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**How employees' personality traits affect the  
perceived psychological safety in the context of  
digital business transformation projects.**

Information Systems Science

Master's thesis

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This study explores how individual's personality traits affect the perceptions psychological safety in a business transformation project context. The topic is motivated by the fact that roughly 70% of business transformation efforts fail to meet their desired targets and involvement characterizes successful transformation efforts. Both key concepts in the study, psychological safety and human personality, have an effect on various organizational success factors, including engagement and motivation, and this Thesis offers a novel insight to the interplay of these factors in the context of digital business transformation.

The research questions addressed in this study are: 1) How do an individual's personality traits affect their perception of psychological safety in a changing work environment? 2) How can the acknowledgment of personality dimensions and their connection to psychological safety be incorporated into change management practices?

Methods used in this research study are both qualitative and quantitative in nature: quantitative personality trait assessment of the big-five personality traits utilizing the mini-IPIP questionnaire and qualitative semi-structured interviews which are thematically analysed.

Key findings of the study highlight the importance of two personality traits Agreeableness and Extraversion. Large-scale technology projects require adaptation within the complex socio-technical context, and the importance of employee voice behaviour emerged as a theme (associated with Extraversion) as a means for workers to keep up with the demanding and fast-paced work environment. Agreeableness trait was found to impact the perception psychological safety via self-criticism. Across all traits one-to-one connection with both colleagues and managers was seen as the number one enabling factor for a psychologically safe team.

With a few key insights found from the vast and complex relationship between organizational practices and psychological phenomena, this Thesis points a direction for future research to study further the connections between management practices, personality traits and perceptions of psychological safety.

**Key words:** 1. The Big-Five Personality Traits 2. Psychological safety 3. Digital Business Transformation 4. Change Management

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## 1 Introduction

According to multiple surveys conducted by McKinsey & Company roughly 70% of all business transformation projects fail (McKinsey 2021; 2017). Fifteen years after the first McKinsey study on organizational transformation, the results seem to be similar, so no drastic change has happened in change implementation and success in the transformation project field. In the 2021 survey less than a third of over a thousand respondents thought that transformation projects had both been successful in improving organizational performance and sustaining the improvements over time. Despite the increase in project management tools available, project success hasn't increased overall.

Involvement, especially in the lower levels of an organization, was reported to be a key element in a successful business transformation. Within these successful companies, respondents to the survey by McKinsey were also more likely to have other practices in place that would differentiate their transformation efforts. These practices included: Communicating in a consistent manner about the changes happening with a specific focus on frontline workers, clearly defined roles and responsibilities and having a strategic emphasis on talent management. Continuing with the same theme, if employees on all levels were not engaged with the transformation, the whole effort is running a risk to be doomed from the start. Within the respondents whose transformations had failed in engagement of frontline employees and managers alike only 3 percent reported of a successful business transformation. In comparison, the success rates were 26 and 28 percent if both abovementioned groups were engaged instead. (McKinsey, 2017).

As a project success factor psychological safety has been found to be an integral part of a team's ability to adapt to change and learn. (Edmondson 1999; Carmeli et al. 2007; Liu et al. 2014). The question of why transformation projects do not meet the goals more often, why are the people not engaged in the change, and the importance of psychological safety to work teams lead me to think about the perceptions of psychological safety on an individual employee's level. What contributes to individual perception of psychological safety, perhaps the personality of the individual? This thought pattern led to the topic of this Thesis.

Personality traits in general have been shown to predict how a team performs in a given task (Barrick et al., 1998). LePine et al. (2011) concluded in their literature review that

the effect of team member personality on team effectiveness is profound and there is a need for exploring additional traits, criteria and linking mechanisms. In this study I will use the terms personality dimension and personality trait as synonyms. I prefer the terms dimension and trait over a personality type since I'm not labelling anyone to any specific "type" of personality. As I will disclose later on, current understanding is that human personality is a complex phenomenon and therefore it makes more sense to describe it with scales and fluid dimensions rather than assigning specific types. Barrick & Mount (1991) found that personality traits presented in the five-factor model of personality (Extraversion, Emotional Stability/Neuroticism, Conscientiousness, Agreeableness and Openness to Experience/Intellect) have numerous predictive capabilities in different job tasks for various occupations. For example: "extraversion was a valid predictor for two occupations involving social interaction, managers and sales (across criterion types).".

Since both psychological safety and individual personality traits seem to play an integral part in how a person thrives in an organizational environment, I decided to explore the connection between them further. After a rigorous literature search, there were no previous studies found that would utilize the same combined methodologies to explore the connection between these two recognized phenomena and take into account the context of digital business transformation projects as an operating environment. Thus, the main goal of the thesis is to shine a light on how the different dimensions of personality of employees affect the perceived psychological safety when facing change in digital business transformation projects. In addition, after conducting the research and having analysed the data, I hopefully can offer practical guidance for project managers on how to address these findings in a work context. Perceived psychological safety is seen as a success factor for IT project implementation. (Jitpaiboon et al. 2019; Witt 2016). By utilizing common sense, it would seem plausible that personalities of people would affect how they react to change, and in this light, how should they be helped to navigate such an environment.

## **1.1 Motivation for the study**

Deep-level characteristics have been found to be more predictive of team performance than surface-level characteristics (Harrison et. al., 2002). Personality traits and psychological safety are deep-level characteristics. According to Kumar Basu (2015) business transformation efforts will eventually lose steam if leaders do not succeed in



creating a right mind-set for the employees, also if the leadership is unsuccessful in ensuring that right people invest a good amount of time on driving the necessary changes.

The topic of the effect of individual's personality traits on perceived psychological safety when facing change in digital business transformation projects is an important one for several reasons. First, transformation projects, especially large-scale ones, often involve significant changes to an organization's technology systems, processes, and structures, which can be a source of stress and anxiety for employees see e.g. technostress (Riedl, 2013). Understanding how individual personality traits may influence an individual's perceived psychological safety during such changes can provide valuable insights for organizations looking to support their employees during these projects. Additionally, psychological safety has been shown to be an important predictor of team performance, creativity, and innovation, as well as employee well-being and job satisfaction. (Arumugam et al. 2013; Wong et al. 2010; Newman et al. 2017). Therefore, by understanding these relationships better organizations might be able to improve team performances, creativity, and innovation, as well as support the well-being and job satisfaction of their employees. While there has been a significant amount of research focusing on the connections between team personalities and project success or team performance, there were no studies found that would, in the context of digital business transformation projects, dive deep into the role that psychological safety and personality traits play in this complex environment.

Team composition research has examined various member attributes such as age, gender, functional expertise, and abilities. However, personality traits are considered to be particularly crucial (Barrick & Mount 1991; Barrick et al. 1998) due to the fact that the thoughts, emotions, and actions that define an individual's personality not only have a direct impact on the contributions made by each team member towards achieving task objectives but also affect how team members interact and cooperate with each other during work performance. The number of interacting variables when doing research on performance and personality is vast and this has led to quite slow progression in the field of research focusing on personality traits, psychological phenomena like psychological safety and work performance. (LePine et al. 2011). My research taps into this continuum of studies that focus on the relationships between these factors. According to research conducted by LePine (2003) the five-factor model of personality is effective in

determining what characteristics manifest themselves in a positive manner in groups that are likely to experience frequent changes in job tasks and require greater adaptability.

In an internal study by Google (rework blog 2015) it was found that psychological safety was the most important dynamic that made a team great. This study was also reported comprehensively by the New York Times Magazine under the headline “What Google Learned From Its Quest to Build the Perfect Team” (Charles Duhigg, 2016). Data was collected via a tool called gTeams from over 3000 employees and 300 teams over a one-year time period. The key findings were reported in a re:Work blog by Julia Rozovsky, Analyst at Google People Operations. According to their findings “who is on a team matters less than how the team members interact, structure their work, and view their contributions.”. Another astonishing finding was that “Individuals on teams with higher psychological safety are less likely to leave Google, they’re more likely to harness the power of diverse ideas from their teammates, they bring in more revenue, and they’re rated as effective twice as often by executives.”. Although the scientific validity of this research isn’t as strong because of the corporate in-house nature without traditional with peer-review process for example, it still shines a bright light on the importance of psychological safety as a phenomenon. The researchers at Google looked at vast amounts of data, looking for patterns but no evidence that the composition of individual team members made any difference, they compared skills, personality types and backgrounds from 180 teams. The question of who is on the team didn’t seem to matter. In the Project Aristotle the team started to look for social norms within teams, the right norms would raise the intelligence of the group and wrong ones would tamper the performance even though on an individual level the members were very clever minded. (The New York Times, 2016). While the researchers studied the behaviours of teams, they noticed two main points: successful teams all shared two key behaviours. A team will be greater than the sum of its part if people speak roughly an equal amount of time also called “equality in distribution of conversational turn-taking” and if members have good emotional intelligence, meaning individuals know how to show empathy toward their teammates. These aspects of successful teams are within the construct of psychological safety – and this Google research is one showcase of why this Thesis research matters.

Knowledge work in general is getting more focused in organizations and therefore there is a greater need for effective collaboration between people who have very specific set of skills. Information and ideas needs to be shared efficiently among different stakeholders

in an organization, without psychologically safe culture there seems to be less trust and the value of shared (bold) ideas decreases (Newman et al. 2017).

## **1.2 Aim of the study**

This study is aimed to direct future research in the topic of how personality traits affect individual's functioning in an organization, in this case, the perceived psychological safety in the digital business transformation context. The extent to which results from a Master's Thesis can be applied in business context is limited, yet there is hope that my findings will provide change management organizations with some practical advise on how take personalities and psychological safety into account.

Newman et al. (2017) point out that "TAT (Trait Activation Theory) suggests that the influence of personality traits may depend on inducements offered by the context (situational cues), and therefore provides an explanation as to how organizational climates, such as psychological safety climate, might interact with the personality traits of the employee to predict their work behaviors and attitudes.". Based on numerous studies, I've concluded that the connection of the dimensions of personality and the perceived psychological safety is relevant and should be further examined.

My two research questions are:

- How do an individual's personality traits affect their perception of psychological safety in a changing work environment?
- How could acknowledgment of these dimensions of personality and their connections to psychological safety be incorporated to change management practices?

## **2 Theoretical background**

One of the key challenges for this Thesis will be that studying human personality combined with psychological safety and IT project context, each a complex topic on their own, needs skilfully written structure for my Thesis to be easily readable. I've searched literature mainly from Google Scholar and Scopus with keyword combinations like "psychological safety" and "\*personality\*". "Personality type" and "team performance", "personality type" and "project management", "Personality trait" and "psychological safety". I have also gone through the reference lists of the most relevant articles found in Scopus and Google Scholar with identified keywords. Often times, while reading an article it provided me with a lot of additional material to build my literature review.

In this section I will explain briefly what digital business transformation means, what we know about the human personality; the relevant theories considered that would explain the studied phenomena and what is yet debatable in the scientific community. In addition, I go through the definition and known effects of psychological safety. In the paper, the term digital business transformation refers to organizational rather than industrial level of the phenomenon.

### **2.1 Digital business transformation**

The digital era has transformed many core business operations either through digital innovation or digitization of processes and has also re-defined management concepts and shaken organizational structures. Sometimes whole business models have changed due to emergence of new technology. (Matt et al. 2015). Digital transformation refers to a multi-layered change within an organization, driven by technological advancements that happen also outside the company. It encompasses two main aspects: the utilization of digital technologies to enhance current operational processes and the pursuit of digital innovation, which has the potential to revolutionize the organization's business model. Digital innovation involves the integration of digital technologies and physical elements to develop unique digital processes, products and services, as outlined by Yoo and others (2010). In order for most of these strategical digital changes to have an effect on the organization, humans must be able to adapt to the new ways of working. Organizational culture, learning and leadership play an integral part on how companies innovate and adopt new digital elements in their (core) functions. (Jiménez-Jiménez & Sanz-Valle,

2011). Organizational learning enables innovation and innovation helps firms to achieve success in the market. Knowledge gathered can help an organization to drive change within an organization and its strategic partners. This organizational learning is mediated by how teams work together and in that togetherness, concepts like psychological safety are extremely relevant. (Tippins & Sohi, 2003).

For the last 10 years the IT function of a company has experienced significant increases in the expectations and the importance to core business in many fields has grown – the trend of digitalization has made operational efficiency and technology intertwine in a way that they are no longer easily separable concepts. Information technologies are vital for a number of companies' core business and enablers of innovation across organizational departments. (Urbach et al. 2017). Matt et al. (2015) note that both product-centric and customer-centric business strategies that utilize digital technologies naturally cross the borders of a company. Digital transformation strategies take into account the changes for business models, products and services as a whole –going beyond the process focus.

Furthermore, it is important to emphasize the critical role of top management support from the very beginning of the planning phase, as digital transformation strategies have a significant impact on the entire organization. The execution of these strategies may encounter resistance from various sectors within the company. In order to effectively address such resistance, transformational leadership skills are crucial. For these skills to be in effective use, there's a requirement for active engagement of diverse stakeholders who are influenced by the transformation process. (Matt et. al 2015).

## **2.2 Briefly on the human personality**

Personality traits are in other words tendencies towards a certain thought pattern, behaviour, emotion and reaction for stimuli received from the environment. (Fleeson, 2001). Currently there is no universal defining theory for the human brain's functioning, the field of neuroscience is rather new and emerging mostly due to the advances in the way we can measure activities inside the human brain. Especially the emergence of non-invasive brain imaging techniques has led to raising popularity of the field, in addition to traditional psychology it is often recommended to combine biological theories and data from actual brain activities when studying psychological phenomena. Some contemporary models of human personality are based on lexical hypothesis of the human personality. In its core is the idea that personality traits of a group of people will

eventually be visible in the language these people use. It is a widely used approach in personality research, and functions as a primary methodology for the grouping and taxonomies of the big-five personality traits, the HEXACO model of personality and the 16PF Questionnaire. For a time in modern age, it was thought that personality is something rooted purely in biology and would remain unchanged over a lifespan. However, as the contemporary view of a human being takes into account both physiological and psychological aspects of human nature it is a generally accepted discourse that some development happens over a person's lifetime when it comes to personality characteristics. It is an open debate how much of our behaviour, and even consciousness is deterministic. Is the universe deterministic? To some extent, sure, but honestly, we don't know for sure what even is the nature of reality. In this regard, I've needed to make assumptions based on previous research.

Human personality is known to be, at least partially rooted in genetics. According to Bouchard et al. (2001) approximately 50% of the five-factor model domains are determined by the genetic pool. Weiss et al. (2008) studied whether subjective well-being and personality traits share a common genetic structure. It is previously known that the two factors are related. They used a sample consisting of 973 twin pairs to test the hypothesis which stated that "heritable differences in subjective well-being are entirely accounted for by the genetic architecture of the Five-Factor Model's personality domains." Results were in support of this hypothesis. For the FFM traits Neuroticism, Extraversion and Conscientiousness a unique genetic influence was found and a common genetic factor that affected all five personality domains. Low Neuroticism, high Extraversion, Openness, Agreeableness and Conscientiousness were all influenced by the same genetic factor. Common genetic factors seem to link personality traits to subjective well-being. Weiss and others (2008) state that "personality may form an "affective reserve" relevant to set-point maintenance and changes in set point over time.", here the affective reserve means that certain personality types can function as an emotional reserve that helps people maintain consistent level of happiness through time. "Set point" refers to an average level of happiness for the individual person and is determined by genetics and environmental factors, personality traits are one of the factors affecting this "Set point". (Weiss et al. 2008). When it comes to the big-five personality dimensions, Extraversion and Neuroticism are currently best understood concerning biological processes and pathways. There is good evidence that these traits in question represent

persons' sensitivity to reward and sensitivity to threat and punishment. (Depue & Collins, 1999).

The field of study called personality neuroscience is rapidly growing, encompassing a range of research methods including but not limited to genetics, neuroimaging, psychophysiology, and psychopharmacology. In order to make sense of the increasing body of research in this area, it's important to have broad theoretical frameworks to organize the findings and make predictions. The Big Five model of personality provides a promising way to structure research in this field. The five factors of personality are strong predictors of various outcomes related to mental and physical health, well-being, education, work, and relationships (Ozer & Benet-Martinez, 2006). Developing a theory about the biological underpinnings of these traits is a crucial step in integrating research on individual differences across psychology and neuroscience. Findings from the study by DeYoung et al. (2010) support the notion that personality neuroscience can be used to advance our understanding of human psychology.

### 2.2.1 The Big Five personality traits

In the continuum of lexical studies starting from the 1940s by e.g. an English researcher Raymond Cattell (1947) that used a factor analysis to assess personality, eventually the big-five personality traits emerged as a concept (see Norman 1963; ...) The challenge for the big-five model has been that the results for other languages than English have not been as coherent as in the original studies. The basis for my personality assessment is derived from the work of Goldberg (1990; 1992). The Big Five personality dimensions are: Extraversion, Emotional Stability (Neuroticism), Intellect / Openness to Experience, Agreeableness and Conscientiousness. Conscientiousness refers to a person's level of reliability, organization, ambition, hard work, and perseverance. Agreeableness reflects an individual's inclination towards being cooperative, friendly, warm, and helpful. Extraversion is the inclination towards being sociable, enthusiastic, energetic, and optimistic. Emotional stability is the degree to which a person is calm, secure, and steady. Openness to experience is the inclination towards being curious, imaginative, sophisticated, and having their head in the clouds so to speak. (LePine et al. 2011). One of the strongpoints of the big-five personality type as a way of identifying one's personality is the relatively stable, long-lasting nature of these characteristics. A 45-year longitudinal study conducted by Soldz & Vaillant (1999) concluded that three of the five

traits carry significant correlation over a long period of time. Numerous studies have shown that the five personality traits remain stable to a high degree when it comes to adulthood (Cobb-Clark & Schurer, 2012; Rantanen et al. 2007; Susan et al. 2007). The big-five model has been shown to predict many things ranging from career success (see: Barrick et al. 1998; Judge et al. 1999) to clinical conditions like depression (McCann 2010; Koorevaar et al. 2017).

DeYoung et al. (2010) applied a novel theory concerning the biological foundation of the Big Five personality traits to develop a set of hypotheses about the connection of each trait with various brain regions' size. After controlling for age, sex, and whole-brain volume, structural magnetic resonance imaging of 116 healthy adults provided evidence for four of the five traits: Extraversion, Neuroticism, Agreeableness, and Conscientiousness. Medial orbitofrontal cortex volume, a brain region involved in reward processing, was found to be linked with Extraversion. Brain areas linked with threat, punishment, and negative emotions were associated with Neuroticism. Regions of the brain that process information about the intentions and mental states of others were linked with Agreeableness. Conscientiousness was related to volume in the lateral prefrontal cortex, a region linked to planning and the voluntary regulation of behavior. For the openness / intellect trait no connection to a specific brain region was found. Intellectuality and intelligence is considered a really complex phenomena and the origins and reliable measures of intelligence are not clear, neither do they have a united discourse or a theory in the fields of psychology and neuroscience. There are theories like Triarchic Theory of Intelligence, Gardner's Multiple Intelligences and Spearman's General Intelligence which all have their pros and cons. These results support the biologically grounded explanatory model of the Big Five and demonstrate the potential of personality neuroscience, which is the systematic use of neuroscience methods to investigate individual variations in personality. DeYoung et al. (2010; 2009) have partially proven that there is yet much to learn about the nature of human personality and that the big five model seems to withstand it's place as one of the most applicable measures of human personality.

Tett et al. (1999) acknowledged in their meta-analysis that the relationship between FFM personality traits and job-performance is bidirectional. Bidirectional relations between personality and job performance imply that there might be alternative ways to interpret the findings of studies involving personality-job performance relations. Since previous



research might have overlooked this possibility, it may have led to biased interpretations of the results. As they have pointed out in the article, the found evidence for bidirectionality suggests that meta-analyses assuming unidirectionality will underestimate the significance of personality in predicting job performance, no matter the direction of the relationship. This is because true positive and negative validities can cancel each other out, leading to an inaccurate assessment of the overall impact of personality on job performance. This study points out that these complex relationships are both worth exploring and rather unknown.

Gurven et al. (2012) provide the first comprehensive test of the five-factor personality model (FFM) in a small-scale indigenous society called the Tsimane horticulturalists of Bolivia. Surprisingly, they fail to robustly replicate the Big Five. They find significant covariance among items across the standard Big Five factors, based on two large samples of self- and spouse-reported personality. Tsimane personality variation may instead be organized along fewer and differently composed dimensions. They find evidence for a “Tsimane Big Two” organized according to prosociality and industriousness in the context of subsistence labor. Their current results require replication, with emic inventories and with other methods such as those based on behavioral observation or on peer reports by other groups than the Tsimane. However, even if other methods were to reveal a Big Five structure, an explanation would still be needed for why verbal reports do not lead to the FFM among these Tsimane, even after correction for response biases, but do almost everywhere else in the developed world. There are only a few exceptions of languages in which the five-factor model of personality has failed to reproduce all the personality dimensions of the big five. In Italian, the Intellect/Imagination dimension was not replicable in the study of the first five lexical factors, study was conducted by Di Blas & Forzi (1998). Also, the same factor space wasn't found in Greek language (Saucier et al. 2005). Yet it is hard to tell whether these few studies would undermine the validity of the big-five model, it is more part of the process and helps to acknowledge that no theoretical model perfect and without its pros and cons. (Ashton & Lee 2007).

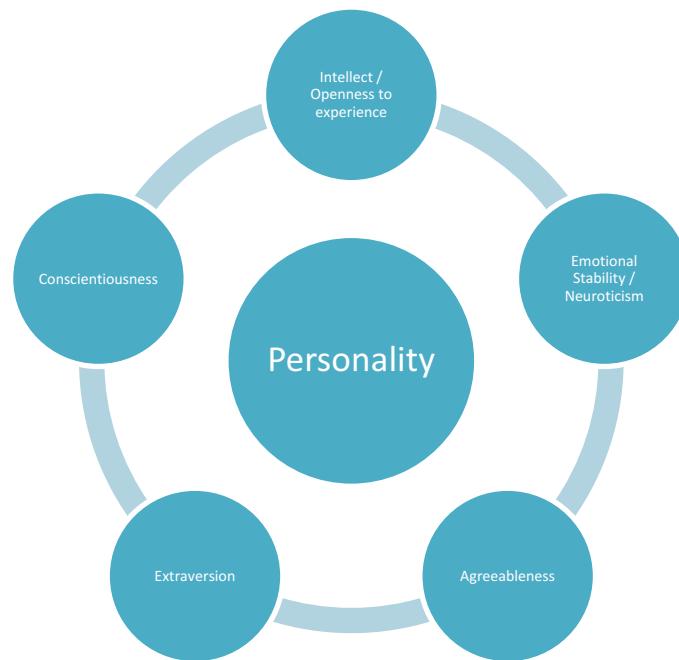


Figure 1 The Five-Factor model of personality (Goldberg 1990; 1992).

### 2.2.2 HEXACO model of human personality

The challenge for the big-five model has been that the results for other languages than English have not been as coherent as in the original studies. This has led to the emergence of a six-factor model (Ashton & Lee, 2007). Based upon the work of Goldberg and the big-five personality types, the HEXACO model has six dimensions instead of the five. This model has gained a lot of popularity in the academic research during the latest 20 years. It builds upon the foundation of the big-five model of personality but is still considered an alternative to the big-five model. (Ashton & Lee, 2007).

The HEXACO model could be a suitable model to use in my research because it includes a dimension of honesty-humility. Honesty-humility is a personality trait that refers to an individual's tendency to be honest, sincere, and modest, and to avoid deceit and manipulation. This trait has been found to be associated with a number of positive outcomes, including greater psychological well-being, better social relationships, and higher levels of trust and cooperation. Perhaps, individuals who score high on this dimension would be more likely to perceive greater psychological safety in a changing environment? Discovery of the six-dimensional personality structure with extensive cross-cultural replicability withholds substantial implications for our comprehension of the nature of human personality. This finding challenges the current notion that only five

dimensions of personality traits would show widespread consistency across different cultures. (Ashton & Lee 2007).

### 2.2.3 Trait activation theory

Given that many dimensions and traits of human personality can be measured, it is relevant to understand how these underlying factors manifest themselves in the real world. Academically the idea of a human reflecting some underlying traits of personality differently in different situations was born in the 1930s by the works of e.g. Henry Murray (1938) and later developed by for example Eysenck (1985) who said that “We can only measure sociability in certain types of situations, namely those involving the relatively free intercourse between people. ... In other words, trait and situation form two sides of a coin that cannot be separated from each other” (p. 39). Kenrick and Funder (1988) state in their literature review that: “Traits influence behavior only in relevant situations... Anxiety, for example, shows up only in situations that the person finds threatening... A person's traits can change a situation... For instance, an aggressive child can bring out the hostility in a previously peaceful playground.” (p. 29.). This claim of situations and personality traits acting in a symbiotic manner is backed up by decades of valid research and seems to hold the test of time.

When it comes to personality traits, individuals who score high on aggression do not necessarily behave aggressively at all times, but only in certain situations. The concept of trait activation explains how personality traits are expressed based on situational cues that are relevant to the particular trait. This theory considers personality traits as differential response tendencies and links them to classic behaviourism, specifically S-R (Self-Regulation) theory. In other words, people with high aggression levels are expected to respond more aggressively to aggression-inducing stimuli, and they may also respond more quickly or strongly to weaker cues. (Tett & Guterman 2000).

The trait activation model by Tett and Burnett (2003) shines a spotlight on how the interplay between personality traits, behaviour and trait-relevant cues can be examined. The cues are expected to activate certain personality characteristics regarding behaviour that in other situations would remain latent. These cues can be found on different levels of interaction, more specifically at social, organizational and individual task levels. (LePine et al. 2011).

### 2.3 Psychological safety

Psychological safety as a term was first introduced in the 1960s but the studies that have most relevancy in the contemporary business world have been conducted since the 1990s. The definition of a psychologically safe environment relates to the concept of risk-taking: people can be themselves without having to think that being a threat to their success in a workplace, they can say what they think, provide constructive feedback and feel safe to take risks. (Edmondson 1999). Newman et al. (2017) concluded that there is growing evidence to show that supporting organizational practices have an effect on employee work outcomes such as job performance and commitment because they heighten perceptions of psychological safety.

In their literature review of 83 studies on psychological safety Newman et al. (2017) use a similar definition than the one created by Edmondson, a psychologically safe environment is one in which a person subjectively feels safe to speak up, tell their opinion, seek for feedback, take risks and experiment. These kinds of environments have been shown to cultivate the best performing teams, enable more learning and reduce errors made by workers in industries like aviation and healthcare. Given the nature of the phenomena called psychological safety I believe a good way of measuring it is on the individual level with interviews, unlike like the majority of literature which seeks to quantify the phenomena. How can one quantify a feeling or a perception of something, two feelings for individual persons are not the same although they would answer the same 3/7 to a questionnaire. While the phenom of psychological safety is well-established among the academic literature the replicability of studies remains a challenge in this area, and also generally in the field of psychology (Newman et al. 2017).

Employee voice behaviours are a part of the concept of psychological safety. It refers to the level of proactivity that people express in their behaviours like speaking up, coming up with suggestions, constructively challenging a decision or proposing a modification even when other might disagree. Employee voice behaviour is a form of proactive behaviour. (Frese & Fray, 2001). Psychological safety is pre-requisite for both promotive and prohibitive employee voice behaviour (Liang et al. 2012). This study focuses mainly on promotive employee voice behaviour since it is considered useful for a company (Van Dyne & LePine, 1998).

### 2.3.1 The known effects of a psychologically safe work environment

Studies conducted by Choo et al. (2007) and Arumugam et al. (2013) both found that psychological safety has a positive effect on team performance, in a Six Sigma context, moderated by knowledge created. Choo et al. (2007) refer to learning that takes place during the project which in turn creates a better understanding and improves the capacities to operate in productive manner for the team members. In other words, the connection to project success seems to be there but the connection is an indirect one. They found that structured methods in Six Sigma projects promote learning behaviours, while psychological safety facilitates the creation of knowledge. Arumugam and others (2013) called the knowledge created “knowing-how” and psychological safety fosters creation of the “know-how”. Witt (2016) studied in his dissertation connections between six sigma project success and team members’ personalities and concluded that psychological safety in fact is a key factor in six sigma project success. Six Sigma was developed by Motorola in 1986 to enhance efficiency. Dissertation by Witt P (2016) states the following: “Further, in our examination of the contextual factors of Six Sigma we attempt to provide a unifying set of contextual factors based on the five factors studied by Nair et. al., (2011) (leadership engagement, strategic project selection, the use of structured methods, the use of improvement specialists, and the presence of psychological safety in the group).”. For individuals within a team, the perception of psychological safety tends to increase the likelihood of coming up with “work arounds” to deal with challenges at work and blocks in work processes. (Halbesleben & Rathert, 2008) Employee reflection on events happening in the workplace is also mediated by psychological safety. (Hetzner et al., 2011). Nair et al. (2011) highlighted the crucial role of psychological safety in promoting cross-functional integration, regardless of the complexity and uncertainty of a project. In recent times, studies on Six Sigma process-improvement projects have identified key determinants of project success. Edmondson (1999) demonstrated that psychological safety positively influences SSTPP when mediated by team learning behaviours, which can be observed through behaviours such as seeking feedback, bold experimentation, and open discussion regarding errors that have been made.

It has been found in previous research that leaders who prioritize participation, people, and production tend to utilize dyadic discovery methods instead of group-based methods for problem-solving. Additionally, they follow an improvement-oriented management style, which helps in creating a work environment that is psychologically safe and fosters

positive outcomes. These findings have been established by various studies, including Roussin (2008) and Wong et al. (2010) for the dyadic discovery methods part and Halbesleben & Rathert (2008) for the improvement-oriented management style part. Wong et al. (2010) also demonstrated that by highlighting the values of productivity, people, and participation a leader can play a significant role in creating a psychologically safe work environment. These values encourage leaders to engage in behaviors that promote positive relationships and offer psychological support to their team members. It is essential to explore how managers model and communicate these values to their team members, thus enabling them to feel safe and use their experiences to learn and grow. Carmeli (2007) suggests that via signaling team members feel safe taking risks, experimenting and saying their ideas out loud. Therefore, a psychologically safe environment will foster learning for both individuals and the team as a whole.

Perspectives of the status characteristics theory which is a theory within the expectation states theory has been used to explain the effects of status on psychological safety. Status characteristics theory seeks to explain how beliefs about status characteristics get translated into performance expectations, which in turn, shape the behaviors of individuals in a group (Berger et al., 1977; Webster & Foschi, 1988). Studies on the subject have established that an individual's perceived status within a team and the professional status of the team itself, have a significant impact on outcomes such as individual willingness to voice their opinions and team engagement, ultimately leading to an increase in psychological safety. The research indicates that the higher the status of the individual or the team, the more comfortable individuals feel in expressing their thoughts and sharing ideas. This finding has been supported by studies conducted by Bienefeld & Grote (2014) on individual perceived status and Nembhard & Edmondson (2006) on team status.

## **2.4 Personality traits in a work environment**

LePine (2003) investigated the relationship between individual personality traits and team performance in the context of unforeseen changes. The study used a sample of undergraduate student teams who participated in a simulation game that mimicked a military command and control team environment. The results indicated that conscientiousness was the only significant predictor of team performance in the face of change. This finding suggests that individuals with high levels of conscientiousness may

be better equipped to adapt to changing environments and maintain high levels of team performance. Witt (2016) found that psychological safety directly affected the six-sigma team performance and so did the big-five personality traits. He merely pointed out the existence of these direct relations, in addition to indirect relationship of psychological safety to projects success via organizational learning behaviours and knowledge created, but he didn't explore these connections further.

Leadership has a profound effect on the perceived psychological safety on an individual level. Characteristics of a leader such as inclusiveness, support, trustworthiness, openness and behavioural integrity have found to influence the experienced psychological safety (see. Carmeli et al. 2010; May et al. 2004; Madjar & Ortiz-Walters, 2009; Detert & Burris, 2007) and via that the perception of a psychologically safe environment leads to increased engagement, involvement and better job performance. (Newman et al. 2017).

LePine et al. (2011) explored several pathways in which team member personalities affect team effectiveness. What one can see from these pathways is that team member personality affects behaviour and behaviour directly affects the perceived psychological safety of an individual within a team. Team member behaviour also directly affects team effectiveness. Psychological safety on the other hand seems to affect effectiveness indirectly through learning behaviours. (See e.g. Edmondson (1999) & Newman et al. (2017). I have demonstrated these connections in Figure 2 which is modified from the LePine et al. (2011) paper's figure and I've added the element of psychological safety and learning behaviour according to research just mentioned in the earlier paragraph.

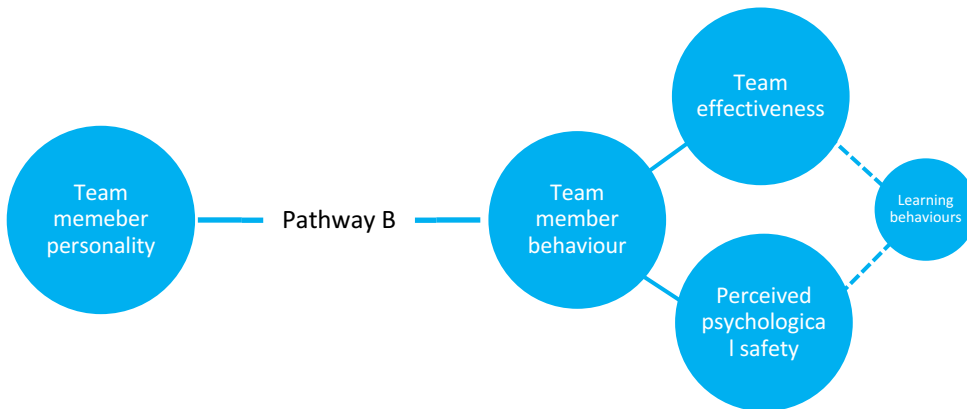


Figure 2 The pathways combining personality, psychological safety and team effectiveness. Modified from LePine et al. (2011), Edmondson (1999) and Newman et al. (2017).



### 3 Methodology

Our minds work in a way that we try to seek explanations and see patterns around us, sometimes even when there are none. I decided to focus a lot on the methodology so my research would minimize the biases and pre-condition I as a researcher am having. I will disclose the reasoning behind my choices of methodology on this part of the Thesis. While choosing the fitting personality type test I evaluated the availability and limited time of the interviewed people and decided to choose the following methods from quantitative and qualitative paradigms for personality assessment and interviews. In this section I will explain the reasoning behind my choices, go through different options that were on the table for conducting my research and finally explain the unique characteristics of my chosen methodology. I will also disclose the tools used for data analysis in this section.

Because the environment consisting of teams that work in different enterprises is so complex, it would make sense to avoid simplistic studies of a few variables to address phenomena like personality and psychological safety. In quantitative studies it is often hard to control a lot of variables and hypotheses, I have chosen to use mostly qualitative methods in addition to the traditionally used quantitative ones. In this way, overlooking potentially significant contributing or mediating factors could be avoided. (Mathieu et al. 2008). Most quantitative research tries to point out cause- and effect relationships, make predictions based on these relationships and generalize it to a broader sample. (Hasim & Antwi, 2015). Psychological safety is totally based on the experience of the individual, and for that purpose qualitative methods are more suitable. In my context this means interviewing people about their past experiences and analyzing the meaning different people with varying profiles of personality dimensions give to these experiences. Personality traits on the other hand, cannot be assessed efficiently without a questionnaire and that falls into the category of a quantitative method in research.

Qualitative research methods, such as interviews, focus groups, and observation, can be useful for exploring and understanding people's experiences, perspectives, and beliefs in depth. More precisely, for a qualitative study on this topic, my plan is to gather data by conducting in-depth interviews with employees who have undergone digital business transformation projects in their workplace. Before the interviews, I plan to use a questionnaire for defining the employee's personality type. Later on, I will focus on in-

depth conversation concerning their perception of psychological safety during the transformation process, and their experiences with change management practices both as a driver and a subject of change. Using a mixed-methods approach allows for a more comprehensive and nuanced understanding of how employees' personality types affect the perceived psychological safety in the context of digital business transformation projects. It allows for the collection of both numerical data and more detailed, in-depth insights which are needed to answer my research questions and for providing a well-rounded picture of the topic at hand. Taking all this complexity into account, I'm going to be able to address my research questions.

Overall, after a rigorous pre-planning grounded in the the body of research from Eriksson & Kovalainen (2016), Järvinen (2021) and Antwi et al. (2015), literature seems to point out that the qualitative approach is indeed a suitable way to explore and understand the complex and nuanced relationship between personality, psychological safety, and change management in the context of digital business transformation projects. It could also provide valuable insights for organizations and their managers seeking to improve psychological safety and manage change more effectively. Based on the data I'm going to collect, I shall analyze the themes and patterns that emerge and use these to develop insights and conclusions about the relationship between the abovementioned factors.

### **3.1 On qualitative research methods**

#### **3.1.1 Action research**

In research, action research is considered as a suitable approach when the research objective involves describing a series of actions that are occurring over time in a particular group, organization, or community. It is also appropriate when the objective is to comprehend the process of change, development, or resolution of a real problem. By applying action research, one can learn from the situation and develop solutions for it.

Furthermore, the differences between a researcher and a management consultant often lessen or disappear as academic research aims to understand the practical issues related to business operations and implement change processes and solutions. The researcher is expected to be somewhat involved in the activities they are researching. (Eriksson & Kovalainen, 2011). Action research stems from the field of social psychology which is close to the context of this study. As a qualitative research method for business, it is

widely adapted and used. Action research leans closer to the paradigm of realism than constructive knowledge creation, which again would be in line with the aims of this study to contribute to effective change management. Action research is particularly beneficial when investigating issues related to processes within organizations, such as learning and change. (Eriksson & Kovalainen, 2011).

While action research sounded like a suitable method for my thesis, I'm not actively involved in a project that would have a specific goal of enhancing psychological safety with different methods, in my opinion action research is not suitable as a method for answering my research questions. There is not currently an underlying problem in a digital transformation project that I ought to solve with this thesis, the main goal of the thesis is to gain valuable insight on the relationships between personality traits and perceived psychological safety and hopefully offer practical guidance for managers on how to address these relationships at work.

### 3.1.2 Interviews

According to Eriksson and Kovalainen (2016) structured and standardized interviews are particularly useful when the interviewer is inexperienced and there is scarce amount of money or time to be spent on the research – all of these aspects are relevant to my thesis. Thematic analysis is a foundational method in the core of qualitative research. It is also a suitable method to use both in the fields of psychology and business research. (Eriksson & Kovalainen, 2016; Braun & Clarke, 2006). According to the typology created by Silverman (2013) there are three different kind of interview studies: positivist, constructivist and emotionalist / subjectivist. The kind of interviews suitable for my research land on the category on an 'Subjectivist' interview study in which the focus is on people's perceptions, emotions understandings and conceptions about different phenomena. An example study from the book of Eriksson and Kovalainen (2016, p. 92) utilizing this type of interview was "studying the process of organizational change". One rule of thumb I followed while inventing the interview questions was that the interviewees are not able to answer my research questions directly, this sounds obvious but sometimes the basics are important to keep in mind while creating a research setting. The book gives guidance on how to conduct interviews. It helps a researcher to design, conduct and analyze qualitative interviews in a systematic and rigorous manner. It includes tips on

preparing for interviews, selecting participants, creating interview guides, and recording and transcribing interview data.

The book also covers various aspects of working with qualitative data, including how to manage large amounts of qualitative data, how to code and categorize data, and how to use various software tools to analyse qualitative data. According to the authors combining heterogeneous data from various sources is considered to be the best approach when conducting research, this principle is called triangulation. Realistically this isn't always an applicable approach but rather an ideal. By taking into account many perspectives and utilizing various methods the researcher, or a student doing their thesis, can try to increase the validity and reliability of their findings.

## **3.2 Choosing the personality trait assessment**

### **3.2.1 Scientific validity as an arising challenge**

Two key challenges in choosing the personality assessment were that most questionnaires are not open to public, and many are debated in terms of validity in the scientific community. Many “popular science” books about personality, like *Idiot's around me* by Thomas Erikson, don't really have a solid academic justification and are widely criticized despite of their popularity. They are either described vaguely in research papers or behind a paid subscription. I do not have the competence myself to come up with a lexical identifier questionnaire for human personality so I have to rely on ready-made tests. My goal was to find a ready-made easy-to-use version of a questionnaire that would help me identify how do the participants score in different domains of the big five factors. If I were to solely focus on the assessment of personality it would make sense to combine both self-report and observer methods of data collection but since the purpose of determining the personality traits is to support the qualitative analysis of the interview data, self-report measures are sufficient.

First when searching for suitable personality assessment I came across a Myers-Briggs type indicator (MBTI) test. For MBTI test the challenge is that the questionnaire takes time, this would have made my data gathering difficult with a constraint of time and the fact that personality assessment is only a part of my data gathering. For academic purposes the MBTI test had a few flaws to consider, by googling “scientific validity of the MBTI test” I found numerous articles on whether the test is considered pseudoscience

or science. Some like The Guardian (2013) point-out that there are clear scientific gaps for the reliability of this indicator. Also, Wikipedia has a section acknowledging that there is a wide criticism for this indicator despite its wide adoption in the corporate world. For these reasons I decided not to use MBTI in my research.

Another option would be to use the big-five personality traits assessment. The basis for my questionnaire could be derived from the work of Goldberg (1992). The next question arising was how am I going to evaluate the big-five personality traits? At truity.com one can evaluate their personality according to the big-five model. They've done the test with 60 questions and 5-10min completion time which I find very optimistic. One assessment I thought I could use for my research is used by DeYoung et al. 2010: "We administered the self-report version of the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) to assess the Big Five personality factors." This test consisted of 120 statements. All in all, with these scales and measures of the big-five personality traits, there is a significant time constraint, in the context of my research a quicker yet reliable measure of personality dimensions would be preferred. Most of the focus of my interviewees should be on the interviews rather than on the personality test. While doing more searches on personality assessment I found the Eysenck Personality Questionnaire. Based on the theory of Hans Eysenck who focused on temperament and genetic, inherited aspects of human personality. There has been a significant critique towards this model and therefore, being as controversial as it is, I decided not to move forward with this questionnaire method. (Mor 2010).

Majority of the research concerning the HEXACO -model of personality seems to be led by two main researchers in the field Michael C. Ashton and Kibeom Lee. This could be a challenge for the reliability of the model. However, the articles they've produced are published in quality journals if one can rely on [julkaisuforum.fi](http://julkaisuforum.fi). The model builds upon widely known big-five-factor model but is still considered an alternative. Given these circumstances I believe choosing the more widely adapted and tested model of personality would be a better option for my thesis research. There is still a chance that the HEXACO model proves to be better in almost all predictions and modelling, but currently there is no broad evidence to suggest that.

### 3.2.2 International Personality Item Pool

IPIP stands for International Personality Item Pool and it consists of several thousand lexical items. The pool doesn't refer to any specific measure of personality but is a repository from which different scales like "the 50-item IPIP representation of the Goldberg (1992) markers for the Big-Five factor structure" can be derived from. Some scales are named by the creator and in those cases that particular naming is preferred when the scale is used, for example "IPIP-120-NEO" scale (Johnson, 2014). I will derive the questionnaire from IPIP also known as International Personality Item Pool (IPIP.ori.org) which is based on the article "The development of markers for the Big-Five factor structure." by Goldberg (1992).

A study conducted by Cooper et al. (2010) highlights the Mini-IPIP personality scale as a suitable short-form measure of the Five Factor Model (FFM) of personality, also known as the Big-Five. The study points out that the Mini-IPIP can be useful in situations where there are time constraints or other limitations that allow only a limited number of measures to be used. This is exactly the kind of measure I was looking for. The study finds that the Mini-IPIP has an acceptable level of reliability and a well-defined factor structure, supporting previous results provided by Donnellan et al. (2006). It is worth mentioning that the current Cooper et al. (2010) study administered only the 20 items of the Mini-IPIP, whereas Donnellan et al. (2006) extracted the subset of items post hoc from a larger set of items. The participant pool of the study comprised of predominantly female and highly educated students. Demographics of the participants of my research study are also highly educated and mostly female. (Cooper et al. 2010). Both of these measures are based on the work of Goldberg (1992; 1999). Donnellan et al. (2006) however, chose to score the measure of Emotional Stability in reverse and use Neuroticism instead, this differs from the original type of measurement. I'm going to use Neuroticism as one dimension too, since the Mini-IPIP scale is validated and tested including this change in the scoring and I dare not to modify it in order to maintain the scientific validity of the measure.

The IPIP (International Personality Item Pool) scales are a set of self-report measures of personality, basically they are statements that the answerer needs to assess how accurately they match their own personality. I have listed some of the advantages and disadvantages regarding the use of the IPIP scales in my research. IPIP as a foundation for research is

widely used, IPIP scales are one of the most cited measures of personality and have been tested for reliability and validity in numerous studies. (See e.g. Donnellan et al. 2006; Cooper et al. 2010; Goldberg 1999; Johnson 2014) The IPIP scales are freely available to use, which in the context of my thesis is very important. Tools like Google Forms make it easy to create questionnaire forms and are by nature time-efficient to analyze, in other words they are simple to create and use. The large pool of items and wide research usage makes choosing the questionnaire questions easier. The IPIP scales consist of a large pool of items that can be used to assess different aspects of personality, such as extraversion, agreeableness, and conscientiousness – all of which are relevant for my research.

There are also some disadvantages for using the IPIP scales as there are in all self-report measures. The self-report bias is a part of the challenge when people might tend to not describe themselves accurately. They might have distorted picture of themselves that others would not agree with, so what then is truly representing the human personality? Overall, the psychological theories of human personality are an evolving field and have started only recently to integrate with the fields of molecular biology and neuroscience. While most of the studies regarding the big-five personality types are based on a pool of representing Western culture, so is mine, and I don't find that tampering with the validity and suitability of the measure. If I were to conduct a similar study in e.g. Sudan, it might be a challenge to apply the standard items for my research interviewees.

I am going to utilize a mini-IPIP questionnaire I found was tested in a research study “A confirmatory factor analysis of the Mini-IPIP five-factor model personality scale” by Andrew Cooper et al. (2010) with the tool Google Forms. The questions are based on the IPIP standard 50-question questionnaire (IPIP.ori.org). The use of a shortened 20-question has been also validated by Donnellan et al. (2006) who evaluated a series of studies to assess the Mini-IPIP measure and found that it had adequate reliability and demonstrated comparable patterns of associations with the longer IPIP-FFM measure. Specifically, the Mini-IPIP measure showed similar correlations with facets of the Five-Factor Model and other pertinent measures of personality. Basically, for each category of the big-five four items are chosen instead of the ten that was originally planned. Due to the time constraint of my interviewees and myself, I believe choosing this shortened version is the best way to approach the personality assessment part of my research. To sum it up, the mini-IPIP standard questionnaire for assessing the big-five personality

dimensions is time-efficient and reliable and therefore was chosen to be part of the research methodology.

Scoring instructions for the mini-IPIP can be found online with a free access from the IPIP website (see [IPIP.ori.org](http://IPIP.ori.org)). Exactly the same questionnaire and invitation message was used with all the participants in order to minimize unnecessary third-party variables from affecting the results.

From the website of scoring instructions on the mini-IPIP there was a note that “The authors of the Mini-IPIP chose to score the Emotional Stability scale from the lexical Big Five in reverse and to use the label *Neuroticism* from the Five-Factor Model for this scale. The current consensus is that Emotional Stability and Neuroticism are opposite ends of the same dimension, or nearly so. Again, should one decide to use the Mini-IPIP in research, one should be aware that Donnellan, et al.'s (2006) scoring and conceptualization of this factor differ from that of the original IPIP scale on which it was based.” I have taken this part into account for my questionnaire. Donnellan et al. (2006) tested the validity of the mini-IPIP measure of personality and results across five different studies indicated that the Mini-IPIP is a psychometrically acceptable and practically useful measure of the Big Five factors of personality.

### 3.2.3 Data security and confidentiality

It's important to take appropriate measures to ensure the confidentiality, anonymity, and security of the data collected through my IPIP survey and 1on1 interviews in order to protect the privacy of the participants. I believe telling the participants how their data is going to be used and that the answers are anonymous are essentials for both ethical research and a successful interview. I have chosen to address these aspects of research the following way:

- Confidentiality: No one else except for the author and upon request the university thesis supervisor will be able to access the data I've collected. The data will be stored in highly secure cloud storage platforms of Apple and Google; the iCloud Drive and Google Drive. No other encryption will be needed.



- Anonymity: I will create and use a unique identifier to identify my interviewees' answers about their personality traits and interview questions. No real names are needed to be used publicly anywhere.
- Data security: In the accounts that are used to store the data there is a 2-factor authentication in place. The hardware devices used to handle the research data are Apple's MacBook computers with the latest software updates in place that have a built-in firewall and anti-virus software called XProtect.

According to the following statement from the Finnish government the nature of my research data is pseudonymized: "The encoding of personal data is an example of pseudonymisation. Encoded data cannot be connected to a specific individual without a code key. For the holder of the code key, however, decoding the records and identifying each data subject remains a simple task. Personal data can also be protected with false names. For example, a data item related to the individual can be replaced with another in a database. Pseudonymisation is a commonly employed method in research and statistics." (tietosuoja.fi). I have created a six-character long random identifier with Excel's "RANDBETWEEN" function for the participant of the research study. The file connecting the identifier and the person's name is stored offline to researcher's computer behind two-factor authentication, password and firewall protection.

This guideline from the university has been followed for the survey part of the Thesis "**Carry out the research surveys without identification data** (name, address etc.) whenever these are not essential for conducting the survey. The appropriate procedure is to, for example, send a survey request to a person's email but responding to the survey itself would happen anonymously in e.g. Webropol." (University of Turku / Intranet).

### **3.3 Interview structure**

#### **3.3.1 Selection of the interviewed professionals.**

I am utilizing the professional network I have gathered during my time working with colleagues and clients in a large U.S. based consulting corporation that has approximately 300 000 employees. The profile of the interviewed people is determined by the requirement of having worked in a large-scale technology transformation project. For

example, an ERP vendor / system change. Questions that guided me through my selection of the interviewed people:

- Who has deep knowledge of issues related to my research question?
- Do I want to control some background variables regarding informants, that can affect their answers?
- Would I like to use a snowball technique, to find more informants during the data collection process?
- For document analysis: what kind of metadata should I collect from documents, to understand for example, who wrote it, when, and for what purpose.

I decided that people with relevant experience can be found through teams and function I'm either working in or closely with. I went through the country + EMEA company structure and name list found online from the intranet and decided to approach professionals from different focus areas like technical consulting and change management functions. Over half of the people I interviewed I hadn't met before. The ratio of men to women was 3 men to 10 women in the sample. For the metadata part I don't need any special metadata because I'm not conducting document analysis but focusing on the data gathered. I do have an Excel file for scoring the personality trait assessment so that can be considered metadata.

### 3.3.2 The interview questions

I have chosen to have fixed interview questions and the type of the interview will be semi-structured. I will give myself the freedom to ask additional questions if something of interest arises in the dialogue during an interview but the basis of the interview will be the same for all participants. (See Appendix. 1). Since my focus is on the individual level rather than on the team experience of psychological safety, I do not see why group interviews would be preferred over individual interviews in this thesis. The interview meeting will be held by the interviewer and for one interviewee at a time.

As a basis on how to evaluate the perceptions of psychological safety I have used the definition of psychological safety and numerous previous studies to come up with interview questions that would be successful in exploring the relationship between different dimensions of personality and the perception of psychological safety. I found

the following questionnaire used by an HR organization. For example, these exemplary questions have helped me to create my own interview questions:

1. Are people at this organization able to bring up problems and tough issues.
2. Do you feel safe to take a risk in this organization.
3. Is it difficult to ask other members of this organization for help.

The scientific validity of this test isn't relevant. It was used as an example in a blog at [predictiveindex.com](http://predictiveindex.com). From my research's point of view, it is important to distinct that I'm not trying to measure the level of psychological safety itself in a team but rather the perceptions of its existence, and the variety of these experiences per an individual and their personality dimensions.

For the questions I ended up using in my research I combined examples from e.g. the work of Amy Edmondson (1999; 2006; 2014) and her TedxTalk. I incorporated aspects of the big-five personality traits into some of these interview questions, there are good descriptions of each personality trait available online and in the works mentioned in the literature review. An example question from the interviews: "Do you usually feel like you can ask what the goal of a task or a project is, without the risk of sounding like you're the only one out of the loop?". Structurally I went from general and easy questions like background and education towards more specific questions like: "Can you describe a time at work when you felt particularly safe and supported psychologically? Why?" to more broad questions in the end: "Overall, in your opinion, how important is acknowledgement of personalities and psychological safety for the success of a digital business transformation project?". The full list of interview questions can be found from the Appendices section. My goal is to generate a robust thematic analysis narrative that captures the richness and complexity of participants' experiences and perspectives on the interplay between personality traits and psychological safety in large-scale business transformation projects like ERP change.

## **4 Data analysis and results**

This section of the thesis will showcase the key findings and describe the process of data analysis. I used the NVivo tool for the data analysis. The personality assessment results I calculated in Microsoft Excel. The calculations were fairly simple plus-minus calculations based on the IPIP scale instructions. I created transcripts from the interviews I held and used thematic analysis to find different themes through coding the data. The personality trait assessment helped me in this coding process and offered insight into whether people who possess certain traits seemed to perceive psychological safety in particular ways. I focused on what fascinating, or not-surprising, insights would arise from the interviews. Thematic analysis is a foundational method in the core of qualitative research. (Eriksson & Kovalainen, 2016; Braun & Clarke, 2006).

After I had conducted the interviews I transcribed the data that was in both audio and video format using the NVivo tool. By reading through the interviews, I identified codes along the way – these codes were eventually grouped together and used to create emerging themes from the interview data. Themes are patterns found in the data that can form a valid narrative about the research (Eriksson & Kovalainen, 2016). As a process my data analysis was iterative, revising, reviewing and going back on the identified codes and themes was central to my analysis process. One of the key challenges in the process was to create themes that are distinct enough from one another. In this section I will disclose the key findings of the coding process.

### **4.1 Coding of the interviews and personality assessments**

The initial round of coding the transcribed interview data was done manually in nVivo software by reading through the interviews and highlighting relevant points bearing my research questions in mind. I started with simple labelling of personality dimensions of the interviewees to relevant answers from the interviews: examples of codes used: “High Agreeableness” and “Low Neuroticism” for codes of personality and “Reaction to change” and “Doing mistakes” for the interview question answers. Personality assessments of the big-five personality traits functioned as starting data points and labels for the coding process. With the tool nVivo there are good options to use like queries to find common patterns and compare all the interview codes between one another. Below you can find a full list of initial codes, reference amounts used to start the interview

analysis. In this section I will back up my findings and claims with “*quotes*” from the interview transcripts.

| <b>Code name</b>                    | <b>Description</b>   | <b>Files</b> | <b>References</b> |
|-------------------------------------|--|--------------|-------------------|
| Background - Education              | Professional and educational backgrounds   | 7            | 12                |
| Communication                       | Preferred types of communication / people & organizational levels                  | 6            | 22                |
| Confidence level                    | How employees are feeling about themselves in a fast-paced environment             | 4            | 5                 |
| Employee voice behaviours           | Employee voice behaviour – shows the presence of psychological safety in behaviour | 6            | 18                |
| High Agreeableness                  | Personality trait of the big-five model  | 6            | 42                |
| High Conscientiousness              | Personality trait of the big-five model  | 7            | 17                |
| High Extraversion                   | Personality trait of the big-five model  | 2            | 12                |
| High intellect - imagination        | Personality trait of the big-five model  | 2            | 8                 |
| High neuroticism                    | Personality trait of the big-five model  | 3            | 12                |
| Importance of the studied phenomena | Links to projects success, do the topics matter?                                   | 5            | 9                 |
| Low extraversion                    | Personality trait of the big-five model  | 2            | 4                 |
| Low Intellect - Imagination         | Personality trait of the big-five model  | 1            | 2                 |
| Low Neuroticism                     | Personality trait of the big-five model  | 3            | 3                 |
| Managerial advice                   | Any advice for managers on the interview topic                                     | 5            | 13                |
| Mistakes                            | Everything related to making mistakes, feelings and reactions.                     | 8            | 15                |
| Psychological safety                | Answer that relate to the concept of psychological safety                          | 7            | 37                |
| Reaction to change                  | Descriptions of experiences with both driving change and being a subject to change | 8            | 15                |
| Support                             | What people have felt that brings them psychological safety                        | 7            | 27                |

Table 1 Interview coding as a starting point for thematic analysis.

## 4.2 Emerging themes

### 4.2.1 Employee voice behaviours

An interesting notion regarding employee voice behaviours was that at the client site, some consultants didn't question things in meetings as much and told that they emotionally suppress their reactions at least when it comes to behaviour (you can't silence feelings easily).

*“when you're working with a client I feel like then you have to be the one who is more like secure and you're reassuring others about the change, so you have to be more confident about it. And when it's happening to you I think you're not expected to be calm every time so ... you can freak out a bit more than if you're in the driving seat”*

In the driver's seat of change management, extraversion as a personality trait plays a role in employee voice behaviours. There's a chance that creating the facilities for communication and holding team meetings wouldn't come as easy to people that would score low on Extraversion. Those who reported being vocal and speaking up in meetings scored relatively high on Extraversion, this is just an observation, but causality cannot be determined from the observation. This could be due to high psychological safety in the team or being extraverted or explained by a third variable.

*“we said it out loud that we didn't feel very comfortable, then we tried to force more team interaction, so for example instead of having only once a week a team meeting we had it twice and we asked questions like: "Who can you thank you from the team what happened that changed your week, anything good that you want to share or just anything fun that happened that made you smile" something like that. At the beginning people were very hesitant but then they started to improve.”*

*“I am usually the type of a person who speaks out concerns, so if there are problems or viewpoints that I feel have been neglected”*

An interviewee scoring low on Extraversion told a story about workshops and how speaking equal amounts and making sure everyone is heard is facilitated, remember the internal Google study from chapter 1.1 about “equality in distribution of conversational turn-taking”. Writing things down together, having a pause in a meeting with some time

to fill-in a Mural for example should enable both extraverted and introverted people to get their voices heard.

*“writing down kind of makes the situation more equal even though I'm not the most quietest person but I still think that it's nice for everyone to be able to participate and not only those persons who are louder than others”*

People who scored high on Neuroticism also reported being a bit worried about change and their reaction seems to have a negative connotation. This particular interviewee showed remarkable self-awareness and emotional intelligence in acknowledging her own natural tendency for reacting to change by navigating the highly neurotic personality with self-awareness.

*“I'm really aware that I always have like negative attitudes towards change, and I also think that's why I really like doing this change management parts because I truly understand why people don't like it because I don't like it myself.”*

In general, if people have been given clear goals and structure for their work the employee voice behaviours are vocal, an interviewed management consultant answered on the topic of challenging the status quo in meetings and in project as follows:

*“I don't have any problems, I mean if we are not aligned in why we're doing or where we're at, how can you perform? So I really don't have any problems in that and I also have no problems in questioning.”*

One question I had was on how comfortable the interviewed people are making mistakes in their (project) work and how they feel if they've done a mistake. There were examples of different team environments regarding the level of psychological safety that offered me an insight on how people are feeling in different settings.

*“the project manager who's really like a micromanager, so people are really afraid of making mistakes and the result of that is just that they don't like confess that they have made mistakes”*

*“there was really not a good environment and when I joined I could really feel there was not a nice vibe with the people so nobody really asked any question”*

This relates to psychological safety, are people willing to admit mistakes that have happened or afraid of doing them in the first place? Another interviewee elaborated on our in-head perceptions and reactions to making mistakes in a way that phrases the paradoxical nature of our teamwork and communication. An individual scoring high on Agreeableness should according to the explanation of the Big-Five incline towards being cooperative, friendly, warm, and helpful and this is reflected on the below quote as well. They would never treat a colleague who does a mistake in a malicious way yet there's a bit of fear in the back of a mind that someone would do it to them.

*“I think it's always so fascinating how you would never respond in any negative way towards a colleague about the mistake right? But then you think that the colleague would do it towards you, so it's a bit funny how our mind works”*

#### 4.2.2 Self-criticism

Self-criticism was a theme emerging in the interviews, many people who are career-driven seem to be hard critiques of themselves. It might be that if a team lacks psychological safety people are even harder on themselves for doing mistakes and it might be easier to let go and focus on problem-solving and future when there is no culture of pointing fingers and blaming people but rather a solution-oriented mindset in the team they're working in.

*“I can be very critical if I make a mistake”*

Agreeable individuals might find it hard to deal with making mistakes because in the heart of it, a mistake rattles social cohesion. One interviewee scoring high on Agreeableness told how a mistake he made early in his career shook him.

*“I tried everything to make it correct and maybe try to learn from them avoid it in the future”*

Another interviewee with a dominant Agreeableness trait told that they find it hard to let go when they've done a mistake.

*“also things that seem pretty minor still stick to my mind even after years I still remember that one e-mail that was supposed to go to the whole team and then I forgot one team member”*



How to cope with the issue? There seemed to be at least two ways to deal better with making mistakes. The interviewed people thought that leading by example is the best way to show what you can do in a team and what not. If the manager him/herself admits mistakes with a solution-oriented mindset and show example it will encourage others to do so as well and eventually contribute to a greater level of psychological safety.

*“I think that it's really important that for example the project manager or the people in the top they kind of walk the talk so they admit when they have made mistakes and I think that's really important because it will affect the whole team and it will like start the good culture”*

Another way to overcome the self-criticism is working on an individual level and developing as a professional through reflection and self-awareness. People who score high on Conscientiousness might find it especially difficult to silence the critical voices in their head – but luckily, one doesn't need to silence anything, thoughts cannot really be suppressed in healthy manner so instead, an employee should acknowledge the arising criticism rather than try to silence it.

*“I try to learn how to apply more empathy towards myself.”*

#### 4.2.3 Managerial advice for fostering psychological safety

This might sound obvious but from the interviews a common theme arose that by genuinely caring about your team members, also a bit outside of work context, really makes a difference to their perception of psychological safety. Leading with empathy seems to have real value in the minds of employees. One-on-one meetings without specific agendas were seen as valuable for checking in on each other's well-being. The interviewees also suggested informal gatherings like coffee breaks as opportunities to connect and relieve stress. Checking in on personal level whether you're a team member or a leader on workload, mood etc. has a crucial role. In addition, positive feedback loops engaged employees which in turn is according to literature one of the key success factors in successful digital business transformation. Following examples are from when asked specific types of communication and support that the employees find useful during stressful times at work.

*“When you like one-on-one check in with them, I feel that it's going to be an important factor for psychological safety”*

*“I think it's really nice when someone else asks you like "hey are you OK with your workload, just double checking" you know, or just asking how are you doing generally.”*

*“reassurance that you're doing a good job and reassurance we're all in this together asking for help and knowing that the help will be there”*

One of the interviewed people pointed out that there is a fine line for managers to what extent they can focus on individuals' hopes, dreams and fears because at the end of the day, there is still a lot of work to be done. This is true, it might happen that in a very psychologically safe and inclusive team people bring too much of their burdens to work – the point for a (project) manager is not to be a therapist but to focus on work outcomes. The positioning of this fine line has been evolving over the past decades. We have come from not disclosing almost any private matters at work to nowadays being recognized as humans whose work is a part of their life as a whole, this is the norm in the Nordic countries at least. In addition to the forementioned, one individual pointed out that there's probably no universal truth or quick fix on which style of communication is the best to facilitate psychological support since we're all different in our personalities despite the models and labels. Nevertheless, if there are no efforts put to communication, support and fostering psychological safety digital business transformation efforts might lose steam in the minds of employees as Kumar Basu (2015) suggested.

*“I mean that if you have a problem going on you should do your own work with the therapist whatever but work is work in my opinion, so you want to keep it separate. Then, if the condition of the team do not give you psychological safety or something that is within the team that everyone together sort of feel the same about an issue, then it's a thing that you need to acknowledge absolutely.”*

*“I feel that everyone is dealing with stress differently and as let's say project lead you need to be able to know your team members and know like how a few of your members deal with stress and if, for example, I know that Matias deals with stress by running, he can go and run.”*

Managerial skills in successful digital business transformation projects are not highlighted without a reason (see. The New York Times, 2016; McKinsey 2017). The

themes arising from interviews back this up. Some interviewees felt that “knowing your people” and their personal preferences are essential for effective leadership.

There’s a clear link to previous literature in what people reported in my research data about management style that contributes to the perception of a psychologically safe team. It is known that leadership has a profound effect on the perceived psychological safety on an individual level. I previously disclosed that characteristics of a leader such as inclusiveness, support, trustworthiness, openness and behavioural integrity have found to influence the experienced psychological safety (see. Carmeli et al. 2010; May et al. 2004; Madjar & Ortiz-Walters, 2009; Detert & Burris, 2007) and via that the perception of a psychologically safe environment leads to increased engagement, involvement and better job performance. (Newman et al. 2017). I would highlight that for managerial support especially one-to-one connection was seen as an important factor, inclusiveness from the literature can be interpreted as the importance of welcoming everyone’s ideas that was emphasized in the interviews. From the data it’s clear that also openness and behavioural integrity matter significantly. When asked what can we do to one another to enhance the perception of psychological safety in a team, both honesty and transparency were highlighted the former can be interpreted as behavioural integrity and the latter as openness.

*“be honest and transparent with your team”*

Behaviours and leadership that lead to higher levels of psychological safety across all personality dimensions in the scope of this research are somewhat difficult to obtain. Simply telling people they can “be themselves” or “express any ideas freely” isn’t enough but these principles have to be acted upon on a continuous day-to-day basis. Skills of emotional intelligence and empathy should be highlighted in talent acquisition in order to hire people that more naturally facilitate a psychologically safe environment at work because that is what drives the most successful teams and enables project success in its own part.

#### 4.2.4 Online vs Offline interactions

For one-to-one interactions with the managers and giving shoutouts in an online work environment this behaviour needs to have more structure. The time for feedback, having a 1on1 or reflection needs to be scheduled more often the interviewers experience. While

working on-site the feedback can be a smile, a pat on the shoulder that is completely not planned or unexpected, but in the online workplace people don't bump into each other by accident and share anything if there is no dedicated timeslot from the calendar for that kind of behaviour. Another interviewee also elaborated on the frequency of support and checking in, we as humans have a certain baseline of interaction needs and it differs per individual. Regardless, it seems that in a team environment that's mostly online one would need support more frequently.

*“I think you need it to be more like scheduled when you work online, it has to be a dedicated time slot because I think that when you work physically, I'm just assuming because I've never had proper on-site work, but I would assume there you have a quicker way of just reacting and responding when someone does a good job with your smile with the pat on the shoulder and there's it's easier to give that shoutout with other ways than just verbally. And when you're online I feel like you need a dedicated time slot and people sometimes need those deadlines for feedback”*

*“I think maybe online you would actually need support more, like more frequently because I think when you're face to face then you can maybe already sort of be hinted out if a person seems like he's having a lot”*

Some interviewees didn't have a preference or weren't aware of any preference regarding whether they find digital interaction different from F2F interaction. In this regard, the research offers no advice on which would be a preferred way of communicating for everyone, again, no quick fixes or magical formulas although most of us would love to have them wouldn't we.

*“I don't really have a specific preference if it's one-on-one, even slack is good because then I can just reach out to you”*

## 5 Conclusions and discussion

Findings from the research on what makes a team great conducted by Google (The New York Times, 2016) and McKinsey (2017;2021) share the same key factors and ideas that were mentioned in the interviews: having good emotional intelligence, showing empathy, setting up clear goals, giving everyone an equal amount of time and freedom to speak up and raise their concerns.

Most findings of this study are also aligned with the other contemporary scientific beliefs. For example, people scoring high on extraversion were not hesitant in voicing their opinions and asking questions, they were more confident in their employee voice behaviour which can be due to established psychological safety or the personality dimension. Also, the fact that according to the interviewees, psychological safety and acknowledgment of personality traits mattered as concepts when considering the success of a digital business transformation project. Yet reality at work related to communication, management style and trust seems to be often different, even though we know that it is effective to have psychological safety in a team and encourage people to voice their opinions, there is a gap between what we know and how we behave as communities. The cultural gap of “old-school” managers and modern management is significant. One of the reasons why psychological safety and the areas focusing on individuals has thrived in research only after the 90s could well be that we as generations have changed and that has led to the scientific findings being more relevant and new style of management to be more effective. It might be possible that having psychological safety in the team would not have been as efficient in the 1970s.

Agreeable individuals were found to be profoundly impacted by the mistakes they had made in previous projects. However, they were harsh on themselves rather than afraid of someone in the team punishing or shaming them – in other words they were themselves the hardest critiques of the mistake rather than afraid of external reactions. The agreeable individuals I interviewed had realized that everybody makes mistakes sometimes and the team environment allowed for consultants to be human too. The connection between self-criticism and psychological safety is an interesting one because taking the theoretical background of trait-activation theory into account some traits only express themselves (strongly) in certain situations and it could be that a lack of psychological safety creates

harder self-criticism especially for Agreeable individuals. These findings are gathered for conceptualization's sake to Figure 3.

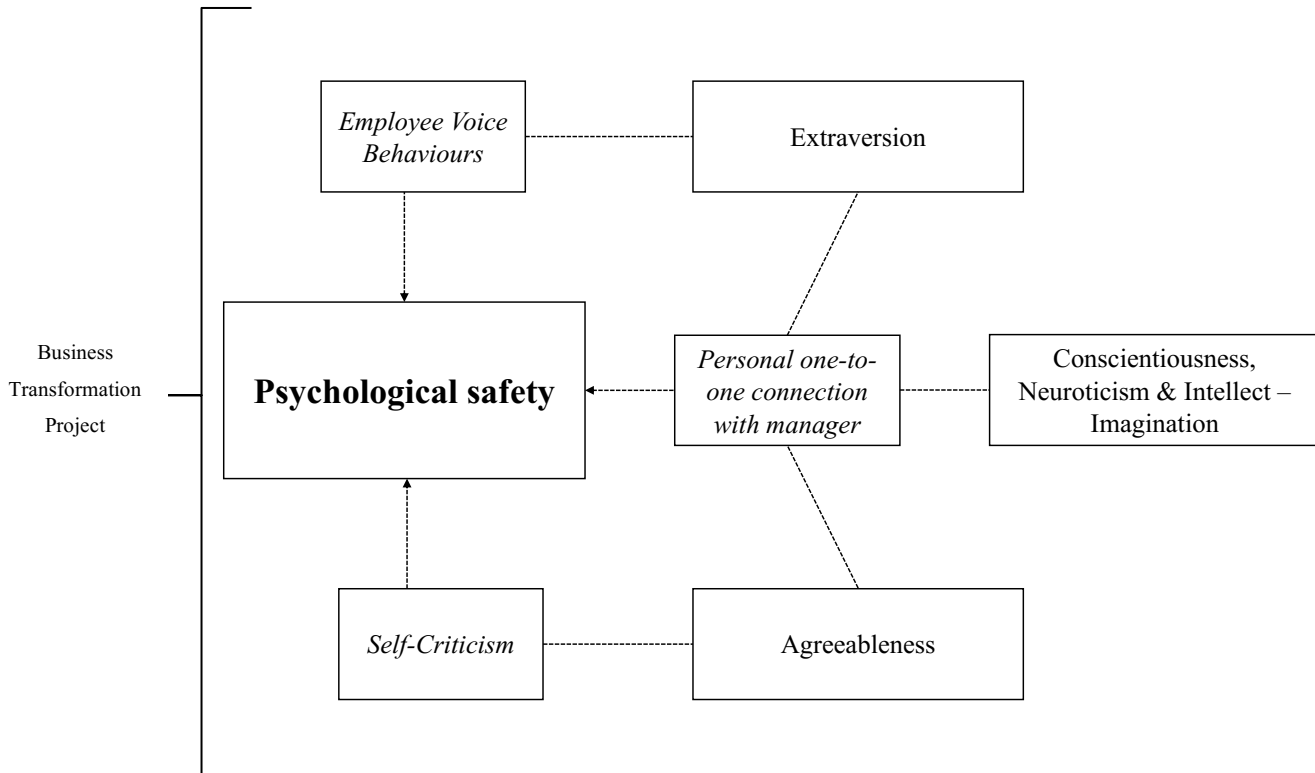


Figure 3 The big-five personality traits and psychological safety in the context of digital business transformations

The nature of large-scale technology projects is complex and impossible to plan everything beforehand. There is a great need for adaptation in the whole socio-technical context. It's no surprise why methods like Agile have been created. This context emphasizes the importance of employee voice behaviour as a means for workers to keep up with the demanding and fast-paced work environment (Van Dyne & LePine, 1998).

All in all, acknowledgment of individuals' personality traits can help managers to gain a deeper understanding of their employees which enriches the one-on-one connection that is essential for creating a psychologically safe team environment and was a universal requirement for all personality traits. However, a manager should be extra careful and mindful when conducting personality trait assessments for employees. Some employees might feel like they expose themselves too much in that way and it should be made clear that doing a test like the mini-IPIP is voluntary, extremely confidential and secure. Perhaps enabling a scientifically valid personality test to be done for the employees for

only their own use. It could help people gain more self-awareness and that awareness brings depth to one-on-one interactions with the manager.

### **5.1 Limitations of the study**

Self-report bias is one of the key challenges in relying to self-report measures for conducting research. I have addressed the challenge by creating an anonymous space for people to answer honestly but the unconscious willingness to make yourself look better in the eyes of a researcher (and yourself) is hard to manage. I have also made visible the data governance process but regardless of these steps taken to avoid self-report bias there is a possibility it affects the results of the study. What people think of themselves and how they really are perceived by others are not always aligned. Donaldson and Grant-Wallone (2003) summarize self-report bias as phenomenon: “In general, research participants want to respond in a way that makes them look as good as possible. Thus, they tend to under-report behaviors deemed inappropriate by researchers or other observers, and they tend to over-report behaviors viewed as appropriate. Self-report bias is particularly likely in organizational behaviour research because employees often believe there is at least a remote possibility that their employer could gain access to their responses.”.

My sample size of interviewed people, although varying in their cultural background and geographical location, could have been greater. This fact might limit the generalizability of the results. However, as you know well at this point the aim of the study is to give direction for future research to investigate these relationships further and for that purpose the sample size was sufficient. In addition, the people interviewed were mostly from Western culture and female, this might lead to some bias in the connection between perception of psychological safety and personality traits. I would like to highlight that these findings might not be universal to human nature but rather tied to a generation born and raised in a certain time in a certain (Western) part of the world.

One obvious limitation is that the interviewer himself has not conducted research independently before, so there are possibilities that the lack of experience might affect the results in ways the interviewer doesn't recognize –but this is also a limitation of almost all qualitative and quantitative research when there is interpretation of data in play.

## 5.2 Future research

This research for a Master's Thesis opens a window to future research to be conducted on the field. Given the nature of what we know currently about the human brain and how that knowledge is rapidly evolving, I think there are gaps in the knowledge to be filled concerning personality traits, psychological safety and digital business transformation.

Companies are under heavier digitization and need for digital innovation than ever and the advent of technological advances like generative AI. As long as a firm's operation involves humans, the need to study the psychological phenomena's effects on project success will be there. Regarding managerial tools and change management practices available, I wonder if AI could be incorporated into the future research settings of this topic. One could study how the use of Large-Language-Model based assistants or task manager bots who e.g. run a meeting or take notes, could help in fostering psychological safety in a team and take personalities into account.

And lastly, descending on the level of ideation from a futuristic vision to the actual next step, it would make sense to conduct a similar set of research with a bigger quantity of participants and focus on the Agreeableness and Conscientiousness dimensions of the big-five personality traits.



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## Appendices

### Appendix 1 – Interview questions

Interview questions:

1. What is your professional background, education?
2. How long have you worked with large business transformation projects (how about as a driver of change?)
3. Think of a time when you have been forced to change your behaviour. How do you typically respond to change in your work environment? (E.g. Anxiety, stalling of commitment, negative first impression, excitement?) Role difference, change affecting you (new tools etc.) or being a driver of the change for the client?
4. Can you describe a time you have made a mistake in a large scale project environment? How did it make you feel?
5. Have you often opted for continuing a meeting without clarifying anything, in order to avoid being perceived as someone who is unaware?
6. Can you describe a time at work when you felt particularly safe and supported psychologically? And if so, why?
7. What do you think team members can do to support each other's sense of psychological safety during an IT transformation project? – 1on1 online or f2f?
8. Do you usually feel like you can ask what the goal of a task or a project is, without the risk of sounding like you're the only one out of the loop?
9. Are there any specific types of support or communication that you feel are particularly helpful during stressful times and rapid change at the workplace?
10. Overall, how important is acknowledgement of personalities and psychological safety for the success of an IT transformation project?

## Appendix 2 – Research Data Management Plan

This document is a data management plan for the Master’s Thesis of Matias Mäkinen at the University of Turku.

### 1. Research data

Research data refers to all the material with which the analysis and results of the research can be verified and reproduced. It may be, for example, various measurement results, data from surveys or interviews, recordings or videos, notes, software, source codes, biological samples, text samples, or collection data.

In the table below, list all the research data you use in your research. Note that the data may consist of several different types of data, so please remember to list all the different data types. List both digital and physical research data.

| Research data type                                      | Contains personal details/information * | I will gather/produce the data myself | Someone else has gathered/produced the data | Other notes                                |
|---|---|---------------------------------------|---|--|
| Example,<br>Data type 1:<br><i>Interviews</i>           | x                                       | x                                     |   |  |
| Example,<br>Data type 2:<br><i>Survey questionnaire</i> | x                                       | x                                     |   | Mini-IPIP standard questionnaire questions |
|   |   |                                       |   |  |
|   |   |                                       |   |  |

\* Personal details/information are all information based on which a person can be identified directly or indirectly, for example by connecting a specific piece of data to another, which makes identification possible. For more information about what data is considered personal go to the [Office of the Finnish Data Protection Ombudsman’s website](#)

### 2. Processing personal data in research

I will prepare a Data Protection Notice\*\* and give it to the research participants before collecting data

The controller\*\* for the personal details is the student themselves  the university

My data does not contain any personal data

\*\* More information at the university's intranet page, [Data Protection Guideline for Thesis Research](#)

### **3. Permissions and rights related to the use of data**

#### 3.1 Self-collected data

You may need separate permissions to use the data you collect or produce, both in research and in publishing the results. If you are archiving your data, remember to ask the research participants for the necessary permissions for archiving and further use of the data. Also, find out if the repository/archive you have selected requires written permissions from the participants.

Necessary permissions and how they are acquired

Data type 1: Interview data, pseudonymized.

Data type 2: Personality trait survey, pseudonymized.

### **4. Storing the data during the research process**

Data will be stored in: Personal computer hard drive (offline)  and iCloud Drive and Google Drive

I will create backup files for the research data. Pseudonymized answers for the personality trait survey are stored in Google Drive.

The interviews will be recorded with a smart device and data stored in the abovementioned Cloud Services.

### **5. Documenting the data and metadata**

#### 5.1 Data documentation

Can you describe what has happened to your research data during the research process? Data documentation is essential when you try to track any changes made to the data.

To document the data, I will use:

A field/research journal

A separate document where I will record the main points of the data, such as changes made, phases of analysis, and significance of variables

A readme file linked to the data that describes the main points of the data

Other, please specify:

#### 5.2 Data arrangement and integrity

I will keep the original data files separate from the data I am using in the research process, so that I can always revert back to the original, if need be. ☒

Version control: I will plan before starting the research how I will name the different data versions and I will adhere to the plan consistently. ☒

I recognise the life span of the data from the beginning of the research and am already prepared for situations, where the data can alter unnoticed, for example while recording, transcribing, downloading, or in data conversions from one file format to another, etc. ☒

### 5.3 Metadata

I will not store my data into a public archive/repository, and therefore I will not need to create any metadata. ☒

## 6. Data after completing the research

You are responsible for the data even after the research process has ended. Make sure you will handle the data according to the agreements you have made. The university recommends a general retention period of five (5) years, with an exception for medical research data, where the retention period is 15 years. Personal data can only be stored as long as it is necessary. If you have agreed to destroy the data after a set time period, you are responsible for destroying the data, even if you no longer are a student at the university. Likewise, when using the university's online storage services, destroying the data is your responsibility.

### **What happens to your research data, when the research is completed?**

I will store all research data (except for personal identifiers) for a maximum of 5 years.

I will destroy all personal data immediately after completion, because: it is no longer needed after successful completion of Thesis.

If you will store the data, please identify where: iCloud Drive.