CBS COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

COLLABORATION AND TASK COMPLEXITY

An explorative study into how task complexity affects indivuals' willingness to collaborate and with whom

Msc in Economics and Business Administration (cand. merc.)
Management of Innovation and Business Development
Master's Thesis

Date of Submission: 15th of May 2020

Authors
Bianca Sage Pollock - 122507
Benedikt Michael Hagner - 124746

Supervisor
Associate Professor Dr. Marion Poetz

Number of pages
75

Number of characters
160865

ABSTRACT

Continuous and extensive developments in technology, as well as rapid changes in customer preferences have led to innovation becoming increasingly important for firms to gain competitive advantage. It is widely recognised that collaboration is useful for driving innovation, especially under complex circumstances, and that team composition plays an important role for collaboration outcome. However, little is known about individual collaboration preferences. This explorative study aims to reduce this knowledge gap by analysing preferences regarding when individuals choose to collaborate and which collaboration partner characteristics they value, under three different task complexity levels.

In order to build an understanding of these relationships, an online survey was conducted. Survey participants were presented with three different task scenarios and asked whether they would choose to collaborate for the task or work individually. Those who chose to collaborate were then presented with several 'collaboration partner characteristics' and asked to indicate which characteristics would be important to them in an ideal collaboration partner, and in what order. The survey also included several control variables to control for general willingness to collaborate and complexity perception, in addition to open-ended questions asking respondents to explain their choices.

Overall, the study found a significantly positive relationship between task complexity and choice to collaborate, where increased task complexity leads to increased willingness to collaborate. Regarding preference of partner characteristics, the study illustrated a high tendency across all tasks of valuing most importantly functional aspects, such as practical experience or knowledge in the task area. Additionally, homogeneity of attitudes and heterogeneity of skills and knowledge were preferred consistently across all levels of complexity.

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1 INTRODUCTION

1.1 BACKGROUND & RELEVANCE

The 21st century has been deemed a "new competitive landscape" for firms due to the increased rate of technological change and diffusion, availability of information and increased knowledge specialisation of firms (Bettis & Hitt, 1995). 'Static' firm strategies are no longer sufficient in capturing sustained competitive advantage during these times of rapid change, and competences that were once successful in exploiting certain markets are being rendered obsolete due to structural changes in the industry (Teece, Pisano & Shuen, 1997; Afuah & Utterback, 1997). Continued process and product innovation are imperative for organisations to survive shortened product life cycles, increased competition and rapidly changing market preferences and demands (Bettis & Hitt, 1995; Teece, Pisano & Shuen, 1997). However, innovation has become "increasingly complex, costly, and risky due to changing customer preferences, extensive competitive pressure, and rapid and radical technological changes" (Cavusgil, Calantone & Zhao, 2003, p.6).

Collaboration has been identified as an effective and efficient way of innovating successfully despite these challenges, by enabling firms to acquire and combine necessary knowledge and skills (Adams et al., 1998 as cited in Cavusgil et al, 2003). Knowledge is increasingly seen as a firm's most valuable resource, as the exchange of knowledge is a primary driver of innovation (Wasko & Faraj, 2005; Grant, 1996; Liebeskind, 1996). However, in the words of Hargadon and Sutton (1997, p.716), "*Knowledge is imperfectly shared over time and across people, organizations and industries. Ideas from one group might solve the problems of another, but only if connections can be made across the boundaries between them*". Collaboration is what enables these connections to be made.

The concepts of collaboration and complexity are inextricably linked. Problems in professional workplaces today are often so complex they exceed the cognitive capabilities of individuals and require multiple people to work together to solve the problem (Hung, 2013). Additionally, collaboration has repeatedly been shown to lead to better outcomes under complex or difficult circumstances (Qin, Johnson, Johnson, 1995; Sears & Reagin, 2013; Singh & Fleming, 2010). What has become a more pressing issue, is how to better facilitate and actively encourage collaboration to occur.

Heterogeneous teams enable the shortcomings of individuals to be overcome under complex circumstances. Complex problems require knowledge that is unlikely to be held by one person due to the bounded rationality of individuals (Baer, Dirks, & Nickerson, 2012). By combining different but complementary expertise and knowledge sets, heterogeneous teams can overcome bounded rationality (Hung, 2013; Baer, Dirks, & Nickerson, 2012). Rodan & Galunic (2004) found that the amount of heterogeneous knowledge, i.e. the variety of knowledge, know-how and expertise, to which a manager has access in their network improved the manager's performance and ability to execute complex tasks in general. Moreover, this was especially true for the manager's innovation performance (ibid.). Whilst the benefits of heterogeneous teams are clear in a complex innovation context, impediments can also result from heterogeneous info sets, heterogeneous cognitive structures and heterogeneous objectives (Baer, Dirks, & Nickerson, 2012). Hence, naturally forming teams have been observed to be homogeneous in nature (Goins & Mannix, 1999). However, little is known about whether this a conscious decision. To better facilitate collaboration, it is also important to understand the characteristics that individuals actively search for in collaboration partners.

1.2 PROBLEM DISCUSSION

Despite the benefits of collaboration and teamwork being widely explored in the literature, "surprisingly little" is known about individual preferences to work alone or in a team (Kocher, Strauß, & Sutter, 2006, p.260). Relatively few studies focus on the "antecedents of attitudes about collaboration" at an individual level, and fewer still undertake empirical tests (Campbell, 2018, p.277). This is a pressing area to understand. Rather than being placed in teams or told to collaborate, individuals are increasingly autonomous actors and therefore make conscious decisions to collaborate. This is especially relevant in an open innovation context, in addition to becoming increasingly common within the workplace.

Firstly, increased labour mobility and accessibility to knowledge resources outside the boundaries of the firm has led to the popularisation of open innovation techniques such as crowdsourcing and online communities where individuals '*self-select'* to collaborate. For example, for open innovation methods such as crowdsourcing, individuals purposefully decide to work with the firm and with other users to solve innovation problems, often without compensation (Boudreau & Lakhani, 2009). Additionally, in online communities, knowledge collaboration usually takes the form of individuals *offering* their knowledge to the community, while also actively recombining, modifying, and integrating knowledge

which was contributed by others (Faraj, Jarvenpaa, & Majchrzak, 2011). However, whilst organisations are increasingly using crowdsourcing to solve complex innovation problems, many companies have been unable to use crowds successfully due to lack of knowledge and understanding of the motivations and preferences of external innovators (Boudreau & Lakhani, 2009; Boudreau & Lakhani, 2013; Piezunka, Dahlander & Jeppesen, 2019).

Secondly, within the boundaries of the organisation, there is an increased trend in decentralising decision-making to allow for more efficient and effective collaboration. Burcharth, Knudsen & Søndergaard (2017) contend that if employees are required to consult managers for every decision, the 'likely outcome' is an "unproductive collaborative environment marked by a slow pace of progress, characterised by employees who follow tight procedures and make uninformed decisions" (p.1249). Additionally, organisational commitment to employee autonomy better enables firms to utilise knowledge gained from outside of the firm (Gambardella and Panico, 2014 as cited in Burcharth et al, 2017).

This shift in dynamic and the growth of the importance of collaboration has seemingly developed at a faster rate than the research behind it. For progress to be made in actively facilitating collaboration, especially in today's age of increased individual autonomy within this context, more research into the *microfoundations* of collaboration must be undertaken. Using the individual as the unit of analysis will allow further insights into the following two major issues.

Firstly, there is currently little understanding of how the characteristics of a task influence an individual's tendency to collaborate. Task complexity is a particularly relevant characteristic to look into, as whilst it has been determined that complex tasks benefit from a collaborative approach, it is unknown whether collaborative tasks are more or less likely to influence an individual's willingness to collaborate (Hung, 2013; Baer, Dirks, & Nickerson, 2012). Understanding how task complexity influences an individual's willingness to collaborate will enable better facilitation of collaboration.

Secondly, it is also important to better understand *who* individuals prefer to collaborate with. Autonomous collaboration does not happen without the active selection of others to collaborate with. Therefore, it would be remiss to attempt to understand the microfoundations of collaboration preferences without also understanding the characteristics individuals value in a collaboration partner. The literature highlights the benefits of heterogeneity, however, has also noted that individuals tend to gravitate to

homogenous characteristics when naturally forming teams (Baer, Dirks, & Nickerson, 2012; Rodan & Galunic, 2004; Goins & Mannix, 1999). There is very little research into the characteristics that an individual actively seeks out when collaborating, and whether these characteristics change depending on the complexity of the task. To develop a more holistic understanding of the relationship between task complexity and collaboration it is important to study not only if complexity influences *willingness* to collaborate, but also its effect on *who* individuals would ideally choose to collaborate with.

1.3 PURPOSE

The purpose of this research is to address research gaps surrounding individual collaboration preferences and specifically, the relationship between task complexity and collaboration. Given this is an area that has not been widely researched previously, an explorative approach is most appropriate. This research aims to gain preliminary insights into the relationship between collaboration and task complexity in order to lay the groundwork for future research in this area.

The experiment conducted in this research investigates how an individual's choice to collaborate, and who they choose to collaborate with, changes when presented with task scenarios at varying levels of complexity. This research is conducted via an online survey to allow for a quantitative exploration of patterns in the respondents' choices. Moreover, open-ended questions were included to gain qualitative insights into *why* different choices were made.

1.4 RESEARCH QUESTION & THESIS STRUCTURE

To address the research gaps above, the research question that guides this explorative study is as follows:

How does task complexity affect people's willingness to collaborate and with whom?

To address this research question, the topic will be explored in the following four chapters. Firstly, a literature review on the concepts related to the research questions will be conducted. Secondly, the methodology will present how the survey was designed and conducted. Third, the analysis & findings section will present how the collected data was analysed and the main findings will be presented. Lastly, the findings will be discussed in depth, followed by a consideration of possible limitations and contributions of the research.

2 LITERATURE REVIEW

This chapter focuses on understanding the findings of existing literature in relation to the research question. Given the research question for this study considers three distinct concepts, each will be reviewed separately. First, a general understanding of collaboration will be established. This will also investigate the various factors that have been found in literature to contribute to willingness to collaborate. Second, literature regarding optimal team composition will be reviewed to better understand individual preferences for choosing who to collaborate with. Thirdly, the concept of task complexity will be explored. Particularly, the different perspectives on how task complexity should be defined and measured will be considered. This will be followed by a review of current literature that has previously explored the relationship between collaboration and task complexity.

2.1 COLLABORATION

Collaboration is a widely used concept that can take various forms. The terms co-operation, teamwork, knowledge sharing and collaboration are often used interchangeably. However, there are a few features that are central specifically to collaboration, regardless of the form it takes. These are jointly decided goals, shared responsibility among collaborators, and working together in order to reach greater achievements than those that would have been achieved individually (Barfield, 2016). Having a shared goal is commonly cited as a central aspect of collaboration (Maienschein, 1993). This is further argued to be relevant, regardless of whether the goal is articulated in the exact same way or articulated at all (ibid.).

Team collaboration can occur in various ways, for example, pure virtual collaboration, semi-virtual/ hybrid collaboration, global virtual collaboration, and face-to-face collaboration (Cheng et al, 2016). Collaboration within a team can take the form of various actions such as, information exchange, resource sharing among all actors, and working towards the achievements of another organisation with mutual benefits and shared goals existing (Boughzala & De Vreede, 2015; Rico, Sánchez-Manzanares, Gil & Gibson, 2008 as cited in Cheng et al, 2016).

2.1.1 Motivations to collaborate

The growing importance of collaboration has led to considerations of what motivates people to collaborate. Maienschein (1993) identified three causes that typically lead to collaboration. First, collaboration can occur when an individual needs help and the resulting labour division will lead to more efficiency. This can take the form of either sharing the same work tasks among more individuals, or combining individuals with different expertise in order to achieve a goal. Secondly, collaboration can be undertaken due to the belief that greater credibility is achieved by combining the various individuals' credentials. This is especially common in the field of research. Thirdly, by combining work efforts, individuals may hope to create a community which will be able to access resources individuals would not have been able to access on their own. (Maienschein, 1993)

The term 'knowledge collaboration' captures various activities such as the "sharing, transfer, accumulation, transformation, and co-creation of knowledge" (Faraj, Jarvenpaa, & Majchrzak, 2011, p. 1224). There are many parallels between willingness to participate in knowledge sharing and willingness to collaborate and therefore literature regarding knowledge sharing is particularly useful to consider, especially given collaboration requires the active exchange of knowledge (Nissen, Evald & Clarke, 2014). Within the context of online communities, literature has found various motivating factors behind individuals choosing to participate in knowledge sharing. These factors include self-interest, identity, social capital, and social exchange (Faraj, Jarvenpaa & Majchrzak, 2011). Additionally, Wasko & Faraj (2005) found that people contribute knowledge when they believe it will enhance their own professional reputation, when they have adequate experience and when their position in the 'network' is well-established and secure.

2.1.2 Factors influencing willingness to collaborate

Individual traits that may lead to higher willingness to collaborate have also been widely explored in the literature. It has been found that collaboration is influenced by a variety of factors, including different culture, history and political systems (Sanchez-Burks et al., 2003 as cited in Cheng et al., 2016). Demographic factors such as age, gender and education level have also been linked to knowledge sharing and co-operative tendencies (Czibor et al., 2017 as cited in Elloriaga, Poetz & van Praag, 2018; Beersma et al. 2003 as cited in Ghobadi, S., Campbell, J., & Clegg, S, 2017; Kuhn, P. and Villeval, M. C, 2013). Additionally, certain personality traits and preferences have been shown to influence

collaboration and knowledge-sharing tendencies. The main traits that influence an individual's general willingness to collaborate are presented and discussed below.

Willingness to Trust

Trust is defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer et al, 1995 as cited in Brown Poole & Rodgers, 2004, p.117). This definition highlights the interpersonal components of trust which are particularly relevant for collaboration (Brown et al, 2004). An individual's *disposition to trust others* has been identified as a key determinant of willingness to partake in shared activity, or engage in information sharing (Fukuyama, 1995; Gambetta,1988; Nahapiet and Ghoshal, 1998 as cited in Ridings, Gefen & Arinze, 2002).

Trust is imperative for the effective performance of an interdependent team and functions on a number of levels (Pinto, 2016). Firstly, there is trust as it relates to professional interaction and competence, i.e. that the other team member(s) can be trusted to accomplish the tasks required. Secondly there is trust at an 'integrity' level, i.e. that the team member(s) can be depended upon to fulfil their requirements. Finally, trust on an emotional level based on intuition refers to the instinctive 'personal' feeling the team members have towards each other (ibid.). Similarly, Mischa et al (1996) contend that interpersonal trust is "based on the belief that the latter party is (a) competent, (b) open, (c) concerned, and (d) reliable" (as cited in Brown et al., 2004, p. 117).

A high level of interpersonal dependence is required to collaborate and can be exploited if a party decides to act opportunistically. As a result, trust in others is an important component of collaboration to ensure participants continue to act in good faith for the overall benefit of the collaborative partnership (Brown et al., 2004). Lack of trust within a team often leads to additional time devoted to monitoring each other and documenting problems (Wilson et al., 2006 as cited in Cheng, et al., 2016). Therefore, it is argued that collaboration effectiveness can be improved by increasing individual trust (Cheng et al., 2016).

As technology continues to facilitate collaboration in a virtual context, trust becomes an increasingly important factor affecting an individual's willingness to collaborate (Brown et al., 2004). Virtual relationships are characterised by uncertainty and ambiguity, especially for individuals who are

accustomed to face-to-face contact. In this context, trust is even more crucial to mitigate the doubts that may arise due to lack of interaction 'in person' (ibid). Many virtual communities have failed due to unwillingness to share knowledge with other community members (Keikha, 2018). However, interpersonal trust has been found to have a significant impact on stimulating knowledge sharing behaviour and thus is crucial to the management of virtual communities (ibid.).

Altruism

Altruism has been described multiple ways including, "unconditional kindness without the expectation of a reward" (Fehr & Gachter, 2000 as cited in Hung, Durcikova, Lai & Lin, 2011 p.418), and, specifically in an organisational context, an individual's "discretionary behaviour that has the effect of helping a specific other person with an organisationally relevant task" (MacKenzie, Podsakoff & Fetter, 1993, p.71). Altruism involves increasing the welfare of others without the expectation of anything in return, and therefore resembles 'organisation citizenship behaviour', i.e. discretionary individual behaviour that promotes the functioning of the organisation without being recognised by a formal reward system (Hsu & Lin, 2008, p.66).

Resultantly, altruism has been found to have a significant effect on knowledge sharing behaviour as it involves the individual voluntarily sharing knowledge for the benefit of others (Wang & Hou, 2015). Particularly in an online context, altruism has been found to be a driver for participating in online communities and open-source projects, as well as a key determinant of online knowledge sharing (Ma & Chan, 2014; Liu & Fang, 2010; Wasko & Faraj, 2005; Hars & Ou, 2002). Additionally, altruism has been found to augment the relationship between interpersonal trust and knowledge sharing intention in an online community setting (Chen, Fan & Tsai, 2014).

Intrinsic & Extrinsic motivation

Davenport & Prusak (1998) argue that an individual will be willing to share knowledge if the reward gained will be bigger than the cost paid. Therefore, the intrinsic and extrinsic motivation level of an individual will influence how high they perceive the 'reward gained' to be. Intrinsic motivation can be seen to be 'autonomy-oriented', whilst extrinsic motivation is 'control-oriented' (Wang & Hou, 2015).

Campbell (2018) argues collaboration within the organisation involves investing in goals whose benefits do not accrue exclusively to any individual. Collaboration can lead to tensions between self and

collective interests and therefore, rewards that are based on individual performance rather than group performance act as a prohibition to collaboration (ibid). Similarly, Saavedra, Early & Van Dyne (1993) found that performance feedback should be congruent with the task and task goal. Their study showed that group performance was highest when task, goal and feedback interdependence are congruent, i.e. where there is team interdependence, group goals and group feedback (ibid.).

Wang & Hou (2015) found that both 'hard rewards' such as reciprocity, financial benefits, promotions and other benefits, as well as 'soft rewards', for example, personal reputation and relationships with significant others, both had a significant relationship with knowledge sharing behaviour. They also found that altruism for organisational benefits has a positive effect on knowledge sharing behaviour. Some studies have proposed that the concepts of 'autonomy oriented' or intrinsic motivations are related to the concept of altruism, as the individual is motivated by the personal satisfaction of helping others or by the achievement of shared vision or goals (Chang & Chuang, 2011).

Self-Efficacy

Self-efficacy is one's belief "in their own capabilities to mobilize the motivation, cognitive resources, and course of action needed to meet given situational demands" (Chen, Gully & Eden, 2001 p.62). Furthermore, *general* self-efficacy is an individual's perception of their ability to perform across various situations (ibid). Self-efficacy can also be seen as a form of 'self-evaluation' and underlies an individual's behaviour in deciding the amount of effort and persistence to put forth when faced with obstacles (Hsu, Ju, Yen & Chang, 2007). It therefore plays an important role in influencing individuals' motivations and behaviour.

Self-efficacy has been shown to play a critical role in guiding individual behaviour, and therefore research has linked self-efficacy with knowledge-sharing in a virtual community setting and co-operative strategies in economic game situations (Karamanoli, Fousiani, & Sakalaki, 2014, as cited in Elloriaga, Poetz & van Praag, 2018; Hsu, Ju, Yen & Chang, 2007).

Mood

The literature has also demonstrated that the *affective state* of an individual may influence information processing and decision-making, which may impact collaborative choices, especially in the context of strategy development (Hertel, Neuhof, Theuer & Kerr, 2000). Additionally, Elloriaga, Poetz & van

Praag (2018) found a significant interaction effect between task difficulty and positive mood on participants' willingness to join a team.

Personality Traits - Agreeableness, Openness & Extraversion

Many personality psychologists support the use of the 'Big 5 dimensions' of personality as a general taxonomy of personality traits (John & Srivastava, 1999). Three of the 'Big Five dimensions', *extraversion*, *openness* and *agreeableness*, have been shown to be linked to cooperative tendencies and information sharing.

Extroversion includes traits such as sociability, activity, and positive emotionality, and therefore is likely to influence a participant's willingness to want to work with others (John, Naumann, & Soto, 2008). Similarly, agreeableness and openness have both been linked to knowledge sharing (Beersma et al, 2003 as cited in Ghobadi, Campbell & Clegg, 2015). Agreeable people are likely to be cooperative, and seek out cooperation rather than competition (Matzler, Renzl, Müller, Herting, & Mooradian, 2008). Accordingly, this trait has been found to have a positive relation with sharing knowledge with others (Matzler et al, 2008). Additionally, openness to experience is a reflection of curiosity and originality, which are predictors of seeking insights from other people (Cabrera, Collins, and Selgado, 2006 as cited in Matzler et al, 2008).

Risk Attitude

An individual's propensity to take risks will also influence their tendency to collaborate or join teams. In the context of collaboration, risk is highly related to trust. Luhman (1979) contended that risk is a prerequisite in the choice to trust (as cited in Costa, 2003, p.607). True collaboration or teamwork involves depending on others, and as a result involves making the choice to allow oneself to be vulnerable to potentially opportunistic behaviour (Costa, 2003). This is especially true for collaboration and teamwork on virtual platforms where uncertainty is high due to the lack of face-to-face interaction (Brown et al., 2004).

Collaboration Context

In addition to the abovementioned individual traits, the context that collaboration takes place in has an impact on individuals' willingness to collaborate. Transformational leadership has been shown to

improve the 'cooperative climate' of virtual teams and improve task cohesion (Huang, Kahai & Jestice, 2010). Transformational leaders are characterised by behaviour that inspires followers to rise above their immediate self-interests and focus on helping the group and its members, and thereby place increased importance on the benefits of the group as a whole (ibid). Campbell (2018) undertook a survey to better understand individual collaboration preferences in the public sector; specifically looking into how efficiency orientation, incentives, and transformational leadership impacts willingness to collaborate. He found that the presence of transformational leadership and efficiency orientation intensity are both positively related to employee willingness to engage in interorganisational collaboration. Moreover, he found that the effect of transformational leadership on willingness to collaborate was amplified by efficiency orientation intensity and amplified when using performance-based incentives (Campbell, 2018).

The task itself has also been shown to have an impact on collaboration. Task interdependence, or the degree to which group members must depend on each other to perform their individual tasks within the larger task, affects the level of cooperation in a group (Shaw, 1973 as cited in Saavedra, Early & Van Dyne, 1993). Moreover, group goals impact the development of cooperative strategies (Matsui et al., 1987; Mitchell & Silver, 1990; Weingart & Weldon, 1991 as cited in Saavedra, Early & Van Dyne, 1993).

Additionally, collaboration will be impacted by the resources available to the individual, specifically who the individual can collaborate with. Collaboration has been shown to be impacted by the individual's perception of a contributor's competence (Czibor et al., 2017 as cited in Elloriaga, Poetz & van Praag, 2018). However, whilst the availability of a suitable collaboration partner will impact an individual's willingness to collaborate, there are inconsistencies in the literature regarding individuals' preferences for who they would ideally choose to collaborate with. The following section is aimed at exploring the major themes identified in team selection literature regarding this topic.

2.2 WHO DO PEOPLE COLLABORATE WITH?

Research has primarily focused on characteristics within a team from a managerial perspective, with the aim of composing an optimum team (Owens, Mannix & Neale, 1998). However, as individuals are increasingly making autonomous decisions to collaborate, greater research is required to understand team selection preferences from the perspective of the individual (Burcharth, Knudsen & Soøndergaard,

2015). The following themes were identified in team selection literature as being important in well-functioning teams.

2.2.1 Exploring Diversity

A common theme discussed pertaining to individuals working effectively together, is the concept of diversity. Generally speaking, diversity can be defined as "any attribute that another person may use to detect individual differences" (Williams & O'Reilly, 1998, p.81). Diversity in the context of collaboration and individuals working together, can be approached in various ways. A widely used paradigm of contextualising diversity in the context of teams is the so-called 'factor approach' (Mannix & Neale, 2005). Within this approach different types of diversity are recognised and measured. This can be further divided into a 'two-factor approach', where diversity is coded as two broad types, or a 'multi-factor approach', where exhaustive lists are attempted to be created. A common two-factor approach is splitting diversity factors into visible factors, such as race, ethnicity, age and gender, and non-visible factors, such as education, skills and abilities, values and attitudes, and functional background (Jackson et al., 1995; as cited in Mannix & Neale, 2005).

However, one issue with this approach is that it is highly dependent on a narrow set of variables (Mannix & Neale, 2005). A multifaceted approach is useful in tackling this problem as it allows for utilization of several categories. One example of a multifaceted approach are the five categories created by McGrath et al. (1995), including (1) demographic attributes; (2) task-related knowledge, skills, and abilities; (3) values, beliefs, and attitudes; (4) personality and cognitive and behavioural styles; and (5) status in the work group's organisation (as cited in Mannix & Neale, 2005). Mannix & Neale (2005) created an extended list based on McGrath et al. (1995)'s work and refer to six broad categories, namely social-category differences, differences in knowledge or skills, differences in values or beliefs, personality differences, organisational- or community-status differences, and differences in social and network ties (see Table 1).

Categories & Types of Diversity - Mannix & Neale (2005)	
Social Category Difference	Race Ethnicity Gender Age Religion Sexual Orientation Physical Ability
Differences in knowledge or skills	Education Functional knowledge Information or expertise Training Experience Abilities
Differences in values or beliefs	Cultural Background Ideological beliefs
Personality Differences	Cognitive Style Affective disposition Motivational Factors
Organisational/community-status differences	Tenure/length of service Title
Differences in social and network ties	Work-related ties Friendship ties Community ties In-group memberships

Table 1 Categories & Types of Diversity – Mannix & Neale (2005)

Although it is widely accepted that diversity is a key feature when analysing who people collaborate and work with, there are differing opinions on whether diversity is desirable (Mannix & Neale, 2005). Advocates of the 'optimistic view' postulate that there is "value in diversity" (Cox, Lobel, & McLeod, 1991, p. 827), arguing that cultural diversity can enhance both value to the organisation and performance (Copeland, 1988; Cox & Blake, 1991; Esty, 1988; Sodano & Bailer, 1983 as cited in Cox, Lobel, & McLeod, 1991). Under this view, diversity leads to value creation by having beneficial effects on team outcomes, despite the acknowledgement of diversity creating certain challenges in team interaction (Mannix & Neale, 2005). Hoffman & Maier (1961) suggest that conflict resulting from different viewpoints within heterogeneous groups may potentially be beneficial to the team's performance and final outcome (as cited in Mannix & Neale, 2005).

Hoffman et al. (1959; 1961) suggest that diversity in groups is also related to functional aspects such as different knowledge, expertise, and perspectives (as cited in Mannix & Neale, 2005). Furthermore, especially for complex decision-making problems, it is argued that heterogeneous groups will produce higher quality solutions than homogenous groups (Baer et al, 2012; Hoffman, 1959; Hoffman & Maier, 1961, as cited in Mannix & Neale, 2005). This complements findings by Bantel & Jackson (1989) that functional heterogeneity also facilitates better innovativeness. Heterogeneity in attitudes is further argued to be better suited to solving creative tasks (Triandis, Hall, & Ewen, 1965). This is because the contribution of different or conflicting ideas allows team members to form new associations they may not have thought of before, build on these contributions, or combine them with their own ideas, allowing creative ideas to emerge (Paulus & Yang, 2000, Shin & Zhou, 2007, Hargadon & Bechky, 2006 as cited in Baer et al, 2010). Following a similar argument, Bunderson & Sutcliffe (2002) found that functional diversity led to greater knowledge sharing which ultimately led to improved performance.

However, there are also a number of issues that can result from heterogeneous information sets, cognitive structures and objectives (Baer et al, 2012). Lack of coherence in a heterogeneous group can lead to biased information sharing, various cognitive biases and errors, production blocking, representational gaps, and issues with motivation, coordination, and communication (ibid). This dissimilarity between individuals can further result in much lower cohesion and process loss (Goodman & Shah, 1992 as cited in Gruenfeld, Mannix, Williams & Neale, 1996). This view is mainly based on the assumption that diversity leads to social divisions, which in turn produces poor social integration and negative results for groups (Mannix & Neale, 2005).

2.2.2 Naturally forming teams

Group formation or team assembly is often seen as a managerial task, and therefore few studies have analysed the dynamics of autonomous team formation and individual preferences when selecting team members or collaboration partners (Owens, Mannix & Neale, 1998). Although highly limited in its scope, research has found in general that within ‘naturally forming’ groups, individuals were mainly chosen or attracted to each other based on proximity, similarity, and prior contact. (Gruenfeld, Mannix, Williams & Neale, 1996).

Social ties among individuals can have an important impact on team-selection as it indicates the likelihood of successfully working together (McClelland, Atkinson, Clark, & Lowell, 1953; Schachter,

1959; as cited in Goins & Mannix, 1999). There is an observed tendency of individuals seeking out someone they know, instead of strangers, and hence preferring pre-existing contacts (Shapiro, 1980, as cited in Goins & Mannix, 1999). The nature of prior contacts can be either social or work-related (Goins & Mannix, 1999). Chen & Gong (2018) further support this in their findings that individuals seek out members based on prior connections instead of their skills. As a result, a lack of diversity is a commonly found feature of these groups, specifically regarding redundancy of certain knowledge bases and perspectives (Gruenfeld, Mannix, Williams & Neale, 1996).

Another dimension affecting individuals' team selection decisions is similarity. It has been found that individuals tend to feel comfortable around people that are similar to them in terms of age, gender or race (Berschied, 1985; Sears, Freedman, & Peplau, 1985; McGrath et al., 1995 as cited in Goins & Mannix, 1999). These characteristics are also highly visible and therefore have the power to evoke biases or stereotypes (Milliken & Martins, 1996). Similarity on a demographic basis is often perceived as representative for value or attitude similarity, which in turn is used as a predictor for ease of communication (McGrath, Berhadl & Arrow, 1995; Milliken & Martins, 1996; Northcraft, Polzer, Nealre & Kramer, 1995 as cited in Goins & Mannix, 1999). This is due to individuals with similar backgrounds possibly sharing values and experiences and hence perceiving the interaction with each other positively (Milliken & Martins, 1996). Furthermore, Byrne (1971) found that individuals show higher attraction to other who hold similar attitudes and interestingly perceive those people to be "more intelligent, knowledgeable, and well-adjusted" (as cited in Mannix & Neale, 2005, p. 39). Based on this, multiple literature has shown that naturally forming groups tend to be homogeneous based on demographic characteristics (Goins & Mannix, 1999).

Although social similarity has been identified as a factor in naturally formed groups, functional heterogeneity regarding the task also plays an important role (Owens, Mannix & Neale, 1998). Relational ties continue to play a role in this, as they enable individuals to evaluate others' specific skills and hence allow for task-related choices (Gilchrist, 1952; Senn, 1971, as cited in Goins & Mannix, 1999). Putting an emphasis on functional background can also be highly beneficial as teams that possess a broad functional background are found to interact and perform more effectively than teams composed with a narrow array of functions (Mannix & Neale, 2005).

2.3 TASK COMPLEXITY

2.3.1 What is task complexity?

Task complexity has been identified as an important component in the study of human performance and behaviour, however there is no universally accepted definition for task complexity (Liu & Li, 2012). The result of this is that whilst there has been much research on task complexity, the absence of a clear definition has resulted in some contradictory results and lack of overall academic progress in understanding the intricacies of task complexity (Wood et al, 1987 as cited in Liu and Li, 2012).

Liu & Li (2012) argue that previous literature on task complexity can be broadly grouped into three perspectives, which then pertain to how task complexity is defined. Firstly, the 'structuralist' viewpoint defines complexity from the structure of the task itself. Secondly, the 'resource requirement' viewpoint is defined by the resource requirements imposed by the task. Finally, the interaction viewpoint defines task complexity as the product of human-task interaction.

Structuralist Viewpoint

Wood (1986) and Campbell (1988)'s early definitions of task complexity have been seminal in further empirical studies analysing the impact of task complexity on human behaviour. Both aim to describe task complexity independently of the individuals who perform the task, and therefore belong to the 'structuralist' viewpoint of task complexity.

Woods (1986) contends that tasks contain three essential components: products, required acts and information cues. Based on this, Woods (1986) argues that total complexity is a function of three types of task complexity; component complexity (the number of different acts and information cues required for the task), coordinative complexity (the relationship between task inputs and task products), and dynamic complexity (how the relationship between task inputs and task products changes over time).

Similarly, Campbell (1988) contends that any characteristic that results in an increase in information load, information diversity or rate of information change is a contributor to complexity. He identifies four task characteristics that meet this requirement: the presence of multiple paths, the presence of multiple outcomes, the presence of conflicting interdependence among paths to multiple outcomes, and the process of uncertain or probabilistic links among paths and outcomes. From this, Campbell (1988)

creates a typology of tasks based on the complexity factors that are present, including 'decision tasks', 'judgment tasks', 'problem tasks' and 'fuzzy tasks (p.47). Complexity is then determined by the degree to which these characteristics are present in a task and by the total number of basic attributes contained in the task (Campbell, 1988).

Both bodies of work have been successful in identifying attributes or components that contribute to task complexity and have been widely cited in further task complexity research, particularly for laboratory experiments (Liu & Li, 2012). However, drawing inferences about the total complexity of a task based on the tasks attributes remains difficult, as the relative contribution of each of the attributes to complexity is unknown (Campbell, 1988).

The Resource-Based viewpoint

Conversely, the resource-based viewpoint defines task complexity by the amount of resources the task requires. This includes human information processing such as cognitive, physical and mental requirements, short-term memory requirements, in addition to visual auditory cognitive and psychomotor resources, knowledge, skills and time (Liu & Li, 2012). Those who hold this perspective argue that more complex tasks require task performers to invest more resources in order to undertake the task. Using this definition, task complexity can be indistinguishable from task load or task demand (ibid).

Whilst this viewpoint is similar to Campbell (1988)'s definition of task complexity being anything that increases information load, information diversity or rate of information change, there is a difference in how the relationship between resource requirements and task complexity is viewed. Campbell (1988) held that resource requirements are determined as a *result* of task complexity. Whereas those holding the resource-based viewpoint believe task complexity is a *result* of the resource requirements of the task (Robinson 2001; Liu & Li, 2012). Whilst neither perspective has been proven to be more useful than the other, the resource requirement viewpoint tends to be used in literature as a measure of task complexity (Chu & Spires, 2000; Sintchenko & Coiera, 2003; Bedny, Karwowski, & Bedny, 2012 as cited in Liu & Li, 2012).

The Interaction Viewpoint

Finally, the interaction viewpoint of task complexity defines task complexity as a "product of the interaction between task and tasker performer characteristics", which includes the task performer's "idiosyncratic needs, prior knowledge and experience" (Liu & Li, 2012, p.555). This viewpoint sees task complexity as a relative term, dependent on the subjective interpretation and experience of the 'task-doer' (ibid.). The argument for looking at complexity from this perspective is that each individual may interpret the same task differently in regards to its complexity, and that the 'perceived' complexity of the task will influence the task performer's interpretation of information needs and actions (Byström & Järvelin, 1995).

A popular model based on this perspective is Byström & Järvelin (1995)'s model for task complexity, taking into consideration the task performer's point of view by analysing the "priori determinability of, or uncertainty about, task outcomes, process and information requirements" (p.194). Based on this concept of task complexity being reflected in the priori uncertainty of task inputs, process and outcome, Byström & Järvelin (1995) have created a task typology, categorising tasks into five categories from 'automatic information-processing tasks' to 'genuine decision tasks'. Automatic information-processing tasks are seen as less complex, as from the task-performers perspective the inputs, process and outcome are all determinable prior to doing the task. Genuine decision tasks are highly complex as they are unstructured tasks where the result, process and information requirements cannot be known in advance (Byström & Järvelin, 1995).

2.3.2 Clarification of terms

Complexity vs difficulty

Throughout the task complexity literature there is some confusion on the relationship between task complexity and task difficulty. The terms are often used interchangeably (Campbell, 1988; Liu & Li, 2012; Kim, 2008). However, those who do distinguish between the terms often do so by using task complexity as an objective representation of the task characteristics, and task difficulty as an interaction between the task, the task-doer and the context.

Campbell (1988) suggests that while the terms are related, the relationship is "not straightforward" (p.45). He argues that the difficulty of a task is perception based, therefore whilst complex tasks are "by

their nature, difficult", the reverse is not always true (ibid.). For example, a relatively clear task may be made difficult for the task-doer due to a communication failure. Or, due to the task-doer's level of experience in the task area, the difficulty of the task may vary between individuals whilst objective characteristics of the tasks are the same. Similarly, Kim's (2008) research in the information seeking domain distinguishes task complexity from task difficulty by explaining that task complexity is the objective properties of a search, whereas task difficulty refers to the context of the individual 'searcher'.

In problem solving, problem difficulty is often determined by the size of the 'problem space', i.e. when solving a problem "the number of branches at each node and depth of search to a solution node" which is inherent in the problem and therefore objective (Kotovsky, Hayes & Simon, 1985). However, Kotovsky, Hayes & Simon (1985) found that there were various contributors to problem difficulty that lead to significant differences in solver time for problems with the same sized problem space. This included the solvers' ability to learn the rules, apply the rules, and to what extent the rule differed from 'real-world knowledge'. For example, a problem involving the shapeshifting of monsters was significantly more difficult than a problem involving the size of acrobats, despite the underlying problem being the same. In general, they found that due to the limited processing capacity of problem solvers, memory requirements of unfamiliar problems can result in the problem being more difficult (Kotovsky, Hayes & Simon, 1985). Furthermore, they found the problem difficulty was alleviated by rule-training and external memory aids. Therefore, the problem difficulty is a combination of both the information inputs of the problem and the information processing and previous training of the solver.

Differences in how task complexity and difficulty should be defined are likely to be due to the underlying beliefs of the researcher regarding objective and experienced task complexity. The differences and argumentation for both perspectives are presented in the following section.

Objective vs experienced complexity

Task complexity literature is inconsistent on how the subjective experience of the task performer should be evaluated in terms of task complexity. Thus, there are two main perspectives on how task complexity should be evaluated: (1) the objective perspective; and (2) the subjective perspective.

Some researchers believe that task complexity should be evaluated on an *objective basis,* independent of how the task-doer views the task. Thus, the complexity of the task should be viewed from the

perspective of a detached, omniscient observer and should be seen as independent of any task performer (Campbell, 1985; Wood, 1986; Byström, 1999). The objective perspective is relatively specific. Whilst it allows researchers to look more precisely into elements of task complexity, it is a difficult perspective to apply to field studies where the task performer is likely to be influenced by a range of factors outside of the task itself (Liu & Li, 2012).

Subjective task complexity, otherwise known as experienced, perceived, or psychological complexity, considers how factors other than the task itself may affect how complex the task is perceived to be by the task performer (Liu & Li, 2012). Factors that may moderate the relationship between objective complexity and 'experienced complexity' include the person's familiarity with the task, their short-term memory and computational capabilities, their attention-span, the availability of resources and time constraints (Campbell, 1988). The subjective or 'perceived' task complexity approach is more generalisable, and therefore makes it possible to study how people react to different levels of perceived task complexity (Byström, 1999). Researchers from the 'information seeking domain' tend to support the subjective perspective as the perceived complexity is what "forms the basis for interpreting information needs and the choice of promising actions for satisfying them" (Liu & Li, 2012; Byström & Järvelin, 1995).

Both perspectives have their own strengths and weaknesses (Byström, 1999). The appropriate perspective to adopt depends on the type of research being conducted. Although objective task complexity can be easily manipulated in laboratory experiments, it is "unattainable" in real situations (Liu & Li, 2012, p.558). The perceived task complexity perspective allows for a better understanding of the effects of task complexity in general, although it may be difficult to identify the specific elements of task complexity that are affecting that perception (Byström, 1999). Using a combination of the complexity contributors identified in both bodies of research enables a better understanding of the task, and the relationship between the task and the task performer, in order to conduct more comprehensive research (Liu & Li, 2012).

2.3.3 Task complexity model

The aforementioned bodies of research vary greatly in terms of defining and measuring task complexity. For the purpose of this study Liu & Li (2012)'s model of task complexity has been used. This model aims to summarise previous bodies of task complexity literature by collating a number of CCFs

(Complexity Contributory Factors), that have been identified throughout complexity literature as having a relationship with task complexity.

Table 2 itemises these CCFs by breaking them down into the task components of Goal/Output, Input, Process, Time and Presentation. Interestingly, this model does not only identify factors that contribute to the task being more complex, but also factors that have a negative relationship with task complexity and thus, all else held constant, make the task less complex.

Task Components	Complexity Contributory Factors (CCFs)	Relationship with complexity
Goal/output	Clarity	Negative
	Quantity	Positive
	Conflict	Positive
	Redundancy	Negative
	Change	Positive
Input	Clarity	Negative
	Quantity	Inverted U-Shape
	Diversity	Positive
	Inaccuracy	Positive
	Rate of change	Positive
	Redundancy	Negative
	Conflict	Positive
	Unstructured guidance	Positive
	Mismatch	Negative
	Non-routine events	Positive
Process	Clarity	Negative
	Quantity of paths	Positive
	Quantity of actions/steps	Positive
	Conflict	Positive
	Repetitiveness	Negative
	Cognitive requirements by an action	Positive
	Physical Requirements by an action	Positive
Time	Concurrency	Positive
	Pressure	Positive
Presentation	Format	Depend on task types
	Heterogeneity	Positive
	Compatibility	Negative

Table 2 Complexity Contributory Factors (CCFs) – Liu & Li (2012, p.561)

2.3.4 Relationship between complexity and collaboration

As previously discussed, the relationship between complexity and collaboration has not yet been adequately explored in literature. Literature related to the topic to date tends to focus on two areas. Firstly, the benefits collaboration has for the outcomes of complex tasks and secondly, how task complexity impacts individual information seeking.

By working with others, especially those with heterogeneous backgrounds, the bounded rationality of individuals can be overcome in order to solve complex problems (Baer, Dirks, & Nickerson, 2012). Therefore, complex problems in particular are likely to benefit from a combined or collaborative approach (Hung, 2013). This has been demonstrated in numerous studies. Sears & Reagin (2013) used individual ability to alter the complexity of a task. They found that the mainstream students, for whom the task was complex, performed significantly better in groups than individuals. For the accelerated classes, for whom the class was less complex, individuals performed better than groups, thus demonstrating that working with others was more effective for complex tasks. Qin, Johnson & Johnson (1995) analysed the effectiveness of cooperative efforts, where individuals worked in teams, versus competitive efforts, where individuals competed against each other, for different types of tasks. Their meta-analysis of 46 studies found overall that cooperative efforts outperform competitive efforts for higher-level tasks such as problem solving (Qin, Johnson & Johnson, 1995). Moreover, Singh & Fleming (2010) determined that inventors who collaborate are more likely to come up with a "breakthrough" than a useless invention.

In relation to information seeking, task complexity has been shown to impact the type of relationship sought by workers (Byström & Järvelin, 1995). If there is a gap between a worker's knowledge of a task and his perception of the necessary requirement, information seeking will take place (Belkin et al., 1982 as cited in Byström & Järvelin, 1995). The information needs determined by the task performer will be based on the individual's interpretation of the task, prior experience and knowledge and memory skills, which will impact how complex they perceive the task to be. Personal factors such as attitude, motivation and mood will also influence this process (Kuhlthau, 1991 as cited in Byström & Järvelin, 1995). This process of information-seeking will also be affected by situational factors, such as the amount of time available, organisational factors, perceived accessibility of information channels and sources, and personal information-seeking style based on the task-performer's history of successful attempts (ibid). Similarly, in an online community setting Faraj, Jarvenpaa, & Majchrzak (2011) state that knowledge

sharing among members often occurs due to certain problems being particularly complex for the individual.

However, the antecedents of collaboration decisions at the individual level have not been adequately explored (Campbell, 2018). Given this relevant gap in collaboration literature, the purpose of this study is to shed light on the relationship between task complexity and individual collaboration preferences.

3 METHODOLOGY

3.1 OVERVIEW OF THE STUDY

The purpose of this research is to explore the relationship between task complexity and collaboration preferences. Given the topic area has not been well-defined in previous research, an explorative approach is most appropriate. Therefore, the purpose of this research is not to test a theory or provide solid conclusions on the topic, but to provide preliminary insights into the relationship between task complexity and willingness to collaborate and thereby lay the groundwork upon which future studies can build (Singh, 2007).

In order to increase generalisability of the study and understand preferences at an individual level, a survey was deemed the appropriate research tool for this study. The population for this survey was the general population, as this topic is not confined to a specific industry, age-group or occupation. Distributing the survey online allows for access to a broad and diverse selection of potential respondents and improves the ability to collect a larger number of responses in a short period of time. Additionally, a survey enables the collection of data about both elements of the research question. Patterns in the respondents' choice to collaborate, as well as who they choose to collaborate with, can be identified through quantitative analysis. Furthermore, with the inclusion of open-ended questions deeper explanatory insights into why the choices were made can be uncovered through qualitative analysis. The use of multiple analysis methods allows some of the weaknesses of purely quantitative research to be overcome and provide richer insights into the research (Saunders, Lewis & Thornhill, 2019, p.166.).

The purpose of the survey was to detect whether the respondents' choice to collaborate would change based on the manipulation of the primary independent variable, 'task complexity'. A repeated-measures design was chosen in an effort to reduce unsystematic variation in results. Reducing unsystematic variation allows for a more sensitive measure of the experimental manipulation, which was most important in this case (Field, 2018).

To elicit the most realistic responses from participants, the survey consisted of scenarios designed to simulate real-life tasks at varying levels of complexity. The purpose of this was to capture, firstly, whether the participants' collaboration choices changed depending on the complexity of those tasks, and

secondly, if the participants did choose to collaborate, which characteristics would be important to them in an ideal collaboration partner for each task.

Whilst complexity contributory factors (CCFs) were used to manipulate the inherent complexity of the tasks, true 'objective' complexity is "unattainable" outside of a laboratory context (Liu & Li, 2012 p.558). The purpose of this study is to understand behaviour responses to changing task complexity levels and therefore, the 'perceived complexity' approach must be considered (Byström, 1999). One of the downsides of the 'perceived complexity' approach is being unable to ascertain whether it is truly the task complexity that was the cause of the behavioural change (Byström, 1999). Therefore, open-ended questions were included in the survey to enable deeper insights into the relationship between complexity and collaboration choice and serve as a robustness check for the quantitative analysis.

The purpose of the open-ended questions in the survey was to gain a deeper understanding as to whether the participants made the choice to collaborate based on task complexity, or if not, identify alternative factors aside from complexity that may have influenced their choice. First, the participants were asked why they chose to collaborate for the tasks in which they selected yes. Second, they were asked why they did not choose to collaborate for the tasks in which they selected no. For participants that choose to collaborate for all(/none) of the tasks, in addition to being asked why they made their choices, they were also asked under which circumstances they would not (/would) choose to collaborate.

The survey also contained several scales to control for other factors aside from task complexity that may have influenced the respondent's decision making. This included demographic questions and personality and preference scales to control for other factors which the literature has demonstrated may influence the participants' willingness to collaborate or inference of the task complexity.

The entire survey can be found in Appendix 10.

3.2 MEASUREMENT – DEPENDENT VARIABLES

The purpose of this study is two-fold. Therefore, there are two main dependent variables that were analysed separately.

3.2.1 The choice to collaborate

The first part of the study is to better understand the relationship between task complexity and willingness to collaborate. Therefore, the dependent variable is 'choice to collaborate'. This is measured based on the survey participants' responses to whether they would or would not choose to collaborate after being presented with the various task scenarios (see section 3.3.1), and is therefore a binary categorical variable of 'yes' or 'no'.

3.2.2 Collaboration partner characteristics

In addition to understanding collaboration choices, the purpose of the study is also to explore which characteristics individuals look for in their ideal collaboration partner i.e. 'who' the individual would ideally collaborate with for each task. It was also important to explore whether this preference changes depending on task complexity.

8 different characteristics were selected for the respondents to choose from based on themes identified in team-selection and collaboration literature. The themes are presented below, each explaining the selected characteristics used in the survey.

Familiarity

The literature suggested that personal familiarity with the potential collaboration partner is preferential for individuals. Various papers indicated that a common selection preference for individuals is based on prior social contact, being either of work- or social nature (Gruenfeld, Mannix, Williams, & Neale, 1996; Goins & Mannix, 1999). Therefore, the characteristics "*get along well with on a personal level*" and '*I have worked with before*" were chosen.

Heterogeneous and homogeneous characteristics

Another major and conflicting theme found in the literature is team diversity and the benefits of homogeneous vs heterogeneous teams. The literature has indicated that heterogeneous teams are more likely to produce novel and innovative outcomes, however are also more likely to face disruptions and conflict than homogeneous teams (as discussed in 2.2.1.) (Mannix & Neale, 2005). In order to get an insight into whether individuals would instinctively choose to collaborate with someone who has a heterogenous or homogenous profile to themselves, the characteristics '*holds similar attitudes to*

myself", '*holds different attitudes to myself*', '*has similar knowledge and skills to myself*' and '*has different knowledge and skills to myself*' were selected.

Functional competencies

The literature indicated that characteristics relating to competence for the specific task are important criteria for team selection. This implies that functional and skill/knowledge-based characteristics are also important to individuals when selecting the ideal collaboration partner (Owens, Mannix, & Neale, 1998). Therefore, the characteristics '*practical experience in the area*' and '*strong knowledge of the area'* were selected.

Additionally, these characteristics allowed for a second method of analysing functional diversity by comparing the respondent's own knowledge and experience level to whether they choose to collaborate with someone who has "practical experience in the area" and/or "strong knowledge of the area".

Measurement of characteristics

In the survey, the characteristics were presented only to the respondents who chose to collaborate for each task. The question was structured as follows:

For this task, I would ideally like to collaborate with someone who…

- *Has practical experience in this area*
- *Has strong knowledge of this area*
- *I get along well with on a personal level*
- *I have worked with before*
- *Holds similar attitudes to myself*
- *Holds different attitudes to myself*
- *Has similar knowledge and skills to myself*
- *Has different knowledge and skills to myself*

Participants were asked to choose the characteristics that were important to them, and then rank only the characteristics that they chose. Therefore, two insights were able to be gained. Firstly, by choosing only 'important' characteristics, insight was gained into what characteristics were important and not important to respondents, allowing a distinction between 'low importance' and 'no importance'.

Secondly, by ranking the characteristics a better understanding could be gained about how respondents prioritise these characteristics, which more closely resembles the decisions individuals make in a real-world setting. Additionally, ranking the characteristics allowed for an analysis of how priorities changed depending on the complexity of the task.

3.3 MEASUREMENT - INDEPENDENT VARIABLES

3.3.1 Main Treatment - Task complexity

To understand whether choice to collaborate is correlated with task complexity, the primary independent variable for this study is 'task complexity'. The relationship between the dependent variables and task complexity was measured by recording the participants' responses to three different 'task scenarios' at low, medium and high levels of complexity.

Construction of the 'task complexity' scenarios

To gain an understanding of how the participants' collaboration choices changed depending on the level of complexity, a number of task scenarios were formulated and manipulated to include various task complexity contributory factors ('CCF's) (Li & Liu, 2012). Whilst there is currently no established way to measure task complexity in units, or to understand how different complexity factors should be weighted relative to each other, Liu & Li's (2012) CCF model was used as a guide to create task scenarios at three 'levels' of task complexity – low, medium and high (see Table 3).

To reduce participant speculation of what the study was testing and thus reduce bias, the tasks themselves were all different. However, the tasks all pertained to relevant/topical issues that most people would be familiar with in order to limit the effect of unfamiliarity moderating the complexity of the tasks. Additionally, the tasks were all set in a workplace context, to limit variability based on the environment of the tasks.

Originally, two task scenarios were formulated at each level of complexity and a pre-test was conducted to test the complexity interpretation of all 6 task scenarios. This was conducted via an online questionnaire with 10 participants. Given it would be impractical to ask the participants about each CCF, four key complexity contributors were chosen, and participants were asked to score each on a 10-point scale:

- How clear they perceive the goals of the task to be (reverse scored)
- How clear they believe the guidance for the task is (reverse scored)
- How many possible ways there are to achieve success for the task; and
- How much cognitive effort they believe is required to achieve the task.

The participants were also asked more generally how complex they perceive the task to be on a 10-point scale. The above four factors, in addition to the general complexity question enabled a 'complexity score' to be calculated from each participant for each task.

Final task scenarios

The results of this pre-test indicated that there was a clear distinction between the complexity scores of three tasks in particular. For ease of explanation the tasks will be referred to as 1) the data entry task (low complexity), 2) the sustainability task (medium complexity) and 3) the management task (high complexity). It was found that on average participants found the complexity of the sustainability task ($M = 7.2$, $SE = 1.71$) to be higher than the data entry task ($M = -14.2$, $SE = 1.39$). This difference of 21.4 was significant, $t(9) = 10.61$, $p = 0.000$. Furthermore, the management task ($M = 17.7$, $SE = 1.81$) was found to be more complex than the sustainability task on average, with the difference of 10.5 also being significant $t(9) = 4.94$, $p = 0.001$. Thus, illustrating that three distinct levels of complexity were perceived by the survey participants (Appendix 1).

The full descriptions for the final tasks that were presented in the survey are detailed below:

The data entry task scenario (low complexity)

You have been asked to enter 100 printed customer data files into an Excel spreadsheet. You have been given all the customer data and the spreadsheet has been set up with the necessary fields, for example, customer name, address, occupation and contact details. Each customer file contains the same information that you will need to repeatedly put in the spreadsheet, being careful to avoid errors. The task requires 3 hours of work and you have an entire workday to complete it.

The sustainability task scenario (medium complexity)

Your workplace has launched a range of new initiatives to become more sustainable. As part of this program everyone has been asked to present one idea of how the workplace could become more environmentally friendly. Everyone has been given a week to complete this task and has the choice of working alone or with others.

The management task scenario (high complexity)

You have been asked to be in charge of launching a new 'digitalisation' team in your organisation. The organisation is a very conservative organisation and therefore has never had a digitalisation team before. As the head of the team, you will be responsible for hiring new people in the team, managing them, creating the strategy for rolling out the digital initiatives your team comes up with, as well as coordinating and communicating with other business units to make sure the new initiatives are well received and add value to the overall organisation.

Table 3 illustrates the complexity contributory factors that were manipulated in order to create the distinct levels of complexity for each scenario.

To ensure that the management task was perceived to be 'highly complex' due to the CCFs rather than the nature of the task itself, a follow up questionnaire was sent to the pre-test participants. The questionnaire contained an open question asking the participants to explain in their own words why they perceived the task to be highly complex. Of the 8 pre-test participants who indicated they would be willing to answer follow-up questions, all 8 cited at least one CCF as their reasoning for why the management task was highly complex. This included the size of the task, the variety of decisions that need to be made, needing to satisfy multiple potentially conflicting stakeholders, the ambiguity of how the task should be done and the variety of different ways the task could be done. The other highly complex task that was created was an 'investment plan' task and in contrast to the management task, the participants explained they perceived this task to be complex due to the type of knowledge and experience needed to complete the task. Hence, the management task was chosen as the high complexity task for the final survey.

Task Components	Complexity Factors	Complexity Relationship	Data Entry Task	Sustainability Task	Management Task
Goal/output	Clarity	Negative	Very High	Medium	Medium
	Quantity	Positive	Low	Low	High
	Conflict	Positive	Low	Medium	Med-High
Input	Clarity	Negative	High	Low-Medium	Low
	Unstructured guidance	Positive	Low	Medium	High
	Non-routine events	Positive	Low	Medium	High
Process	Clarity	Negative	High	Medium	Low
	Quantity of paths	Positive	Low	High	High
	Quantity of actions/steps	Positive	Medium	Medium	High
	Repetitiveness	Negative	High	Low	Low
	Cognitive requirements	Positive	Low	Medium	High
Time	Concurrency	Positive	Low	Low	Medium
	Pressure	Positive	Very Low	Low-Med	N/A
		Overall Relative Complexity	**Low**	**Medium**	**High**

Table 3 Complexity Contributory Factors

3.3.2 Control variables

Several scales and additional questions were included in the survey to control for factors other than task complexity, such as cognitive, affective and personality factors, identified in the literature that may impact the collaboration preferences of participants. Scales for the factors that were identified in the literature review as likely to impact willingness to collaborate are detailed below. Details of all scales can be found in Appendix 2.

- *Disposition to trust others* - three 7-point Likert scales, adapted and tested by Ridings, Gefen & Arinze's (2002).
- *Altruism* - three 7-point Likert scales developed by MacKenzie, Podsakoff & Fetter (1993).

- *General self-efficacy* - in addition to potentially influencing collaboration decisions, general self-efficacy has also been shown to impact an individual's ability to remain motivated through rapidly changing, stressful and increasingly complex work environments (Chen, Gully & Eden, 2001). Therefore, general self-efficacy may also play a moderating role in the perception of complexity. Chen, Gully and Eden's (2011) 'new general self-efficacy scale' was included in the survey, consisting of eight 7-point Likert scales.

- *Intrinsic motivation* - a validated scale for general intrinsic motivation was not found in the literature, therefore a scale was adapted based on Trembla, Blanchard Taylor & Pelletier's (2009) intrinsic motivation scale for why people do their work. The questions were adapted from a work-specific context, to a more general context.

- *Mood* - Van Knippenberg, Kooij-de Bode and VanGinkel's (2010) self-reported scale was included in the survey, asking respondents to identify to what extent they felt the positive emotions 'happy, cheerful and active', and the negative emotions 'sad, miserable and blue' to give an overall 'negative mood' score.

- *Extraversion*, *openness,* and *agreeableness* - Rammstedt & John's (2007) shortened version of the big 5 inventory was used to test for extraversion, openness and agreeableness. Each trait was tested using two 5-point Likert scales.

- *Risk attitude* - Dohmen, Falk, Huffman, Sunde, Schupp, & Wagner's (2011) single-item scale was included in the survey, where participants were asked to rate their own general willingness to take risks from 0 to 10.

- *General willingness to collaborate* - a validated scale for general willingness to collaborate was not found in the literature, therefore one was created using the 'risk attitude' scale as a guide. A single-item scale was also created to capture the participant's *general willingness to collaborate*. The participants were asked to self-assess their own willingness to collaborate on a scale of 0 to 10, with 0 being "only collaborate when required", and 10 being "actively seek out collaboration".

Aside from general willingness to collaborate and intrinsic motivation, all scales have been tested and used previously and are therefore valid in controlling for the above-mentioned variables.

It was also necessary to control for factors that may influence the participant's interpretation of how complex the task is. Familiarity with a task has a negative relationship with task complexity (Campbell, 1988). Therefore, after reading the task scenario, participants were asked how much experience they have in the task area, as well as how much knowledge they have in the task area. The answers that could be selected were no experience(/knowledge), a little experience(/knowledge), some experience(/knowledge), a lot of experience(/knowledge). A manipulation check was also included, asking the participants to rank the three tasks in order of complexity with 1 being the most complex and 3 being the least complex.

As the survey was open to the general public, socio-demographic controls were included. Participants were asked their age, gender and education level because these have been linked to knowledge sharing and co-operative tendencies (Beersma et al. 2003 as cited in Ghobadi, S., Campbell, J., & Clegg, S, 2017; Czibor et al., 2017 as cited in Elloriaga, Poetz & van Praag, 2018; Kuhn & Villeval, 2013). Additionally, participants were asked their state of employment and the area or industry that they work or study in. This was, again, to control for whether certain areas of knowledge/experience impacted the perceived complexity of the tasks.

3.4 SURVEY VALIDATION

3.4.1 Survey design

The sequence of the survey was thoroughly considered in order to avoid order effects and response bias. The survey was structured in such a way as to get as accurate responses as possible to all questions and controls, without influencing the participant's responses to the task scenarios.

Independent variables that are more likely to change in the short term i.e. trust, general self-efficacy, altruism, intrinsic motivation and mood, were presented before the complexity manipulation. The scales pertaining to risk attitude and general willingness to collaborate were presented after the manipulation to avoid influencing treatment responses. The remaining three personality controls - openness, extraversion and agreeableness have been shown to be more stable, and less likely to be impacted by short-term or environmental factors (Cobb-Clark & Schurer, 2012). Therefore, these questions were asked after the task scenario questions. Demographic questions were asked at the end of the survey as they require the least amount of concentration and it was expected the participants may have fatigued.

Several other methods were used to reduce unsystematic variation in the survey. For example, randomisation was used on each section to counterbalance order bias. Accordingly, all scales were randomised within their respective sections, and all task complexity scenarios were randomised. Additionally, to ensure consistency among respondents, a definition of collaboration was presented before the tasks, explaining that collaborating with someone would involve "working together throughout the task and sharing both the responsibility and the results". As the survey was for the general population and therefore respondents were expected from multiple nationalities, internationally recognised scales for education and industries were included to avoid confusion (UNESCO, 2011).

A manipulation check was also included in the survey. Immediately after the questions regarding the task scenarios, the participants were asked to rank the tasks in order of complexity. This allowed the researchers to check to what extent the manipulation was successful, whilst ensuring the concept of complexity was not introduced to respondents until after the treatment, and therefore did not influence their responses.

3.4.2 Survey pre-test

The final survey was pre-tested with 5 different people to check duration and understandability. This was done individually, and the participants were observed throughout the survey and asked a set of questions immediately afterwards.

The most impactful takeaway from the pre-testing was that the survey took the respondents longer than anticipated, ranging from 15-25 minutes. The most time-consuming portions of the survey were the control scales, as well as open ended questions which asked the participants to explain the knowledge and experience they had in the task areas. The open-ended questions pertaining to the respondent's knowledge and experience were replaced with a drop-down list. Additionally, the full Big-5 Index scales for extraversion, openness and agreeableness were replaced with the shortened version scales to keep survey duration to a minimum (see section 3.3.2.). The shortened scales' correlations with the original indexes were 0.89, 0.79 and 0.74 for extraversion, openness and agreeableness respectively (Rammstedt & John, 2007). Therefore, whilst some of the variability captured in the original index was lost, the shortened scales allowed the controls to be retained, and reduced 26 questions to 6. Pre-tests of a further three people demonstrated that the above adjustments reduced the duration of the survey to within the desired range of 10-15 minutes, without majorly compromising on the comprehensiveness of the survey.

Other minor adjustments made after the pre-test included clarifying certain words that were confusing to non-native English speakers, formatting instructions that the participant's overlooked in bold and adding some words of encouragement towards the end of the survey, where it was obvious participants were beginning to fatigue (see Appendix 10 for survey structure and formatting).

3.5 SAMPLING & SAMPLE CHARACTERISTICS

3.5.1 Overview of Data collection

The survey was open to the general population and was distributed online to increase the quantity and breadth of the sample. Data was collected primarily through the use of social media platforms, including Facebook, Instagram and LinkedIn. A link to the survey was posted via the researcher's personal platforms accompanied by the same message to ensure consistency. Additionally, data was collected through the online platform 'Survey Circle' which connects researchers with respondents through a 'reciprocal points system' based on completing other surveys. One round of data collection was conducted for a duration of two weeks.

All respondents self-selected to take part in the research. The completion of the survey was voluntary, and all respondents were notified at the beginning of the survey that responses would be kept anonymous and that respondents could exit the survey at any time. The benefits of self-selection sampling are that responses could be collected in a short period of time, and that most surveys were properly completed as the respondents chose to participate. Whilst respondents were not directly compensated for their participation, incentives including a raffle of 5 x 30 euro Amazon vouchers were used to increase the survey response rate. Respondents were also offered a copy of the final survey results if interested.

During the two-week period of data collection, the survey was promoted various times on all platforms to increase response rate. Additionally, further responses were gathered due to the survey being shared by members of the researchers' networks.

After two weeks, data collection was closed and a total of 243 responses were collected and recorded. Of these responses, 51% were collected through the Facebook and LinkedIn social media platforms, 37% were collected via Instagram and 12% were collected from the 'Survey Circle' platform. Response rate calculation is difficult as it is not known how many people viewed the online posts requesting

participation. However, one possible measure of response rate is the number of completed surveys per the number of unique visits to the survey page, which was 71.3%.

3.5.2 Data preparation

To ensure quality of the sample responses a data cleaning process was undertaken. 22 responses were excluded from the sample due to clearly misunderstanding the survey, not taking the survey seriously or not filling in the survey properly. Moreover, the dataset was rearranged to enable the following analysis. Additionally, all categorical variables were converted to dummy variables, and overall scores of each control variable were generated for each respondent.

3.5.3 Sample characteristics

The above procedure resulted in a sample of 221 useful responses which were further used to analyse the data. The analysis of the data was mainly conducted with participants who "passed" the manipulation check for the complexity of the tasks and ranked them in the correct order. A total number of 165 participants ranked the tasks correctly in accordance to the manipulation checks order.

In terms of sample characteristics, the gender ratio of the respondents was 65.5% female and 34.5% male, with the mean age of the respondents being 28. Due to the sample not being limited to a specific nationality, respondents from a total of 24 different countries were captured. Australia was the largest percentage with 35.8%, followed by Germany and Denmark with 22.4% and 12.1% respectively. A total percentage of 51.5% of all respondents indicated that they are currently employed, while a further 40.6% are still in education. The remaining 7.7% consists of 2.4% retired respondents, 4.8% of self-employed and 0.6% of unemployed.

Regarding educational levels, 53.3% of all participants currently hold a bachelor's or equivalent level degree and 28.5% hold a Master's or equivalent level degree. Due to a large proportion of respondents falling into these two educational level groups alone, the latter analysis uses three educational levels. The first is made up with respondents belonging to all educational levels up to the level of post-secondary non-tertiary education (9.7%). The second level consists of those currently holding post-secondary non tertiary education, short-cycle tertiary education or a bachelor's degree (60.0%). The final group is made up of those holding a master's degree or higher (30.3%).

	Whole Sample		Correct Manipulation Check	
Characteristics	*n*	*Percentage*	*n*	*Percentage*
Gender	**221**	**100%**	**165**	**100%**
Male	71	32.1%	57	34.5%
Female	150	67.9%	108	65.5%
Nationality	**221**	**100%**	**165**	**100%**
Australia	83	37.6%	59	35.8%
Germany	47	21.3%	37	22.4%
Denmark	26	11.8%	20	12.1%
Other	65	29.3%	49	29.7%
Educational Level	**221**	**100%**	**165**	**100%**
1. Up to and including upper secondary	25	11.3%	16	9.7%
2. Up to and included bachelor's degree	126	57%	99	60%
3. Master degree or higher	70	31.7%	50	30.3%
Current Situation	**221**	**100%**	**165**	**100%**
Currently employed	118	53.4%	85	51.5%
Retired	4	1.8%	4	2.4%
Self-Employed	10	4.5%	8	4.8%
Unemployed	1	0.5%	1	0.6%
In education	88	39.8%	67	40.6%
Industry	**93**	**42.1%**	**72**	**43.6%**
Professional, Scientific or technical services	24	25.8%	20	27.8%
Finance or insurance	17	18.3%	13	18.1%
Healthcare or social assistance	12	12.9%	8	11.1%
Management of companies or enterprises	10	10.8%	8	11.1%
Other	30	32.2%	23	31.9%

Table 4 Sample Characteristics

4 ANALYSIS & FINDINGS

The analysis of the data was conducted in three broad steps, each aiming to analyse a different aspect of the research question. First the relationship between willingness to collaborate and task complexity is explored. This is followed by exploring the collaboration partner preferences and their link to task complexity. Both these sections consist of quantitative analysis that was primarily conducted through the statistics software 'SPSS'. Lastly, open ended answers were analysed qualitatively using thematic coding, to enrich the quantitative findings and gain further insights into explaining the relationship between task complexity and collaboration preferences.

	N	Minimum	Maximum	Mean	Std. Deviation
Collaboration choice (dummy)	495	0	1	.66	.48
Trust	165	4	20	14.77	3.06
Self-Efficacy	165	26	56	44.61	5.26
Altruism	165	3	21	17.52	2.42
Intrinsic Motivation	165	12	21	18.64	1.99
Mood*	165	-12	10	-3.30	4.58
Experience Score	165	0	3	1.33	.99
Knowledge Score	165	0	3	1.60	.92
Risk	165	2	10	6.28	1.97
General WTC	165	0	10	6.64	2.32
Extroversion	165	-4	4	1.55	1.77
Openness	165	-4	4	.98	1.8
Agreeableness	165	-4	4	.98	1.59
Age	165	18	66	28.27	9.52
Gender (dummy)	165	0	1	.65	.48
Education (3 Levels)	165	1	3	2.21	.60

Table 5 Descriptive Statistics

* = negative mood score
General WTC = General Willingness to Collaborate

4.1 WILLINGNESS TO COLLABORATE AND TASK COMPLEXITY

Before describing each analysis step in more detail, a general overview of the whole dataset (n=221) is given. Regarding the manipulation check, a total of 165 respondents ranked the tasks exactly as intended based on the manipulation of the CCFs. A further 25 of the remaining 56 respondents ranked the scenarios in the order of medium-high-low complexity, and therefore only switched the positions of the high and medium complexity tasks, but still recognised their higher complexity in comparison to the low complexity task. The following analysis of a potential relationship between willingness to collaborate and task complexity will be based on a sample of n=165 which only includes those participants who passed the manipulation check.

Regarding collaboration choice frequencies and descriptive statistics, both samples are highly similar. General Descriptive Statistics and other frequencies are although produced for both samples and can be found in Table 5 (n=165) and Appendix 3 (n=221).

4.1.1 Preliminarily Insights into Data

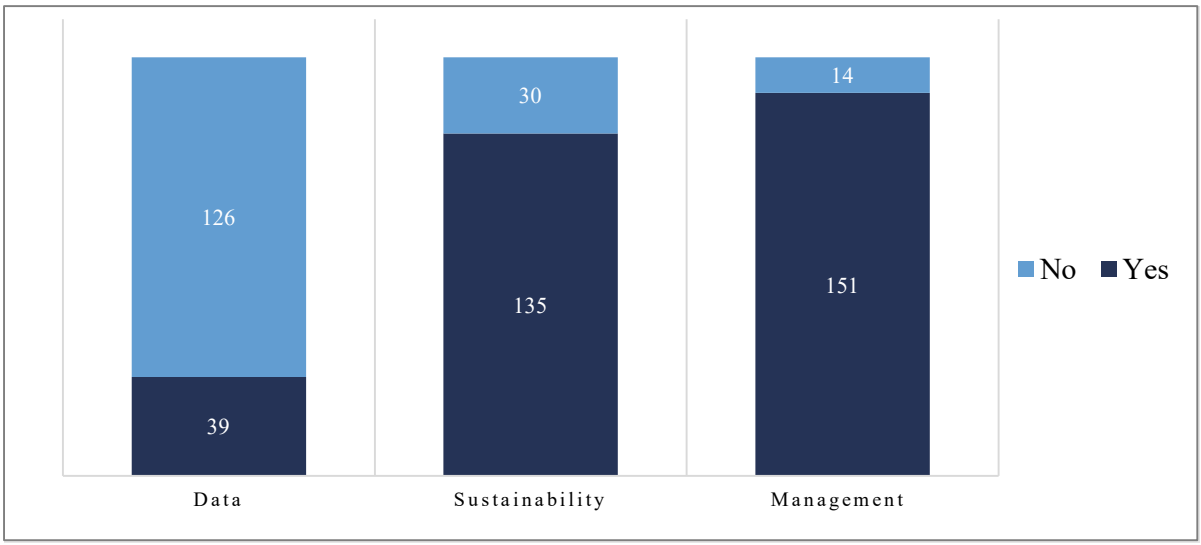

Figure 1 Collaboration Choice for each Task

Figure 1 shows the frequencies of collaboration choice for each task. A first pattern is clear through this visualisation, showing a distinct trend of growing collaboration willingness with increasing task complexity. In order to further analyse the observable differences, a crosstab is produced, showing the variable collaboration choice with the two options 'yes' and 'no' in the rows and the three levels of task complexity, low, medium and high, with a column representing each (see Table 6).

Comparing the expected and actual frequencies for each task, the same pattern is clear showing high differences between all expected and observed counts. The expected count of 'no' for the collaboration choice for all tasks was 56.7, however for low, medium and high complexity, actual counts of 126, 30 and 14 were recorded, respectively. For collaboration choice 'yes', all expected counts were at 108.3 but differed as only 39 chose to collaborate for low complexity, as well as 135 and 151 for medium and high complexity, respectively. Again, this points to collaboration choice having a positive relationship with task complexity. As each task shows a different subscript, it is apparent that the proportions differ significantly from the proportions of the other task columns within the row. Therefore, looking at the first row, significantly more respondents did not collaborate for a low complexity task, compared to a medium and high complexity task.

			Low Complex	Med Complex	High Complex
Choice to collaborate	**No**	Count	126a	30b	14c
		Expected Count	56.7	56.7	56.7
		% within Choice	74.1%	17.6%	8.2%
		% within Task	76.4%	18.2%	8.5%
		% of Total	25.5%	6.1%	2.8%
		Standardized Residual	9.2	-3.5	-5.7
	Yes	Count	39a	135b	151c
		Expected Count	108.3	108.3	108.3
		% within Choice	12.0%	41.5%	46.5%
		% within Task	23.6%	81.8%	91.5%
		% of Total	7.9%	27.3%	30.5%
		Standardized Residual	-6.7	2.6	4.1
	Total	Count	165	165	165
		Expected Count	165.0	165.0	165.0
		% within Choice	33.3%	33.3%	33.3%
		% within Task	100.0%	100.0%	100.0%
		% of Total	33.3%	33.3%	33.3%

Table 6 Crosstab - Collaboration Choice x Task
Each subscript letter denotes a subset of task categories whose column proportions do not differ significantly from each other at the 0.05 level.

The corresponding chi square analysis, shown in Table 7, compares the observed frequencies with the expected frequencies and shows that there is a significant association between collaboration choice and task complexity $\chi^2(2) = 197.25$, $p<0.01$ (Field, 2018). Therefore, a respondent's willingness to collaborate differs significantly depending on the complexity of the task.

Cramer's statistic is used to get an estimate of effect size, and shows a strong association between the two variables with a value of 0.631 (Cohen, 1988 as cited in Sun, Pan, & Wang, 2010). The individual task contribution to the association can be better understood by looking at the standardised residuals. Apart from the medium complexity task for collaboration choice 'yes', which shows a medium significance at the $p<0.05$ level and a standardized residual of 2.6, all others show a high significance at the $p<0.001$ level and standardized residuals above +-3.29. Therefore, it is concluded that all complexity levels contribute strongly to the association between the variables, with the small note of less strong contribution by medium complexity for collaboration.

n = 495	Value	df	Significance (2-sided)
Pearson Chi Square	197.25	2	.000
Likelihood Ratio	204.08	2	.000
Symmetric Measures	**Value**		**Approximate Significance**
Cramer's V	.631		.000

Table 7 Chi Square & Cramer's

4.1.2 Explanatory Analysis – Logistic Regression

To get a clear overview of potential correlation and multicollinearity issues, a correlation table was produced, and multicollinearity diagnostics were conducted. Both can be found in Appendix 4 & Appendix 5. The highest correlation between two variables was measured for the 'Knowledge score' and 'Experience score' with a value of .67 and significance at the $p<0.01$ level, which led to the exclusion of the knowledge score from the following regressions in order to reduce possible negative effects.

No major multicollinearity issues were found as the average VIF value was 1.41, with the highest VIF score being a value of 1.93 for trust (see Appendix 5).

Logistic Regression

A logistic regression was conducted to explain the association between collaboration choice and task complexity. To enable this analysis the data was rearranged to allow for a singular dependent variable of collaboration choice. Therefore, each respondent's data was multiplied and rearranged into three rows, each row being identical aside from the task specific variables, such as experience score, complexity level and the dependent variable of collaboration choice. Therefore, the sample size for the regression is 495 to account for each respondent's choice for all three tasks.

DV: Willingness to collaborate	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Medium Complexity	2.68**	2.43**	2.18**	2.51**	2.6**	2.69**	2.7**
High Complexity	3.55**	3.35**	3.48**	3.9**	3.82**	4.03**	4.03**
Experience Score		-.33*	-.38^	-.32	-.39^	-.37^	-.37^
Age				.01		.00	.01
Gender				.42		.61*	.62*
Education				.02		.07	.07
Self-Efficacy				-.02		.00	.00
Altruism				.04		-.01	-.01
Intrinsic Motivation				.08		.04	.04
Mood				.03		.03	.03
Risk				.03		.03	.03
Extroversion				.18*		.07	.07
Openness				.02		.03	.03
Agreeableness				.07		.01	.02
General WTC					.29**	.29**	.31**
Trust				.00			-.01
MedComplex*Exp			.19	.05	.00	-.02	-.02
HighComplex*Exp			-.11	-.30	-.15	-.27	-.23
Constant	-1.17	-.57	-.49	-3.16	-2.49	-3.96	-3.94
Adjusted R^2	.47	.48	.48	.51	.53	.54	.54
DR^2		.01	.00	.03	.02	.01	.00
-2LL	432.78	426.83	426.09	411.74	399.33	392.71	392.69

Table 8 Logistic Regression
^ = p < 0.1
* = p < 0.05
** = p < 0.01
R^2= Nagelkerke R^2
-2LL = -2 x log-likelihood

Various models were tested to gain a better understanding of whether the complexity variables would be impacted, and if so in what way. Model 1 includes only the treatment dummy variables, medium and high complexity, compared to the base case of low complexity. Model 2 additionally includes experience score, to understand whether the respondents' experience in the task area diminishes the relationship between collaboration choice and task complexity. Model 3 further includes interactions between the complexity variables and the experience score to understand if the relationship changes at different levels of complexity. In Model 4 all controls were added, with the exemption of the general willingness to collaborate score, as the correlation table demonstrated that this score was correlated with many of the control variables (Appendix 4). Model 5 does the opposite and includes only the general willingness to collaborate, scale and excludes all further possible predictors. In Model 6 everything is included except for the trust score control, since this showed potentially high correlations with other control variables. Finally Model 7 includes all control variables.

4.1.3 Main Findings

In all models medium and high complexity show high significance at the $p<0.01$ level and have the highest coefficients. Between the two, high complexity shows a stronger coefficient with 4.03 compared to 2.70 for medium complexity. Both coefficients are persistently positive in all models and therefore shows a relationship where increasing task complexity leads to increased probability of a positive collaboration choice being made.

Moreover, an effect size is shown through the odds ratio and can be found in Appendix 6. Medium complexity shows a Exp(B) value of 14.86 with a 95% confidence interval of [4.99; 44.25], while high complexity possesses a Exp(B) value of 56.22 with an interval of [14.48 ; 218.24]. Therefore, high complexity shows a stronger effect size than medium complexity, however both have a significantly strong effect on collaboration choice when compared to the base case of low complexity. Given, the confidence intervals for both tasks are well above 1, it is shown that the effect of additional complexity is highly significant.

4.1.4 Other findings

Besides the main treatment of task complexity, few other predictors showed significance, depending on certain models. Experience score shows low significance ($p<0.1$) in all models, except when general

willingness to collaborate is excluded. The coefficient for experience was negative, which indicates a relationship where higher experience in the task area leads to lower probability of choosing to collaborate. Additionally, general willingness to collaborate shows high significance ($p<0.01$) whenever included in models. The coefficient for general willingness to collaborate shows a positive relationship to collaboration choice, as would be expected. An interaction effect was included between complexity and experience, but no significance was detected.

It is not surprising that the general willingness to collaborate scale was significantly correlated to collaboration choice. However, it is interesting to note that, as shown in the correlation table (Appendix 4), the willingness to collaborate scale was highly correlated with many of the other control variables. These controls were included in order to control for general willingness to collaborate, therefore, although this scale was created for this study, the fact that it was correlated with most of the other controls shows that it did seem to capture this trait.

Two more predictors show significance in certain models. Extroversion shows medium significance at the $p<0,05$ level in Model 4 with a coefficient of +.18, where all controls were included apart from the general willingness to collaborate control variable. This can be traced back to the two variables being significantly correlated with a relatively high value of 0.40. The following models, which include both variables show no further sign of significance for extroversion.

The last predictor to show a minor significance at the $p<0.1$ level is gender. This significance only appears in the final two models, which differ only in one model dropping the trust control. Since the sample used for the regression shows a gender ratio of 65.5% female to 34.5% male ratio and the coefficient for gender shows a positive relationship with collaboration choice, the significance could be based on this unequal ratio.

Aside from gender, all other demographic controls showed no significance in relation to collaboration choice. Furthermore, apart from the above-mentioned controls, no other personality related controls showed any significance, thus further strengthening the observation that the complexity manipulation was the driving force behind collaboration choice.

4.2 VALUABLE CHARACTERISTICS & RANKS WITHIN EACH TASK

The first step in analysing the data related to the collaboration partner characteristics, is to look at the selection and ranking frequencies. The frequencies for each characteristic within each task, are shown in Table 9, 10 and 11 respectively. It is important to note that only those who chose to collaborate for each task were then asked to complete this question. Therefore, the sample size for each task varies.

A scoring system was used to analyse the respondents' ranking of the tasks. Characteristics ranked as 1, indicating this was the most important characteristic to the respondent for the specific task, were given a score of 8. Each subsequent rank was given one less score, i.e. rank 2 was scored 7, rank 3 was scored 6 and so on. Characteristics that were not selected were scored as 0.

4.2.1 Characteristics Overview

The following section will analyse the patterns in characteristic selection and ranking for each respective task.

Low complexity

In the case of the low complexity task, 'practical experience' was chosen as an important characteristic 84.62% of the time, and shows the highest frequencies of being placed in the top two ranks. Therefore, it shows the highest importance within the low complexity task. 'Strong Knowledge' was found to be the second most important characteristic having been chosen by 46.15 % of all respondents and only being ranked in the top three ranks. On the other end of the scale 'Different Attitudes' was only selected once (2.56%), followed by 'Similar Knowledge' which was only chosen 8 times (20.51%). Therefore, it can be assumed that those two characteristics were often perceived to be of no importance for the majority of respondents. Especially for the case of 'different attitudes', the ranking position indicates the same finding as it was ranked in 8th place. Although 'Similar Knowledge' was ranked by some participants within the top four ranks, it still shows the lowest total count of appearing in those ranks, apart from different attitudes, and therefore supports the finding of being of lower importance.

Medium complexity

Within the medium complexity task, the most frequently chosen attribute is 'strong knowledge' (75.56%), followed by 'practical experience' with one less count (74.81%) and 'getting along well personally' (71.11%). All three characteristics show the highest appearances in the top rank with 37, 35 and 26 respectively. 'Similar knowledge and skills' was only chosen by 15 out of 101 participants (11.11%), and is the least important characteristic in this task, while 'different attitudes' is the second least important with only 14.07% of respondents having selected it. It is interesting to note that 'different attitudes' has been ranked 8th five times and is therefore the characteristic that is most frequently found in the bottom rank.

High complexity

For the high complexity task 'Practical Experience' is by far the most important characteristic as it was chosen by 92.05% of all respondents and ranked by 48.92% of those in the top rank. This is followed by 'strong knowledge', being selected by 74.83% of respondents and appearing in the top rank 35 times, while ranking second a further 52 times. On the other end of the spectrum 'similar knowledge' was only chosen by 10 out of 151 participants and therefore shows no importance to most participants. In addition to this it is placed 5 times within the two bottom ranks. Similarly, 'different attitudes' was only chosen by 9.93% of respondents and placed 4 times in the lowest ranks, therefore also indicating low importance for the majority of respondents.

Data Task n=39	Practical Experience	Strong Knowledge	Get along well	Worked before	Similar Attitudes	Different Attitudes	Similar Knowledge	Different Knowledge
Count	33	18	15	13	15	1	8	10
Count %	84.62%	46.15%	38.46%	33.33%	38.46%	2.56%	20.51%	25.64%
Rank 1	15	6	4	6	5		1	2
Rank 2	12	6	4	4	3		1	6
Rank 3	5	6	4	2	4		2	1
Rank 4			1	-	3		3	
Rank 5	1		2	1				
Rank 6				-		1		
Rank 7				-				1
Rank 8				-			1	
Score	238	126	97	92	100	3	43	66
Mean Score	6.10	3.23	2.49	2.36	2.56	0.08	1.10	1.69

Table 9 Frequencies and Ranks of Characteristics - Low Complexity Task

Sustainability Task n=135	Practical Experience	Strong Knowledge	Get along well	Worked before	Similar Attitudes	Different Attitudes	Similar Knowledge	Different Knowledge
Count	101	102	96	28	60	19	15	81
Count %	74.81%	75.56%	71.11%	20.74%	44.44%	14.07%	11.11%	60.00%
Rank 1	37	35	27	2	13	1	1	19
Rank 2	28	37	15	7	14	9	1	23
Rank 3	22	21	29	6	15		6	20
Rank 4	12	8	19	2	12	1	1	13
Rank 5	2	1	6	5	5	1	1	2
Rank 6				2		1	3	3
Rank 7				3		1	2	1
Rank 8				1	1	5		
Score	692	709	614	144	373	90	73	517
Mean Score	5.13	5.25	4.55	1.07	2.76	0.67	0.54	3.83

Table 10 Frequencies and Ranks of Characteristics - Medium Complexity Task

Management Task n=151	Practical Experience	Strong Knowledge	Get along well	Worked before	Similar Attitudes	Different Attitudes	Similar Knowledge	Different Knowledge
Count	139	113	93	37	62	15	10	98
Count %	92.05%	74.83%	61.59%	24.50%	41.06%	9.93%	6.62%	64.90%
Rank 1	68	35	21	3	8	2	2	12
Rank 2	35	52	16	6	17			23
Rank 3	23	20	31	12	10	1		42
Rank 4	10	6	15	5	23	2	1	13
Rank 5	3		9	4	2	3	1	7
Rank 6			1	3	1	3	1	1
Rank 7				1	1	2	3	
Rank 8				3		2	2	
Score	989	794	580	193	371	59	36	605
Mean Score	6.55	5.26	3.84	1.28	2.46	0.39	0.24	4.01

Table 11 Frequencies and Ranks of Characteristics - High Complexity

4.2.2 Characteristics scores/ranks across tasks

Multiple approaches are used in order to gain insights into differences between the characteristic choice data for each task. First the orders of scores are compared and first patterns deducted. This section is followed by statistical analysis regarding whether certain characteristics rise significantly in importance based on differing complexity. Lastly, insights are made into patterns regarding homogeneous or heterogeneous preferences.

General patterns

The first part of analysis is based on a sample of n=165 which consists of all respondents that passed the manipulation check. Furthermore, since respondents only responded to the characteristics questions if they chose to collaborate for that specific task, there are different sample sizes for each task. Low complexity has a sample size of n=39, medium complexity has a size of n =135. High complexity shows the highest sample with n=151.

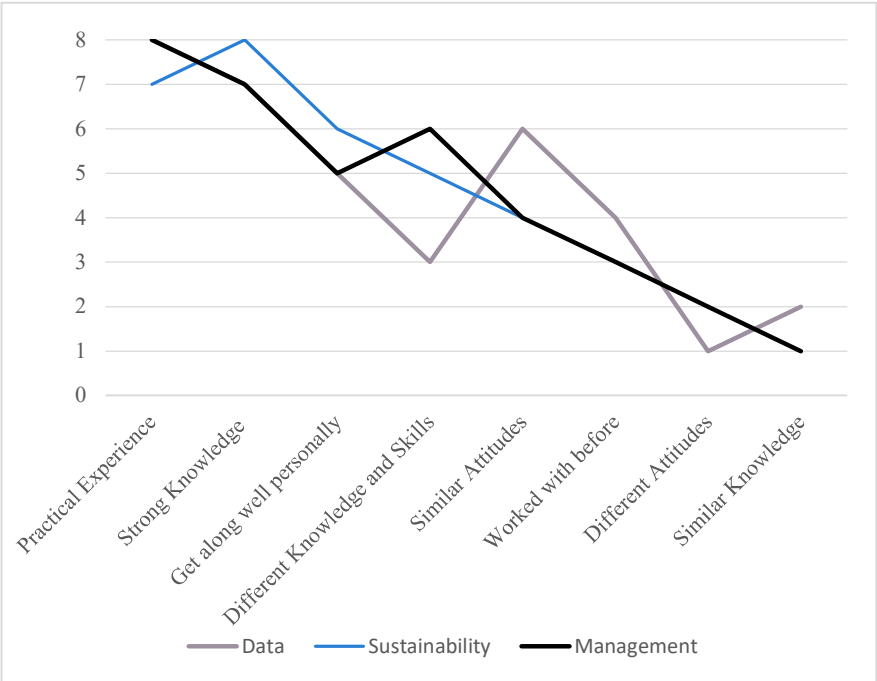

Figure 2 Characteristic Ranks within each task (8 = most important)

For all three tasks, 'practical experience' and 'strong knowledge' are scored the highest. Conversely, 'similar knowledge' and 'different attitudes' are consistently ranked with the lowest scores, and hence show the least importance. There is some variance within the ranks 3-6, although 'similar attitudes' is ranked fifth for both the medium and high complexity task, and only achieved a higher rank (3) within the low complexity task. This shows that in terms of importance between the different characteristics, all three tasks show a highly similar pattern. The described pattern is shown visually in Figure 2. The horizontal axis shows all characteristics in order of their overall importance across all tasks. Each line represents a task and shows how highly the characteristic was ranked overall within that task. Although the alignment is not 100%, all graphs are very close to each other, especially medium and high complexity are fully aligned for the bottom four characteristics.

Regarding whether one characteristic shows higher importance in one task compared to the other two, both frequency of selection percentage is looked at, as well as their mean score. Besides, 'similar attitudes' all characteristics show at least one obvious increase or decrease between both mean score and selection frequency from one task to another. This indicates an increasing or decreasing importance

of the characteristic between tasks. In order to statistically analyse whether these differences are significant, a one-way analysis of variance (ANOVA) test on the entire sample was conducted.

4.2.3 One-way ANOVA

A one-way ANOVA was conducted based on the above described sample. The ANOVA table (Appendix 7) shows significance for all characteristics, except 'similar attitudes. Furthermore, 'practical experience', 'strong knowledge', 'get along well personally', 'similar knowledge' and 'different knowledge' show high significance at the $p<0.01$ level. 'Have worked with before' and 'different attitudes' show medium and low significance at the $p<0.05$ and $p<0.1$ level, respectively.

Complexity Level	Practical Experience	Strong Knowledge	Get along well personally	Worked with before	Similar Attitudes	Different Attitudes	Similar Knowledge & Skills	Different Knowledge & Skills
Low	6.10	3.23^{b*c*}	$2.49^{b*c\wedge}$	$2.36^{b*c\wedge}$	2.56	$0.08^{b\sim}$	$1.10^{b\wedge c*}$	1.69^{b*c*}
Medium	5.13^{c*}	5.25^{a*}	$4.55^{a*c\sim}$	1.07^{a*}	2.76	$0.67^{a\sim}$	$0.54^{a\wedge}$	3.38^{a*}
High	6.5^{b*}	5.3^{a*}	$3.8^{a\wedge c\sim}$	$1.3^{a\wedge}$	2.5	0.4	0.2^{a*}	4.0^{a*}

Table 12 Mean Scores of Characteristics for each task

a = significantly different to low complex
b = significantly different to med complex
c = significantly different to high complex
** = p < 0.01*
^ = p < 0.05
~ = p < 0.1

Pairwise comparisons give insight into which tasks the characteristics significantly differ between. 'Practical experience' is significantly higher and therefore more important for high, compared to medium complexity. The characteristic of 'strong knowledge' is significantly higher for medium and high complexity compared to low complexity but shows no difference between medium and high complexity.

'Getting along well with personally' again differs significantly between low and medium, as well as low and high complexity, while it shows its highest mean score for medium complexity.

Having worked with someone before shows the highest mean score for the low complexity task, while differing significantly from both medium and high complexity. 'Having different attitudes' is only significant between low and medium complexity with higher mean for medium complexity.

Choosing someone with 'similar knowledge' scored significantly higher for low complexity than high complexity. 'Different knowledge and skills' on the other hand is significantly lower for low complexity compared to medium and high complexity. These findings show that certain characteristics show significant variation in means across different complexity tasks.

4.2.4 Repeated Measures ANOVA

The above one-way ANOVA is calculated based on the samples for each task being independent groups due to different sample sizes. However, the survey was designed as a 'repeated measures' study, and therefore a 'repeated measures' ANOVA was conducted only on the respondents who collaborated for all tasks. Therefore, a smaller sample of n=26 was used. This allows for a more sensitive measure of how characteristic choices changed between tasks for each individual respondent.

The Greenhouse-Geisser statistic shows which characteristics have significant within-subject variation. 'Strong knowledge', as well as 'different knowledge' show a medium significance at the p<0,05 level. Therefore, 'practical experience', 'get along well with personally', 'have worked with before', 'similar attitudes', 'different attitudes', and 'similar knowledge' do not differ significantly within subjects for the different tasks. To further explore the above found variations pairwise comparisons are conducted. (see Appendix 8)

	Practical Experience	Strong Knowledge	Get along well personally	Worked with before	Similar Attitudes	Different Attitudes	Similar Knowledge & Skills	Different Knowledge & Skills
Low	6.15[c*]	2.96	2.27	2.08	2.65	0.00	0.85	1.92[b~]
Medium	5.31	4.81	3.42	0.58	3.08	0.81	0.50	3.62[a~]
High	6.58[a*]	5.65	3.65	0.73	2.19	0.62	0.00	3.50

Table 13 Mean Scores of Characteristics for each task, n=26
a = significantly different to low complex
b = significantly different to med complex
c = significantly different to high complex
** = p < 0.01*
^ = p < 0.05
~ = p < 0.1

Strong knowledge scored a higher mean score for high complexity tasks in comparison to low complexity tasks. Therefore, strong knowledge was more frequently chosen/ranked higher for the high

complexity task than the low complexity task. The difference is statistically significant at the $p<0.01$ level.

The second characteristic to show a significant difference is 'different knowledge and skills'. It only shows a significant difference ($p<0.1$) between low and medium complexity tasks, where respondents scored it higher for the medium complexity task.

4.2.5 Heterogeneity/Homogeneity Insights

To gain insights into whether individuals tend to prefer heterogenous or homogenous characteristics, frequencies and crosstabs are analysed. This was conducted in two steps, with the first analysing the frequencies of the heterogeneity/homogeneity characteristics, and the latter comparing the respondents' characteristic choices to their own individual experience/knowledge.

Frequency of heterogeneous/homogeneous characteristics

Tables 9, 10 and 11 show the frequencies of the characteristics 'similar attitudes', 'different attitudes', 'similar knowledge and skills' and 'different knowledge and skills' for all three tasks. Based on those frequencies certain tendencies become clear. For the attitude characteristics, 'similar attitudes' was consistently chosen more often than 'different attitudes', as well as ranked more frequently in the top ranks across tasks. Therefore, 'similar attitudes' was of higher importance than 'different attitudes'.

Considering heterogeneity and homogeneity in relation to knowledge and skills the opposite pattern occurs. 'Different Knowledge' shows higher frequencies of choice, as well as higher ranks, than 'similar knowledge' within all three tasks, whereby within the medium and high complexity tasks the difference is much more extreme than within the low complexity task. This shows a general tendency to value 'different knowledge' more highly.

Based on the above frequencies a tendency towards homogeneity of attitudes and heterogeneity of knowledge and skills is observable.

Characteristics chosen based on own profile

A second way of analysing potential tendencies towards heterogeneity or homogeneity was conducted by matching respondents' own level of knowledge and experience with their chosen characteristics.

Thus, crosstabs were produced that allow insight into whether the existence of knowledge or experience in the task area influences participant's choice of characteristics. For each complexity level it was first tested whether the mere existence of knowledge or experience would result in a significant association with the respective characteristics of 'strong knowledge' and 'practical experience'. No crosstab showed a significant change in column proportions or a significant Fisher's exact test, which was used due to low expected count values.

In order to see whether the possession of a high amount of knowledge or experience would alter these findings, two additional crosstabs were produced for each task using dummy variables for if the respondent selected they had 'a lot of experience' or 'a lot of knowledge', as well as dummy variables for whether 'practical experience' or 'strong knowledge' were selected. Significance was only detected in one case, for the high complexity task. The crosstab within the high complexity task for 'a lot of experience' and 'practical experience' showed significant differences in column proportions and a Fisher's exact test significance at the $p<0.1$ level. The counts show that there was a decrease in percentage of respondents who chose 'practical experience', when they indicated that they have 'a lot' of experience themselves. Therefore, a small tendency towards heterogeneity is detected. Since this is the only significance detected and only low significance is indicated, this finding is to be treated with caution when generalising findings.

			Practical Experience Characteristic		
			0	1	**Total**
A lot of Experience	0 (Not present)	Count	9a	129b	138
		Expected Count	11.0	127.0	138.0
		%within a lot of experience	6.5%	93.5%	100.0%
		%within Practical Experience	75.0%	92.8%	91.4%
		% of Total	6.0%	85.4%	91.4%
		Standardized Residual	-.6	.2	
	1 (Present)	Count	3a	10b	13
		Expected Count	1.0	12.0	13.0
		%within a lot of experience	23.1%	76.9%	100.0%
		% within Practical Experience	25.0%	7.2%	8.6%
		% of Total	2.0%	6.6%	8.6%
		Standardized Residual	1.9	-.6	
Total		Count	12	139	151
		Expected Count	12.0	139.0	151.0
		% within a lot of experience	7.9%	92.1%	100.0%
		% within Practical Experience	100.0%	100.0%	100.0%
		% of Total	7.9%	92.1%	100.0%

Table 14 Crosstab – A lot of experience x Practical Experience (High Complexity Task)
Each subscript letter denotes a subset of practical experience choice whose column proportions do not differ significantly from each other at the 0.05 level.

n=151	Value	df	Exact Sig. (2-sided)
Pearson Chi Square	4.45	1	.070
Continuity Correction	2.48	1	
Likelihood Ratio	3.21	1	.070
Fisher's Exact Test			.070
Linear-by-Linear Association	4.42	1	.070

Table 15 Chi Square for Heterogeneity/Homogeneity Crosstab

Besides this no tendency was observed of preferring homogeneity or heterogeneity in experience or knowledge based on one's own level of experience or knowledge. The earlier discovered high importance of 'practical experience' and 'strong knowledge' seems to be further supported by this, showing that those characteristics were important despite whether knowledge or experience was already personally held.

4.3 ANALYSING OPEN-ENDED QUESTIONS

To gain further insights into the respondents' reasoning for their collaboration choices, open ended questions were included in the survey. The participants were asked to explain in their own words why they choose to collaborate or not to collaborate for each task. This question was asked before the complexity manipulation check to ensure that the respondents would not be influenced by the use of the word 'complexity'.

The answers for these questions were analysed using thematic coding, to understand firstly, whether complexity played a role in the respondents' decisions to collaborate or not, and secondly, to see what other factors may have influenced their decisions. The answers were grouped into reasoning for or against collaboration for each task, and then coded using the software 'NVIVO' to find themes within these answers. The themes identified for each task are explained below. A table summarising all themes identified is listed in Appendix 9.

4.3.1 Explanations for *not* collaborating – Data Entry

The following section details the themes found in the respondents' explanations for choosing *not* to collaborate for the data entry task. The primary explanations included the task being less complex, the need to complete the task accurately, the 'mechanical' nature of the task and having enough knowledge and experience to complete the task alone.

Less complex

Many respondents referred specifically to the complexity of the task when explaining their reasons for not collaborating for the data entry task. 50 respondents described the data entry task as 'simple', 'easy', 'basic', 'straight forward' or 'less complex' and for this reason chose to undertake the task alone.

When looking more deeply into the answers many respondents indirectly referred to the task being less complex by stating complexity contributory factors that have a negative relationship with task complexity, this included:

- The task being clearly defined
- The objective of the task being clear
- The task not having goal conflict - "*Only needing to think of what one person would need from you*"
- The task having one correct answer
- Low cognitive effort or "*not needing to think much*"
- The task being repetitive

Another complexity contributory factor that was clearly identified in the task was the sufficient time allocated to complete the task. 26 respondents stated that because the task was of short duration and because "*the time available to complete the exercise was (overly) sufficient*", there was no need to collaborate with someone else.

Accuracy

15 respondents referred specifically to the requirement of accuracy when explaining why they would rather work alone. For some, this was due to a lack of trust in the competency of the collaboration partner, for example *"not worrying about the other making errors",* whereas others focused more on having control over the task due to confidence in their own abilities; *"If I do it, I know I don't need to check the results after.".*

Other respondents believed that the collaboration process itself would lead to less accuracy for this particular task, for example "*splitting/collaborating could cause more errors than if one person does it*", and "*I believe that the risk of doing it incorrectly would increase when including more people*".

Therefore, many believed that collaborating would negatively impact the quality of the task output in this case.

Nature of the task

19 respondents stated that they could not see any benefits of collaborating, specifically referring to the lack of creativity required by the task, and how "*discussion*", "*reflection*" or "*sparring*" with a collaboration partner would not lead to an improved outcome. A further 10 respondents reasoned this was due to the 'mechanical' nature of the task. In the words of one respondent, "*It's a "robot" job and I don't believe collaboration would add value in this case.*".

22 respondents stated that they believed it would be more efficient to do the task alone than to collaborate with someone else, stating that discussion, explanation and coordination would lead to unnecessary time lost. 6 respondents also mentioned that due to the nature of the task, it is a task they *"would not want to bother"* or *"waste someone else's time"* with.

Sufficient knowledge and experience

16 respondents referred to their own experience with data entry when explaining why they would choose not to work with someone else. A further 8 referred to their own 'confidence' in their ability to successfully complete the task, even though some of them explicitly stated they did not have much experience in this area, for example *"I feel like I could easily complete this task with my own skill set (despite little experience in the field)".*

4.3.2 Explanations for *not* collaborating – Sustainability

The follow section describes the themes for why respondents chose *not* to collaborate for the sustainability (medium complexity) task. Like the data entry task, sufficient knowledge/experience and the task being less complex were common explanations, however for the sustainability task there was also the addition of reasons regarding strong interest in the field and wanting to receive singular credit.

Less complex

8 people stated that they chose not to collaborate for the sustainability task due to the "*easiness*" or "*manageability*" of the task. Some also referred to the short duration and sufficient time of the task, and

how the task seemed "*less important*" than the management task and therefore would prefer to do the task alone.

Specific interest

A number of respondents referred to their specific interest in the task area when explaining why they would not want to collaborate. They explained their 'passion' for the topic of sustainability may result in disputes with a collaboration partner, and therefore the process would be easier to undertake the task alone. For example, *"I would potentially clash with others as it is a subject I feel very strongly about"* and *"if it's something I'm passionate about I may not agree with the other person".*

Singular credit

4 respondents mentioned they would choose not to collaborate for this task as they would prefer to present their own ideas. Although no reward was explicitly mentioned in the task description, one respondent stated that they would like the "*glory*" of coming up with a good idea to be *"all [their] own".*

Sufficient knowledge & experience

10 people referred to their own knowledge and experience when choosing to work on their own. A further 7 stated they would feel "confident" in their own abilities to undertake the task, without referring to specific prior experience or knowledge. However, one respondent referred specifically to their lack of knowledge in their explanation; *"Even if I lack both knowledge and experience, I consider the task doable with some basic google research and creativity".*

4.3.3 Explanations for *not* collaborating – Management

The choice *not* to collaborate was selected for the management task the least, and therefore there were only a few clear themes within the answers regarding choosing not to collaborate. This included wanting to retain accountability for the task and having sufficient experience and knowledge in the field of management or digitalisation.

Single Accountability

Of those who chose not to collaborate for the management task, 10 respondents explained that for this specific task they would prefer to be the singular point of accountability. Some mentioned they would delegate specific tasks where possible but believe the task would be successfully implemented if only one person was in charge. A further element of wanting complete control was present in many of these answers with people referring to wanting to have "*100% say"* or *"make decisions myself*", not wishing to share that responsibility.

Sufficient knowledge & experience

6 people stated that their own experience or knowledge regarding management or digitalisation would make them feel sufficiently prepared to manage a team alone. For example, "*I have experience in management and knowledge of digitisation strategies and feel confident in my ability to do this task by myself.*"

4.3.4 Explanations *for* collaborating – Data Entry

The following section details the reasons given for choosing to collaborate specifically for the data entry task. The main themes identified were due to the task being 'boring' and thus wanting to complete it quicker, or do less work, and to increase the accuracy of the task output.

'Boring' task

9 people stated that they would choose to collaborate for the data entry task due to the 'boring' nature of the task, e.g. "*sounded boring, would like someone to share the workload*". Therefore, despite having sufficient time they would prefer to work with someone else to get the task over with quicker, to share the workload and to have an extra set of eyes to look for mistakes. In the words of one respondent *"it can be quite boring, and things can easily be missed as it all starts to blur together, so another set of eyes would be helpful"*.

Similarly, 10 people stated they would like to collaborate with someone else in order to get the task done more efficiently, "*This was more because the task was boring so better get it done fast*". Many people referred specifically to the task being 'simple' and therefore there are unlikely to be issues when splitting the task, "*it's boring and easy- so that almost no one can really do it wrong*"

4.3.5 Explanations *for* collaborating - Sustainability and Management

Many people chose to collaborate for both the sustainability and management tasks and therefore referred to both tasks collectively in their answers. The following themes were uncovered from the answers referring to both the sustainability and management tasks, followed by answers that referred to the management task specifically.

Brainstorming, innovation and creativity

43 people referred specifically to the need for idea generation, brainstorming, innovation and creativity when citing why they collaborated for these tasks. The desire for discussion with a team was commonly stated. A further 20 responses explained they believed these tasks called for 'diverse inputs'. Within these answers many stated that they believed these tasks required "*different points of view*", "*different skills and knowledge*", "*different mindsets*" and "*different capabilities*" and therefore collaboration was necessary. Additionally, within these answers, some respondents stated that a variety of perspectives were particularly important for these tasks due to the outcome of the task impacting more people, for example *"as the outcome involved other people it would be helpful to have more people's input so that the outcome is not just a representation of my thoughts and feelings"*. Another respondent explained, "*Combining different input and knowledge in designing solutions or approaches are to me inevitable when delivering projects for a wider audience. This will increase the likelihood of accommodating for the most possible people.*".

Interestingly, some responses stated that despite having knowledge or experience in these areas that inputs from someone with different skills than them, even if they are less experienced in the task area, would be beneficial to the outcome. When explaining why they collaborated for the management task, one respondent stated *"Even though I have more experience within this field, I believe that the sheer size of the project and complexity makes it more important to get additional input, especially from someone with a different skillset than mine."*

More complex

15 people specifically stated that these tasks were more "complex" or "difficult" when referring to both the tasks. A further 3 people used these terms specifically for the management task. However, other

answers referred to complexity contributory factors that have a positive relationship with task complexity without specifically using the term 'complexity'. These responses included:

- Referring to the need to satisfy more people, i.e. higher goal conflict (3)
- Explaining that these tasks were 'subjective' tasks that did not have one right answer, or had multiple paths to success (5)

3 people also referred to the increased importance and responsibility involved with the tasks

Specifically for the management task, more factors related to the CCFs were uncovered in the respondents' answers including:

- The size of the task (12)
- The need for stakeholder management (4)

3 people also explained that the fact that the task was for a *"new division"* that had not been done before was part of their reason for collaborating. This adds to the 'non-routine' element of the task which is an element of task complexity.

Lack of knowledge or experience

When referring to both tasks, 19 people cited their own lack of experience or knowledge as part of the reason they chose to collaborate. Of those who referred to the tasks specifically, 7 people stated their own lack of experience or knowledge was part of the reason they chose to collaborate for the sustainability task, while 30 people included this as part of the reason for the management task. This suggests that as the tasks grew in complexity, lack of existing knowledge or experience was an increasingly important factor in choosing to collaborate.

Joint accountability

A theme that was identified *specifically for the management task* was that people chose to collaborate as they did not want to be responsible for the task alone. 6 people stated as part of their reasoning for choosing to collaborate that they would not want to be the only one in charge, make decisions on their own, or be *"blamed"* if everything went wrong.

4.3.6 Explanation *for* collaborating – All Tasks

The respondents that collaborated for all tasks tended to refer to all three tasks together when explaining why they chose to collaborate, and hence gave more general insights about the benefits of collaboration or why they prefer to collaborate. The main themes identified within these answers were a general preference for working with others, a belief that the outcome will generally be better if collaboration occurs and the learning benefits that come from collaborating.

Preference for working in teams

For the respondents that choose to collaborate for all tasks, one of the most common themes in their explanations was '*general enjoyment*' for working with others or in a team environment. 11 people stated that they prefer to work with other people and therefore would generally opt to collaborate regardless of the task. Specific reasoning for this included the ability to talk to other people, bounce ideas off others, and increased enjoyment or fun with other people involved.

Better outcome

14 people referred to either brainstorming or being able to tap into a diversity of inputs by choosing to collaborate. They referred to collaboration being able to *"maximise"* the experience, knowledge and skills of the individual members, leading to synergies and overall a more holistic outcome. A further 6 referred specifically to *'knowledge sharing'* being a key benefit of collaborating with others. Similarly, 9 people referred specifically to collaboration leading to a better-quality outcome or more successful result, whilst 5 people stated that collaboration would make the process for each task more efficient.

Learning opportunities

5 people stated that they chose to collaborate with others for their own personal development. They explained that they chose to collaborate in order to learn from others and *"enhance [their] own skill set"*.

4.3.7 Under what circumstances would you choose *not* to collaborate with someone?

The respondents who chose to collaborate for all tasks were asked the additional question of identifying the circumstances in which they would choose not to collaborate. This allowed for interesting insights

into the general factors that may influence individual's collaboration choice. This included who the collaboration partner was, contextual factors such as time constraints and the task type, as well as personal factors such as individual expertise.

Based on collaboration partner

When the respondents who collaborated for all tasks were asked when they would choose not to collaborate, the most common theme in the responses was based on the collaboration partner. 20 respondents explained that they would not choose to collaborate based on the traits of the collaboration partner, specifically referring to traits such as:

- Not being as interested or invested in the task (4)
- Not getting along on a personal level (5)
- Having an intolerant or close-minded attitude (3)
- Being generally 'difficult to work with' (4)
- Being unreliable or untrustworthy (4)
- Not being competent/ having the necessary knowledge and skills (3)

Time constraints

Another reason people stated they would not collaborate was if there were strict time constraints for the task. 8 people referred to urgency and time availability, stating that they would choose to work on their own if *"discussion would take unnecessary time"* in a "*high-pressure*" situation.

Type of task

Some respondents said the type of task would play a role in choosing to work alone, specifically if the task was *routine* or *"did not impact others"*, citing examples such as cleaning and organising.

Another group of respondents said they would not collaborate if the task was highly *"quantitative"*, *"technical"* or *"mathematical"*.

Expertise

5 people stated they would choose not to collaborate if they had *"particular expertise"* in the task area or had the *"requisite skills and knowledge"* to complete the task. A further 4 respondents referred to their own self-confidence in being able to complete the task, e.g. *"I would not collaborate if I trusted I could complete a task effectively without the assistance, advice, help etc. of another party"*.

5 DISCUSSION

The purpose of the research was to explore the relationship between task complexity and collaboration preferences at an individual level in order to discover patterns in firstly, likeliness to choose to collaborate, and secondly, preferences in the characteristics of a collaboration partner.

How does task complexity affect people's willingness to collaborate and with whom?

The quantitative analysis of collaboration choice found that there was a significant relationship between collaboration choice and each level of complexity manipulated in the task scenarios. This relationship was tested only on the respondents who correctly understood the task manipulation, further validating this finding. Furthermore, the significance of the complexity variables held, even when all other controls were included in the model. This indicates that the task itself was significant in influencing respondents' collaboration choices.

However complete 'objective' complexity is "unattainable" outside of a laboratory context (Liu & Li, 2012 p.558). Given each task scenario was different, the quantitative analysis cannot conclusively prove that the correlation between collaboration choice and the task scenarios was solely based on task complexity. The inclusion of open-ended questions in the survey allowed for a qualitative analysis that supported the aforementioned relationship between task complexity and collaboration choice and added robustness to the quantitative findings.

Firstly, the analysis of the open-ended questions confirmed that for many respondents it was the complexity (or lack of complexity) of the tasks that was the basis of their collaboration choice. In addition to referring to the complexity of the tasks generally, many respondents also unwittingly identified various CCFs from Liu & Liu's (2012) task complexity model when reasoning for their collaboration decision.

CCFs with a negative relationship with task complexity were repeatedly cited as a reason *not* to collaborate, whilst CCFs with a positive relationship with task complexity were cited as a reason *to* collaborate. CCFs that have a negative relationship with task complexity such as repetition, lack of time constraints, and the task process and goals being clearly defined were repeatedly mentioned as being a reason *not* to collaborate for the task (Liu & Li, 2012). Conversely, positive CCFs were mentioned for the medium and high complexity tasks, including the size of the tasks, having multiple paths to success,

having multiple right answers, the tasks being 'non-routine' and needing to satisfy the needs of different people, which can be interpreted as higher goal conflict (ibid.). This adds robustness to the quantitative findings that the inherent complexity of the task itself had a positive relationship with collaboration choice.

However, interestingly, analysis of the respondents' answers also revealed certain elements of complexity demonstrated the inverse relationship with willingness to collaborate. For example, when asked when they would choose *not* to collaborate, the presence of time constraints was a key theme identified in the respondents' answers, despite time constraints being a factor that has been shown to increase the complexity of the task (Liu & Li, 2012). Additionally, the requirement of accuracy increases the cognitive effort required for the tasks, and thus has a positive relationship with task complexity (Liu & Li, 2012). However, for the low complexity task the need for accuracy was more commonly cited as a reason *not* to collaborate than it was for a reason to collaborate. This indicated that elements of complexity may have contradicting relationships with willingness to collaborate, depending on the task type and collaboration process.

In addition to the underlying complexity of the task, analysis of the open-ended questions made it apparent that the *perceived* complexity of the task, which is affected by the respondents own skill base, experience and familiarity with the task, played a large role in the choice to collaborate (Campbell, 1988). Many respondents stated that their own lack of knowledge or experience in the task areas would be the primary reason why they would choose to collaborate with someone else. This was also reflected in the characteristic analysis, which demonstrated consistently that those who collaborated for each task deemed experience and knowledge in the task area as the most important characteristics in a collaboration partner. Byström & Järvelin's (1995) research on information seeking argues that as the task-performer experiences gaps in their own knowledge and the necessary requirements for the task, they will seek information from 'general purpose sources' such as experts, and therefore aligns with this finding. The importance of prior experience was also reflected in the quantitative analysis as the respondents' 'experience score' for each task was deemed a significant variable with a negative relationship to collaborate choice.

Interestingly, Wasko & Faraj (2005) previously proposed that knowledge contribution by an individual will be more likely when that individual possesses adequate experience. Thus, the abovementioned finding that more experience leads to less collaboration somewhat contradicts this proposition. Although

it is important to note that knowledge sharing and collaboration have different features, this finding suggests that the existence of experience held by an individual can affect collaborative efforts in different ways.

However, the analysis also demonstrated that other task characteristics aside from task complexity played a role in the respondents' decision to collaborate. Particularly, the need for creativity, innovation and brainstorming were repeatedly cited as catalysts for choosing to collaborate. The literature has emphasised the use of collaboration in order to innovate and combine different knowledge sets for firms to create competitive advantage (Adams et al., 1998 as cited in Cavusgil et al, 2003). It is interesting to note that this value is mirrored at a microfoundation level in the respondents' answers. The need for creativity is somewhat related to increased task complexity, as having 'multiple paths to success' and 'increased cognitive effort' is seen as a contributor to task complexity (Campbell 1988; Liu & Li, 2012). However, the need for creativity can also be argued to be a separate task characteristic, as tasks can be highly complex due to other factors, without needing creativity.

Similarly, the 'type of task' was repeatedly mentioned as an explanation of collaboration choice. A common theme in the respondents' explanations for *not* collaborating was based on the task being 'technical', 'quantitative' or 'mechanical'. Again, this can be seen as the task potentially having one right answer or a clearer process, which is associated with less task complexity due to priori determinability of the task (Byström & Järvelin, 1999; Li & Liu, 2012). However, it is unclear whether it is the complexity of the task or the nature of the task itself that is leading to less collaboration.

Another alternative task characteristic that seemed to influence respondents' choice to collaborate was the level of importance or responsibility the task required. For some individuals, this influenced their choice to collaborate in order to share the load and not be held accountable if something goes wrong. This could be dependent on an individual's personal risk attitude; however, risk attitude was not found to be significant in the quantitative analysis. For other individuals, they chose not to collaborate in order to receive all the credit for doing the task correctly themselves or because they wanted to be a single point of accountability. This attitude may be tied to the individual's personal perception about the goals and ultimate reward of the task. Campbell (2018) argues that individual performance accountability is weakened in collaborative initiatives and found that rewards based on individual performance have a negative impact on willingness to collaborate. Whilst there was no explicit mention of rewards within the task scenarios, credit for successfully completing the tasks may have been assumed by task

respondents and thereby as a ‘soft reward’ motivated their decision not to collaborate (Chang & Chuang, 2011).

Regarding the characteristics deemed important in an ideal collaboration partner, various findings have been achieved. Currently there is no generally accepted framework to understand how individuals prioritise characteristics when seeking collaboration partners. However, previous literature focuses strongly on relational characteristics and postulates that the choice of collaboration partner is mostly based on previous contact, familiarity and similarity (Gruenfeld, Mannix & Neale, 1996). The importance of this was reflected in the findings of this study, as ‘getting along well personally’ was overall the third most important characteristic among all tasks.

However, Goins & Mannix (1999) suggest that the importance of previous contact may not only be due to the preference to work with someone that is already familiar, but also enables the individual to evaluate the potential partner’s skills and knowledge based on past experience. This study found that ‘practical experience’ and ‘strong knowledge’ were consistently chosen most frequently and ranked as most important. Given these characteristics were found to be more important than getting along well with someone or having worked with someone before, this supports Goins & Mannix (1999)’s contention. Furthermore, it is interesting to consider whether the importance of prior contact may have been overstated in previous observational studies, as choosing familiar teammates or partners may conceal the individual’s primary motivation of identifying partners with the relevant experience and knowledge.

A further theme in group formation suggested by the literature is concerned with homogeneity and heterogeneity of teams in general. It is argued that individuals show a preference for homogeneity in regard to attitudes and values, however the literature also repeatedly acknowledges the importance of heterogeneity in terms of skills and knowledge (Owens, Mannix & Neale, 1998). The frequencies of the included diversity-related characteristics show that both suggestions by literature are in line with this study’s findings. Within all tasks ‘similar attitudes’ outscored ‘different attitudes’, reflecting Byrne’s (1971) finding that individuals tend to find others with a similar attitude to themselves “more intelligent, knowledgeable and well-adjusted" (as cited in Mannix & Neale, 2005, p. 3). Conversely, ‘similar knowledge and skills’ was consistently chosen less and ranked as less important than ‘different knowledge and skills’. Furthermore, it was found that within the high complexity task, ‘practical experience’ showed less likelihood of being chosen when individuals already possessed a high amount

of experience themselves, as opposed to when they did not. Therefore, the preference for heterogeneous knowledge and skills is apparent.

Despite the changing complexity of the tasks, the relationship with the characteristics chosen remained consistent. Within all tasks, 'practical experience' and 'strong knowledge' were ranked as most important, whereas 'similar knowledge' and 'different attitudes' were least important. However, some slight variation occurred for certain characteristics between tasks. An interesting finding is that 'different knowledge' gained importance compared to other characteristics with rising complexity, being ranked 6th in low complexity, 4th in medium complexity and 3rd in high complexity. This shows a preference of individuals toward heterogeneous knowledge and skills, the more complex a task was. Another interesting finding to note is that with rising complexity respondents seemed to value 'similar attitudes' relatively less, as it dropped from being the third most important in the low complexity task to the 5th most important for both medium and high complexity. This follows the opposite pattern of 'different knowledge and skills' and suggests that with rising complexity, functional aspects are valued higher, whereas attitudinal aspects lose importance.

In light of the above findings it is interesting to note that collaborative efforts have been repeatedly linked to better outcomes under complex circumstances. Moreover, it has been suggested by the literature that heterogenous teams produce higher quality solutions within those complex situations (Baer, Dirks & Nickerson, 2012; Mannix & Neale, 2005). This study demonstrated that within this context, individuals made choices that the literature suggests would lead to better outcome at an organizational level, i.e. there was a greater tendency to collaborate when tasks were more complex and the importance of heterogeneity in regards to experience and knowledge was recognized in the individuals' responses. Therefore, individual preferences in regard to both collaboration choice and partner are aligned with what is recommended for best possible outcomes by the literature. Given Burcharth, Knudsen, & Søndergaard (2017) argue that autonomy for employees in a collaborative setting can lead to beneficial outcomes, this study finds support for implementing increased employee autonomy to better facilitate collaborative decision making.

The focus on this study was to identify the characteristics individuals prioritise in others when looking for a collaboration partner, and thus focused on the important *positive* characteristics that may assist in facilitating collaboration. However, an interesting by-product of the qualitative analysis was the revelation of the *negative* characteristics of a collaboration partner or teammate, that would result in the

individual foregoing collaboration altogether. The survey respondents that collaborated for all tasks were asked to identify under which circumstances they would choose *not* to collaborate. Rather than identifying certain tasks as expected, most of these answers explained that they would not collaborate if they did not deem the collaboration partner appropriate. The most common collaboration partner characteristics that would prevent an individual from collaborating included a close-minded attitude, lack of interest in the task, not being dependable or not being competent in the task area. Additionally, not getting along with the collaboration partner was cited as a reason not to collaborate.

These findings are highly related to the literature on interpersonal trust. Mischa et al. (1996) states that interpersonal trust is based on believing the other individual is competent, open, concerned and reliable. This is almost exactly the antithesis of the characteristics provided by the survey participants, as 'concerned' can be interpreted as the individual's interest in the task, and 'open' can be inferred as the individual's attitude and willingness to learn. Similarly, Pinto (2016) argues that there are three levels of interpersonal trust: the 'competence' level, the 'integrity 'level and the 'emotional' level. Whilst the first two levels are in line with Mischa et al. (1996), the final level relates to the instinctive 'personal' feeling the team members have towards each other and therefore relates to the final explanation of the respondents of 'not getting along well' with the other party.

As a result, this study has produced insights into which characteristics individuals prioritise when selecting a collaboration partner, which characteristics were seen as low or of no importance to the individuals, as well as which characteristics would have a negative impact on choice to collaborate. Moreover, this confirms that regardless of the task, the characteristics of the potential collaboration partners does have an impact on the decision to collaborate or not.

5.1 CONCLUSION AND CONTRIBUTION

Firstly, the study has demonstrated that the level of task complexity does have a relationship with an individual's choice to collaborate. The study demonstrated that based on the task scenarios presented, there was a significant difference in the respondents' choice to collaborate for each level of task complexity; low, medium and high. Qualitative analysis of the open-ended questions confirmed that task complexity was a large factor in the respondent's decision-making process and allowed deeper insights into the elements of task complexity that may have influenced the participants to collaborate more than others.

Secondly, analysis of the 'ideal partner characteristics' demonstrated that functional characteristics, specifically 'strong experience in the task area' and 'strong knowledge in the task area' were consistently selected as important and ranked highly compared to the other characteristics. This was consistent across all levels of complexity. In regard to heterogeneous and homogeneous profiles, the respondents' choices indicated that generally respondents would choose to collaborate with someone with similar attitudes to themselves but with different skills and knowledge. This was consistent for all tasks, however the relative importance of these characteristics compared to the other characteristics shifted with task complexity. Heterogeneous knowledge became increasingly important as task complexity increased whilst the relative importance of similar attitudes lessened as task complexity increased.

Despite the growing relevance of the concepts covered in this research, the relationship between task complexity and collaboration preferences has not been previously explored, and therefore the findings of this study make a valuable theoretical contribution. Furthermore, by conducting a general exploration into the relationship of task complexity and collaboration, this study has captured various interesting insights that should be further explored regarding both willingness to collaborate and the collaboration preferences of individuals. Thus, this study lays the groundwork for future research into this increasingly important area (future research detailed in section 5.2.2).

The managerial implications of these findings are twofold. Firstly, by better understanding individual preferences managers can facilitate collaboration by creating an environment that is more conducive to collaboration. Our study identified that theoretically, individuals prioritise collaborating with those that have practical experience and knowledge in the task area, more so than people that they have previous relationships with. Therefore, managers can actively facilitate collaboration by making it easier for individuals to locate where and with whom knowledge resides. This is particularly relevant in an online setting where design choices can improve the transparency around potential partners' areas of expertise and previous experience.

Secondly, whilst the focus of this study is on the microfoundations of collaboration due to increased individual autonomy and agency in collaboration decisions, better understanding of individual preferences also enables managers to give more effective direction. Even when individual autonomy is not present, by better understanding the types of tasks individuals would prefer to collaborate in, and the type of people they would prefer to collaborate with, managers can make and communicate decisions

regarding teamwork and collaboration that are more likely to align with the interests of, and thus be accepted by, their team.

5.2 LIMITATIONS AND FURTHER RESEARCH

5.2.1 Limitations

A first limitation stems from the approach of the research. As this was an explorative study, its purpose was to provide preliminary research into the relationship between collaboration and task complexity to lay the groundwork for future research (Singh, 2007). As no hypotheses have been tested and/or validated, this study does not conclusively prove that collaboration is correlated with increased task complexity. Therefore, the generalisability of the results should be considered with caution (ibid.).

Additionally, the research design for this study was a repeated-measures survey design. The purpose of this was to capture a larger sample in order to identify patterns whilst limiting the unsystematic variation of using independent groups (Field, 2019). However, there are a number of limitations with this approach.

Firstly, response to the hypothetical tasks in a survey format may not necessarily represent the respondent's natural choices in a real-world setting. Particularly for the ideal partner characteristics, it is unlikely that the choices presented are representative of the resources available in a real-world setting. Moreover, the responses may have been an idealised reflection of the individual's actual priorities when selecting who to collaborate with. This is because in a real-world setting individuals are likely to be influenced by subconscious biases when choosing who to work with, based on highly visible characteristics, such as age, gender and race, and this could not be captured in this survey (Milliken & Martins, 1996).

Secondly, to avoid respondents in the repeated-measures study assuming the purpose of the study, the tasks used in the survey were all different. This meant that firstly, the respondent's level of experience varied from tasks to task, and secondly, that there was variation between the tasks *aside* from the complexity of the tasks, primarily the task structure and task topics. This could indicate the relationship between collaboration choice and the tasks was due to something other than task complexity. The inclusion of open-ended questions mitigated the likelihood of this limitation, however further research is required to conclusively prove that task complexity leads to more collaboration.

The sample used for this study was intended to reflect the general population and therefore there were no restrictions on who could participate in the survey. Whilst the survey sample covered a wide range of nationalities, ages and professions, the survey was primarily distributed through the researchers own profiles, and therefore the sample is more likely to reflect the demographics of the researchers' own networks. The size of the sample is limited in size and unlikely to reflect the diversity and patterns of the general population sufficiently. Additionally, given the sampling strategy for this study was 'self-selection' there may be a response bias in the types of people that are more willing to volunteer their time for this study.

5.2.2 Areas for Future Research

The purpose of this research was to conduct a general exploration of the relationship between task complexity and willingness to collaborate which has not been yet explored in research. As a result, our findings shed light on an important correlation that should be further explored. Additionally, in the course of this exploration the study has revealed a number of interesting nuances within this relationship, setting the groundwork for numerous interesting studies going forward.

Firstly, this study was deliberately broad in order to understand the overarching influence of task complexity at a general level. Thus, the task scenarios in this study contained various CCFs in order to create three distinct levels of task complexity. However, the results of the qualitative analysis revealed that not all CCFs had the same impact on willingness to collaborate. Moreover, it is unknown whether it was the factors themselves or how important they were perceived to be by the respondent that elicited this effect. To further understand the details of this relationship, the effect individual CCFs have on collaboration should be studied using an independent measures design in a laboratory setting to ensure complete 'objective' task complexity (Li & Liu, 2012).

Secondly, given a survey is limited in the depth of insights it can produce, more detailed observational studies within this area should be undertaken. This would provide further interesting insights into an individual's decision-making regarding collaboration choice and particularly, collaboration partner selection in a real-world setting. A study such as this would also allow for interactive follow-ups with study participants to gain deeper explanatory insights into their choices.

Additionally, this study revealed that there are several task characteristics that are closely related to task complexity that may also have an impact on collaboration choice. Particularly, the need for creativity and the need for innovation within a task have been repeatedly discussed in the literature and identified as explanations for collaboration within our findings. It would be interesting to better understand how these characteristics impact collaboration preferences, and moreover how task complexity fits into this relationship.

Finally, as mentioned throughout this thesis, open innovation is increasingly taking place in a virtual setting. As an exploratory study this research did not narrow the scope of collaboration by looking into a certain environment of collaboration or population of individuals. However, based on the findings in this study, it would be interesting to look more specifically into a virtual community or crowd sourcing platform for example, to understand how individuals make collaboration decisions in a virtual setting and especially how the complexity of the task or innovation problem impacts this process. Doing so would enable greater insights into collaboration at the individual level by observing not only if individuals collaborate and who they collaborate with, but also how they search for the appropriate partner(s).

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7 APPENDICES

Appendix 1: T-test results for complexity pre-test

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Sustainability - Data	21.4	6.38	2.02	16.84	25.96	10.61	9	.000
Pair 2	Management - Sustainability	10.5	6.72	2.13	5.70	15.31	4.94	9	.001

Appendix 2: Independent Variables

Construct	Survey item	Answer Options	Adopted From
Age	*How old are you?*	*Number between 1 -100*	Self-constructed
Gender	What is your gender?	Male/Female/Other	Self-constructed
Nationality	What is your Nationality?	All countries	Self-constructed
Educational Level	What is the highest educational level you achieved?	1. Early childhood education 2. Primary Education 3. Lower secondary education 4. Upper secondary education 5. Post-Secondary non-tertiary education 6. Short-cycle tertiary education 7. Bachelor's or equivalent level 8. Master's or equivalent level 9. Doctoral or equivalent level 10. Not elsewhere classified	International Standard Classification of Education (UNESCO, 2011)
Current Sitation	Please choose the option that mostly resembles your current situation.	1. I have not yet finished my education 2. I am currently employed 3. I am self-Employed 4. I am unemployed 5. I am retired.	Self-constructed
Industry	Which of the following industries most closely matches the one in which you are employed?	List of all industries	Adopted from Qualtrics Default Options (2020)
Disposition to trust	I generally have faith in humanity. I feel that people are generally reliable.	7-point Likert scale: Strongly Disagree - Strongly Agree	Ridings, C. M., Gefen, D., & Arinze, B. (2002)

	I generally trust other people unless they give me reason not to.		
Altruism	I help others even though it is not required. I am always ready to help or to lend a helping hand to those around me. I am willing to give my time to help others.	7-point Likert scale: Strongly Disagree - Strongly Agree	MacKenzie, Podsakoff & Fetter (1993).
General Self-Efficacy	I will be able to achieve most of the goals that I have set for myself. When facing difficult tasks, I am certain that I will accomplish them. In general, I think that I can obtain outcomes that are important to me. I believe I can succeed at most any endeavor to which I set my mind. I will be able to successfully overcome many challenges. I am confident that I can perform effectively on many different tasks. Compared to other people, I can do most tasks very well. Even when things are tough, I can perform quite well.	7-point Likert scale: Strongly Disagree - Strongly Agree	Chen, G., Gully, S. M., & Eden, D. (2001)
Intrinsic Motivation	I derive much pleasure from learning new things. I get satisfaction from the experience of taking in interesting challenges. I get satisfaction from the experience of doing a task successfully.	7-point Likert scale: Strongly Disagree - Strongly Agree	Self-constructed based on Tremblay, Blanchard, Taylor, and Pelletier (2009)
Mood	I am feeling sad. I am feeling happy. (reverse-coded) I am feeling blue. I am feeling active (reverse coded) I am feeling miserable. I am feeling cheerful. (reverse coded)	5-point Likert scale: 1. Disagree - 5. Agree	Van Knippenberg, D., Kooij-de Bode, H. J., and Van Ginkel, W. P. (2010)

Extroversion, Agreeableness, & Openness	I see myself as someone who is reserved. I see myself as someone who has few artistic interests. I see myself as someone who is generally trusting. I see myself as someone who has an active imagination. I see myself as someone who is outgoing, sociable. I see myself as someone who tends to find fault with others.	5-point Likert scale: 1. Disagree Strongly - 5. Agree Strongly	Rammstedt, B., & John, O. P. (2006)
Risk Attitude	Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?	10-point scale: 0. Unwilling to take risks. 10. Fully prepared to take risks	Dohmen, T., & Falk, A. (2011)
General Willingness to collaborate	Are you generally a person who is very willing to collaborate or do you try to avoid collaboration.	10-point scale: 0. Only collaborate when required. 10.Actively seek out collaboration.	Self-constructed

Appendix 3: Descriptive Statistics - Full Sample (n=221)

	n	Minimum	Maximum	Mean	Std. Deviation
Collaboration choice (dummy)	663	0	1	.68	.47
Trust	221	4	21	14.92	3.12
Self Efficacy	221	26	56	44.49	5.17
Altruism	221	3	21	17.46	2.54
Intrinsic Motivation	221	12	21	18.67	1.91
Mood	221	-12	10	-3.36	4.68
Experience Score	221	0	3	1.33	1.01
Knowledge Score	221	0	3	1.56	.95
Risk	221	1	10	6.16	1.97
General Willingness to Collaborate	221	0	10	6.71	2.37
Extroversion	221	-4	4	1.38	1.91
Openness	221	-4	4	.93	1.77
Agreeableness	221	-4	4	1.03	1.60
Age	221	18	66	28.14	9.23
Gender (dummy)	221	0	1	.68	.47
Education	221	1	3	2.20	.62

Appendix 4: Correlation Table

n=165	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1.Choice (Dummy)	1																
2. Medium complexity	.24**	1															
3. High complexity	.39**	-.50**	1														
4. Trust	.05	.00	.00	1													
5. Self-Efficacy	.00	.00	.00	.09	1												
6. Altruism	.05	.00	.00	.37**	.19**	1											
7. Intrinsic Motivation	.04	.00	.00	.16**	.5**	.14**	1										
8. Mood	.02	.00	.00	-.23**	-.3**	-.01	-.25**	1									
9. Risk	.02	.00	.00	-.03	.37**	-.01	.38**	-.22**	1								
10. General Willingness to collaborate	.17**	.00	.00	.24**	-.01	.25**	.17**	-.09*	.11*	1							
11. Extroversion	.08	.00	.00	.02	.16**	.08	.17**	-.14**	.2**	.37**	1						
12. Openness	.01	.00	.00	.08	.21**	.12**	.15**	.05	.03	.01	-.02	1					
13. Agreeableness	.06	.00	.00	.58**	-.11*	.16**	.06	-.16**	.02	.32**	.07	.05	1				
14. Age	-.01	.00	.00	.16**	-.07	-.08	-.14**	-.03	-.03	.00	-.17**	.01	.09*	1			
15. Gender (Dummy)	.05	.00	.00	.11*	.02	.08	.02	-.01	-.12**	-.14**	-.10*	.06	.05	-.16**	1		
16. Education (Dummy)	-.01	.00	.00	.04	.10*	-.08	.23**	-.09*	-.05	-.03	.02	-.05	-.03	.02	-.09*	1	
17. Experience Score	-.33**	-.25**	-.16**	.00	.08	-.01	.10*	-.09*	.12**	.10*	.07	.07	.01	.07	-.02	.06	1
18. Knowledge Score	-.16**	-.04	-.12**	-.09	.13**	-.02	.16**	-.01	.14**	.06	.07	.11*	-.07	-.02	-.09	.09*	.67**

***=p < 0.05**
****=p < 0.01**

Appendix 5a: Collinearity Statistics

Variable	Tolerance	VIF
Medium complexity	.63	1.58
High complexity	.66	1.52
Trust	.52	1.93
Self-Efficacy	.59	1.68
Altruism	.76	1.32
Intrinsic Motivation	.61	1.65
Mood	.81	1.24
Experience Score	.79	1.27
Risk Aversion	.73	1.38
General WTC	.70	1.44
Extroversion	.79	1.27
Openness	.91	1.10
Agreeableness	.58	1.71
Age	.86	1.16
Gender Dummy	.89	1.12
Education Dummy	.88	1.14

Appendix 5b: Collinearity Diagnostics

Dimension	Eigenvalue	Condition Index	Medium complexity	High Complexity	Trust	Self-Efficacy	Altruism	Intrinsic moti.	Mood	Exp Score	Risk	General WTC	Extro-version	Openness	Agreeable-ness	Age	Gender	Education
1	11.10	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2	1.00	3.46	.22	.21	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3	.82	3.83	.00	.00	.00	.00	.00	.00	.19	.00	.00	.00	.02	.43	.06	.00	.00	.00
4	.77	3.94	.01	.01	.00	.00	.00	.00	.02	.00	.00	.00	.07	.34	.19	.00	.00	.00
5	.61	4.43	.00	.00	.00	.00	.00	.00	.02	.00	.00	.00	.62	.00	.11	.00	.01	.00
6	.51	4.83	.05	.08	.00	.00	.00	.00	.36	.11	.00	.00	.02	.08	.13	.00	.01	.00
7	.48	5.02	.11	.16	.00	.00	.00	.00	.21	.20	.00	.00	.00	.09	.08	.00	.00	.00
8	.32	6.18	.03	.02	.00	.00	.00	.00	.02	.01	.00	.00	.03	.00	.01	.01	.77	.00
9	.17	8.36	.57	.49	.00	.00	.00	.00	.00	.66	.01	.01	.00	.00	.01	.02	.01	.01
10	.09	11.63	.00	.00	.00	.00	.00	.00	.01	.00	.27	.07	.13	.00	.00	.45	.00	.05
11	.08	12.27	.00	.00	.00	.00	.00	.00	.00	.00	.03	.06	.00	.00	.01	.31	.03	.48
12	.07	12.75	.00	.00	.00	.00	.00	.00	.04	.00	.32	.55	.06	.01	.09	.04	.00	.00
13	.05	16.24	.00	.00	.06	.01	.06	.00	.00	.00	.18	.20	.01	.00	.00	.07	.15	.35
14	.02	25.98	.01	.01	.66	.08	.00	.04	.01	.01	.13	.01	.00	.00	.24	.00	.00	.05
15	.01	32.01	.00	.00	.26	.04	.87	.04	.03	.00	.03	.01	.01	.00	.04	.01	.00	.05
16	.01	46.35	.00	.00	.00	.83	.00	.43	.06	.00	.00	.08	.02	.01	.00	.00	.00	.01
17	.00	54.67	.00	.00	.00	.03	.06	.48	.03	.00	.02	.00	.00	.03	.00	.10	.00	.00

Appendix 6: Logistic Regression – Odds Ratios

		95% C.I. for Exp(B)	
	Exp(B)	**Lower**	**Upper**
Medium complexity	14.86	4.99	44.25
High complexity	56.22	14.48	218.24
Experience Score	.69	.45	1.05
Experience Score*medium complexity	.98	.52	1.85
Experience Score*high complexity	.77	.37	1.60
Trust	.99	.89	1.11
Self-Efficacy	.10	.94	1.06
Altruism	.99	.88	1.12
Intrinsic Motivation	1.04	.88	1.22
Mood	1.03	.97	1.10
General Willingness to Collaborate	1.34	1.17	1.53
Risk	1.03	.89	1.20
Extroversion	1.07	.91	1.26
Openness	1.03	.89	1.20
Agreeableness	1.02	.82	1.26
Age	1.01	.98	1.03
Gender	1.85	1.05	3.27
Education	1.07	.69	1.68

Appendix 7: One-Way ANOVA Table

Measure	Sum of Squares	df	Mean Square	F	Sig.
Practical Experience	152.95	2	76.48	10.49	.000
Strong Knowledge	147.07	2	73.54	7.29	.001
Get along well personally	198.16	2	99.08	9.79	.000
Worked with before	55.86	2	27.93	4.44	.012
Similar Attitudes	18.57	2	9.28	.922	.399
Different Attitudes	13.15	2	6.58	2.89	.057
Similar Knowledge & Skills	29.60	2	14.8	5.8	.003
Different Knowledge & Skills	175.24	2	87.62	8.55	.000

Appendix 8: Repeated Measures ANOVA Table

Measure	Type 3 Sum of Squares	df	Mean Square	F	Sig
Practical Experience	21.72	1.79	12.14	1.74	.191
Strong Knowledge	98.56	1.70	57.68	5.41	.011
Get along well personally	28.62	1.97	14.55	1.84	.170
Worked with before	35.41	1.62	21.87	2.56	.100
Similar Attitudes	10.18	1.98	5.14	.542	.583
Different Attitudes	9.26	1.93	4.80	1.69	.196
Similar Knowledge & Skills	9.41	1.48	6.35	1.79	.187
Different Knowledge & Skills	46.49	1.91	24.41	3.42	.043

Appendix 9: Themes within open-ended questions

Collaboration Response	Themes	Sum of References	Example Quote
No to Data	Accuracy	15	*I believe there is a smaller margin for error if less people are involved for the data entry*
	Efficiency	22	*Communicating with another person would just slow me down.*
	Enough time	26	*The time available to complete the exercise was (overly) sufficient*
	Less complex	41	*It seemed like a straight forward and linear task*
	Mechanical task	12	*It is more mechanical and does not need creative input.*
	No benefit of collab	19	*I don't see the benefit of collaborating in the data entry task*
	Not to bother others	6	*I wouldn't want or need to take up another resource*
	Self confidence	8	*It is something that I am confident could do on my own*
	Sufficient knowledge or experience	16	*I have huge experience with data entry and therefore feel extremely comfortable and capable performing this task on my own*
No to Sustainability	Interest	4	*I would potentially clash with others as it is a subject I feel very strongly about*
	Own ideas	4	*Might be better to present just my ideas and not someone else's*
	Sufficient knowledge or experience	5	*I have knowledge of sustainability measures and would like to share my own ideas*
	Sufficient time	2	*The time constraints and my skills set allowed for me to be able to achieve the task*
No to Data AND Sustainability	Can work alone	8	*I typically prefer to work alone so when I can, that is my choice.*
	Confidence	7	*Smaller tasks where I consider myself more than capable of fulfilling them*
	Less complex	7	*Relatively simple tasks which I can handle easily by myself*
	Not to bother others	2	*Tasks that I would be able to effectively and efficiently be able to carry out without the need to use the time and resources of another person.*
	Sufficient knowledge or exp	7	*I have stronger knowledge in these areas.*
No to Management	Control	4	*I would want to have 100% say in who makes up that team*
	Efficiency	1	*I think sharing this task would just create friction and slow it down*
	Single accountability	6	*Management tasks are carried out better when coming from one individual only (one responsible)*
	Sufficient knowledge or exp	6	*I have experience in management and knowledge of digitisation strategies and feel confident in my ability to do this task by myself*
Under what circumstances would you *not* collaborate?	Based on collaboration partner	20	*If someone wasn't as invested as me in the task, would make me look bad or didn't want to learn.*
	Expertise/confidence	9	*I would not collaborate if I trusted I could complete a task effectively without the assistance, advice, help etc. of another party.*
	Less complex	2	*When it is a simple task and it is less efficient to collaborate*
	Personal tasks	3	*When it's personal things - such as sorting my clothes, shopping, organising the house & cooking*
	Size of task	2	*When the task isn't large, broad or specialised*
	Technical task	3	*If it was highly specialised, detailed and quantitative, making discussion redundant and hand-over time consuming*
	Time constraints	8	*Under time constraints, particular tasks are best to undertake solely*
Yes to all tasks	Better outcome	9	*I believe all of the tasks would be completed at a higher standard and more efficiently if done by multiple people*
	Brainstorming	6	*More people means more ideas. It also provides an opportunity for discussions to generate ideas*

	Different viewpoints	9	*Variety of skills and opinions to make a decision that works for all*
	Efficiency	5	*Through collaboration, you can reach more within a short time*
	Enjoyment or preference	11	*I prefer working in group rather than on my own*
	Lack of knowledge or experience	4	*I have little to no knowledge in the scenarios provided.*
	Lack of confidence	1	*I don't trust myself enough*
	Learning benefits	5	*I reckon the benefits of teamwork are higher and so are the overall learnings.*
	Less work	3	*When the task becomes more complicated, there are others to share the load*
	Risk adverse	1	*Risk adverse so I'd rather succeed or fail as a team.*
Yes to Data	Accuracy	3	*The data entry task was very manual so it is good to have 2 persons for data error.*
	Boring task/Less work	9	*Data entry seems boring so if two people were doing it, it would go faster.*
	Efficiency	6	*Would be quicker with another party involved*
Yes to Management	Brainstorming	9	*I believe a better outcome would be reached by brainstorming different ideas with another party*
	Complexity	3	*This task is larger and more complex*
	Increased knowledge base	3	*Broaden knowledge base, leverage diverse personal strengths*
	Joint accountability	6	*Would not want to take the responsibility on my own*
	Lack of confidence	3	*Management is an area I'm not really strong at due to my personality*
	Limited knowledge or experience	30	*I don't know a lot about management or digitalisation, so would be thankful for the extra knowledge*
	Managing stakeholders	4	*Sounds like it needs a lot of stakeholder management - two pair of eyes to make a smooth implementation should be favored*
	New task	2	*I think since it's a brand new initiative it would help to have other opinions and ideas on what direction to take it.*
	Task duration	2	*Time wise it is much longer than the other two*
	Task size	10	*This task typical is larger task that require more man power.*
Yes to Sustainability	Brainstorming	9	*Better outcome would be reached by brainstorming different ideas with another party*
	Lack of experience or knowledge	7	*I collaborated in this task as I have limited knowledge in the area*
	Learning	1	*Would benefit from brainstorming with and learning from others*
	Task size	1	*The task appears to be quite broad*
Yes to Sustainability & Management	Better outcome	6	*I believe these are tasks where collaboration would lead to a better outcome*
	Brainstorming, innovation, creativity	30	*I believe it is important to collaborate when it comes to new ideas as this breeds innovation, creativity and greater brainstorming opportunities*
	Diversity of inputs	20	*Requires different capabilities and differing mindsets to succeed on these tasks.*
	Enjoy working in teams	3	*Working with others is something I enjoy*
	Lack of experience and knowledge	19	*Not confident with my own knowledge or experience in the areas of sustainability or digitalisation*
	Learning	4	*You can, most likely, learn something new or new perspectives by working in a group*
	Many stakeholders	1	*As stakeholders are many and probably diverse, it will require reflection, different ideas/ approaches/ experiences, and sparring with others in order to come to a solution that can be effective for many different people.*
	More complex	15	*In both circumstances the task was more complex or required innovative ideas that are more likely to come from multiple people than an individual*

Not one right answer	5	*There's no perfect solution, and I don't hold all the answers*
Org-wide task	2	*Both tasks involve an organisational solution/ idea*
Task size	6	*I like to collaborate on tasks that have a lot of things to do.*

Appendix 10: Complete Survey as presented to respondents

Survey Flow

Standard: Intro Block (1 Question)
Standard: Changing controls (2 Questions)
Standard: Scenario intro (1 Question)

BlockRandomizer: 3 - Evenly Present Elements

- **Block: Sustainability Scenario (6 Questions)**
- **Block: Data Scenario (6 Questions)**
- **Block: Management Scenario (6 Questions)**

Standard: Open Ended Questions (16 Questions)
Standard: Manipulation Check (2 Questions)
Standard: Unchanging controls (4 Questions)
Standard: Demographic Section (10 Questions)
Standard: The End (3 Questions)

Start of Block: Intro Block

Intro Form

Participant Information and Consent Form

Researchers: Benedikt Hagner and Bianca Pollock

Invitation: We would like to invite you to participate in our Master's Thesis research studying individual approaches to completing tasks. You are eligible to take part in this study if you are over 18 years old. The results of this survey will be analysed as part of our Master's Thesis at Copenhagen Business School within the field of innovation management and business development.

What does participation involve? In this study, you will be asked to respond to a series of questions. The questionnaire should take approximately 15 minutes. This survey can be

completed on mobile devices, however for optimal functionality we recommend using a device with a larger screen.

Voluntary Participation and Withdrawal from the Study Please note that your participation is voluntary. You can withdraw from the study at any time without giving an explanation. You can withdraw from participation by simply discontinuing the questionnaire, for example, by closing your internet browser.

Your privacy The data collected in this survey will be treated completely confidentially. The results are anonymous, aside from your email address if you choose to provide it at the end of the survey.

Why you should participate Firstly, your participation will be an extremely valuable contribution to our research. As a token of our gratitude for your time, we will be raffling 5 x €30 amazon vouchers to participants. Please enter your email address at the end of the survey if you wish to enter the draw to win a voucher. Furthermore, if you are interested in the results of this research we are more than happy to share our final thesis with you. If you wish to learn more, please indicate your interest at the end of the survey.

Contacts If you have any issues regarding this survey please feel free to contact Bianca Pollock or Benedikt Hagner.

Consent If you have read the information above and agree to participate in this research project, remember: That you can withdraw at any time without reason and without prejudice by closing the browser window displaying the survey. All identifiable information that you provide is treated as confidential and will not be released by the researchers in any form.

Your choice to continue and complete the survey questionnaire will be accepted as indicating your consent to participate in this study.

Sincerely, Benedikt Hagner and Bianca Pollock

End of Block: Intro Block

Start of Block: Changing controls

Q1 Firstly, we will show you a number of statements which you may or may not agree with. Please read each statement and decide to what extent you personally agree or disagree with it, with **1 being strongly disagree** and **7 being strongly agree.**

	1 - Strongly disagree (1)	2 - Disagree (2)	3 - Somewhat disagree (3)	4 - Neither agree nor disagree (4)	5 - Somewhat agree (5)	6 - Agree (6)	7 - Strongly agree (7)
I generally have faith in humanity (1)	○	○	○	○	○	○	○
I feel that people are generally reliable (2)	○	○	○	○	○	○	○
I generally trust other people unless they give me a reason not to (3)	○	○	○	○	○	○	○
I will be able to achieve most of the goals that I have set for myself (12)	○	○	○	○	○	○	○
When facing difficult tasks I am certain that I will accomplish them (13)	○	○	○	○	○	○	○
In general I think that I can obtain outcomes that are important to me (14)	○	○	○	○	○	○	○

I believe I can succeed at most any endeavour to which I set my mind (15)	○	○	○	○	○	○	○
I will be able to successfully overcome many challenges (16)	○	○	○	○	○	○	○
I am confident that I can perform effectively on many different tasks (17)	○	○	○	○	○	○	○
Compared to other people I can do most tasks very well (18)	○	○	○	○	○	○	○
I help others even though it is not required (21)	○	○	○	○	○	○	○
I am always ready to help or to lend a helping hand to those around me (22)	○	○	○	○	○	○	○
I am willing to give my time to help others (23)	○	○	○	○	○	○	○

Even when things are tough I can perform quite well (19)	○	○	○	○	○	○	○
I derive much pleasure from learning new things (24)	○	○	○	○	○	○	○
I get satisfaction from the experience of taking on interesting challenges (25)	○	○	○	○	○	○	○
I get satisfaction from the experience of doing a task successfully (26)	○	○	○	○	○	○	○

Page Break

Q2 Below are a number of moods which may or may not apply to you right now. Please read each of the below moods and indicate to what extent you agree or disagree, with **1 being disagree** and **5 being agree**.

At this moment, I am feeling...

	1 - Disagree (1)	2 - Disagree a little (2)	3 - Neither agree nor disagree (3)	4 - Agree a little (4)	5 - Agree (5)
Sad (1)	○	○	○	○	○
Happy (2)	○	○	○	○	○
Blue (3)	○	○	○	○	○
Active (4)	○	○	○	○	○
Miserable (5)	○	○	○	○	○
Cheerful (6)	○	○	○	○	○

End of Block: Changing controls

Start of Block: Scenario intro

Q3 Next, you will be shown three scenarios involving different tasks. Please *read the scenarios carefully* and then decide whether or not you would choose to collaborate with someone else to complete the task or whether you would prefer to do the task alone.

Collaborating with someone would involve working together throughout the task and sharing both the responsibility and the results.

End of Block: Scenario intro

Start of Block: Sustainability Scenario

Q4
Sustainability Initiative Task

Your workplace has launched a range of new initiatives to become more sustainable. As part of this program everyone has been asked to present one idea of how the workplace could become more environmentally friendly. Everyone has been given a week to complete this task and has the choice of working alone or with others.

Q5 Would you choose to collaborate with someone else in the 'sustainability initiative' task?

- Yes (1)
- No (2)

Q6 Do you have practical experience within the area of sustainability?

- No experience (6)
- A little experience (7)
- Some experience (8)
- A lot of experience (9)

Q7 Do you have knowledge in the area of sustainability?

- No knowledge (6)
- A little knowledge (7)
- Some knowledge (8)
- A lot of knowledge (9)

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

Q10 Please consider the type of person you would ideally like to collaborate with for this task.
Drag **only the attributes that are important to you** into the box, in order of **most to least important to you** for this task. You can choose as many attributes as relevant - please only select all if all are important to you.

For this task, I would ideally collaborate with someone who...

Important attributes
_____ has practical experience in this area (1)
_____ has strong knowledge of this area (2)
_____ I get along well with on a personal level (4)
_____ I have worked with before (5)
_____ holds similar attitudes to myself (6)
_____ holds different attitudes to myself (7)
_____ has similar knowledge and skills to myself (8)
_____ has different knowledge and skills to myself (9)

End of Block: Sustainability Scenario

Start of Block: Data Scenario

Q12 **Data Entry Task**

You have been asked to enter 100 printed customer data files into an Excel spreadsheet. You have been given all the customer data and the spreadsheet has been set up with the necessary fields, for example, customer name, address, occupation and contact details. Each customer file contains the same information that you will need to repeatedly put in the spreadsheet, being careful to avoid errors. The task requires 3 hours of work and you have an entire work day to complete it.

Q13 Would you choose to collaborate with someone else in the 'data entry scenario'?

- ○ Yes (1)
- ○ No (2)

Q14 Do you have practical experience with data entry?

- ○ No experience (3)
- ○ A little experience (4)
- ○ Some experience (6)
- ○ A lot of experience (7)

Q15 Do you have knowledge in data entry?

- ○ No knowledge (3)
- ○ A little knowledge (4)
- ○ Some knowledge (6)
- ○ A lot of knowledge (7)

Page Break

Display This Question:

If Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

Q18 Please consider the type of person you would ideally like to collaborate with for this task.
Drag **only the attributes that are important to you** into the box, in order of **most to least important to you** for this task. You can choose as many attributes as relevant - please only select all if all are important to you.

For this task, I would ideally collaborate with someone who...

Important attributes
_____ has practical experience in this area (1)
_____ has strong knowledge of this area (2)
_____ I get along well with on a personal level (4)
_____ I have worked with before (5)
_____ holds similar attitudes to myself (6)
_____ holds different attitudes to myself (7)
_____ has similar knowledge and skills to myself (8)
_____ has different knowledge and skills to myself (9)

End of Block: Data Scenario

Start of Block: Management Scenario

Q20 **Management of Digitalisation Team Task**

You have been asked to be in charge of launching a new 'digitalisation' team in your organisation. The organisation is a very conservative organisation and therefore has never had a digitalisation team before. As the head of the team, you will be responsible for hiring new people in the team, managing them, creating the strategy for rolling out the digital initiatives your team comes up with, as well as coordinating and communicating with other business units to make sure the new initiatives are well received and add value to the overall organisation.

Q21 Would you choose to collaborate with someone else in the 'management of digitalisation team task'?

- ○ Yes (1)
- ○ No (2)

Q22 Do you have practical experience with managing teams **or** within the area of digitalisation?

- ○ No experience (3)
- ○ A little experience (4)
- ○ Some experience (6)
- ○ A lot of experience (7)

Q23 Do you have knowledge within the areas of management **or** digitalisation?

- ○ No knowledge (3)
- ○ A little knowledge (4)
- ○ Some knowledge (6)
- ○ A lot of knowledge (7)

Page Break

Display This Question:

If Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q26 Please consider the type of person you would ideally like to collaborate with for this task.
Drag **only the attributes that are important to you** into the box, in order of **most to least important to you** for this task. You can choose as many attributes as relevant - please only select all if all are important to you.

For this task, I would ideally collaborate with someone who...

Important attributes
_____ has practical experience in this area (1)
_____ has strong knowledge of this area (2)
_____ I get along well with on a personal level (4)
_____ I have worked with before (5)
_____ holds similar attitudes to myself (6)
_____ holds different attitudes to myself (7)
_____ has similar knowledge and skills to myself (8)
_____ has different knowledge and skills to myself (9)

End of Block: Management Scenario

Start of Block: Open Ended Questions

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = No

And Would you choose to collaborate with someone else in the 'data entry scenario'? = No

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = No

Q28 For all three tasks you chose not to collaborate.

Please explain why you did not wish to collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = No

And Would you choose to collaborate with someone else in the 'data entry scenario'? = No

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = No

Q29 Under what circumstances would you consider collaborating with someone?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

And Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q30
For all three tasks you chose to collaborate with someone.

Please explain why you chose to collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

And Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q31 Under what circumstances would you choose not to collaborate with someone?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = No

And Would you choose to collaborate with someone else in the 'data entry scenario'? = No

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q32 You only chose to collaborate for the 'management of digitalisation team' task.

What was it about this task that made you collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = No

And Would you choose to collaborate with someone else in the 'data entry scenario'? = No

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q59 What was it about the 'data entry' and 'sustainability initiative' tasks that made you choose not to collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = No

And Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = No

Q33 You only chose to collaborate for the 'data entry' task.

What was it about this task that made you collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = No

And Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = No

Q60 What was it about the 'sustainability initiative' and 'management of digitalisation team' tasks that made you choose not to collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

And Would you choose to collaborate with someone else in the 'data entry scenario'? = No

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = No

Q34 You only chose to collaborate for the 'sustainability initiative' task.

What was it about this task that made you collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

And Would you choose to collaborate with someone else in the 'data entry scenario'? = No

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = No

Q61
What was it about the 'data entry' and 'management of digitalisation team' tasks that made you choose not to collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

And Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = No

Q35 You chose to collaborate for both the 'sustainability initiative' task and the 'data entry' task.

What was it about these tasks that made you collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

And Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = No

Q36 What was it about the 'management of digitalisation team' task that made you choose not to collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

And Would you choose to collaborate with someone else in the 'data entry scenario'? = No

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q37 You chose to collaborate for both the 'sustainability initiative' task and the 'management of digitalisation team' task.

What was it about these tasks that made you collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = Yes

And Would you choose to collaborate with someone else in the 'data entry scenario'? = No

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q38 What was it about the 'data entry' task that made you choose not to collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = No

And Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q39 You chose to collaborate for both the 'data entry' task and the 'management of digitalisation team' task.

What was it about these tasks that made you collaborate?

_____

Display This Question:

If Would you choose to collaborate with someone else in the 'sustainability initiative' task? = No

And Would you choose to collaborate with someone else in the 'data entry scenario'? = Yes

And Would you choose to collaborate with someone else in the 'management of digitalisation team task'? = Yes

Q40 What was it about the 'sustainability initiative' task that made you choose not to collaborate?

_____

End of Block: Open Ended Questions

Start of Block: Manipulation Check

Q41 Next, we would like to know how complex you perceive the scenarios to be in relation to each other.

Please drag the scenarios into the box in order of complexity with **1 being most complex** and **3 being least complex**. A reminder of the task descriptions is at the bottom of the page.

Complexity ranking
_____ Sustainability initiative task (1)
_____ Data entry task (2)
_____ Management of digitalisation team task (3)

Reminder of the tasks:

Sustainability Initiative Task
Your workplace has launched a range of new initiatives to become more sustainable. As part of this program everyone has been asked to present one idea of how the workplace could become more environmentally friendly. Everyone has been given a week to complete this task and has the choice of working alone or with others.

Data Entry Task
You have been asked to enter 100 printed customer data files into an Excel spreadsheet. You have been given all the customer data and the spreadsheet has been set up with the necessary fields, for example, customer name, address, occupation and contact details. Each customer file contains the same information that you will need to repeatedly put in the spreadsheet, being careful to avoid errors. The task requires 3 hours of work and you have an entire work day to complete it.

Management of Digitalisation Team Task

You have been asked to be in charge of launching a new 'digitalisation' team in your organisation. The organisation is a very conservative organisation and therefore has never had a digitalisation team before. As the head of the team, you will be responsible for hiring new people in the team, managing them, creating the strategy for rolling out the digital initiatives your team comes up with, as well as coordinating and communicating with other business units to make sure the new initiatives are well received and add value to the overall organisation.

End of Block: Manipulation Check

Start of Block: Unchanging controls

Q64 Thank you for your inputs so far! Just a few more questions to go...

Q42 Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?
Please select on the 10 point scale, where 0 means you are unwilling to take risks, and 10 means you are fully prepared to take risks.

Unwilling to take risks — Fully prepared to take risks

0 1 2 3 4 5 6 7 8 9 10

4 ()

Q43 Are you generally a person who is very willing to collaborate or do you try to avoid collaboration?
Please select on the 10 point scale, where 0 means you only collaborate when required, and 10 means you actively seek out collaboration.

Only collaborate when required — Actively seek out collaboration

0 1 2 3 4 5 6 7 8 9 10

4 ()

Page Break

Q44 Below are a number of characteristics that may or may not apply to you. Please read each of the below characteristics and indicate to what extent you agree or disagree with **1 being disagree strongly** and **5 being agree strongly.**

I see myself as someone who...

	1 - Disagree strongly (1)	2 - Disagree a little (2)	3 - Neither agree nor disagree (3)	4 - Agree a little (4)	5 - Agree strongly (5)
is reserved (2)	○	○	○	○	○
has few artistic interests (3)	○	○	○	○	○
is generally trusting (4)	○	○	○	○	○
has an active imagination (6)	○	○	○	○	○
is outgoing, sociable (27)	○	○	○	○	○
tends to find fault with others (5)	○	○	○	○	○

End of Block: Unchanging controls

Start of Block: Demographie Section

Q45 Finally, please answer the following questions about yourself.

Q46 How old are you?

_____

Q47 What is your gender?

- Male (1)
- Female (2)
- Other (3)

Q48 What is your nationality?

- All countries displayed

Q49 What is the highest educational level you achieved?

- Early Childhood education (1)
- Primary eduaton (2)
- Lower secondary education (3)
- Upper secondary education (4)
- Post-secondary non-tertiary education (5)
- Short-cycle tertiary education (6)
- Bachelor's or equivalent level (7)
- Master's or equivalent level (8)
- Doctoral or equivalent level (9)
- Not elsewhere classified (10)

Q50 Please choose the option that mostly resembles your current situation.

- I have not yet finished my education (1)
- I am currently employed (2)
- I am self employed (3)
- I am unemployed (4)
- I am retired (5)

Display This Question:

If Please choose the option that mostly resembles your current situation. = I am currently employed

Or Please choose the option that mostly resembles your current situation. = I am self employed

Q51 Which of the following industries most closely matches the one in which you are employed?

- Forestry, fishing, hunting or agriculture support (1)
- Real estate or rental and leasing (2)
- Mining (3)
- Professional, scientific or technical services (4)
- Utilities (5)
- Management of companies or enterprises (6)
- Construction (7)
- Admin, support, waste management or remediation services (8)
- Manufacturing (9)
- Educational services (10)
- Wholesale trade (11)
- Health care or social assistance (12)

- ○ Retail trade (13)
- ○ Arts, entertainment or recreation (14)
- ○ Transportation or warehousing (15)
- ○ Accommodation or food services (16)
- ○ Information (17)
- ○ Finance or insurance (19)
- ○ Unclassified establishments (20)
- ○ Other (18)

Display This Question:

If Please choose the option that mostly resembles your current situation. = I am currently employed

Or Please choose the option that mostly resembles your current situation. = I am self employed

Q52 What is your profession and position?

_____

Display This Question:

If Please choose the option that mostly resembles your current situation. = I have not yet finished my education

Q53 Please describe what you are currently studying ?

_____

Display This Question:

If Which of the following industries most closely matches the one in which you are employed? = Other

Q54 Please describe the industry you work in.

_____

End of Block: Demographie Section

Start of Block: The End

Q55 Please select all/any that apply.

- ☐ I wish to enter the draw to win one of 5 x €30 Amazon vouchers. (1)
- ☐ I wish to receive a digital copy of the finished thesis. (2)
- ☐ I am willing to be potentially contacted for a short follow-up interview. (3)

Display This Question:

If If Please select all/any that apply. q://QID62/SelectedChoicesCount Is Greater Than 0

Q56 Please enter a valid email address below.

_____

Q57

You have reached the end of the survey! Thank you so much for taking the time to contribute to our research!

If you have any questions regarding the research please feel free to contact Bianca Pollock or Benedikt Hagner.

Please press next to submit your responses.

End of Block: The End