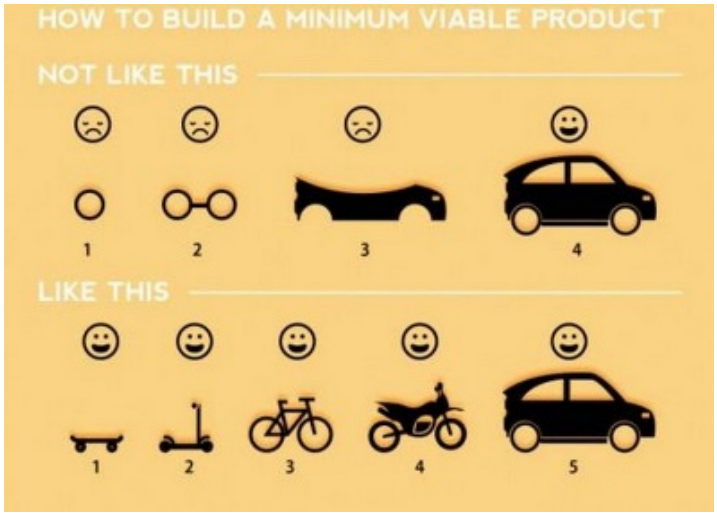
<u>Minutes- of- meeting → Content Review Workshop I & II</u>

- Workshop regarding new web site from Strathclyde University
    - Website, Strathclyde app, Libguides, service catalogue
- Communications strategy 2016-2020
- Exercise 1
    - Use case and fill in: actions, info: search
- Agile methodology
    - Agile vs waterfall





    - Minimum viable product



- Exercise 2
    - Places actions to search term boxes
- Exercise 3
    - Should it stay or should it go
        - Discussing landing pages on library pc as well as lab pc
- MSCoW
- Exercise 3
    - Moscow for aspects on landing page

D. Requirements

D.1 Requirements list

No	Name	Category
R1	Link access for group work rooms (pin)	Coordination
R2	Social Media	Information sharing
R3	Project Management	Coordination
R4	push notifications	Communication
R5	Audio / Video Conferencing	Communication
R6	Chat / Messaging	Communication
R7	Communication external	Communication
R8	Communication internal	Communication
R9	Team chat live	Communication
R10	Voice mail	Communication
R11	Calendar integration	Coordination
R12	Contact Management	Coordination
R13	Group Calendars	Coordination
R14	Meeting schedule	Coordination
R15	Reminder	Coordination
R16	Task Management	Coordination
R17	To do list with assigned responsibilities	Coordination
R18	Grading	Information sharing
R19	Group finding	Coordination
R20	Brainstorming	Information sharing
R21	Content Management	Information sharing
R22	Cooperative Writing	Information sharing
R23	Discussion Boards	Information sharing
R24	Document Management	Information sharing
R25	Sharing	Information sharing
R26	Synchronous Editing	Information sharing
R27	Upload to myplace	Information sharing
R28	Attendance of members	Coordination
R29	Evaluation	Coordination
R30	Feedback	Coordination
R31	Log of everything	Coordination
R32	Newsfeed	Coordination
R33	Version Control	Information sharing
R34	real time update	Information sharing
R35	Screen sharing	Information sharing
R36	statistics per user	Coordination
R37	whiteboarding	Information sharing
R38	doodle	Coordination

R39	prioritisation	Coordination
R40	deadlines, so rest of group can go on	Coordination
R41	seen (like in whatsapp)	Coordination
R42	group messaging, direct messaging	Communication
R43	Progress bar	Coordination
R44	service integration (dropbox, google docs, etc.)	Coordination
R45	alerts	Communication
R46	link rooms for groupwork with pins	Coordination
R47	tool against free- rider	Coordination
R48	Time management	Coordination
R49	Intermediate goals have to be ticked as complete by every member	Coordination
R50	reviewing group process via app	Coordination
R51	Live presence- Display your presence status to notify others about your availability	Coordination
R52	peer reviewing (for documents)	Coordination
R53	workflow history	Coordination

D.2 Requirements catalogue

ID	Name	Business Area	Existing	Application	Available via University of Strathclyde	Sprint
F-001v1-0	Book a room (mobile)	Coordination	Yes	telepen	No	tbn
F-002v1-0	Peer review	Coordination	Yes	"myplace"	Yes	tbn
F-003v1-0	Task management	Coordination	Yes	Microsoft Planner	No	tbn
F-004v1-0	Meeting schedule	Coordination	Yes	Microsoft Outlook Calendar	No	tbn
F-005v1-0	Contact management	Coordination	Yes	Microsoft People, "myplace"	Yes	tbn
F-006v1-0	Group allocation	Coordination	Yes	"myplace"	Yes	tbn
F-007v1-0	Push notifications	Communication	Yes	"myplace", Strath App	No	tbn
F-008v1-0	Audio/ video conferencing	Communication	Yes	Skype for Business	No	tbn
F-009v1-0	Messenger	Communication	Yes	Whatsapp, iMessage	No	tbn
F-010v1-0	Calendar	Coordination	Yes	Microsoft Outlook Calendar	Yes	tbn
F-011v1-0	Grading	Information sharing	Yes	"myplace"	Yes	tbn
F-012v1-0	Brainstorming	Information sharing	Yes	Group Scribbles	No	tbn
F-013v1-0	Content Management	Information sharing	Yes	google drive	No	tbn
F-014v1-0	Collaborative document editing	Information sharing	Yes	google docs	No	tbn
F-015v1-0	Workflow statistics	Information sharing	Yes	google drive	No	tbn
F-016v1-0	Member status	Coordination	Yes	Skype for Business	No	tbn

Last update 13.08.2017

➔ PLEASE FIND A PAGE FOR EACH REQUIREMENT ON THE NEXT PAGES

Requirements catalogue				
Book a room (mobile)				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-001v1-0	in development	1/1

Requirement ID	F-001v1-0
Requirement name	Book a room (mobile)
Business Area	Coordination
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to book a room for group work and have an overview of all available rooms via the Strath App. Furthermore, the user can select the preferred time slot as long as it is free to book. When booking the room for a group, all group members should be registered for the meeting. That enables the telepen solution to keep track of the attendance of all members during the group meeting.
Acceptance criteria	A test user has to open the Strath App and find the feature to book a room. He must be able to distinguish between blocked and free rooms in certain time slots. Furthermore, the provided pin must opene the room.
Rational	The user will be able to check all available rooms for group work and see the available time slots as well. Furthermore, the user can add all expected participants to monitor attendance.
Comments (Domain Expert)	Concept is ready but the API for telepen is to expensive.
Comments	Even though the concept with telepen technology is ready, there is only a small number of rooms on the campus, equipped with telepen hardware yet. Subsequently, investments for hardware and the API are expected.
	Rank 1 in the questionnaire for students with 64% of all participants. Furthermore, 38% voted for attendance monitoring.
Current obstacles	Costs of API and not all rooms are equipped with telepen hardware
Related requirements	F-004v1-0, F-005v1-0, F-010v1-0
Related challenges	C4
Resolution	tbn

Requirements catalogue				
Peer review				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-002v1-0	available	1/1

Requirement ID	F-002v1-0
Requirement name	Peer review
Business Area	Coordination
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to evaluate the group members based on previously defined characteristics. The user shall be able to evaluate every individual group member as well as the personal contribution.
Acceptance criteria	n.a.
Rational	The user will be able to evaluate the contribution of each team member. The feedback is then used by the leacturer to achieve a fair and individual marking per each student.
Comments	Rank 4 in the questionnaire for students with 40% of all participants.
Current obstacle	The feature is available via "myplace". However, it is not used by all lecturers.
Related requirements	F-002v1-0, F-005v1-0, F-011v1-0, F-015v1-0
Related challenges	C6, C7, C8, C9, C12
Resolution	tbn

Requirements catalogue				
Task management				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-003v1-0	in development	1/1

Requirement ID	F-003v1-0
Requirement name	Task management
Business Area	Coordination
Source	Researcher, Theodor Geist
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to visualise task responsibilities, prioritise tasks, and assign statuses to each tasks. This visiaulisation and allocation of the tasks should be made available to the lecturer online.
Acceptance criteria	A test group should identify potential tasks and assign them to differen group members. Furthermore, they should change progress status of tasks and make it visable to all group members as well as the lecturer.
Rational	A visualisation of task responsibilities makes group members more commited (Tang et al., 2014). Furthermore, features as prioritisation and statuses improve the process of group work.
Comments	Microsoft Planner is one of a potential solution.
	Rank 2 in the questionnaire for students with 58% of all participants.
Current obstacle	Microsoft Planner is not part of O365ProPlus and there is no other solution available via the university.
Related requirements	F-002v1-0, F-005v1-0, F-007v1-0, F-012v1-0, F-013v1-0
Related challenges	C1, C2, C4, C7, C9, C10, C11
Resolution	tbn

Requirements catalogue				
Meeting schedule				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-004v1-0	available	1/1

Requirement ID	F-004v1-0
Requirement name	Meeting schedule
Business Area	Coordination
Source	Researcher, Theodor Geist
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to schedule group meetings, keep a history of them and insert the meeting into a digital
Acceptance criteria	n.a.
Rational	Group meetings are a crucial aspect of group projects. To included all members, an intelligent solution has to support all members, who have different schedules .
Comments	Already available via Microsoft Office 365 ProPlus-outlook calendar.
Current obstacle	no obstacle
Related requirements	F-001v1-0, F-005v1-0, F-007v1-0, F-010v1-0
Related challenges	C1, C3, C4, C10
Resolution	tbn

Requirements catalogue				
Contact management				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-005v1-0	available	1/1

Requirement ID	F-005v1-0
Requirement name	Contact management
Business Area	Coordination
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to identify all group members and have access to their contact details in form of the E-Mail address.
Acceptance criteria	A test user must look up on "myplace" whether the information regarding his assigned group is recorded.
Rational	Students already have access to a class list with all names of the participants on "myplace". However, this does not consider any alocation to groups.
Comments	The information regarding group allocation of every user is the information which relates the most with almost all other functionalities.
Current obstacle	The allocation of groups is not documented in real time in "myplace". Since this information is not available, groups can also not be allocated in the contact section.
Related requirements	F-001v1-0, F-002v1-0, F-003v1-0, F-004v1-0, F-006v1-0, F-007v1-0, F-008v1-0, F-009v1-0, F-010v1-0, F-015v1-0, F-016v1-0
Related challenges	C1, C2, C3, C5, C10
Resolution	

Requirements catalogue				
Group allocation				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-006v1-0	available	1/1

Requirement ID	F-006v1-0
Requirement name	Group allocation
Business Area	Coordination
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to select by choice, which group he wants to join. He shall be able to either join an existing group or to create a new group, open to join for other users.
Acceptance criteria	n.a.
Rational	If the group allocation was not dictated by the lecturer and the students had the free choice to form groups, this requirement is applicable.
Comments	Already existing, but the lecturer has to actively activate this activity via "myplace".
Current obstacle	n.a.
Related requirements	F-005v1-0
Related challenges	C5, C7, C10, C12
Resolution	

Requirements catalogue				
Push notifications				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-007v1-0	in development	1/1

Requirement ID	F-007v1-0
Requirement name	Push notifications
Business Area	Communication
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to receive push notifications related to his assigned group only. Potential push notifications could occur in case a group member posted, commented, or uploaded something in the group.
Acceptance criteria	A test user gorup has to be created and one member has to post a note into the group space. All other group members should receive a push notification.
Rational	Push notifications enhance the communication among group members. It helps to stick to deadlines as well as get notified in case of any new updates within the group.
Comments	Push notifications are already existing. However, not for one specific student group.
Current obstacle	No group space available, which only gives access to group members. Currently only possible among all members of one entire class.
Related requirements	F-003v1-0, F-004v1-0, F-005v1-0, F-009v1-0, F-010v1-0
Related challenges	C2
Resolution	

Requirements catalogue				
Audio/ video conferencing				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-008v1-0	in development	1/1

Requirement ID	F-008v1-0
Requirement name	Audio/ video conferencing
Business Area	Communication
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to start a video or audio conference within the group. He shall be able to call a single user as well as make a multi user call.
Acceptance criteria	A test user needs to log in into O365 and access the Microsoft Service Skype for Business.
Rational	Video or audio conferences are more dynamic than written communication. Therefore video or audio conferencing provides a benefit during group dicussions or quick explanations of complex situations.
Comments	See Skype for Business. It is part of O365 but not enabled by the University due to strategic decisions.
Current obstacle	Strategic decision has to be reviewed again.
Related requirements	F-005v1-0, F-009v1-0
Related challenges	C2
Resolution	

Requirements catalogue				
Messenger				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-009v1-0	in development	1/1

Requirement ID	F-009v1-0
Requirement name	Messenger
Business Area	Communication
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to have a chat with one group member or all group members. This chat should be an instant chat.
Acceptance criteria	A test user has to write a message to one group member as well as another message to all group members at the same time.
Rational	If one user is currently not available an instant messenger is a valauble tool, since it can be read later and all communications can be tracked back on detail.
Comments	Reference to Whatsapp or iMessage
Current obstacle	No group space available, which only gives access to group members.Currently only possible among all members of one entire class.
Related requirements	F-005v1-0, F-007v1-0, F-008v1-0
Related challenges	C2
Resolution	

Requirements catalogue				
Calendar				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-010v1-0	available	1/1

Requirement ID	F-010v1-0
Requirement name	Calendar
Business Area	Coordination
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to create a calendar entry, where he shall be able to invite the desired participants.
Acceptance criteria	n.a.
Rational	The coordination of grup meetings is one essential challenge of group work. Therefore, a tool to suggest and confirm group meetings is vital.
Comments (Domain Expert)	Already exists via Microsoft Outlook
Current obstacle	n.a.
Related requirements	F-001v1-0, F-004v1-0, F-005v1-0, F-007v1-0
Related challenges	C1, C3, C4
Resolution	

Requirements catalogue				
Grading				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-011v1-0	available	1/1

Requirement ID	F-011v1-0
Requirement name	Grading
Business Area	Information sharing
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to access the personal grades via a CSCL application.
Acceptance criteria	n.a.
Rational	Grades are an imprtant information for the students. Therefore, a medium which transfers the information from the lecturers to the students is a valueable tool.
Comments (Domain Expert)	Already exists via "myplace".
Current obstacle	n.a.
Related requirements	F-002v1-0, F-015v1-0
Related challenges	none
Resolution	

Requirements catalogue				
Brainstorming				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-012v1-0	in development	1/1

Requirement ID	F-012v1-0
Requirement name	Brainstorming
Business Area	Information sharing
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to quickly express his ideas to the other users. Furthermore, the other users shall be able to comment on the posted thoughts.
Acceptance criteria	A test user needs to scribble some notes down and a second test user needs to check if he can see the notes and potentialy comment on them or modify them.
Rational	Brainstorming is curcial to all team work activities. This can be in form of sticky notes, whiteboarding, mind map etc.
Comments	Reference to TANG, T. Y., WINOTO, P. & LEUNG, H. 2014. A Usability Study of an Educational Groupware System: Supporting Awareness for Collaboration. Journal of Educational Computing Research, 50, 379-402.
Current obstacle	No group space available, which only gives access to group members. However, the function of brainstorming is also not available among the entire class.
Related requirements	F-003v1-0
Related challenges	C11
Resolution	

Requirements catalogue				
Content Management				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-013v1-0	in development	1/1

Requirement ID	F-013v1-0
Requirement name	Content Management
Business Area	Information sharing
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to have an overview of all uploaded docuements. He further shall be able to distinguish the versions of the document.
Acceptance criteria	A test user has to upload many different documents as well as the same documents but as different versions. All other test users should be able to see and access all, but be able to differentiate between versions.
Rational	During a group work activity, the group usually has to deal with a big amount of different documents with different versions. To have one common overview a content management tool helps.
Current obstacle	No group space available, which only gives access to group members. The functionality is not existing with the entire class either.
Related requirements	F-003v1-0, F-014v1-0
Related challenges	C1, C4, C9, C11
Resolution	

Requirements catalogue				
Collaborative document editing				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-014v1-0	in development	1/1

Requirement ID	F-014v1-0
Requirement name	Collaborative document editing
Business Area	Information sharing
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to edit a document, which is simultaneoulsy eddited by another group member.
Acceptance criteria	A test user needs to edit a document which is uploaded online. At the same time another user has to edit the document too. Both users must be able to see what the other user is editing.
Rational	Collaborative document editing is a valuable application, since group work in HE very often requires a handed in written document, which can then be created together as a group.
Comments	See google docs
Current obstacle	No group space available, which only gives access to group members. The functionality is not existing with the entire class either.
Related requirements	F-013v1-0
Related challenges	C2, C4, C11
Resolution	

Requirements catalogue				
Workflow statistics				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-015v1-0	in development	1/1

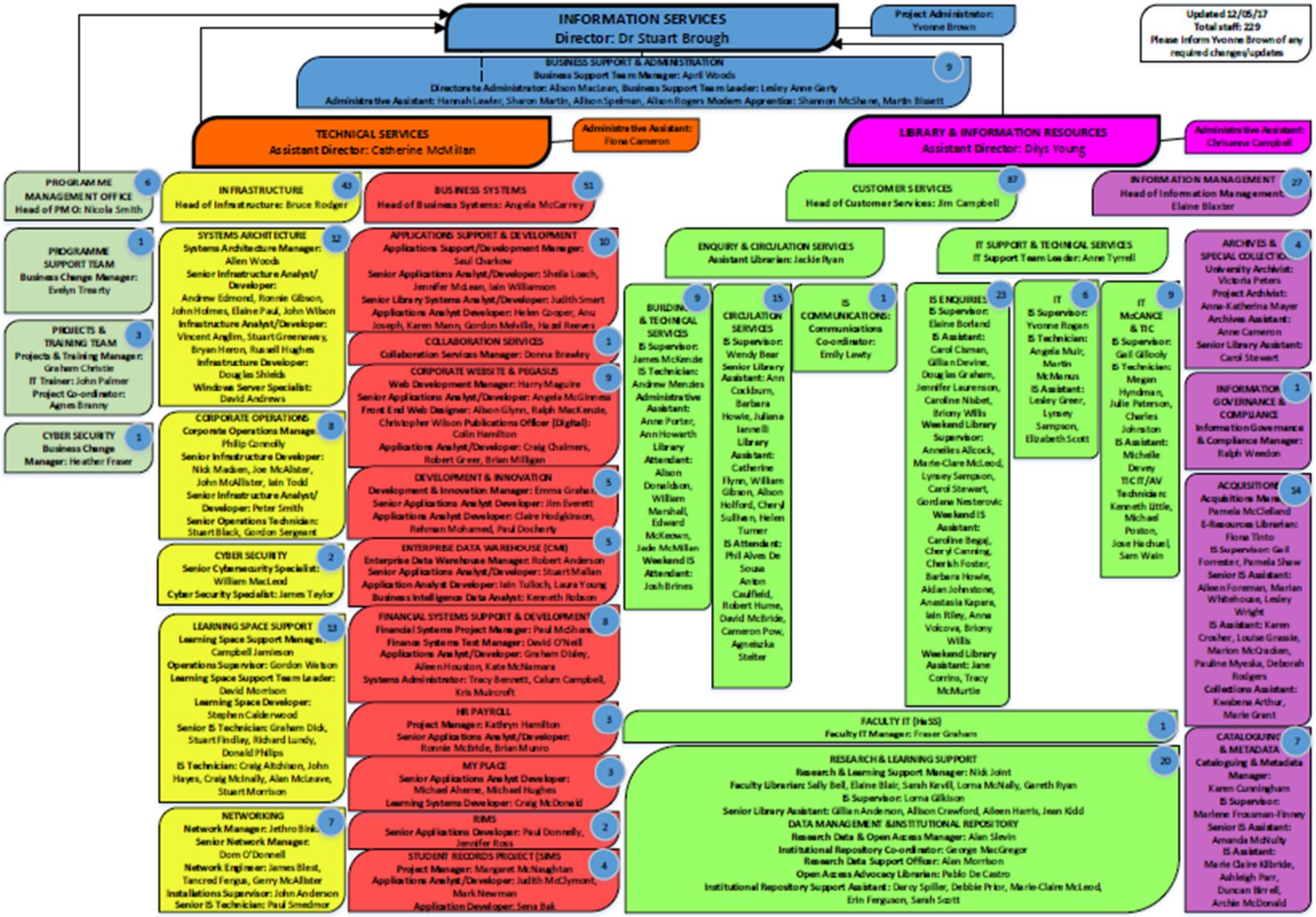
Requirement ID	F-015v1-0
Requirement name	Workflow statistics
Business Area	Information sharing
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to see statistics about his personal performance as well as each other group member. These statistics can be # of uploaded documents, # of fulfilled tasks, etc.
Acceptance criteria	A test user needs to upload a few documents and comment a few posts. Folllowing the test user as well as all other group members need to be able to see the correct statistics accordingly.
Rational	A visualisation of contribution of each team member helps the lecturer to grade fairly as well as the group members to feel more commited.
	See TANG, T. Y., WINOTO, P. & LEUNG, H. 2014. A Usability Study of an Educational Groupware System: Supporting Awareness for Collaboration. Journal of Educational Computing Research, 50, 379-402.
Comments	Rank 3 in the questionnaire for students with 54% of all participants.
Current obstacle	No group space available, which only gives access to group members. The functionality is not existing with the entire class either.
Related requirements	F-002v1-0, F-005v1-0, F-011v1-0
Related challenges	C6, C7, C10
Resolution	

Requirements catalogue				
Member status				
Author:	Date:	Version:	Status:	Page:
Theodor Geist	13.08.2017	F-016v1-0	in development	1/1

Requirement ID	F-016v1-0
Requirement name	Member status
Business Area	Coordination
Source	Project sponsor, Donna Brawley
Owner	Information Services Department
Priority	tbn
Type of requirement	Functional
Requirement description	The user shall be able to see, whether his team members are online or offline. Furthermore, he shall have the opportunity to state his personal status as offline or online.
Acceptance criteria	A test user shall be online and check, whether he can see the statuses of the team members and verify if they are correct.
Rational	An online status helps during group work. Group members, can see if members are available for a chat or a video conference.
Comments	See skype for business member status.
Current obstacle	Strategic decision has to be reviewed again.
Related requirements	F-005v1-0
Related challenges	C1
Resolution	

E. Miscellaneous

E.1 Organisational structure ISD



E.2 E- Mail Jean Keay- attendance monitoring

From: Jean Keay jean.keay@strath.ac.uk

To : Theodor Geist theodor.geist.2016@uni.strath.ac.uk

Thu 20/07/2017 12:18- Scanning Students ID

Hi Theodor

We use little handheld barcode scanners to record attendance at our events. The details on the actual scanners can be found here https://www.ers-online.co.uk/p814/opticon-opn-2001-barcode-memory-scanner

Basically we make use of the fact that all student cards have the library barcode on them. The scanner scans the barcode and stores it, with a timecode, to its on-board memory.

We then download the file created (simple csv file).

Our management system can then upload that data and mark attendance on booking system.

The key in this for us is the barcode lookup. Our booking system does a lookup of student records, so we can match barcodes to people.

However, there are alternatives. I know that the scanner will scan any barcode, so if every member of a group working on a project was issued with a barcode, you could set up your own lookup just for that group. (for example I've also used it to scan barcodes on books and then use these to place orders on Amazon)

You'd be very welcome to come and see a scanner in operation if that would help. I am around all of next week, but then I will be away for a week.

Yours

Jean

Jean Keay

Careers Information and Systems Co-ordinator

Careers Service

Student Experience and Enhancement Services

University of Strathclyde

6th floor, Livingstone Tower

26 Richmond Street

Glasgow G1 1XH

E.3 E- Mail James Everett- O365

From: James Everett <jim.everett@strath.ac.uk>

To : Theodor Geist theodor.geist.2016@uni.strath.ac.uk

Sun 13/08/2017 19:22- Microsoft Planner

Hi Theo

The best person to ask about these sorts of decisions is Allen Woods, although the decisions are ultimately made at a more strategic level by Bruce Rogers.

My understanding is that the decision on what services were to be enabled was made some time ago, long before Planner and a number of other tools became available. I am not aware of any process by which new tools are evaluated for possible inclusion in the portfolio available to students; indeed I canʾt think of any new tools that have been enabled since going live for students.

I have also been asking about getting access to some of the tools that have recently come on stream, if only for testing. So far I have not had any success, but I am pretty tied up with other projects so have not have had much time to pursue this.

It is a pity that Planner is not included in the package, but there are other potentially useful tools like Teams, Forms, Sway, etc. The page I was pointed to for all the tools in our package was https://products.office.com/en-gb/academic/compare-office-365-education-plans

If you are wanting to get something enabled for testing/evaluation, this is something that O365 supports very well. Tools can be enabled for individual users or groups of users through the licence manager, so it should be technically pretty simple to set up a pilot for Teams. I would be very happy to provide technical support for that sort of trial if it could be approved.

Jim

E.4 Project plan

Initial project plan

Week	Date	Stage	Goal	Deliverable
Week 1	29.05.2017	Kick- off	Initiation of the project	Project initiation document & project plan
Week 2	05.06.2017		Build up scientific framework	Literature review & risk analysis
Week 3	12.06.2017		Prepare the data gathering	Baseline analysis & prepared surveys
Week 4	19.06.2017	Data gathering & documentation	Collect data from all involved stakeholders	Result of surveys & ethics approval
Week 5	26.06.2017	Analysis	Structure the results	Requirements list
Week 6	03.07.2017		Draw conclusions from the results	Business process model, data model, functional model
Week 7	10.07.2017	Holiday break		
Week 8	17.07.2017	Interim conclusion	Secure completeness	
Week 9	24.07.2017	Descriptive design	Final concept/ prototype	Potential descriptive concept
Week 10	31.07.2017	Reporting	Create a final report of the case study	Requirements document
Week 11	07.08.2017		Chronological documentation of the project	Final draft, hardcopy of final report
Week 12	14.08.2017			

Modified project plan

Week 5	26.06.2017	Baseline of moodle, App, skype, Survey		
Week 6	03.07.2017			
Week 7	10.07.2017	Holiday		
Week 8	17.07.2017	Interview Experts		
Week 9	24.07.2017	Interview Experts		
Week 10	31.07.2017	Analysis	finish questionnaire, finish lit review	
Week 11	07.08.2017	Writing	write analysis, methodology	
Week 12	14.08.2017	Writing	write conclusion	