The Influence of National Culture Dimensions on Agile Implementations in the South African Software Development Context

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Abstract

Culture plays a role in how Agile frameworks are utilised and implemented. Agility requires the active involvement of team members and is said to be suitable in contexts where there is a horizontal hierarchy (low power distance) and where flexibility and spontaneity (low uncertainty avoidance) are emphasised. Cultures from Anglosphere countries, where Agile methodologies originate from, and Nordic countries, are closest aligned to Agile values. Since Agile values are based on Western culture, there is a need to investigate their suitability for cultures that have different values such as South Africa. South Africa offers an interesting context of study due to its heterogeneous cultural grouping.

While studies have been conducted to investigate the influence of national culture on Agile implementations in Western and Eastern country contexts, there is no research that explores the influence of national culture and the implementation of Agile methodologies in the South African software development context. Furthermore, few studies have focused on the effect of cultural differences within software engineering in general. The purpose of this study was to describe how national culture influences Agile implementations (roles, processes, and artifacts) within the South African software development context.

The study was deductive as national culture frameworks were employed. This study was interpretive and was executed using a qualitative, interview research strategy directed at Agile practitioners in South African software development teams. Data was collected from twenty-six participants from across two major cities in South Africa through online semi-structured interviews. The thematic analysis technique was used to analyse the data. Findings reveal that national culture dimensions influence the Agile roles, processes, and artifacts.

The basis for contributions was based on the empirical research of this study, specifically in relation to 1) insights into the role of a consolidated set of cultural dimensions on Agile practices 2) implications for agility by discussing findings considering Agile principles and values 3) findings mapped to the Complex Adaptive Systems (CAS) theory principles. A key finding was that South Africa does not demonstrate a homogenous cultural trait. Instead, various cultural traits are revealed, which brings more complexity to the Agile implementations. Thirty-two propositions relating to how the various dimensions influence Agile roles, processes, and artifacts were developed by the researcher. The key findings reveal that various national culture dimensions influence the decision-making process, the degree of Sprint interruptions, participation in Agile ceremonies, adherence to policies and prescribed Agile practices, how teams reach agreement, and approaches to process improvement and Sprint Planning. Lastly, in this study, the practical contributions are insights into the current context where national culture dimensions influence large-scale Agile frameworks such as SAFe, and small-scale Agile

frameworks such as Scrum in South African software development teams. In this regard, it can help inform Agile implementations in practice, and therefore help managers and teams curate Agile teams for appropriate environments.

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List of Acronyms

Acronym	Term
ASD	Agile Software Development
CAS	Complex Adaptive Systems
GLOBE	Global Leadership and Organizational Effectiveness
IDV	Individualism
IVR	Indulgence versus Restraint
JAD	Joint Application Development
LTOWVS	Long-term Orientation versus Short-Term Orientation
MAS	Masculinity
MVP	Most Viable Product
PDI	Power Distance Index
PID	Project Initiation Document
PI Planning	Programme Increment Planning
SME	Subject Matter Expert
UAI	Uncertainty Avoidance Index

CHAPTER ONE: INTRODUCTION

1.1. Background

Culture plays a role in how Agile frameworks are utilised and implemented (Sutharshan, 2013). Furthermore, certain beliefs, values, procedural norms, attitudes, and behaviours are either encouraged or opposed within a particular culture (Siakas & Georgiadou, 2003). Indeed, Agile methodologies are underpinned by values and principles which are described in the Agile Manifesto for successful software implementation (Mwansa & Mnkandla, 2014). The Agile values emphasise collaboration and interaction to mitigate bureaucratic issues which often hamper the success of Information Technology (IT) software projects (Joseph, Marnewich & Santana, 2016). Since agility is a mindset or culture, it is imperative to have an environment that characterises and supports the Agile software development (ASD) process (Sidky, Arthur & Bohner, 2007). For instance, the Agile culture requires the active involvement of team members and is said to be suitable where there is a horizontal hierarchy (low power distance). Moreover, flexibility and spontaneity (low uncertainty avoidance) are emphasised (Siakas & Siakas, 2007). Cultures from Anglo countries, from where Agile methodologies originate, and Nordic countries are most closely aligned to Agile values (Palokangas, 2013). Since Agile values are based on Western culture, there is a need to investigate their suitability for contexts that demonstrate different values (Zhao, 2015). This is supported by recent concerns from Agile practitioners regarding whether it was possible to implement Agile practices with all nationalities and cultures (Gregory, Barroca, Sharp, Deshpande & Taylor, 2016).

Hofstede developed a set of dimensions that can be used to determine the national culture attributes of a group of people (Venaik & Brewer, 2010). These national cultural dimensions are power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence. Along those dimensions, Agile methodologies seemingly favour individualistic and masculine cultures (Palokangas, 2013). In contrast, countries with high power distance and collectivism take longer to embrace and accept Agile values and principles. Culture therefore plays a role in the acceptance of Agile methods (Cornelius, 2014). Furthermore, there have been discrepancies in values, beliefs, norms and practices between the visions, values, roles, processes, and the understanding of technology of different team members or groups, which have led to difficulties in performing activities (Geeling, Brown & Weimann, 2018). Nonetheless, Agile methodologies can be successful if adapted correctly (Palokangas, 2013). This is further supported by Sutharshan (2013), who found that Agile practices can be useful in certain cultures but requires major cultural adaptation in others. Agile methodologies can be implemented on a small-scale (e.g., using the Scrum methodology) and on a large-scale (e.g., using the Scaled Agile

Framework (SAFe)) (Edison, Wang & Conboy, 2021). It is important to understand the influence of cultural dimensions implementation in both large-scale and small-scale Agile frameworks since their application is different.

1.2. Motivation/Rationale

Zhao (2015) studied the impact of culture, namely Chinese and Swedish, on the implementation of Scrum, a type of Agile methodology. Their findings concluded that national culture has an influence on Scrum implementations, in terms of how Scrum roles, ceremonies, and artifacts are utilised. Zhao (2015) proposed conducting their study in a different country context than China (Eastern culture) and Sweden (Western culture) to further explore how aspects of national culture might impact Agile implementations. This recommendation is particularly relevant as little is known about how South African culture influences how Agile frameworks are implemented and adhered to. South Africa offers an interesting context of study, due to its heterogeneous cultural grouping (Mnkandla, 2013).

According to Hofstede's culture classification, South Africa is identified as having high power distance, individualism, masculinity, and indulgence as well as low uncertainty avoidance and long-term orientation (Hofstede, 2013). Therefore, due to South Africa's individualism and masculinity it can be determined that Agile implementations are most likely to succeed. However, most of these results were based on a mostly white population data sample which is more closely aligned to an Anglo-Saxon culture. In contrast, traditional African cultures are rooted in collectivism and have more concrete and interdependent self-concepts compared to individualist cultures (Eaton & Louw, 2000). Abstraction versus concreteness refers to the context in which individuals are described. For example, in concrete cultures, such as in the case of collectivist cultures, individuals define themselves within each social relationship (individuals refer to themselves in the context of "we" or "our") as opposed to an inner or self-determining manner as found in individualist cultures (individuals refer to themselves as a separate entity "I am") (ibid). Independent versus interdependent dimensions refer to whether cultures are autonomous or whether they are social. African culture is more social than autonomous. Collectivist cultures such as Ubuntu are interdependent within their family and tribe and behave according to the norms in their communities (Triandis, 2001). In individualist cultures, people are independent in that they behave based on their personal goals and attitudes. Moreover, although traditional cultures such as Ubuntu, which is embodied by the Nguni ethnic groups, are collectivist in nature, Rademacher and Grant (2019) posit that African cultures appear to be more lean, agile, and community-orientated than non-African cultures. However, little is known about how this aspect of traditional Southern African cultures pans out during Agile implementations. South African culture is different to Western culture. Literature finds that Western cultural traits are better suited for agility

whereas Rademacher and Grant (2019) propose that African cultures appear more lean, agile, and team-orientated. This, then, warrants an investigation as to how national culture dimensions influence agility in the South African Agile software development context.

1.3. Research Problem

While studies have been conducted to investigate the influence of national culture on Agile implementations in Western and Eastern country contexts, there is no research that explores the influence of national culture and the implementation of Agile methodologies in the South African software development context. Furthermore, few studies have focused on the effect of cultural differences within software engineering in general (Darwish & Henryson, 2019). Yet information related to cultural differences are valuable for onshore (culturally homogenous) teams as well as globally distributed software teams (Ayed, Vanderose, & Habra, 2017). Moreover, South African culture is different to Western or Eastern culture in that it is less homogenous (Ward, Brown & Kiruswa, 2015). The introduction of different cultures in a team can be problematic for Agile implementations (Sutharshan & Maj, 2011). Even though there is evidence in practice of Agile methods recently being incorporated in African countries, there is a lingering question about how its core values, with roots in western attitudes and behaviours, relates to non-western cultures (Jukich, 2018).

In the few other studies worldwide that investigated the influence of national culture dimensions on Agile implementations, only the Hofstede national culture dimensions models were used and only a few national culture dimensions were explored, namely, power distance, individualism, uncertainty avoidance, long-term orientation. Darwish and Henryson (2019) proposed that future research include the masculinity/femininity (MAS) and indulgence/restraint culture dimensions to aid in the understanding of all aspects of cultural differences. Furthermore, exploring the dimensions of other cultural models would create a more comprehensive view of the effect of culture on software engineering (Darwish & Henryson, 2019). This study investigated national culture dimensions from three different culture models, namely Hofstede, Schwartz, and the GLOBE. This research study used cultural manifestations in South Africa to describe how national culture influence Agile implementations (roles, processes, and artifacts) within the South African software development context.

According to Zhao (2015), there is little research that investigates the influence of national culture on Agile implementations. The study of Sutharshan and Maj (2011) provided further theoretical and empirical proof to substantiate the notion that national culture has an influence on how Agile methodologies are implemented. Batra (2009) explains that Agile values are suited to a less

bureaucratic and more flexible Western culture but not necessarily in a more hierarchical and structured culture as found in Eastern cultures. Indigenous African culture is also hierarchical.

Furthermore, there are certain human or cultural factors that impact on the utilisation of Agile frameworks. As the majority of South Africans are black, the culture is mostly orientated toward collectivism (Eaton & Louw, 2000). This might not be ideal for Agile methods as the values in the Agile Manifesto were suggested by authors who are from individualistic societies. Furthermore, South Africans enjoy clearly defined roles (Janse van Rensburg, Rothmann & Diedericks, 2018) and therefore do not like to be called team members (Tanner & Noruwana, 2012). Therefore, this could pose a challenge for South Africans adopting Agile roles. Lastly, Agile methods are not implemented in a structured approach or as prescribed (Tanner & Noruwana, 2012). The reason may be that practitioners may not understand the problem that is to be solved in their organisation and how Agile practices can solve the problem. Certain aspects of Agile methods such as the values, principles, or practices might not be well understood as intended by the creators who are from the Western culture.

Therefore, this study warranted investigating how cultural manifestations in South Africa influence how South African teams implement Agile methods on a small-scale (e.g., Scrum), and on a large-scale (e.g., SAFe) and how the various aspects of Agile such as the roles, ceremonies, and artifacts are influenced.

1.4. Research Purpose

The purpose of this study was to describe how national culture dimensions influence Agile implementations (roles, processes, and artifacts) within the South African software development context. The influences studied will be on the Agile aspects, namely roles, ceremonies, and artifacts.

1.5. Research Objectives

The objective of the research was to describe how national culture dimensions influences Agile implementations (roles, processes, and artifacts) within the South African software development context. In addition, the project aimed to investigate how the various national cultural dimensions influence the aspects within the Scrum and SAFe methodology (as an Agile method example) such as the processes (ceremonies/events), roles, and the artifacts utilised. Furthermore, the researcher created propositions relating to how the various national culture dimensions influence Agile roles, processes, and artifacts.

The research questions to understand the impact of South African culture on the use and implementation of the Scrum methodology were:

Primary question:

- How do national culture dimensions influence Agile implementations within the South African software development context?

Secondary questions:

- How do the national culture dimensions influence Agile roles within South African teams?
- How do the national culture dimensions influence the use of Agile processes within South African teams?
- How do the national culture dimensions influence the use of Agile artifacts within South African teams?

1.6. Contributions of the Study

This study contributes to the extant literature on the impact of national culture on the utilisation of Agile methods.

A key finding is that South Africa does not demonstrate a homogenous cultural trait across teams whereby each team can be identified as manifesting the same degree of national culture dimensions and consequently the same implementation of Agile methodologies in the team. Instead, various traits per national culture dimension are revealed, which brings more complexity to the Agile implementations.

This thesis provides a useful contribution to research and practice as it provides insights into the role of a consolidated set of cultural dimensions on Agile practices. The findings are also discussed in terms of its implications for agility by referring to the Agile principles and values. In addition, the findings are mapped to the Complex Adaptive Systems (CAS) theory principles.

Based on key findings, thirty-two propositions were formulated to highlight how Hofstede (2013) and GLOBE (House et al., 1999) national culture dimensions influence Agile practices. The key findings reveal that various national culture dimensions influence the decision-making process, the degree of Sprint interruptions, participation in Agile ceremonies, adherence to policies and prescribed Agile practices, how teams reach agreement, approaches to process improvement and Sprint Planning, as well as the extent to which team members are encouraged to have fun.

The findings not only contribute to theories around the impact of culture in Agile teams, but also provide key insights to practitioners on what cultural manifestations might be at play in their project teams. It is important to understand the cultural driving forces at play behind the challenges that they might be experiencing.

Lastly, the findings revealed that national culture dimensions influenced Agile implementations (roles, ceremonies, and artifacts) in South African software development teams differently for small-scale (e.g., Scrum), and large-scale (e.g., SAFe) Agile methods; for example, most of the planning was done by management in large-scale Agile implementations and in small-scale implementations the planning was done by the Scrum team.

These practical contributions of this study provide insights into the current context of how national culture dimensions influence large-scale Agile frameworks such as SAFe, and small-scale Agile frameworks such as Scrum in South African software development teams. In this regard, it can help inform Agile implementations in practice, and therefore help managers and teams curate Agile teams for appropriate environments.

The implication of this research is that future research can use the integrated national culture dimension framework to study other country and industry contexts.

The following section is the literature review where the topic is explained in greater detail from the perspective of other researchers in the field.

1.7. Theoretical Underpinnings

Besides the Hofstede national culture dimension model, other models of national culture also highlight South Africa's interesting cultural setup, which further warrants the need for exploration in relation to Agile implementations. For instance, according to the Schwartz national culture dimensions, South Africa has high embeddedness (conservatism) and hierarchy, and leans more toward mastery (Sagiv & Schwartz, 2007). This seemingly goes against Agile values and principles and may influence how Agile frameworks are implemented in practice. Indeed, Agile frameworks generally promote less bureaucratic and more flexible attitudes in contrast to what is usually expressed in more hierarchical and structured cultures (Batra, 2009).

A more recent model, named the GLOBE (Global Leadership and Organizational Effectiveness) model, was developed to obtain more insights into the structure of national cultures (Shi & Wang, 2011). The GLOBE cultural dimension model is used to study the relationship between organisational and societal culture as well as the accepted beliefs of ideal leadership within a specific culture (Hanges & Dickson,

2004). The model comprises of nine cultural dimensions and entails culture and leadership effectiveness (Venaik & Brewer, 2010). The national culture dimensions are uncertainty avoidance, power distance, institutional collectivism, in-group collectivism, gender egalitarianism, assertiveness, future orientation, performance orientation, and humane orientation (House, Hanges, Javidan, Dorfman, & Gupta, 2004). The GLOBE model includes similar dimensions to Hofstede (Venaik & Brewer, 2010). The GLOBE study introduced new dimensions on the organisational and societal level: in-group collectivism and institutional collectivism (Shi & Wang, 2011). Three additional dimensions were introduced: Humanistic, performance-orientation, and future orientation (House et al., 1999). Hofstede's Masculinity dimension was replaced with gender egalitarianism and assertiveness (House et al, 1999). The two aspects of national culture in the GLOBE model are actual society practices ("As Is") as well as values ("Should Be") (Shi & Wang, 2011).

The similarities between the GLOBE values and the Schwartz values are as follows: uncertainty avoidance, institutional collectivism, and in-group collectivism determine whether a culture is rooted in embeddedness or intellectual autonomy; power distance is similar to hierarchy; gender egalitarianism and assertiveness are similar to egalitarianism; performance orientation is did not have a correlation with mastery; and there was no GLOBE value similar to the Schwartz's harmony dimension (Hanges & Dickson, 2004). These variables can be incorporated to study national culture, which could provide an opportunity to introduce new themes for how national culture impacts Agile implementations. The national culture dimension models are explored in more detail in Chapter 3: Theoretical Framework.

1.8. Overview of the Dissertation

This dissertation comprises seven chapters, starting with the current Chapter 1 which introduces the study. Chapter 2 provides a review of literature in relation to the research problem regarding national culture suited for Agile software development. Chapter 3 builds on the insights from the literature review and illustrates a conceptual national culture dimensions model that can be used to address the research problem. It identifies and defines the national culture dimensions of Hofstede, Schwartz, and the GLOBE studies that will be manifest during the study. On this theoretical basis, a research model is developed to identify similar national culture dimensions that can be grouped together and point to the various Agile practices such as the roles, processes, and artifacts to ensure that the research study results can have practical application in a business context. Chapter 4 presents an overview of research methodology and explains how it was deemed appropriate for this study. Chapter 4 also describes how data was analysed using the thematic analysis technique as well as how verification strategies were used to ensure validity and reliability. Chapter 5 presents and describes the findings.

This is followed by Chapter 6 which discusses the implications of the results and how they relate to the research questions. Chapter 7 concludes with highlights of the research results, limitations, and recommendations for future research.

CHAPTER TWO: LITERATURE REVIEW

2.1. Background

The purpose of this literature review is to provide a basis for the research problem. Firstly, it will demonstrate that there is limited research in the field on the influence of national culture on the implementation of Agile methodologies. It will also validate that culture plays a role in how Agile frameworks are implemented in practice.

2.2. Culture and Values

2.2.1. Defining Culture and Values

It is imperative to define culture to establish a mutual understanding as there is a plethora of definitions, conceptualisations, and dimensions available to describe this concept (Straub, Loch, Evaristo & Karahanna, 2002). It can be complicated to define culture since there is no standard definition for it when used in an empirical study (Taras, Rowney & Steel, 2009). Culture in its entirety is composed of traits and characters peculiar to a group of people which makes them unique from other societies (Aziza, 2001). These traits include language, dress code, music, work, arts, religion, dancing and more. It also entails social norms, taboos, and values (Idang, 2015). Culture is passed on from one generation to the next and acquired through a socialisation process (Idang, 2015). It is generally agreed that culture is a "multi-layer construct represented by observable artifacts and practices at the surface and by tacit attitudes, values, and basic assumptions at the core" (Taras et al., 2009, p. 369). Since culture is a broad term, in this research we will narrow the context of culture and cultural differences to values and practices that people acquire by living in different countries, i.e., national level culture (Hofstede, Hofstede, & Minkov, 2010).

This thesis will use the definition of culture as provided by Kaarst-Brown et al. (2004, p. 34):

> *"Culture is reflected in the practices, values, beliefs, and underlying assumptions of formal and informal groups."*

In addition, we consider the definition of Hofstede and Hofstede (2005, p. 4) as it more clearly mentions people groups, which states that culture is:

> *"the collective programming of the mind which distinguishes the members of one group or category of people from others".*

Values in this context are understood as what is right and wrong and what the important things in life are (Brits, 2011). In this context, we will define values as, "a set of social norms that define the rules

or context for social interaction through which people act and communicate" (Leidner & Kayworth, 2006, p. 359). These social norms will determine the behaviour of people in a society as a means of acting as a control mechanism that sets expectations and boundaries regarding appropriate behaviour (adapted from O'Reilly & Chatman, 1996 as quoted by Leidner & Kayworth).

2.2.2. National Culture

There are several national culture frameworks used for studying national culture. The culture frameworks that have a single dimension are from Hall (1977, 1981), Lewis (1992), Fukuyama (1995), Triandis (1995), and Botger et al. (1985). The models that measure multiple dimensions are from Kluckhohn & Strodtbeck (1951, 1961), Hofstede (1980, 2001), Hampton-Turner (1990), Trompenaars (2002), Schwartz (2008), and GLOBE (2004). The most commonly used framework is from Hofstede which have the greatest number of citations and various areas in the sphere of international business research are associated with it (Dimitrov, 2018). The wide use of Hofstede (2001) can be attributed to it being simple and highly responsive to the practical real-world experience of managers (Venkateswaran & Ojha, 2019).

National cultures are a segment of the "mental software" we acquired during the first ten years of our lives, in the living environment, family, and at school, and they hold most of our basic values (Minkov & Hofstede, 2011, p. 14). This study will focus on Hofstede, Schwartz, and Globe's national culture models as there is data available for the South African culture and there are other studies such as Zhao (2015), Sutharshan (2013), Palokangas (2013), and Veerla and Subramahnyam (2011) that made use of these models for the Agile software development discipline.

2.2.3. South African Social Context

South Africa, which is also known as the "rainbow nation", has a culture that is one of the most multifaceted and diverse in the world (Tanner, 2009). It consists of 60.1 million people of which 30.8 million (51,1%) are female and 29.4 million (48,9%) are male (http://www.statssa.gov.za/, 2021). In South Africa, children (0 to 14 years of age) and the youth (15 to 34 years of age) comprise approximately 38 million people, and the median age is 28 years of age. 79.2% of people live in formal households while 83.5% of households have access to piped water and 90.3% have access to electricity (http://www.statssa.gov.za/, 2016). In South Africa, there are four distinct official population groups namely, Black African (80,9% or 48,6 million), Coloured (8,8% or 5,3 million), Indian/Asian (2,6% or 1,5 million), and White (7.8% or 4,7 million) (South Africa. Statistics South Africa, 2021). The unemployment rate is 29.1% and the participation rate is 59.8% where the participation rate relates to the percentage of people working or actively seeking work as a percentage of the working population aged between 16 and 65 (http://www.statssa.gov.za/, 2016).

2.2.4. Ubuntu Definition

In Southern Africa among the traditional Nguni people which includes the Zulu, Xhosa, Ndebele, and Swazi people, there exists a common way of life known as 'Ubuntu' (Metz & Gaie, 2010). Ubuntu means humanity and the term can be loosely translated as "I am because we are" (West, 2014). This belief is based on the philosophical view of being connected in a universal bond of sharing (Okoro, 2015).

2.2.5. Ubuntu Principles

There are guiding principles by which the Nguni people live. Nussbaum (2003) summarised the general principles of Ubuntu in the following way:

> *"• The hallmark of Ubuntu is about listening to and affirming others with the help of processes that create trust, fairness, shared understanding and dignity, and harmony in relationships.*
>
> *• Ubuntu consciousness is about the desire to build a caring, sustainable, and just response to the community – whether that be company, village, city, nation, or our global family.*
>
> *• Because of its emphasis on our common humanity and the ethical call to embody our communal responsiveness in the world, Ubuntu offers an alternative way to re-create a world that works for all. Simply put, people, businesses, and countries would re-learn how to live together with respect, compassion, and dignity, and justice and to re-organize resources accordingly.*
>
> *• Ubuntu, applied to business and corporate responsibility, would be ultimately about sharing wealth and making (at the very least) basic services, such as food, housing, and access to health and education accessible and visible to all members of our global family"* (p. 9).

2.2.6. Cultural Dimension of Collectivism in Ubuntu

Collectivism is evident in the core values found in African leaders (Wanasika, Howell, Litrell & Dorfman, 2011). These core values of Ubuntu are summarised as respect for the dignity of others, group solidarity, teamwork, service to others, and the spirit of harmony and interdependence (i.e., 'each one of us needs all of us') (Mbigi, 2007). The fifth dimension, the spirit of harmony and interdependence, was labelled as the spirit of Ubuntu. Wanasika et al. (2011) posits the philosophy of Ubuntu encompasses human existence and social relations, and postulates that Ubuntu "offers a unique perspective on in-group collectivism and reflects a response to collective need rather than individual performance". Fink, Holden, Karsten, and Illa (2005) further elaborate that indigenous Africans share similar characteristics and have an affinity for a sense of family among each other. Wanasika et al. (2011) then argue that, while there are views of collectivism being associated with current

relationships, Ubuntu is grounded in history and includes the present and future obligations to individuals as well. Another example of the collectivism in Ubuntu is that there is no phrase or concept of “agree to disagree,” therefore a consensus must be reached on mutual understanding and agreement regarding a matter through socialisation (Nussbaum, 2003). In addition, Ubuntu is often used to reference ‘correct behaviour’ where ‘correct’ is defined in relation to relationship with others (Kachabe, & Kirabo Petersson, 2020). Lastly, Beets and Le Grange (2005) assert that the Ubuntu principles of sharing, compassion, and respect have the potential to help us to combat concerns of competition, intolerance, arrogance, and self-claimed superiority which are associated with modern society and the related practices embedded in education.

2.3. Software Development Methodologies

2.3.1. Software Development Life Cycle

The process for building computer software and information systems are determined by the selected software development methodology (Dora, & Dubey, 2013). There are two broad categories of software development approaches, namely, heavyweight methodologies (Traditional Software Development Life-Cycle) and lightweight methodologies (Agile Software Development Life-Cycle) (Arikpo & Osofisan, 2010). The SDLC includes a subset of the following activities: Planning and Visualization, Requirement Analysis, Software Modelling and Design, Coding, Documentation, Testing, Deployment and Maintenance (Rastogi, 2015). The most common of the SDLC models are the Waterfall Model, V-Shaped Model, Iterative Model, Big Bang Model, and Agile Model (Kramer, 2018). The Waterfall model is one of the traditional SDLC models (Mahalakshmi, & Sundararajan, 2013). In the Waterfall methodology approach, each phase is completed in a step-by-step fashion without the possibility of going back to previous phases (Mergel, Gong & Bertot, 2018). Hence, it is named the Waterfall approach (Mbelli & Hira, 2016), whereby the Agile methodology promotes the adaptive planning, evolutionary development and delivery in a time-boxed iterative approach, and encourages rapid and flexible responses to change (Dora, & Dubey, 2013).

2.3.2. Agile Software Development

There are a myriad of Agile software development methods. Some examples of the family of analogous Agile development processes include eXtreme Programming (XP), Scrum, Feature Driven Development (FDD), and Dynamic Systems Development Method (DSDM) (Sharma & Hasteer, 2016). Agile methods are based on values and principles defined in the Agile Manifesto and are composed of Agile practices (Campanelli & Parreiras, 2015). Schwaber (2007) explains that Agile processes are iterative and use specific project management and software engineering practices to sustainably deliver new software functionality at regular intervals ranging from a week to four weeks. From a

cultural point of view, Agile methods require minimal hierarchy, and favour self-organisation, equity, empowerment, commitment, responsibility, participation, learning and continuous improvement, consensus, respect, compromises, trust, honesty, openness, and communication (Iivari & Iivari, 2011). Ramnath (2011) argues that Agile software development is made up of many development methods that employ the Agile values, principles, and practices, instead of rigid specified software development processes.

2.3.3. Benefits of Agility

Mergel et al. (2018) state that, while the benefits derived from deploying Agile methods are greater efficiencies, better designed and implemented applications, and cost savings, there is requirement for capacity, skills, culture, policy structures, and leadership. In organisations, Agile methods also provide control, full transparency, finished work after each iteration, and continuous feedback from customers (Denning, 2016). Denning (2016) further elaborates that Agile frameworks have heatmaps which show progress, or the lack thereof, and that are visible to everyone in the organisation. As a result, issues are identified early which reduce technical debt being accumulated (ibid). Most Agile practices were found to reduce and better manage technical debt (Holvitie et al., 2018).

2.3.4. Agile Values

The Agile Manifesto describes the goal of Agile software development and values individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a prescribed plan (The Agile Manifesto http://agilemanifesto.org/). The Agile Manifesto was adopted in 2001 (Mbeli & Hira, 2016). The Manifesto for Agile software development states they aim to "uncover better ways of developing software by doing it and helping others do it". While there is value in the latter items, more emphasis is placed on the former items (http://agilemanifesto.org/).

2.3.5. Agile Principles

The Agile Manifesto has twelve principles that guide the nature of Agile software development methodologies (Misra, Kumar, Kumar, Fantazy, & Akhter, 2012). A comment from a survey by Williams (2012) sums up the purpose of any principle as providing "a simple, clear source of guidance and inspiration" (p. 72).

There are twelve principles in the Agile Manifesto. These principles are:

> *"Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.*

Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

Business people and developers must work together daily throughout the project.

Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

The most efficient and effective method of conveying information to and within a Developers is face-to-face conversation.

Working software is the primary measure of progress.

Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

Continuous attention to technical excellence and good design enhances agility.

Simplicity--the art of maximizing the amount of work not done--is essential.

The best architectures, requirements, and designs emerge from self-organizing teams.

At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly."

2.3.6. Agile Practices

In contrast to Agile software development methods, Agile practices are at a more granular level since they involve specific parts of an Agile method (Diebold & Dahlem, 2014), such as the concept of pair programming in the eXtreme Programming (XP) Agile methodology (Salza, Musmarra & Ferrucci, 2019). Each Agile method consists of its own set of practices, which is a description of how the day-to-day work activities are carried out by the software team (Al-Saqqa, Sawalha & AbdelNabi, 2020). Diebold and Dahlem (2014) analysed the most common Agile methods at the time, namely Scrum, XP, Adaptive Software Development, and DSDM, and extracted similar practices which were grouped as follow: quality check, refactoring, customer involvement, unattached communicative teams, validation practice, learning loop, outcome review, planning meeting, time boxing, common knowledge, progress monitoring, product vision, evolving and hierarchical specification, continuous

integration/deployment, delivering frequent releases, small cross-functional teams, daily discussion, and continuous specification analysis.

2.3.7. Agile Frameworks

Recently, the most popular Agile frameworks are Scrum (108 answers, 90% of respondents), followed by Kanban (50; 41.7%), DSDM or AgilePM (10; 8.3%), SAFe (8; 6.7%), Nexus and LeSS (4; 3.3% each), XP (3; 2.5%) Scrum@Scale, LeanSD and Waterfall (2; 1.7% each) (Marek, Wińska & Dąbrowski, 2021). This following section describes the Scrum software development framework in more detail since this study leverages off the Zhao (2015) study that investigated the impact of national culture dimensions on Scrum implementations.

2.3.8. Scrum Software Development

The Scrum framework provides the flexibility to control and manage requirements and the development process by allowing software to be developed in small chunks in multiple iterations (Hayat, Rehman, Arif, Wahab, & Abbas, 2019). Software development methodologies became a team sport (Tanner & Van Belle, 2010) and the activities in the Scrum methodology can be compared to the events in a sports match. The name derives from a term used in rugby as Scrum shares a few characteristics with this sport (Cervone, 2011). The context of development is a playing field (environment) with rules (controls) (Schwaber, 1997). The ball should always be moved forward down the field in phases (Rising & Janoff, 2000). Rugby developed from breaking soccer rules thereby adapting to the environment and in the same way the rugby game ends, software development does not end until the environment dictates so based on the business needs, competitive forces, features, or Sprint cycles (Schwaber 1997). The activities in Scrum can be divided into pre-game, game, and post-game phases (Akhtar, Ahsan & Sadiq, 2010). The life cycle of the Scrum methodology includes planning, staging, development, and release (Sutherland, 2005). The Scrum model consists of three aspects: roles, process, and artifacts (Cervone, 2011).

2.3.9. Scrum Values

The creators of the Scrum framework, Ken Schwaber and Jeff Sutherland, presented five values of Scrum to the Scrum Guide (West, 2016). These values are namely:

- Courage: The Scrum team members have the courage to do the right thing and work on complex problems
- Focus: Everyone focuses on the work of the Sprint and the goals of the Scrum team
- Commitment: People personally commit to achieving the goals of the Scrum team

- Respect: Scrum team members respect each other to be capable independent people
- Openness: The Scrum team and its stakeholders agree to be open about all the work and the challenges with performing the work

These values encourage management and team members to take responsibility instead of blame shifting (Neelima, & Saile, 2013). Schwaber and Sutherland (2017) suggest that Scrum teams need to become proficient in living the Scrum values to successfully use Scrum.

There are many benefits to living out the Scrum values. West (2016) posits that by making Scrum values explicit and transparent, it will challenge the team approach of practicing Scrum. West (2016) further explains that these values provide direction in decision-making and team dynamics. These values also help teams in the adoption of Scrum and to deliver quality software to their customers. Furthermore, they cultivate a great workplace environment, which is an advantage in a highly competitive employment market (ibid).

2.3.10. Types of Users in Scrum (Roles) Teams

The Scrum team consists of a Product Owner, Scrum Master, and the Developers (Schwaber, 2017). Tanner (2013) mentions that Schwaber and Beedle (2002) identified that management, customers, and users also play a role in the Scrum process. According to Schwaber and Sutherland (2017), Scrum teams are self-organising and cross-functional. Tanner (2013) posits that management should be responsible to give the team the time and space to organise themselves, users are the human beings who make use of the system, and customers inspect the product at the end of the Sprint.

The Product Owner is responsible for deriving value from the work of the Scrum team (Schwaber & Sutherland, 2017). This person is responsible for providing requirements and maintaining the Product Backlog. Cervone (2011) suggests that the Product Owner is typically a functional unit manager who knows the contents and sequence of what needs to be developed.

Product Backlog management includes: 1) articulating the Backlog items; 2) ordering the Backlog; 3) optimizing the value of the work of the Developers; 3) making the Backlog visible, transparent, and clear, as well as displaying what the Scrum team will work on next; and 4) ensuring the Developers understands the Backlog items to the appropriate level (Schwaber & Sutherland, 2017). The Product Owner may elect the Developers to do these tasks, but the Product Owner remains accountable (ibid).

The Developers are responsible for developing the functionality (Schwaber, 2004) and are interdisciplinary members of the team that must achieve the goals of the specifications of the Product Owner (Thiele et al., 2020). The characteristics of the Scrum team are: 1) self-organising; 2) cross-

functional; 3) no titles for Developers; 4) does not recognise sub-teams; and 5) there may be individuals who have specialised skills, but the responsibility lies with the Developers as a whole (Schwaber & Sutherland, 2017).

The Scrum Master is responsible for enacting the Scrum values and practices, and to remove impediments (Cervone, 2011). Thiele (2020) elaborates that this person oversees the process, coaches team members, and ensures the Scrum methodology is implemented correctly. Schwaber and Sutherland (2017) state that the Scrum Master promotes and supports Scrum by helping team members understand the theory, practices, rules, and values of Scrum. This role is conventionally assumed by a Project Manager or Team Leader (Cervone, 2011).

2.3.11. Process / Work Practices / Ceremonies / Events in Scrum Software Development

This section will describe the various prescribed events used in the Scrum methodology. They are Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective (Schwaber & Sutherland, 2017). These events exist in a Sprint that is time-boxed to a month or less, where a useable, and potentially a releasable product is created (Schwaber & Sutherland, 2017). Rising and Janoff (2000) posit that the end date of the Sprint does not change but the team can reduce functionality during the Sprint. Cervone (2011) highlights that another difference between a Sprint and a phase in traditional software development is that no outside influence is allowed to interfere with the work of the Scrum team, which by implication means that requirements cannot be changed during a Sprint. Before the project starts with the first Sprint, a Kick-Off meeting is convened where the high-level Backlog of the project and the major project goals are defined (Cervone, 2011).

Sprint Planning

At the beginning of a Sprint, a Sprint Planning meeting is held where the Product Owner will communicate which components or features identified in the Backlog are to be prioritized into the next Sprint and which features can be developed in other Sprints (Neelima, & Saile, 2013). The Product Owner will negotiate the features that will be developed during each iteration (Tanner, 2013). The Scrum Master ensures that the Sprint Planning event takes place and that the participants understand the purpose of the meeting, as well as teaching the Scrum team to keep development within the set time-box (Schwaber & Sutherland, 2017). The Sprint Planning addresses three topics: 1) Why is this Sprint valuable? 2) What can be done during this Sprint? 3) How will the chosen work get done? (Schwaber & Sutherland, 2017).

Daily Scrum

The Daily Scrum is a fifteen-minute time-boxed event held every day between the Scrum Master and the Developers (Schwaber & Sutherland, 2017; Cervone, 2011). The structure of the Daily Scrum meeting is an activity carried out by the team where the team gathers in a huddle room and each team member discusses the tasks performed in the previous day, tasks to be done on that day, and to mention hurdles or impediments to progress (Neelima, & Saile, 2013). This format of the Daily Scrum meeting is no longer prescribed by the Scrum Guide but allows for any structure and technique if the ceremony focusses on progress toward the Sprint Goal and produces an actionable plan for the next day of work (Schwaber & Sutherland, 2020). The benefits of the Daily Scrum meeting are that it creates focus, improves self-management, improves communications, helps identify impediments early, promotes quick decision-making, and consequently eliminates the need for other meetings (Schwaber & Sutherland, 2020). Typically, team members stand instead of sit so that the meeting can be brief. (Neelima, & Saile, 2013). Schwaber and Sutherland (2017) recommend that the Daily Scrum be held at the same place each day to reduce complexity.

Sprint Review

This event is held at the end of Sprint to inspect the Increment and to adjust the Product Backlog if necessary (Schwaber & Sutherland, 2017). The developed functionality during the Sprint is demonstrated to the Product Owner (Cervone, 2011). This is an informal meeting and not a status meeting and the intent of the meeting is to receive feedback and foster open collaboration (Schwaber & Sutherland, 2017). This meeting should not be more than four hours long for a one-month Sprint (Schwaber & Sutherland, 2017).

Sprint Retrospection

This activity is performed after a Sprint Review (Neelima, & Saile, 2013). During this event, the Scrum team can inspect current processes and create a plan to improve during the next Sprint (Schwaber & Sutherland, 2017). The Scrum team would reflect and identify what went well, what they should improve on, and could do differently. (Schwaber & Sutherland, 2017; Tanner, 2013).

2.3.12. Artifacts in Scrum Software Development

This section will describe the Scrum artifacts. These artifacts represent the work done or value delivered to provide transparency and opportunities for inspection and adaptation (Schwaber & Sutherland, 2017). These artifacts are the Product Backlog, Sprint Backlog, and Increment (ibid). Another technique used to manage the requirements is to employ the use of a Release Burndown Chart. This chart shows a holistic view of the project progress and the amount of remaining work to

assess the rate at which items are completed. This gives an indication of the amount of work left still to do. (Neelima, & Saile, 2013). This was since removed from the Scrum guide as it does not replace the importance of empiricism, meaning that what will happen is unknown in complex environments, and only what has happened may be used for future decision-making (Schwaber & Sutherland, 2017).

Project artifacts used in Scrum is the Storyboard, where all User Stories, tasks to do and in progress, and dependencies on tasks for a Sprint are displayed on this board, visible for the entire team (Tanner, 2013; Cervone, 2011). The Storyboard is for the Developers to track work done and a User Story describes the functionality from the user's point of view (Tanner, 2013).

Product Backlog

The Product Backlog is a prioritised list of tasks that contains the product requirements (Girot, 2013). It consists of the Sprint Goal, the Product Backlog items selected for the Sprint, and the plan for delivering them (Schwaber & Sutherland, 2020). The Product Owner is responsible for the Product Backlog (Schwaber & Sutherland, 2017). The purpose of the Product Backlog is to keep track of all work that must be done as well as bug fixes (Tanner, 2013). The Product Backlog is the sole source of requirements where changes can be made to the product (Schwaber & Sutherland, 2017). It becomes larger and more comprehensive as the product is used and value is added, thereby making the Product Backlog a living document (Schwaber & Sutherland, 2017).

Sprint Backlog

The Sprint Backlog is a set of items from the Product Backlog that can be done during a Sprint (Girot, 2013). The Developers identify the subset of the Product Backlog which is represented as User Stories (Tanner, 2013). Besides the Sprint Backlog being a set of items from the Product Backlog selected for a Sprint, it is also a plan to deliver the product Increment and to realise the Sprint Goal (Schwaber & Sutherland, 2017). The Developers update the Sprint Backlog as progress is made and only they can change the Sprint Backlog during a Sprint (Schwaber & Sutherland, 2017). During the Sprint, no Sprint requirement scope changes are allowed to the Sprint Backlog from individuals who are not part of the Scrum Tteam (Rising & Janoff, 2000).

Increment

The Increment consists of all the completed Product Backlog items completed during a Sprint as well as the value of the Increments of previous Sprints (Schwaber & Sutherland, 2017). The new Increments must be completed according to the Scrum team's definition of "Done" where the items are usable. The Increment therefore is a body of inspectable, done work that supports the empiricism at the end

of a Sprint (Schwaber & Sutherland, 2017). The Increment consists of usable items, whether released or not, toward the goal or vision (Schwaber & Sutherland, 2017).

In the following section, we will investigate the agility in African culture and the similarities between African culture and Agile values.

2.4. Agility in African Culture

Rademacher and Grant (2019) postulate that the principle of collaboration is displayed in sharing information for the benefit of others as opposed to information as a source of power. This sharing is part of ancient African traditions such as Ubuntu. The central message of Ubuntu being translated as "I am because we are" assumes a universal bond of sharing (Rademacher & Grant, 2019). This needs to occur in an environment where team members feel comfortable to express unorthodox ideas without the fear of ridicule by peers and superiors (Rademacher & Grant, 2019). A study conducted in South Africa by Takpuie and Tanner (2016) concluded that recipients viewed Agile teams as successful high performing teams where team members possessed characteristics such as motivation, capability, credibility, empathy, articulation, and ability to communicate effectively (p. 36). Takpuie and Tanner (2016) further suggest these values can be fostered through appropriate training and in return successful knowledge sharing can occur within teams.

Learning, receiving knowledge, and sharing wisdom are enshrined in the African culture in oral and visual storytelling (Rademacher & Grant, 2019). This oral culture that places high value on the dynamism in face-to-face communication, is a critical success factor for Agile team performance in South Africa (Chiyangwa & Mnkandla, 2017). These tools are used today in Agile practices such as Kanban boards and Scrum storyboards.

Rademacher and Grant (2019) posit that African cultures appear to be more lean, agile, and community-orientated than non-African cultures, thus they can potentially better manage a lack of a clear, single-minded, and foreseeable environment. Baijnath (2013) postulates that greater collaboration and interaction between various stakeholders in the pursuit of shared approaches to the identification and solution of shared challenges are consistent with traditional African philosophies. Furthermore, Mawere and Van Stam (2016) posit that Ubuntu shows its agility, fluidity, and pragmatic underpinnings in community contexts. We propose that Agile values are found in Ubuntu such as collaborative purpose and well-being.

2.5. The Similarities between Agile Management and African Culture

The term 'Agile management' refers to "a set of management goals, principles, values and practices that emerged to speed up software development" (Denning, 2018, p. 3). Agile management not only

relates to software but also to achieving agility in a fast-paced and competitive environment with "constantly fluctuating demands on organisations in terms of rapidly changing technology and customer needs" (Siakas & Siakas, 2007, p. 599). Change in organisations is an inevitability whether it may be small Incremental changes, cultural change, an update to a version of software, or largescale strategic change with change in structure and operational requirements (Siakas & Siakas, 2007).

Rademacher and Grant (2009, p. 43) mentioned that Agile management is currently expanding widely within the business sector in Western societies. Multiple lean software development methods evolved in the 1990s with the purpose of overcoming former methods of micromanagement such as the Waterfall project management methodology. These methods were highly regulated, planned, and involved supervised management. In South Africa, managers who have a light touch or adaptive management style was a critical success factor for Agile implementations (Chiyangwa & Mnkandla, 2017).

Rademacher and Grant (2019) argue that African management is Agile by nature as African businesses have been managed in line with the Agile values long before the term "agility" for the Agile management principle was invented. Abubakre, Faik, and Mkansi (2021) postulate that the approaches to upholding Ubuntu values are dynamic and changes in response to the forces imposed by shifts in the broader economic system, particularly its increasing digitalisation. An example of the agility in African culture is seen in the minibus taxi industry in Africa where there is no schedule of when they arrive or depart (Rademacher & Grant, 2019). This is in alignment with, "the concept of 'African time' that has been criticised as lack of discipline and punctuality from a (post)colonial perspective" (p. 43). Rademacher and Grant (2019) elaborate, "What has often been criticised as chaotic in the past is more commonly embraced as Agile and disruptive innovation in the present" (p. 43). Rademacher and Grant (2019) posit the "mind-shift in the digital age is mostly framed as Western accomplishment although arguably founded on values and principles that originate in indigenous and African cultures and practices rather than Western Platonic traditions and Western corporate cultures." (p. 43).

2.6. Prior Empirical Research

A manual search of conference proceedings, journal papers, books, and industry reports was conducted, resulting in the identification of four-hundred-and-ninety-eight papers from the following databases (Table 1):

Table 1: Database Search

Database	Number of articles
ACM Digital Library	31
BIBSYS Brage	1
CCSENET	1
Credo	2
Ebsco Host	10
Elsevier Science Direct	67
Emerald	19
Gale Academic Onefile	4
Google scholar	212
IEEE Xplore digital library	25
JSTOR	16
Mendeley	1
MUSE	1
ProQuest	3
Research Gate	41
Sabinet African Journals	24
Sagepub	9

Springer Link	18
Taylor and Francis	5
Wiley InterScience	8

The search terms employed included national culture dimensions, Hofstede, Schwartz, GLOBE, impact, influence, global software development, Agile Manifesto, Scrum, Agile values, Agile principles, Agile mind-set, beliefs, conflict, behaviour, attitudes, South African culture, and Ubuntu. In addition, whenever a relevant article was identified, the reference list was reviewed to identify secondary sources. Relevance was determined by the researcher reading the abstract, conclusion and sometimes the discussion or entire article. The most relevant articles derived from the search string "National Culture Dimension AND Agile Software Development".

The articles reviewed for relevance to the topics were related to national culture and software development methodologies in general, of which there were 101 articles. A final refinement led to only 17 articles being retained which were related to national culture and Agile software development. For a list of the relevant articles, see Appendix K – Literature Review Relevant Papers.

Prior empirical research states that people's culture can be an impediment for Agile implementations in that cultural issues can cause a lack of trust in other team members, challenges with collaboration and collective ownership, and preference for their own benefits instead of the team's benefit (Gandomani, Zulzalil, Ghani, Sultan, & Sharif, 2017). Although there is much international empirical research on the relationship between organisational culture and the deployment of Agile methods (e.g., Iivari and Huisman, 2007; Strode, Huff and Tretiakov, (2009, etc.), there are few studies on national culture and the deployment of Agile implementations. The findings were that Agile methodologies are more suited to democratic type of organisations with horizontal hierarchy that emphasises flexibility and spontaneity, as Agile culture requires the involvement of all team members (Siakas & Georgiadou, 2000). Palokangas (2013) conducted a study in Finland, India and China on the impact of national culture on Global Agile Software Development (GASD) teams, that identified Agile methods favouring low power distance, high individualism, high masculinity, and low uncertainty avoidance. Zhao (2015) explored the impact of national culture dimensions in Chinese Scrum teams and Swedish Scrum teams. Jukich (2018) focussed on multicultural IT teams in the Scrum environment. Zhao (2015) recommended that researchers use their study regarding the impact of national culture on Scrum implementations in the context of other countries. We found no articles on the impact of

national culture dimensions on Agile implementation in the South African context. Instead, a South African study conducted by Brits (2011) found that national culture exerts an influence on the use and effectiveness of software development methodologies in general. We are also cognisant that some studies may have been done but possibly not yet published or completed.

2.6.1. Influence of national culture on Agile implementations

Zhao (2015) concluded that national culture has an influence on Scrum implementations. This was further supported by Palokangas (2013) who found that in Eastern cultures teams are organised through hierarchy, management, and group discussion, whereas in Western culture teams are organised in such a way that each member works in a more individualistic manner. Therefore, self-organisation, which is an important principle in Agile, does not happen easily in Eastern cultures. Zhao (2015) also explained that power distance impacts the use of Agile practices with a high probability. The impact of power distance is manifested whereby, in countries with a low degree of power distance, importance is placed on shared understanding and consensus, and discussions are emphasised multiple times.

Palokangas (2013) found that in countries with high uncertainty avoidance, Agile software development teams placed more value on planning, design, testing, and activities that removed ambiguity in their software development discussions. Palokangas (2013) further explains that it was an issue for them to delve into the unknown with less planning and documentation.

Lastly, Zhao (2015) found that individualistic cultures are more flexible in their approach to Agile/Scrum implementations.

2.6.2. Aspects of national culture that have an influence on Agile/Scrum roles

According to literature, power distance influences Agile roles, expected leadership qualities, leadership responsibilities, and decision-making power. For instance, Sutharshan and Maj (2011) found that cultures with low power distance had employees who were not afraid to challenge authority and that their leaders were not autocratic or paternalistic; they preferred a consultative style of decision-making and participative management style, unlike high power distance cultures that were not expected to be involved in decision-making.

In individualist cultures, no titles are likely to exist in Scrum teams (Zhao, 2015). Darwish and Henryson (2019) explain that in countries with higher individualism the individual's role in the team is questioned by other team members if a team member specialises in one role and if they focussed on their own role in the project. They are also less inclined to ask other team members for assistance. In individualist countries, team members emphasise the importance of personal responsibility regarding

tasks performed and the quality of the product produced. Power distance and individualism influenced Agile teams in the practice of having no titles (Zhao, 2015). Zhao (2015) elaborated that power distance has the most impact on Scrum titles whereby job titles exist in higher power distance teams and organisations (ibid). Furthermore, collectivistic and individualistic cultures influenced Agile roles whereby individualistic teams are expected to be more self-reliant and collectivistic teams protect the group members from external interferences; group work is more prevalent in collectivistic teams while individualistic cultures gain more productivity working individually; collectivist cultures emphasise group goals more than individual goals; collectivists pay more attention to members in the group and behave differently toward people outside the group; in collectivist cultures conflicts between individual and in-group goals are resolved in favour of group goals; and individualistic cultures strive to achieve recognition over others in the same group by performing above the norms of the group, whereas collectivistic cultures are less inclined to stand out from the group (Yaggahavita, 2011). Agile roles are also influenced by team cohesion whereby collectivistic members form a sense of sub-teams within the larger Scrum team (Yaggahavita, 2011).

There is a difference between various culture contexts. Hall & Hall define context as "the information that surrounds an event; it is inextricably bound up with the meaning of that event" (Hall & Hall, 1990, p. 6). High culture contexts or collectivism have dependencies on history, traditions, status, relationship level, etc. whereas low culture contexts or individualism depend less on contextual variables to process the meaning of a communicated message (Yaggahavita, 2011). Culture context influences Agile roles in relation to communication whereby communication becomes explicit among low context cultures; conflict in high context cultures is avoided; high context cultures are more concerned with the maintaining group harmony than merely communicating necessary information; and high context cultures use pauses while communicating to reflect the thoughts of the speaker while low context cultures find silence awkward. Collectivism/individualism is similar to high/low context. Collectivist cultures are normally high context cultures while individualistic cultures are normally low context cultures (ibid).

2.6.3. Aspects of national culture that have an influence on Agile/Scrum process/ceremonies

Darwish and Henryson (2019) discovered the opposite effect of the expected result for long-term orientation, whereby a country with a lower long-term orientation index agreed to a greater extent that developers displayed habits that show consideration for future events by preparing for them in the present. In addition, countries with a higher uncertainty avoidance index had more rigorous

planning practices, and used tried and tested tools instead of being open to risk-taking (Darwish & Henryson, 2019).

Individualist countries were found to be more inclined to use documentation for helping to achieve mutual understanding of the system and practice pair-programming than collectivist countries. Collectivist countries had more natural tendencies for team members to help without being asked to do so, and used documentation to help team members find the latest information (Darwish & Henryson, 2019).

The implementations of the Sprint time-boxed practice were influenced by national culture in uncertainty avoidance (Zhao, 2015). The implementations of the practice of a Sprint having no interference were also influenced by national culture in uncertainty avoidance (Zhao, 2015).

Lastly, low context cultures will be more direct during ceremonies and high context cultures might not raise concerns openly in ceremonies. High/low context influenced communication whereby low context members verbally provide more information during meetings while high context members may deem some of the information as unnecessary.

2.6.4. Aspects of national culture that have an influence on Agile/Scrum artifacts

Uncertainty avoidance influenced Agile artifacts in the management of the Product Backlog. Uncertainty avoidance played a role in certain software practices, such as requirements being specified upfront, test-first programming, and making early design decisions, in countries with a higher uncertainty avoidance index (Darwish & Henryson, 2019). Burndown charts and limitations on interruptions on time-boxed are more prevalent in uncertainty avoidance cultures (Zhao, 2015). Therefore, the practice of using a Burndown chart in the implementation of a Scrum team was influenced by national culture in the uncertainty avoidance dimension, specifically where the index was high (Zhao, 2015).

The management of a Burndown chart by the Scrum Master was influenced by national culture in the power distance dimension. Darwish and Henryson (2019) found no clear indication for the influence of power distance in the use of coding standards.

According to Jaggahavita (2011), high context/collectivist members in a team can efficiently manage knowledge and can be successful in dealing with implicit project knowledge, whereas low context members may demand comprehensive documentation. Therefore, high context members are more inclined to downplay documentation. High context-collectivistic cultures demonstrate high commitment towards group goals whereas individualistic members require a sense of competition to keep motivated.

2.7. Gaps in the Study

The impact of national culture on Agile software development methodologies has been studied by a few researchers as demonstrated through this study. Topics concerning national culture and Agile implementations are relevant due to Agile software development becoming a method of choice (Misra et al., 2012). Moreover, past studies have shown how Agile methods are implemented differently in various cultural settings. Zhao (2015) postulates that a gap exists for new aspects of national culture, other than Hofstede's national cultural dimensions used in their study, to be found that have an influence on Agile implementations.

The national culture dimensions used to study the influence of these culture dimensions in the Agile practices were long-term orientation, uncertainty avoidance, individualism, and power distance (Darwish & Henryson, 2019; Ayed, Vanderose, & Habra, 2018). Studies related to the influence of the national culture dimension on Scrum implementations focussed on power distance, individualism, and uncertainty avoidance (Zhao, 2015; Jukich, 2018). Darwish & Henryson (2019) highlighted that the national culture dimensions that still require investigation in the field of national culture influences on Agile implementations, are related to the Hofstede dimensions of masculinity/femininity and indulgence/restraint, as well as other culture theories.

The researcher used all national culture models where data was available for South Africa. The researcher therefore used the Hofstede, Schwartz, and GLOBE models. The next chapter will describe the theoretical framework which employs the use of the above-mentioned national culture models to investigate the impact of how the Scrum methodology is used in the South African culture.

CHAPTER THREE: THEORETICAL FRAMEWORK

3.1. National Culture Dimensions

The study seeks to describe how national culture dimensions influence Agile implementations in South African software development teams. This study employs the use of various national culture dimensions, specifically Hofstede, Schwartz and GLOBE. This chapter elaborates on the theoretical foundation for this study. The chapter describes a consolidated national culture dimension model to describe the influence exerted on Agile roles, processes, and artifacts, as well as provide the national culture dimensions for the South African culture.

3.1.1. Hofstede's Culture Dimensions

The Hofstede national culture dimensions framework came about when Professor G. Hofstede noticed that, although a company had a corporate culture, the culture varied greatly between different countries in the same company (Shi & Wang, 2010). Based on Hofstede's research on multinational cultures, six distinct national culture dimensions were found that distinguish one national culture from another (Hofstede, 2011). Hofstede's model of national cultures comprises of six dimensions, namely power distance (tolerance for unequal power distribution in a society), individualism (members of a society are expected to look out for themselves and immediate family), masculinity (clearly defined gender roles with a focus on assertiveness and material success), uncertainty avoidance (the extent to which people in a society feel threatened by ambiguous or unstructured situations), long-term orientation (the tendency to look toward future rewards, which concerns perseverance and thrift), and indulgence (the extent to which people feel free) (Hofstede, 2013), as shown in Table 2.

Table 2: Hofstede's Culture Dimensions

Dimension	Definition
Power distance	Power distance is the "degree of inequality among people which the population of a country considers normal from relatively equal to extremely unequal" (Hofstede as cited by Brits, 2011, p. 48). In other words, power distance is the extent to which people with less power expect and accept that the decision-making power is distributed unequally (Hofstede, 2011).
Individualism vs. collectivism	Individualism is "a preference for a loosely knit social framework in society wherein individuals are supposed to take care of themselves and their immediate families only" (Hofstede as cited by Zhao, 2015, p. 18).

	Individualism then is the acceptance that people in a nation have learnt to act as individuals, whereas collectivism is where people act as a member of a group. The Individualism dimension of national culture is classified from collectivist to individualist (Hofstede, 2011).
Masculinity vs. femininity	"Masculinity stands for a preference in society for achievement, heroism, assertiveness, and material success" (Hofstede as cited by Zhao, 2015, p. 18). Masculinity is the degree to which masculine values prevail over feminine values. Masculine values include assertiveness performance, success, and competition, and ranges from tender to tough. Feminine values include warm personal relationships, modesty, quality of life, service, and caring for the weak (Hofstede, 2011).
Uncertainty avoidance	"Uncertainty is the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity" (Hofstede as cited by Zhao, 2015, p. 17). Uncertainty avoidance refers to whether people in a nation prefer structured over unstructured conditions which is classified from relatively flexible to extremely rigid. In some countries the tendency is for people to avoid uncertainty and plan their entire day ahead, whereas in other countries people would rather have a more flexible lifestyle (Hofstede, 2011).
Long-term orientation vs. short-term orientation	Long-term orientation is "the fostering of virtues oriented toward future rewards-in particular, perseverance and thrift" (Hofstede as cited by Zhao, 2015, p. 17). This refers to a nation's time orientation and is characterised by "patience, perseverance, respects for older, tradition and ancestors, obedience sense and the duty towards the larger good" (Zhao, 2015, p. 18). In these societies, people are more inclined to share values such as "learning, honesty, adaptiveness, and self-discipline, and see things from an overall perspective" (Zhao, 2015, p. 18). Meanwhile, in short-term societies people are more appreciative of freedom, rights, achievement and thinking of oneself and focus more on the elements of things. Long-term orientation is characterised by a nation having thrift and perseverance while short-term orientation is displayed as respect for tradition and fulfilling social requirements (Hofstede, 2011).

Indulgence vs restraint	In an indulgent culture it is deemed good to be free. Acting on impulses of what one wants to do is viewed as a good thing. Here friends are important, and life makes sense. In a restrained culture, the general sense is that life is hard, and that duty, not freedom, is the normal state of being (Hofstede, 2013).

3.1.2. Schwartz's Culture Dimensions

Schwartz identified seven national culture dimensions and further divided them into three topical areas that confront all societies, of which in each issue group there are two Schwartz national culture dimensions which are opposites of each other (Schwartz, 1999).

Table 3: Schwartz's Culture Dimensions

Dimension	Area	Definition
Conservatism (also called Embeddedness)	Area 1: The first area is related to the manner in which societies are defined based on the nature of relations between individuals and groups.	In a conservative society, emphasis is placed on maintenance of the status quo, appropriate behaviour, and members are inclined to be averse to actions that might change the solidary group or traditional orders such as social order, respect for tradition, and family security (Zhao, 2015). People are also viewed as entities who are embedded in the collective. The meaning of life is closely related to the social relationship through the identification of groups and participation in a shared way of life and their goals (Schwartz, 1999).
Autonomy		Autonomy is the opposite of conservatism. In an autonomous culture, there is an understanding of having one's own uniqueness. These societies cultivate and express their own preferences, feelings, ideas, and abilities (Schwartz, 2006). Autonomy can be split into intellectual autonomy and affective autonomy. Intellectual autonomy is concerned with a society being inclined to favour individuals' independent

		choices, enabling them to follow their own ideas. This society also places emphasis on intellectual qualities such as curiosity, broadmindedness, and creativity (Sagiv & Schwartz, 2007). Affective autonomy is regarding a culture that encourages individuals to pursue experiences that have a positive effect, for example pleasure, a lifestyle of excitement, and a varied life (Sagiv & Schwartz, 2007).
Hierarchy	Area 2: The second area is concerned with society guaranteeing responsible behaviour that can preserve the social fabric, for example, considering the social welfare of others, coordination and managing unavoidable social interdependencies.	A hierarchical culture alludes to unequal power, roles, and resource distribution in the society, which can be seen in social constructs such as social power, authority, humility, and wealth (Schwartz, 1999).
Egalitarianism		Egalitarianism is the opposite of hierarchy. Egalitarian societies expect people to sacrifice selfish interests to have voluntary commitment to promote the social welfare of all people in terms of quality, social justice, freedom, social responsibility, and honesty (Schwartz, 1999).
Mastery	Area 3: The third area is concerned with how society experiences the relation of humankind to the natural and social world such as people actively endeavouring to change the world and society for the sake of	Mastery societies are focused on self-assertion in that ambition, success, courage, and competence are highly admired, and the belief that society needs to develop and grow (Schwartz, 1999).
Harmony		Harmony is the opposite of mastery. Harmony suggests that the culture desires to reach harmony in the environment which includes keeping unity with nature, protecting the environment, and improving the world (Schwartz, 1999).

	further personal or group interests.	

3.1.3. GLOBE Study Culture Dimensions

The GLOBE model consists of nine cultural dimensions. These cultural dimensions are defined in the table below.

Table 4: GLOBE Culture Dimensions

Dimension	Definition
Uncertainty Avoidance	Uncertainty avoidance refers to the degree to which an organisation or society steers away from uncertainty by reverting to social norms, rituals, and bureaucratic practices to lessen the impact of the unpredictability of future events (House et al., 1999).
Power Distance	Power distance is the extent to which individuals in an organisation or society expect and agree to power being unequally distributed (House et al., 1999).
Collectivism I: Societal Emphasis on Collectivism (Institutional)	Institutional collectivism refers to the extent to which organisational and societal institutional practices encourage and reward the collective distribution of resources as well as collective action (House et al., 1999).
Collectivism II: Family Collectivistic Practices (In-Group)	Group collectivism refers to the extent to which individuals express pride, loyalty, and cohesiveness in their organisations or families (House et al., 1999).
Gender Egalitarianism	Gender egalitarianism refers to the extent to which an organisation or a society minimizes gender role differences (House et al., 1999).

Assertiveness	Assertiveness refers to the extent to which individuals in organisations or societies are assertive, confrontational, and aggressive in social relationships (House et al., 1999).
Future Orientation	Future orientation refers to the extent to which individuals in organisations or societies engage in future-oriented activities such as planning, investing in the future, and delayed gratification (House et al., 1999).
Performance Orientation	Performance orientation refers to the extent to which an organisation or society encourages and rewards group members for performance improvement and excellence (House et al., 1999).
Humane Orientation	Humane orientation refers to the extent to which individuals in organisations or societies encourage and reward individuals for being fair, altruistic, friendly, generous, caring, and kind to others (House et al., 1999).

3.2. National Culture Dimensions for South Africa

This section discusses the national culture dimensions for the South African culture using the Hofstede, Schwartz, and the GLOBE study as a lens.

3.2.1. South African Culture using Hofstede's National Culture Dimensions

Insights into how South Africa aligns to these six dimensions are discussed in the following sub-sections. The scores per Hofstede national culture dimension are out of a value of 100 where 0 is the lowest value on the national culture dimension and 100 is the highest number on the national culture dimension. The higher the score value per dimension, the greater the extend of the dimension for that society e.g., when a society has a high score for individualism, that society has high degrees of individualism. The below sections detail the scores from Hofstede (2013) study for each national culture dimension as they pertain to South Africa.

3.2.1.1. Power Distance (PDI) for South Africa

South Africa scores 49 on the power distance dimension which is a moderate score, and it indicates that hierarchical order is accepted to a medium extent. Here each person has a position in society that needs no further justification. Hierarchy in the context of an organisation is seen as accepted inequalities, centralisation is the norm, subordinates expect to be told what to do and the perceived perfect supervisor is a compassionate autocrat (Hofstede Insights, n.d.). Wanasika, Howell, Littrell, and Dorfman (2011) mentioned that Kiggundu (1989) described African decision-making in the context

of the high power distance relationship between management and ordinary workers by stating that "respect for hierarchy is seen as unconditional obedience to instructions and directives" (p. 235). Wanasika et al. (2011) further motivate that the before-mentioned view is likened to the autocratic leadership style exhibited by many African political leaders and managers.

3.2.1.2. Individualism (IDV) for South Africa

South Africa scores 65 which indicates it is an individualist society. The preference is for a loosely knit social framework where individuals care for themselves and their immediate families only. In individualist societies, "offense causes guilt and a loss of self-esteem, the employer/employee relationship is a contract based on mutual advantage, hiring and promotion decisions are supposed to be based on merit only, management is the management of individuals" (Hofstede Insights, n.d., para. 5).

3.2.1.3. Masculinity (MAS) for South Africa

South Africa scores 63 on the masculinity dimensions and is therefore a masculine society. People "live in order to work" in masculine countries, managers are expected to be decisive and assertive, the emphasis is on equity, competition, and performance and, lastly, conflicts are resolved by battles. (Hofstede Insights, n.d.)

3.2.1.4. Uncertainty Avoidance (UAI) for South Africa

South Africa scores 49 on the uncertainty avoidance (UAI) dimension and therefore has a moderate preference for avoiding uncertainty. Countries with low UAI have a more relaxed attitude where practice is valued more than principles and deviation from the status quo is more easily tolerated. People in low UAI societies are of the view there should not be more rules than what is necessary and if they are vague or ineffective then they should be removed or changed. In societies with low UAI, "schedules are flexible, hard work is undertaken when necessary but not for its own sake, precision and punctuality do not come naturally, and innovation is not seen as threatening" (Hofstede Insights, n.d., para. 10).

3.2.1.5. Indulgence (IVR) for South Africa

South Africa has a high score of 63 and this is indicative of a clear culture of indulgence. In societies classified by a high score in indulgence, people generally display impulses and desires regarding enjoying life and having fun. These societies maintain a positive attitude and have a tendency towards optimism. Furthermore, they place more value on leisure time, they do as they please and spend money as they wish (Hofstede Insights, n.d.).

These results were based on the white population of South Africa. The results may vary for the black African population which constitutes most of the country.

3.2.1.6. Long-term Orientation versus Short-Term Orientation (LTOWVS)

South Africa has a low score of 34 on the long-term orientation dimension, suggesting that the culture is more normative than pragmatic. People in societies with short-term orientation are normative in their thinking in that they have a strong motivation to establish absolute truth. These societies have "great respect for traditions, a relatively small propensity to save for the future, and a focus on achieving quick results" (Hofstede Insights, n.d., para. 12).

3.2.2. South African Culture Using Schwartz's National Culture Dimensions

South Africa is displayed high on embeddedness and hierarchy (Sagiv & Schwartz, 2007). Western countries are more inclined toward intellectual autonomy. This means South African culture is focused on shared understanding, interdependence, and regard for seniority rather than individual rights and self-government. According to the Coplot map of cultural orientation (figure 1), South Africa has a high degree of embeddedness and hierarchy. Western countries lean more toward intellectual autonomy. The sub-Saharan African group emphasised mastery instead of harmony and this preference was attributed to the challenge to overcome poverty (Gutterman, 2010).

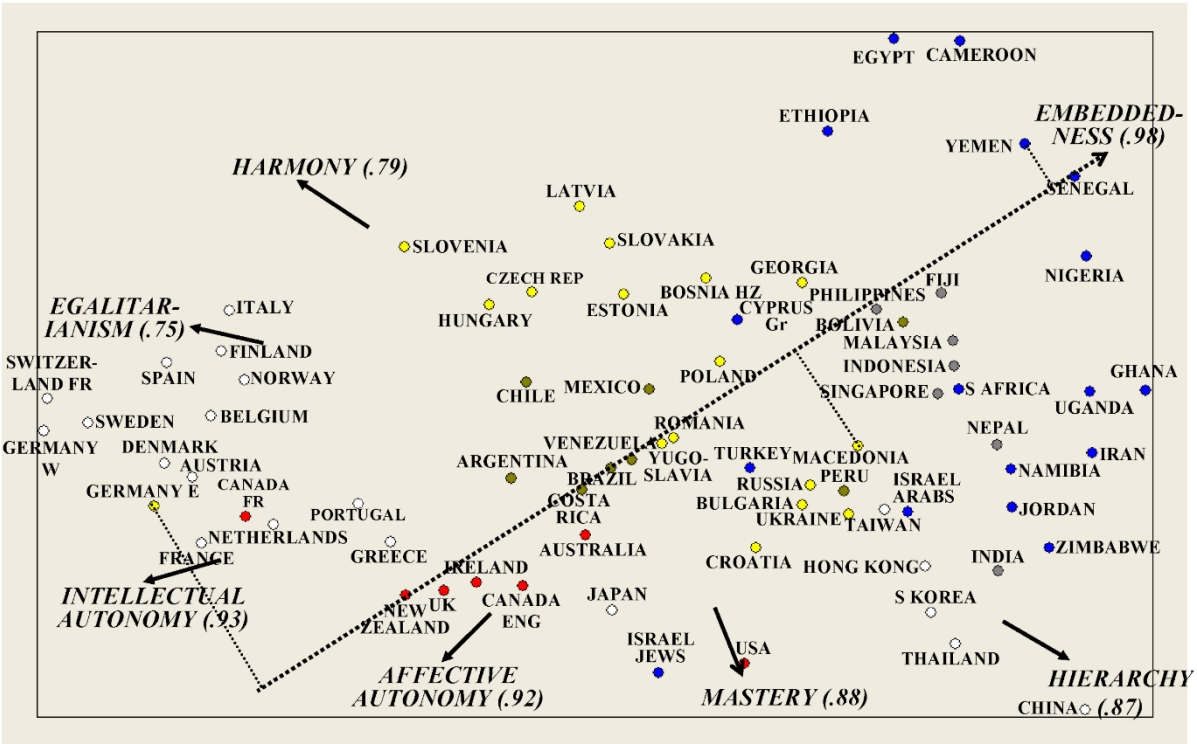

Figure 1: Coplot map of 76 national groups on seven cultural orientations

3.2.3. South African Culture using GLOBE Study National Culture Dimensions

The GLOBE survey was conducted in the mid-1990s (Shi & Wang, 2011). The GLOBE project surveyed the white and the black population of South Africa that was clustered into the Anglo and sub-Saharan Africa societal clusters, respectively. The white sample of South Africa, which is categorised under the Anglo cluster, is principally English speaking from a mostly Protestant Christian background. This cluster is characterised by values of individualism and egalitarianism due to the evolution of the democratic government in England and the individuality of the colonists (Ashkanasy, 2002). Cultural clusters such as sub-Saharan Africa has been under-represented in literature (Piana, Vecchi & Jimenez, 2018). In terms of the assertiveness dimension, South Africans have an above-average score and their responses suggest that South Africans are of the opinion that their level of assertiveness is too high (Booysen & Van Wyk, 2007). Therefore, South Africans would like to be less assertiveness than they currently are. Furthermore, South Africa has an above-average score for the performance orientation dimension, which translates to South Africans having a desire to be even more achievement orientated. South Africa is also well above average for future orientation. South Africans have a propensity for the male role and masculine values and do not value femininity and give recognition to female roles as much as male roles. The data shows South Africa is a rather inhumane society. Due to the South African apartheid history and an increase in violent crime, it is not surprising that the humane orientation is low. South Africa scores high on power distance with a desire to be more egalitarian. South Africa is orientated toward institutional collectivism which suggests a high degree of integration into groups and within organisations and society. South Africa is orientated low on in-group collectivism and desires a greater integration into smaller groups and families. The explanation for this could be due to the black sample size having an intense sense of collectivism, as shown by media analysis, where we find black trade unions, labour laws, worker empowerment, consultative management by a spokesperson, and participative management. South Africa has a low score on uncertainty avoidance and there is no desire to change this. However, in Booysen's (1999) study, there was a higher level of uncertainty avoidance in white men than shown in the GLOBE study. According to media analysis, the black people have a higher uncertainty avoidance propensity and are more collectivistic than whites (ibid).

3.3. Comparison of National Culture Models

The below sub-sections aim to compare the Hofstede versus GLOBE national culture dimensions and the GLOBE versus the Schwartz national culture dimensions.

3.3.1. Hofstede vs GLOBE National Culture Dimensions

Hanges and Dickson (2004) compared the national culture dimensions of Hofstede to the GLOBE project national culture dimensions. Their findings were that there was a positive correlation between Hofstede's power distance dimension and the GLOBE power distance (As Is) scale meaning that the power distance national culture dimensions of the two models were the same. There was a positive correlation between Hofstede's uncertainty avoidance scale and the GLOBE uncertainty avoidance cultural values (Should Be) scale, meaning that Hofstede's uncertainty avoidance and the uncertainty avoidance that South Africans would have wanted was similar. Hofstede's individualism dimension was negatively correlated to the GLOBE societal collectivism I: institutional collectivism cultural values (Should Be) scale as well as to the collectivism II: in-group collectivism (As Is) dimension meaning that the individualism national culture dimension was a polar opposite of the in-group collectivism dimension and what South Africans want the institutional collectivism dimension to be. Lastly, in terms of Hofstede's masculinity scale, there was a significant positive correlation with GLOBE's societal assertiveness cultural practices, which translates to these two dimensions being closely the same.

The Hofstede long-term orientation and GLOBE Future Orientation national culture dimensions were not compared by Hanges and Dickson (2004). However, Venaik, Zhu & Brewer (2013) mentioned that Hofstede long-term orientation and GLOBE future orientation dimensions capture distinct aspects of time orientation of societies, i.e., Hofstede's long-term orientation (LTO) focuses on past (tradition) versus future (thrift) aspect of societies, while GLOBE future orientation (FO) practices capture the present versus future (planning) practices of societies, and GLOBE FO values reflect societal aspirations and preferences for planning. In an earlier paper by Venaik, Zhu, & Brewer (2012) they suggested that Hofstede's LTO should be relabelled as past-tradition versus future-saving orientation, in place of short-term versus long-term orientation; while GLOBE FO should be relabelled as present versus future-planning orientation instead of simply future orientation.

3.3.2. GLOBE vs Schwartz National Culture Dimension

Hanges and Dickson (2004) compared the GLOBE national culture dimensions to the Schwartz national culture dimensions. Their findings were that Schwartz's Hierarchy dimension positively correlated with the GLOBE power distance cultural values scale which means that these dimensions are the same. Secondly, the Schwartz's Intellectual Autonomy dimension was significantly negatively related to the GLOBE Uncertainty Avoidance cultural values scale which means that they can be compared as

opposites of each other. Thirdly, the Schwartz's Embeddedness dimension had a significantly positive relationship with the GLOBE Uncertainty Avoidance cultural values scale, meaning that that these dimensions are the same. Fourthly, the Schwartz's Egalitarianism dimension had a significantly positive relationship with the GLOBE Gender Egalitarianism cultural values scale, meaning they are the same. Lastly Schwartz's Egalitarian National Culture dimension also had a significantly negative relationship with the GLOBE Assertiveness cultural values scale, which translates to them being opposites of each other.

3.4. Combined National Culture Model

This section discusses the consolidated national culture dimension model as a theoretical framework for the findings in Chapter 5: Data Analysis and Findings. The below theoretical framework was constructed by the researcher based on the findings of Hanges and Dickson (2004). Hofstede, Schwartz, and the GLOBE national culture dimensions are listed in the below figure, and the blocks to the right of the national culture dimensions are the Scrum practices, namely, Scrum roles, Scrum processes, and Scrum artifacts. The arrows suggest that the researcher anticipates national culture to have an influence on various practices in the Scrum methodology.

Based on the similarity identified by Hanges and Dickson (2004), Hofstede's power distance, GLOBE study's power distance, and Schwartz' hierarchy dimensions have been combined as power distance; Hofstede's individualism, the GLOBE study's collectivism I: institutional collectivism and collectivism II: in-group collectivism dimensions have been grouped together as individualism vs. collectivism; Hofstede's uncertainty avoidance, the GLOBE study's uncertainty avoidance, and Schwartz' intellectual autonomy and embeddedness national culture dimensions have been put together under uncertainty avoidance; and Hofstede's masculinity, the GLOBE study's assertiveness, and egalitarianism dimensions, as well as Schwartz' gender egalitarianism national culture dimension have been grouped together under the masculinity national culture dimension.

Lastly Hofstede's long-term orientation, and indulgence national culture dimensions; the GLOBE study's future orientation, performance orientation, and humane orientation national culture dimensions, as well as Schwartz' affective autonomy, and mastery versus harmony national culture dimensions had no proven similarity with other culture dimensions. Hence, they will be discussed as separate national culture dimensions.

The Agile practices we anticipate the various national culture dimensions to influence are as follows:

a) Power distance may influence sub-teams, titles, Sprint scope or duration, Scrum Daily Meetings, interferences, Product Vision, Product Goals, Product Backlog, Sprint Backlog, Definition of “Done”, manage Burndown Chart, Increment, and other artifacts

b) Individualism is expected to influence expectations to be looked after by the Scrum Master, expectations to be loyal to the Scrum Master, expectations on the involvement of the Scrum team in meetings and in the artifacts

c) Masculinity may influence how conflicts are resolved, importance of working together during ceremonies and on artifacts to reach agreement

d) Uncertainty avoidance / conservatism (Embeddedness) is expected to influence how flexible job duties and Sprints are, whether the scope is strictly signed-off, whether there are strict policies to follow procedures and Scrum processes, whether burn-down charts are being used, whether interferences in Sprints are allowed, and whether there is a timeframe to resolve blockers

e) Long-term orientation is expected to influence how change in Scrum roles, processes and artifacts are accepted, the nature of the type of work done, as well as whether focus of the meetings is more on the past or on future improvements in meetings

f) Indulgence is expected to influence whether personal enjoyment and humour in Scrum roles, during meetings, and in the artifacts are encouraged

g) Institutional collectivism is expected to influence whether leaders encourage group loyalty and commitment to the Sprints even if individual goals suffer

h) Gender egalitarianism is expected to influence the differences in duties between male and females, whether team members commit to assist others in meetings as a matter of choice, and what happens when team member proposes an impediment

i) Assertiveness is expected to influence the degree to which team members are generally dominant in their relationships with each other

j) Future orientation is expected to influence how often Sprint Planning and Refinement sessions are held and who is involved, whether a Sprint was ever terminated or is allowed, how far ahead the planning process is done for, whether the Product Goals are communicated, the degree to which the Product Backlog is prioritised, and whether there is a strategy to roll-out increments

k) Performance orientation is expected to influence the degree to which the team is dynamic and orientated to achievement, how performance is rewarded, how success for an Increment is defined, and to what extent items are completed according to the team's definition of "done"

l) Mastery is expected to influence whether training is encouraged in Agile roles, how teams prepare for Retrospective meetings, whether the team puts measures to improve and whether is documented and visible, and how the contents of the Increment are managed

m) Humane orientation is expected to influence how tolerant team members are of each other when certain duties were not performed, and whether the Scrum Master coaches the team and plays a supportive role to get the team back on track

n) Intellectual autonomy is expected to influence the degree individuals are encouraged to pursue their own ideas and intellectual directions independently regarding their roles, the processes, and artifacts

o) Affective autonomy is expected to influence the degree to which members are encouraged in the meetings to pursue positive life experiences such as pleasure, and a varied life

p) Harmony is expected to influence the degree to which members accept their roles, the processes and artifacts as is without trying to change, direct or exploit.

National Culture Dimensions

Hofstede	GLOBE	Schwartz
Power distance	Power distance	Hierarchy
Individualism	Collectivism I: Institutional Collectivism	
	Collectivism II: In-Group Collectivism	
Uncertainty Avoidance	Uncertainty Avoidance	Intellectual Autonomy
		Embeddedness
Masculinity	Assertiveness	Egalitarianism
	Gender Egalitarianism	
Long-term Orientation		
Indulgence		
	Future Orientation	
	Performance Orientation	
	Humane Orientation	
		Affective Autonomy
		Mastery versus Harmony

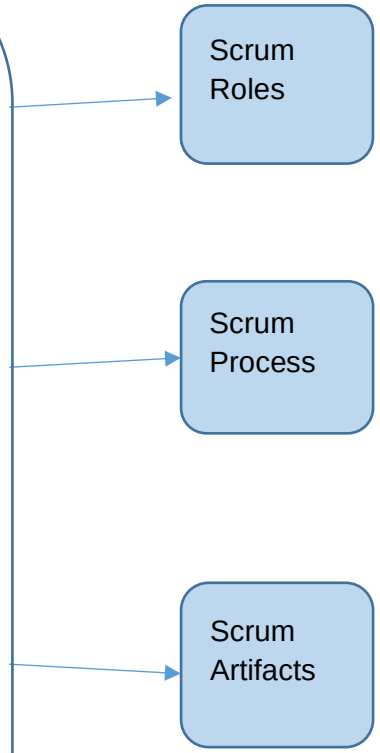

Figure 2: Cross Analysis of Scrum Practices and National Culture Dimensions

3.5. Conclusion

There are Agile principles and values which are required to be embraced for the successful implementation of these methodologies. The Agile principles were created by software developers in Western countries. South Africa is not a Western country and has a separate set of cultural values. This literature review started with defining culture as "the collective programming of the mind which distinguishes the members of one group or category of people from others" (Hofstede, 2005, p. 4). The cultural lenses reviewed were Hofstede's national culture dimensions, Schwartz's national culture dimensions, and the GLOBE study. On the Hofstede culture dimensions, South Africa identified as high on power distance, individualism, masculinity, and indulgence, and low on uncertainty avoidance and long-term orientation. For the Schwartz national culture dimensions, South Africa was high on embeddedness (conservatism) and hierarchy and leaned more toward mastery. The Ubuntu definition and principles were investigated, and culture dimensions identified for this as well. There is a strong link of collectivism in Ubuntu. The researcher identified three models, namely, the Hofstede, Schwartz, and the GLOBE national culture models where data was available for the South African context. In what follows the researcher proposes to use these models to describe how national culture influences Agile implementations (roles, processes, and artifacts) within the South African software development context. Furthermore, the researcher elaborated on the relationships that Hanges and Dickson (2004) found among the dimensions and cultural values of these model. Finally, a combined national culture dimension model was presented.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1. Introduction

The following chapter describes the research methodology which was followed for this study. The methodology identifies the research epistemology, purpose, philosophy, approach to theory, research strategy, choices, research instrument, and time horizon. Data collection and analysis is then discussed, followed by a description of the target population and sample, targeted interviews, validity and reliability, and ethical considerations.

The researcher took a subjectivist stance. A qualitative descriptive method was used. The study was deductive as national culture frameworks were employed. This study was interpretive and was executed using a qualitative, interview research strategy directed at Agile practitioners in South African software development teams. Data was collected using a one-on-one semi-structured interview method from twenty-six participants from across two major cities in South Africa through online semi-structured interviews. The thematic analysis technique was used to analyse the data. Validity and reliability were established using various verification strategies. The time horizon was cross-sectional. These will be elaborated on in more detail in the following sections.

4.2. Research Epistemology

Epistemology is the theory of knowledge embedded in the theoretical perspective and thereby in the methodology (Crotty, 1998, p. 4). Major types of epistemologies are objectivism, constructionism, and subjectivism (Al-Ababneh, 2020). Firstly, objectivism assumes that meaning and meaningful reality exist apart from the operation of any consciousness (Crotty, 1998), and it represents “the position that social entities exist in reality external to social actors” (Saunders et al., 2009: p. 110). Secondly, constructionism suggests that meaning comes into existence in and out of human engagement with the realities in the world (Al-Ababneh, 2020). Lastly, subjectivism refers to having meaning come from anything but the object to which it is ascribed, which means the object itself makes no contribution to the meaning that is imposed on the object by the subject (Crotty, 1998). Saunders et al. (2009) considered the subjectivist view as a social phenomenon that is created from the perceptions and consequent actions of social actors.

This study was conducted under the subjectivist stance which states that there are multiple realities which are created by social actors and that all knowledge is personal and depends on an individual’s viewpoint (Lackéus, Lundqvist, & Middleton, 2016). A subjectivist viewpoint is necessary as the aim of this study is to understand each participant’s point of view regarding their experience of how national

culture influences Agile implementations (roles, processes, and artifacts) within the South African software development context.

4.3. Purpose of the Study

A research purpose may be classified as being exploratory, descriptive, or explanatory (Snead & Wright, 2014). The purpose of this study is descriptive in nature.

Exploratory research is defined as a form of research that generates initial insights into the nature of an issue and develops questions to be investigated by more extensive studies (Marlow, 2005, p. 334 as quoted by Strydom, 2013). Exploratory research is often the first study before a more detailed study (Strydom, 2013).

Descriptive research is defined as a process of recording and reporting phenomena that are not primarily concerned with causes (Marlow, 2005, p. 333, as quoted by Strydom, 2013). Descriptive studies are seen as a large-scale effort from numerical studies that attempt to characterise a group, to understand, to make visible and to gain a detailed picture of the patterns of a particular group to differentiate them from other phenomena, or to accurately describe programme activities (Strydom, 2013).

Explanatory research seeks to identify causes, to ascertain causality between factors and to determine effects on behaviour of a social phenomenon, and to predict how one phenomenon will change or vary in relation to another variable (Strydom, 2013)

A qualitative descriptive method was used to describe the phenomenon that was desired by the researcher (Sandelowski, 2000). In the context of the study, the researcher sought to describe how national culture influences Agile implementations (roles, processes, and artifacts) within the South African software development context. The qualitative descriptive method is useful for researchers who want to know who were involved, what was involved, and where events took place (Lambert & Lambert, 2012). The questions in the study were “how” questions in that the researcher wanted to describe how national culture dimensions impact on Agile implementations in the South African context. The data that emerged was descriptive, meaning that the data was reported in words or pictures instead of numbers (Creswell, 2003). Qualitative description studies provide a comprehensive summary of an event in the daily terms of those events (Sandelowski, 2000). Hence, the researcher sought an account of the events that both the researcher and participants would agree was accurate. The researcher remained close to the data in the form of the words used by participants in the study regarding events. Participants gave meaning to the facts and the researcher conveyed the information in a manner that is useful and coherent.

4.4. Research Philosophy

There are five major philosophies in business and management: positivism, critical realism, interpretivism, postmodernism and pragmatism (Saunders, 2007). This paper was written from an interpretivist paradigm perspective since meaning was socially constructed and the research participants used their own words while they shared their experiences and beliefs (Rashid, Rashid, Warraich, Abir & Waseem, 2019). In this study, the interpretivist paradigm assumed the point of view that culture needs to be understood by studying stakeholders' ideas, thoughts and meanings, and that rich insights would be lost if a purely positivistic paradigm were used (Saunders et al., 2009). Interpretivism is an appropriate research paradigm since culture is acquired through the socialisation process and thereby also constructing meaning socially.

4.5. Research Approach

There are three contrasting approaches to theory: deductive, inductive, and abductive (Saunders, 2007). This study employed a deductive research. The questions were answered using deductive research methods because the research started with an organising framework that consisted of themes of the coding process (Braun & Clarke, 2006). The framework used was an amalgamation of three cultural frameworks, namely Hofstede, GLOBE studies, and Schwartz, to guide the data collection and analysis process. This was necessary due to the different aspects of culture and society that these frameworks studied. With a deductive approach, the initial themes are identified from the literature and are aligned by research aims, research questions, and interview questions (Zungah, 2018). Based on the Hofstede, Schwartz, and GLOBE models for national culture, the researcher identified several themes concerning the influence of national culture dimensions on Agile implementations in the South African software development context. The paper is qualitative in nature. This allowed the researcher to explore the depth and complexity of the phenomenon, identify and describe its components and their themes, and develop a picture of the whole that enhances and guides practice and future research (Thompson and Walker, 1998). The phenomenological qualitative approach was adopted to capture the experiences of the participants from their point of view in the Agile team (Williams, 2007).

4.6. Strategy

Qualitative semi-structured interviews were adopted to describe how national culture influences Agile implementation (roles, processes, and artifacts) within the South African software development context. Semi-structured interviews are questionnaires that start with guiding questions to ask the participants, but the researcher asked other relevant questions based on the responses of the participants to probe into their statements (Braun & Clarke, 2006). This was important since the aim

was to receive qualitative data that explained the experiences of the participants. The difficulties of using this method were to keep the conversation on track with the questions asked and to minimise participant repetition. Whenever the conversation was no longer relevant, did not align with the questions, the participant repeated themselves, or provided insufficient examples, the researcher thanked the participant and took the appropriate action which was to restate the question or probe further into a matter. Where questions were not applicable to the participant, for example, where there was no Scrum Master, or the team did not do Retrospectives, etc., those questions were not posed to the participant or, alternatively, the researcher improvised by asking other possible relevant questions to get information regarding the influence a particular national culture dimension exerted on the Agile practices (roles, processes, and artifacts).

4.7. Choices

This study used a monomethod. Only qualitative research was used since the researcher aimed to describe a phenomenon. This study used the mono strand design as this study had a single research method or data collection technique (Teddlie & Tashakkori, 2006). Quantitative surveys were not used although some of the data from the initial demographic, Agile method, and experience questions were presented in a graphical format.

4.8. Research Instrument

Initial interview questions aimed to set the context for the rest of the interview in terms of the roles, processes, and artifacts that were identified. The national culture dimension questions required the participant to expound on their response given in relation to the culture dimension and the influence it exerted on the roles, processes and artifacts identified. The researcher probed into unexplored themes that arose or asked the participant to clarify where the researcher felt more information could be retrieved regarding the context. Therefore, the researcher sought to engage the participant and draw relevant qualitative data for the study.

The interviews were structured based on a list of questions that related to national culture dimensions and the possible influences they may have on Agile practices such as Agile roles, Agile processes, and Agile artifacts.

Appendix A lists the interview questions that were presented to each participant. Initial questions probed the participants' role, their industry, team composition, and Scrum practices used. Those questions were followed by more detailed questions concerning how national culture dimensions influences various Agile practices within the roles, processes, and artifacts.

The questions were derived from existing themes identified by Zhao (2015) and were adapted by the researcher to include themes for the national culture dimensions from the Hofstede, Schwartz, and the Globe study models. Initially, questions were related to the Scrum methodology roles, processes, and artifacts. Participants were also contacted who used the Scrum methodology. However, the researcher discovered that Scrum was used in a large-scale environment with an overarching Scaled Agile Framework (SAFe) as well. Hence, other Agile methods such as SAFe and its roles, processes, and artifacts were also included in the study.

4.9. Timeframe

The timeframe of research can be classified as being cross-sectional or longitudinal (Groth & Nielsen, 2015). A cross-sectional timeframe was chosen. No previous data was used, and no data was collected after write-up of analysis. The data was collected over about a six-month period from December 2020 to May 2021.

4.10. Target Population and Sample

Purposive sampling was used in this study. Within purposive sampling, judgemental sampling was more specifically used as the researcher targeted participants who could provide the relevant information to meet the objectives of the study (Etikan & Bala, 2017). The target population was Agile practitioners within the software development context. Participants were from various roles within the Agile methodology as well as management to get a different perspective which was often a more holistic view than the responses from a team member. Participants were asked about all the various roles, artifacts, and ceremonies within the Scrum framework. Furthermore, the researcher also targeted participants from a wide range of cultural groups in South Africa. There are four distinct population groups namely, Black African, Coloured, Indian/Asian, and White (South Africa. Statistics South Africa, 2016). The initial group of participants was drawn from the researcher's personal and professional network on the LinkedIn professional social network platform. Thereafter the researcher requested referrals from those participants. The researcher also made use of the snowballing technique whereby the researcher asked participants for references which led to the researcher approaching the Agile community in South Africa on various electronic platforms such as Slack and LinkedIn. One of the Agile forums was the Scrum User Group South Africa. There were several Agile Coaches, trainers, Scrum Masters, as well as other members who were part of this group. Some Agile consulting firms were represented as well and the researcher contacted some of them to arrange an interview with of the Agile Coaches.

4.11. Data Collection Method

Data was collected from various project team members and stakeholders such as the Scrum team, Product Owner, Scrum Master, management, end-users, and customers across different teams and companies in South Africa. Twenty-six interviews were conducted, and the demographics of the participants will be presented in the next chapter. Open-ended questions were posed, and the researcher improvised where needed based on the context to probe into special cases that did not follow the normal flow of the questionnaire due to roles or processes omitted. The researcher sent invitations via email and attached the research study request and consent form (refer to Appendix A - Qualitative Questionnaire). Invitations were sent via LinkedIn as well. The potential participants were emailed with a meeting invitation and a copy of the questions. The meetings were held via digital video communication platforms such as Google Meet, Microsoft Teams, and Zoom. All interviews were transcribed.

Each participant answered the questions in line with their Agile implementation context and the events experienced within the teams they were part of or managed. Participants were involved in projects in various phases of the software development life cycle. Some were part of mature Agile teams while other teams were involved in newly formed teams. Some participants changed companies and were too new to answer questions for the team they were in at that point in time and referred to the previous team or organisation they were part of since they had more experience to refer to for those teams. The researcher then focused on that selected team as the context for the interview. Most of the interview responses were based on the current context of the team within their team formation stage and software development life cycle. However, some respondents also provided data looking retrospectively and gave insight into how the team dynamics, processes, and artifacts changed over time. These responses were noted in the data analysis and the discussion sections.

Scrum Masters, Product Owners, Scrum Developers members, customers, end-users, and management were interviewed regarding the use of Scrum in the team. The data collected was related to intra-project culture and values of individuals within the Scrum team. Some of the members were part of the team while others were Agile Coaches and trainers, as well as management that assisted the team where needed. The participants were initially selected from the researcher's professional network from past engagements or LinkedIn based on those who may have had experience with Scrum or have Scrum roles. After the researcher's network was exhausted, assistance was sought via references from interviews held which led to the researcher seeking further assistance from the Agile community such as the Scrum User Group of South Africa (SUGSA) and business consulting firms.

4.12. Analysis

The data was analysed using thematic analysis. Analysis and data collection were conducted concurrently. In thematic analysis, responses are used to identify, analyse, and report patterns or themes within the data (Braun & Clarke, 2006). By way of example, the researcher coded the responses in a qualitative data analysis tool called NVivo. Themes were identified within the data for each question and discussed in the data analysis and discussion chapters (refer to Appendix L – Interview Study Themes). The collected data was organised and described in rich detail and various aspects of the research topic were interpreted. Thematic analysis entails the following phases: familiarising yourself with your data, generating initial code, searching for themes, reviewing themes, defining, and naming themes, producing the report (Braun & Clarke, 2006). The below section will describe in greater detail how the data analysis was conducted.

Phase 1: Familiarising yourself with your data

The video recordings from the interviews were transcribed. The transcriptions were read and corrected where necessary. The researcher at times referred to the recording for context or where the researcher was unsure of what was typed in the transcription. An initial mind map of ideas was created based on some of the responses of participants that stood out to the researcher for various questions (refer to Appendix H - Initial Mind Map of Study).

Phase 2: Generating initial code

The mind map formed the initial structure and highlighted the key themes that emerged from the data. For example, the researcher realised there were more Agile methods used by teams than Scrum. The data was segmented based on these methodologies and sometimes by industry as well. The codes were created from each question in the semi-structured questionnaire.

Phase 3: Searching for themes

Similar codes were gathered and collated to form a theme. These codes were grouped together for each Agile methodology. The questionnaire was already partially structured in terms of themes where national culture dimensions exerted an influence on Agile roles, processes, and artifacts. The responses that best illustrated or explained the theme were used as quotations. Tables were used for the initial questions that created the context for the interview. Mind-maps assisted to create the themes for the data collected (Appendix I – Research Study Mind Map).

Phase 4: Reviewing themes

The themes were checked in relation to the coded extracts. Themes were reviewed for uniqueness and to identify themes that could be grouped together to form a bigger theme. These themes depicted the current context and how the respondents experienced the national culture dimension as well as how it influenced the Agile roles, processes, and artifacts.

Phase 5: Defining and naming themes

The themes were named according to the idea or element that prevailed in the South African software development context. The themes were defined in the data analysis as it was discussed.

Phase 6: Producing the report

The report produced in the analysis section explained the themes and provided an example extract to support the theme. The researcher checked the themes in relation to the literature and the research questions.

4.13. Validity and reliability

The matter of validity and reliability is imperative to qualitative studies (Noble & Smith, 2015). Validity refers to the extent to which a study accurately expresses the opinions of its participants (Yilmaz & O'Connor, 2012), while reliability relates to the consistency of the study (Leung, 2015). While widely agreed-upon criteria for evaluating the validity and reliability of qualitative studies are lacking (Noble & Smith, 2015), numerous strategies exist to ensure the credibility of a study's findings.

This study made use of the following verification strategies: selecting the appropriate sample (Morse, Barrett, Mayan, Olson, & Spiers, 2002), comparing cases to seek out similarities and differences across companies to ensure different perspectives are represented (Slevin, 2002), using 'rich' and 'thick' verbatim quotes from participants (Noble & Smith, 2015), consulting multiple data sources such as suggested links to concepts and other resources (Buchan et al., 2017), and reflexivity, where the researcher made notes of questions to change after each interview (Noble & Smith, 2015).

4.14. Ethics and Confidentiality

The concern of research ethics and confidentiality was an imperative to this study. The researcher applied for ethics approval from the UCT e-Commerce Information Systems Department to ensure that ethical matters were identified and appropriately addressed. The data collection process commenced only once ethics approval was granted. Each of the participants granted consent to

participate the study. A template of the forms is included (Appendix D and E). The consent form provided information about the purpose of the study.

The study participants signed that they understood and agreed to take part by signing the consent form. The researcher considered that the participants of this study would be answering questions that related to their team members. The study, therefore, ensured that the details discussed in the interviews were not shared with any other participants. The data collected from this study was not misused by the researcher in any way and was reserved for the purposes of this study. To protect the anonymity of all involved throughout the study, pseudonyms were used to conceal the identity of the selected organisations and their employees (Saunders et al., 2012; Takpuie & Tanner, 2016; Ndlela & Tanner, 2019).

4.15. Summary

In summary, Table 5 provides a synopsis of this study's research methodology.

Table 5: Research Methodology Summary

Research Epistemology	Subjectivism
Research Philosophy	Interpretivism
Research Purpose	Descriptive
Approach to Theory	Deductive
Research Strategy	Qualitative, interviews
Time Horizon	Cross-sectional
Data Collection	One-on-one semi-structured interviews
Data Analysis	Thematic
Validity and Reliability	Verification strategies

The next chapter provides the findings of the study.

CHAPTER FIVE: DATA ANALYSIS AND FINDINGS

5.1. Introduction

This chapter provides a detailed account of how national culture dimensions influence Agile implementations in the South African software development context. The scope of the Agile practices was the Scrum framework initially. However, during data collection, it was found that corporate organisations used Scrum in the context of the Scaled Agile Framework (SAFe), and some included Kanban especially for support and maintenance work requests. Some of the SAFe and Kanban practices were then included in the study. Section 5.2 presents an overview of the demographics of the participants as well as the Agile practices employed by the respondents. Section 5.3 discusses the analysis of the influence of national culture dimensions on Agile implementations (roles, processes, and artifacts) within the South African software development context. Section 5.3 is structured in line with the national culture dimension, the themes identified per dimension and then analysed by the influence the national dimension has on roles, processes, and artifacts, respectively. The researcher included and adapted questions of each national culture framework for Agile implementations and how the various national culture dimensions related to how these national culture dimension could possibly influence roles, processes, and artifacts. These questions were standard questions asked by Hofstede, Schwartz and the Globe study and then adapted for this study. The chapter then concludes with section 5.4 where a summary is provided. These findings will be discussed by comparing them with the literature.

5.2. Overview of Study Participants and Agile Methods Used

The researcher aims to firstly provide insights into the respondents' demographics and the common Agile practices employed by the respondents to give the reader an overview of each respondent as well as to illustrate that the researcher interviewed broadly across roles, industry, the size of teams, experience levels, and Agile methods used. Table 6 below illustrates the introductory responses visually per candidate. The table is a summary of the geographical, industry and Agile use information of the respondents. Graphs that give detailed insight into the roles, industries, team composition, team size and Agile use can be found in Appendix G – Demographic Graphs.

Table 6: Respondents' Demographics

Person	Role	Race	Years of experience in role	Industry	Team size	Agile method
P1	Scrum Master	Black	5 yrs.	Banking	16-25	SAFe, Kanban, and Scrum interchangeably depending on the project at hand.
P2	Agile Coach	White	8 yrs.	Retail	7	Scrum
P3	Scrum Master	White	1 year	Web Hosting	9-13	Scrum
P4	Agile Coach	White	3 yrs.	Finance	12	SAFe moderately
P5	Product Owner	White	3 yrs.	Gig Economy	4-7	Scrum
P6	Technical Product Manager	White	5 yrs.	e-Commerce	4-11	Scrum eventually
P7	Credit Analyst	Black	8 yrs.	Micro-Lending	12	Scrum
P8	Agile Coach	Black	2 yrs.	Banking	13	SAFe (minimum of scrum activities)
P9	Scrum Master	White	2 yrs.	Insurance	6	Scrum
P10	Product Owner	Coloured	1 year	e-Commerce	8	Kanban

P11	Scrum Master	White	5 yrs.	Sales - Telecommunications	8-9	Scrum
P12	Agile Project Manager	Coloured	1 year	Fintech	12	Scrum
P13	Project Manager	Coloured	5 yrs.	Insurance	6	Scrum
P14	Application Support Specialist	Coloured	1 year	Retail	20	SAFe
P15	Solutions Architect	White	8 yrs.	Micro-Lending	8-9	Scrum
P16	Agile Coach	White	1 year	Insurance	~14	SAFe
P17	Scrum Master	White	6 yrs.	Insurance	15	Scrum
P18	Agile Coach	Indian	5 yrs.	Utilities Management	7	Scrum
P19	Agile Coach	White	1 year	Fintech	7	Scrum
P20	Head Of Application Development	White	4 yrs.	Fintech	5-10	Scrum
P21	Agile Coach	White	5 yrs.	Banking	~10	SAFe
P22	Product Manager	White	1 year	Finance	6	Scrum
P23	Scrum Master	Coloured	5 yrs.	Banking	6	Scrum

P24	Centre of Excellence Manager	Indian	6 yrs.	Micro-Lending	6-9	Scrum
P25	Business Analyst	Coloured	2 yrs.	Insurance	6-7	Scrum
P26	Agile Coach	White	1 year at organisation 9 yrs. in role	Education	3 teams with 5 people on average	Scrum

5.2.1. Agile Use

Some teams in SAFe used a combination of Scrum and Kanban. Scrum in a SAFe team was used for big projects, whereas Kanban was used for maintenance and support work. Some members of the team would normally alternate on the standby and maintenance schedule. Scrum roles, ceremonies and artifacts were generally followed moderately. In more pure Scrum teams, the framework is used for products and all software development work which includes handling technical debt, doing support work, new requirements and enhancements, production issues and complex projects,

5.2.2. Activities in Agile

In SAFe some additional ceremonies to pure Scrum were found to be held such as Program Increment Planning which is held every quarter with all stakeholders. Sometimes Program Increment (PI) Planning meetings had about fifty meeting participants. One SAFe team had knowledge sharing sessions with experts from other teams. There were normally interdependencies between SAFe teams where some teams were enablement teams for other teams. In general, Scrum and SAFe teams had traditional Scrum ceremonies such as Sprint Planning, Sprint Retrospectives, Daily Scrum Meetings, and Sprint Reviews. In addition, both SAFe and Scrum teams had Backlog Refinement sessions with the stakeholders to get clarity on the requirements. SAFe teams had a supplementary meeting called the Scrum of Scrums every month where Scrum Masters of each team would meet to align and discuss dependencies and blockers due to the interdependencies between various teams. Some Scrum teams had the 3 Amigo Sessions (Story Kick-Off Huddles or the Triad), Release Retrospectives, Quarterly Visioning or Planning and demos to customers. Agile Coaches had additional sessions such as one-on-one coaching, Agile training for team members and stakeholders, stakeholder meetings, and middle management Stand-ups. One Scrum team in the financial sector did not have Sprint Retrospective

meetings due to blame being shifted between the internal team and outsourced company that was part of the Scrum team.

Kick-Off Meeting

A Kick-Off meeting is the first meeting when a project is started and the stakeholders along with the technical staff gather, get introduced and discuss the scope and goals of the project. A similar concept, called a Set-Off, was done by another Scrum team that owned the product they built. These sessions were held normally after a request to initiate a project. This document was typically called a Project Initiation Document (PID) which contained the scope of the project. Normally these documents were produced for big projects and not smaller enhancements to the system that could be done in a Sprint.

> *"The larger projects have a PID (Project Initiation Document) that gets set up. There would be a Set-Off before the PID gets evaluated and then split into Sprints." (P15)*

The findings were that teams that had projects for various initiatives used Kick-Off meetings whereas teams that continuously refined their product, such as in a Fintech company, did not use Kick-Off meetings; however, improvements to their product were discussed as part of their Refinement sessions. In numerous Scrum teams there were quarterly planning sessions or visioning sessions held instead of a Kick-Off.

In a SAFe team in the banking industry as mentioned by respondent 1 (P1) a Joint Application Development (JAD) session was held with business stakeholders and technical people. In a case where a SAFe team had a Kick-Off meeting before the project, the meeting was a minimum of two hours long. Here a programme of products would be discussed which was called an Epic. A typical example of this is where related products were grouped together to form the larger project or programme. Another respondent who was an Agile Coach in the banking sector made an example in a presentation likening an Epic to a video or movie series, the features were likened to an episode and the user stories were likened to a scene within the episode.

> *"We have products within programmes. It would be an epic. Everyone in the team, as well as business stakeholders are part of the Kick-Off meeting." (P16)*

Every quarter, Programme Increment (PI) Planning sessions were held. PI Planning was high-level planning that was done and took place over three to four days. These were big sessions where about fifty people were in the same room or on the same call at the time. Every six weeks or third Sprint a Big Room Planning would be held where stakeholders gave input to the objectives for the next three Sprints.

In Scrum teams, Kick-Off Refinement meetings were held to discuss and gain context of the problems they were trying to solve and the requirements to resolve the issues at a higher level. In a Fintech Scrum team that owned the product and improved it for use by external clients such as banks, the Kick-Off was incorporated in the Refinement sessions for the expansion of the product.

> *"Yes, but it was more of a continuous expansion of the product itself. We were productised. The typical Kick-Off was incorporated in our Refinement sessions." (P20)*

A Kick-Off happened for every project in the case of where bespoke software was done. In a Scrum team where Kick-Off meetings did not happen, it was because the business stakeholder dictated to the team what needed to happen and when it needed to happen in terms of features and user stories. In another Scrum team that developed their own product, the Kick-Off was between four to five days with the entire team and business stakeholders to gain an understanding of the project. In the gig economy a Scrum team included the support agents to get user feedback. In these sessions UX designs were created and called Sprint Zero where the group validated what was going to be built. Where the Product Team and the Development were separate, different sessions were held for each team. The requirements were gathered by the Technology Leader and a Kick-Off was done internally with the Development Team. In another Scrum team, Kick-Off meetings were held among middle management which identified a Product Owner. At the time of being remote due to national lockdown restrictions, separate sessions were held online with different teams. Newer concepts such as a team lift-off were incorporated where sessions are held when a new team forms or a new member joins the team.

> *"Lately, we don't have a Kick-Off meeting. Instead, we identify the product vision collaboratively and then we would identify the Roadmap. We would call it a team lift-off" (P18)*

Daily Scrum

In most SAFe teams and all Scrum teams, the Stand-up meeting was held every day at nine in the morning for between fifteen to thirty minutes online. These meetings were attended by the whole team including the Product Owner and the Scrum Master. For both SAFe and some Scrum teams where there were dependencies between teams, a Scrum of Scrums meeting was held, and management was involved. The below comment was from a manager explaining their involvement in this ceremony to prepare teams and focus their attention in terms of the work they needed to coordinate. In some of the Scrum teams, the product owner was not part of the Scrum team as a team member. The Product Owner in those cases was part of the Product team and reported to a Product Manager. Where there were a Development team and Product team, only the Development team

attended the Daily Scrum meeting. The Head of Technology then communicated the various operational tasks to the Development team.

Backlog Refinements

In both SAFe and Scrum teams, Backlog Refinement would occur once a week where the Backlog requirements were discussed. These sessions were led by the technical leads in most cases where the requirements were discussed for understanding and to size for effort and complexity. Sometimes the domain expert or Business Analyst was involved at this session to provide clarity. The purpose of these sessions was to remove ambiguity and uncertainty to break down the requirements into tasks that the team will do and better plan for the execution of these tasks.

> *"We run two weeks Sprints...We have Refinement once a week. We use this session to prepare the Backlog and understanding the Definition of Ready." (P16)*

Sprint Planning

In SAFe teams, Sprint Planning ranged from forty-five minutes to four hours and everybody in the team, including the subject matter expert, Product Owner, Scrum Master and Agile Coach, was included in the session. In Scrum teams the planning sessions ranged from one hour to four hours. This is where requirements were mapped out and user stories created for the team. These were normally run by the Product Owner and Scrum Master. Sometimes Sprint Planning was done in two sessions where the first Sprint Planning session was used to identify the Sprint Goals and then the second session, called the Sprint Planning two, was held with technical teams to plan for the Sprint ahead. Technical staff such as Analysts were not part of the Sprint Planning Two sessions as they would not have directly contributed to those sessions.

> *"The Sprint Planning sessions are presented and facilitated by Product Owner. The Developers participate in story estimation and finalising the Sprint goal and commitment for the Sprint based on historical velocity and familiarity with the work being done." (P26)*

Sprint Review

In a SAFe team there were demos but not really a review of the Sprint where the teams needed to talk about what was done during the Sprint and what can be deployed, while in another SAFe team there were reviews that took place. In Scrum teams there were combined reviews as well as peer reviews.

> *"They're not very good with review meetings; it is more of a demo session which lasts for about half an hour. The Sprint Review is for the team to get feedback from the stakeholders. The team would attend the demo sessions. The developer would facilitate the session." (P8)*

Sprint Retrospective

In SAFe teams, Retrospectives were between thirty minutes and two hours long. The whole team was part of the meeting. In teams where the team was not enthusiastic about this meeting the meeting was quite short. In Scrum teams this meeting ranged from thirty minutes to four hours. Most Scrum teams had an hour and a half session. Everyone attended. In the case of a team that was separate from the Product Team, the Product Owner did not attend. In high-performing teams, Retrospectives were done in real-time as an event occurred. From a management level, there are sometimes quarterly Retrospectives with senior management.

> *"In bigger organisations we hold quarterly Retrospectives with senior stakeholders being included in the Retrospectives." (P3)*

5.2.3. Artifacts in Agile

In large-scale Agile teams that use SAFe, traditional Scrum artifacts were used. The Product Backlog, Sprint Backlog, Increment, including developer release notes, test evidence, Trello Board for defects, and feedback from production were used as artifacts. In the financial sector, the team used the whole Scrum framework with processes and artifacts, but they have not introduced the notion of the Product Goal yet. This was of particular interest to them as the participant who was the Agile Coach (P21) mentioned, *"The Product Goal is more measurable than the product vision"*. In Scrum teams the Product Backlog, Sprint Backlog (in TFS or Trello), Sprint Reviews, demos, Increment (working software), including Burndown charts, are common artifacts. Additional artifacts are Quarterly Planning Roadmap, Long Term Product Strategy, Product Goal, T Shirt sizing session, user stories, process flows, summarised notes, Vision Board for the Product Backlog, Acceptance Criteria Specifications, Process Flows and User Stories, task board, knowledge base, vision statement, Impact Planning, Vision Mapping, Assumptions Mapping, Empathy Mapping, User Journeys, User Story maps, Minimum Viable Product (MVP), Release Plans, Architectural Runway Designs, and Magic Estimation.

5.2.4. Number of work hours and projects

Agile Coaches and Scrum Masters strived to have work done at a sustainable pace. Overtime work in the banking industry was an exceptional case and was discouraged. In general, teams worked remotely over the period that the study took place, and they had flexible hours and core working hours. The teams worked eight hours a day. There was a mix of working on one project or multiple projects concurrently for both SAFe and Scrum teams.

> *"Out of the three teams that I collaborate with only one team has a high work in progress limit and they work on three projects in a Sprint which is not good practice. This is due that they are*

still new to Agile and are in the process of having the team only working on a scope split of 30 % new feature work, 30 % architectural innovation, 20 % technical debt and 20 % support bugs per two-week Sprint. This is done to ensure that the team is able to deliver while maintaining the stability of the system and products that they are working on" (P26)

5.3. Analysis of the Influence of National Culture Dimensions on Agile Implementations in South African Software Development teams

The analysis in this section is discussed according to the influence that each national culture dimension has on the Agile roles, processes, and artifacts in South African software development teams. There are various roles within the Agile framework for various teams. These roles and duties will be discussed in more detail as they vary between teams in disparate industries. There are various processes, however, in the context of this study. The researcher discussed the influence of the national culture dimensions on the Agile processes such as the Daily Scrum Meeting, Sprint Planning, Sprint Review, and the Sprint Retrospective. There are various artifacts and some which are no longer relevant in the Scrum Guide, such as the Story Board and Burndown Chart, but the researcher will still discuss how national culture influenced those artifacts where they are still in use by Agile teams. The findings were varied based on the size of the team, Agile method adopted, industry sector and whether the respondents were involved in sub-teams or a single team. Figure 3 illustrates which Agile methodology was favoured by a particular industry. Furthermore, the researcher found Agile implementations differed based on industry, methodology, and when it was a single team or whether there were sub-teams and the vendor involved. This was evident in the roles, processes, and artifacts for these cases.

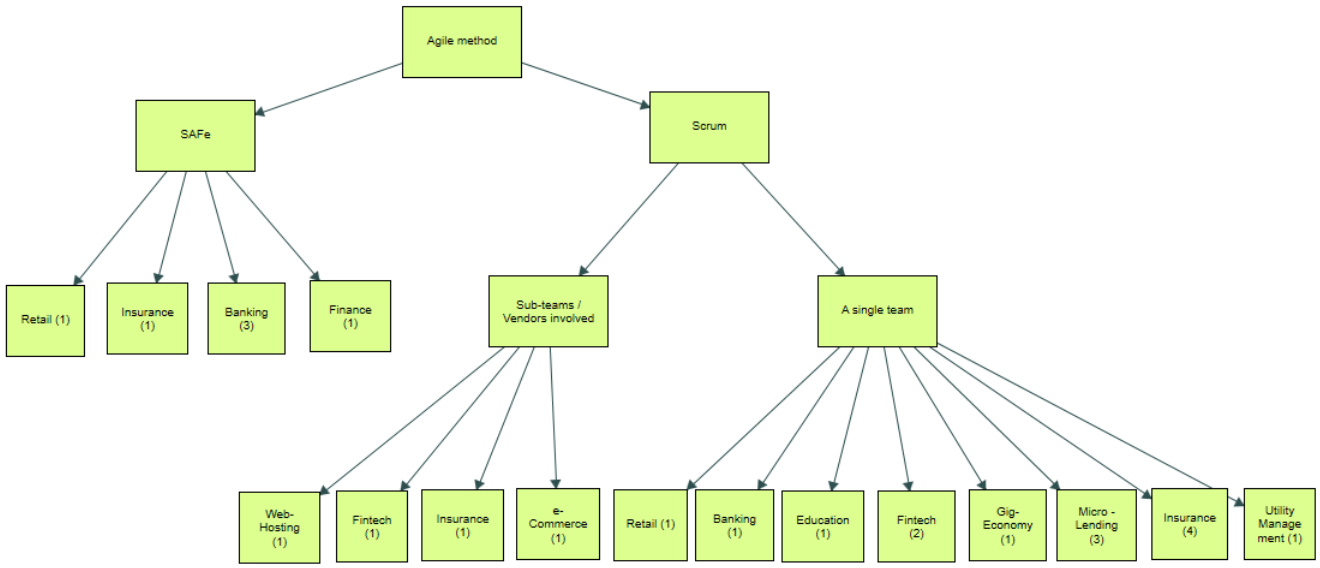

Figure 3: Industries and Agile Method Used

5.3.1. Influence of Power Distance on Agile Implementations

Power distance is a national culture dimension that describes the degree of inequality among people (Hofstede, 2013). In the context of this study, power distance is framed as the extent to which people in Agile teams expect and accept decision-making power to be unequally distributed.

5.3.1.1. Influence of Power Distance on Agile Roles

Power distance influenced Agile roles in relation to team hierarchies, Agile job titles, compliance with obligations and rules, and leadership responsibilities.

Team Hierarchies

According to literature, the Agile framework favours horizontal hierarchy (Siakas & Siakas, 2007). Hierarchy is where there are inequalities in roles, there are subordinates who expect to be told what to do, and centralisation of decision-making power is the norm. South Africa has a high power distance index (Hofstede, 2013). The findings revealed teams where a high degree of power distance was demonstrated, and hierarchies were prevalent in the teams. This was particularly evident in large corporate organisations in which hierarchical structures existed in Agile teams. P21 said that *"traditionally, [the bank] has been quite hierarchical"*. Therefore, high power distance was viewed as hierarchy due to legacy organisational structures in which there was an established hierarchical order over many decades or even the past century. Participants from large South African corporate organisations generally used the Scaled Agile Framework (SAFe). Team autonomy was mostly not a reality for these South African software development Agile teams that used the SAFe methodology. In industries such as the banking and financial sector, bureaucracy prevailed. This resulted in the Agile teams feeling as if they were being micro-managed by management. P5 elaborated, *"In SA, I found that it is still very bureaucratic in its hierarchy, almost a sense of micro-management. Team autonomy is still a dream"*.

In matured teams, where a low degree of power distance was demonstrated, P2 mentioned that all the members were seniors and experienced in their field and each person could speak freely. Moreover, in most small organisations teams had a flat team structure where collective accountability was taken. The teams had full autonomy regarding solution decisions with the Product Owner guiding the team on the product requirements. Therefore, it can be deduced that a low degree of power distance was demonstrated in matured teams and in small organisations.

> *"The hierarchical order is very interesting because the Product Owner (in a large company using SAFe) is generally quite senior in the organisation as with many other organisations. They also have leaders within the team as well who acts as an expert in a particular domain.*

The Scrum Masters also have some authority; from their approach they aren't authoritative but they do carry authority in the team." (P4)

Agile Job Titles

Agile job titles in the context of this study are related to job titles in Agile teams. This section describes how rigid or flexible the duties are for each role. Literature showed that job titles were prevalent in high power distance contexts (Zhao, 2015). Findings revealed that high power distance influenced Agile roles whereby specialised job titled were present in South African software development Agile teams. P26 said that, while Scrum does not advocate the use of job titles, in South Africa team members are given specialised roles such as UX designers and automation engineers. In large-scale Agile teams, members also had specialised roles as explained by P9. However, P14 said that while formal titles in relation to specific skills were retained, they did not necessarily assert their position. The Scrum Guide proposes cross-functional Scrum teams; however, most SAFe and Scrum team members had specialised roles such as UX designer, Front-End Developer, Back-End Developer, etc. In the insurance industry the title of Lead Business Analyst was assigned to the Product Owner role since the Business Analysts had more context to the business requirements, as explained by P9. Also in the insurance industry, respondents mentioned that the Project Manager assumed the role of Scrum Master. However, their responsibilities were more toward Project Management in that they were more task-focussed than people-focussed. High power distance therefore influenced Agile roles whereby the Product Owner or Scrum Master roles were senior roles.

In small Agile teams, where a low degree of power distance was demonstrated, team members had titles to describe their roles and duties, but it was not of significant importance to the team during discussions. In Agile/Scrum teams there was a degree of cross-functionality where the developer could do testing when assistance was required with testing. The findings revealed that in South African Agile teams members generally performed their own roles; for example, a developer did mainly software development work unless there was a need to assist with testing.

"They then used the BA's who were particularly strong as product owners to help with decision-making. When the Development team had questions for the managers, they would act as an in-between and also indicate to the team what they need to focus on next." (P9)

Compliance with Obligations and Rules Attached to Roles

From literature, in hierarchical societies, people are expected to comply with the obligations and rules attached to their roles and to show respect to their superiors. This means that members performed their own roles strictly and would be penalised if they did anything else. The findings showed that high

power distance influences Agile roles whereby team members in large corporate organisations only performed their own roles, even if they wanted to assist others, due to being performance reviewed only on their own work. P8 explained that team members feared that helping a team member could possibly have possible detrimental effects on their own performance. P8 elaborated and said that individuals wanted to assist others in the team more, but they were measured on the performance of their own role and had to prioritise their own duties. Therefore, it can be derived that due to the Key Performance Indicators (KPI) that were based on personal performance, team members defaulted to the roles and responsibilities as per their contract. The Agile framework aims to have cross-functional teams; however, due to factors such as compliance with the obligations and rules attached to their roles, as well as how the performance review is structured by what is measured, team members mainly performed the duties according to their job description. Small-scale Agile team members assisted each other where possible. Therefore, low power distance influenced Agile roles whereby roles were more cross-functional, and roles assisted each other more freely due to less compliance with obligations and rules.

"The ceremonies and roles are quite strict while the artifacts definition is looser." (P12)

Agile Team Leadership Role Responsibilities

The study refers to leadership roles as leaders of Agile teams. The Scrum Guide suggests that the Scrum Master and Product Owner are part of the Scrum team and not a superior role. The findings revealed that high power distance influenced Agile responsibilities whereby leadership roles were assumed by the Scrum Master or Product Owner. When high power distance prevailed (e.g., in large corporate organisations like insurance and retail companies), the Product Owner or the Scrum Master were sometimes the leaders of the Agile team. For instance, P7 said that the leader in their team was the Scrum Master who also acted as a manager of three teams. According to the findings, the norm was to have a dominant leader with strong technical skillsets, or governance requirements even if there was a flat structure. In Agile teams where a high degree of power distance was demonstrated, the Team Members assumed that the Scrum Master was the leader. In technology related teams, such as Fintech or e-commerce, high power distance plays a role whereby the Technical Leader was the clear leader in the team and was sometimes also assigned the Scrum Master role, as mentioned by P6. An example of governance requirements is the where the Technical Leader represented the team at Management Committee meetings, as was explained by P23.

Scrum Masters have certain responsibilities as outlined by the Scrum guide. According to the Scrum guide, the responsibility of the Scrum Master was to coach the team on Scrum and the practices and values. Scrum Masters determined the capabilities of the team and followed up on progress. Where

there was a high degree of power distance, the Team Members had an expectation for the Scrum Master to be the leader of the instead of facilitating. Their role was to solve impediments. Scrum teams with a low degree of power distance were taught to take collective ownership. In Scrum teams the responsibility of the Scrum Master was to coach the team on Scrum practices and principles, head up Stand-ups, assist the Product Owner with the Backlog, and remove impediments or conflicts. In addition, the Scrum Master has the responsibility of the team, observing and allowing them to conclude the work that needs to improve, as well as tracking their improvement. In the case of the financial sector in a large corporate, the accountability was with the Scrum Master to manage the team's delivery. P9 said that the Scrum Master played the role of the Project Manager where that role was responsible for the deliverables of the team. This was not congruent with what Scrum prescribes where the team takes collective accountability. P7 said that the Scrum Master acted as the manager of three teams. Therefore, it can be determined that high power distance influenced the Agile roles whereby the Scrum Master was held accountable for the team's performance and in some cases managed the team.

Within cultures where there is high power distance, ideal leaders are caring autocrats. The qualities of various roles relate to the influence of power distance on Agile roles. The findings revealed that general expected qualities in Scrum teams were self-management and staying abreast of technology. According to our findings, where a low degree of power distance was demonstrated, the P1 and P3 said that the leadership qualities of the ideal Scrum Master were that of a servant-leader. In addition, their ideal qualities were being inquisitive, impartial, observant, and provide guidance on processes, as explained by P3.

> *"The Scrum Master is held accountable for the team not delivering, which clashes with the framework of Scrum where we try to remove accountability from one person and address it as a team instead. There is a lot of fear with some of the team members, because they get punished if they are doing too much; management just wants the team to 'tick the boxes' and not be creative or think out of the box." (P9)*

5.3.1.2. Influence of Power Distance on Agile processes

Power distance influenced Agile processes in relation to decision-making, task allocation, scope management, Scrum ceremonies facilitation, and Sprint interruptions and interferences.

Decision-Making

Decision-making power is when certain roles have more influence on the decisions that are made. Agile approaches advocate a decentralised decision-making approach. However, high power distance

influenced Agile roles whereby decision-making power was unequal within Agile teams. According to the findings, in teams where a high degree of power distance manifested, top-down decision-making was prevalent. For example, P6 said, *"It was pretty much from the top down from the product lead, engineering leads who designed the process in the end"*. Top-down decision-making is when management makes decisions and subordinates are expected to execute those decisions. Team Leaders had more decision-making power in teams where there were senior roles assigned in the team, i.e., a hierarchical structure. For example, in a company in the insurance industry, the Team Leader was a Senior Business Analyst, and in the e-commerce industry that person was a technical person. Scrum Masters also introduced Scrum processes. When a Technical Leader, Team Leader or a subject matter expert (SME) spoke during a ceremony, they had more authority, although it was encouraged that everyone should have an equal say. P6 stated that in their Agile teams where there was a definitive hierarchy, there was no expectation for all to be involved in all the ceremonies except for the Stand-up meetings. P6 said that senior developers did most of the talking and junior developers only sometimes gave insight in technical design sessions of the solution.

In small Agile teams with a flat organisational structure, the Power Distance was low and influenced Agile processes whereby decision-making power was equal among team members. P18 said that power struggles were well managed in these instances. P20, whose role was Head of Application Development, explained that the team took ownership of the Agile processes, and they had the freedom to adapt the Agile processes to suit them. Agile teams with flat internal structures favoured open discussions prior to making any decisions which could impact the team. P19 said that the attitude toward suggestions was to test ideas to evaluate them over a set period, for example a Sprint, and then discuss in the Retrospective whether they worked for the team. The findings showed that Agile coaches addressed inequalities in decision-making power in teams by coaching the team on the Scrum processes and values.

Furthermore, Agile teams that manifested a low degree of power distance had various voting mechanisms that were used by teams to make decisions. The voting mechanism used was that of consensus. However, in one hierarchical team the final decision was sometimes made by the Team Leader or go-to management if a decision could not be made by the team. Low power distance teams had a consensus model for decision-making when it came to technical solution decisions to address the business requirement. Consensus is where the team voted regarding decisions that had to be made during the Sprint. Each team member's vote counted and was equal to the next person's vote regardless of their seniority in the team. The decision was made on the majority vote. P17 explained the various consensus-building approaches used in their team which were Dot Voting, Roman Voting,

and Fists-of-Five. In a matured Scrum team, there was a consent model. A consent model is where the team willingly consents to decisions made without having to vote since they trust the decisions made by subject matter experts in the team to be sound and in the best interest of the team and the product. P20 mentioned that the team initially used a consensus model but over time they learnt to trust one another and consented to decisions made by those in the team who had the most knowledge in a particular domain.

> *"Over time, we got to a level of consent. If we get to a point where enough of the team want to go a different way, the minority would give their consent and trust that the decision will be well-received by the team. It evolves over time as the team gets to trust each other." (P20)*

Task Allocation

According to literature, in Scrum management is not allowed to assign tasks to the team. The Scrum guide prescribes that Scrum teams should be self-organised. High power distance influenced Agile processes whereby management assigned new tasks to teams. In contrast, where low power distance was prevalent, management was not allowed to assign new tasks to the team directly. Most times when management assigned tasks to the team, a conversation was first held with the Scrum Master and Product Owner to decide if it was urgent or added more value than what the team planned for their Sprint. P25 said that a manager could assign work if the work was aligned with the objectives of the current Sprint or if there was more monetary value, such as return on investment, in the new work compared to other items in the Sprint. Most participants in the study who were in small Scrum teams said that this was not allowed in their team and the Scrum Master pushed back. In low power distance environments, management approaching the team for new tasks did not occur often and whenever there was a change of requirements, the benefits to the organisation of the new work to be done were explained to the team to get their buy-in. The item was then swapped for another item or items of lower priority and similar effort if the team had the capacity to do the work in that Sprint. P25 further elaborated that, under normal circumstances, there was a change control process when there was a change of scope in requirements.

> *"Managers don't really assign tasks to the Scrum team. The business stakeholders would always have a discussion with us. We would then have the freedom or ability to fit that into our Sprints. This is also seen as a change of scope, and we have a process around that." (P23)*

Scope Management

Power distance influenced Agile processes in how Sprint scope was managed. In companies that manifested a high degree of power distance, the team faced numerous interruptions whereby management was allowed to change the scope of the Sprint. The Product Manager role existed in some companies where there was high power distance and that role could change the scope of the Sprint, as explained by P14. In low power distance teams, the Scrum team could change the Sprint scope, as mentioned by P20 and P22. The Product Owner prioritised the requirement scope items, did feasibility analysis, and considered the capacity of the team to have a change of scope. In Scrum teams in the financial sector, P9 said there was a strong emphasis on the Lead Business Analyst fulfilling the role of the Product Owner. The Business Analyst in those instances, therefore, had the mandate to change the requirements or scope of the Sprint. In teams that manifested a low degree of power distance, the scope was locked-in but anyone in the team could change the scope if the reason was good enough.

"From a Business Analyst point of view, in our requirement Sprint, the business owner and stakeholders can change the Sprint scope or duration. From a developer's point of view, there are multiple influences; in most cases the Developers get to give input, their management would get to decide whether it should change or not." (P9)

Scrum Ceremonies Facilitation

Facilitation is a skill required in the Scrum team to ensure the team is effective during their ceremonies. This section relates who facilitates meetings to the power distribution in the team. According to the findings, in companies with high power distance, the Agile Coach or Project Manager facilitated the Retrospectives. In teams new to Scrum, the Scrum Master facilitated the Daily Meeting and then later the team members. In low power distance environments such as where a flat organisational structure existed, the Scrum Master did less facilitation over time as the Agile teams matured, and the developers displayed the Sprint Backlog and facilitated the Daily Scrum meeting.

"No one runs the Daily Scrum meetings and I think that is the beauty of it. The Scrum Master would facilitate at times, but mostly the team would take responsibility of the meeting, so a 'chairman' wasn't necessary." (P2)

Sprint Interruptions and Interferences

According to the study, high power distance influenced Agile processes whereby Sprint interruptions and interferences occurred. For example, hierarchical companies had interferences coming from more senior roles than the Product Owner. Interferences with the Scrum team can come from various sources such as management, other teams, or the customer. It was possible for a team to have a flat structure within a hierarchical organisational structure and vice versa. P23 said that, while the organisational structure in the banking industry was hierarchical, their team had a flat structure with low power distance. Therefore, although a team had low power distance, they could still get interferences and interruption from the rest of the organisation that may be hierarchical. It was the role of the Scrum Master to reduce interruptions to the team. P2 said that the Scrum Master minimised the interferences for the team to be focused on the Sprint Goals. P1 explained that managers tried to ask Developers for status updates, but the Scrum Master reminded management of the process to be followed or addressed the concern with management. P23 said that, when interferences occurred, the Scrum Master pushed back or clarified the process to the manager. The interferences in Agile teams with a flat organisational structure were in the form of meetings and people having to conduct job interviews. Interferences from operational business managers in Agile software development teams with flat organisational structures were rare. Interferences with low

power distance teams were not allowed, but where the team was in danger in terms of non-delivery, management then assigned new tasks.

> *"In pure scrum, this is not allowed. But I think that when the team is under fire then it is necessary for having the conversation and drawing attention to new tasks that may be assigned." (P20)*

5.3.1.3. Influence of Power Distance on Agile Artifacts

This section describes how power distance influences the artifacts and who created them in South African Agile software development teams. Power distance influenced Agile artifacts in relation to management input on Product Vision and Goals, Product Backlog management, Sprint Backlog management, handling Definition of "Done", Burndown Chart management, and Increment Content management.

Management Input on Product Vision and Goals

According to the findings, in companies where a low degree of power distance manifested, the product vision was at the team level P15, P18, P19 and P20. In contrast, in companies that manifested a high degree of power distance, the vision was the responsibility of management and at the business stakeholder level. P14 said that the objectives were set by the Product Manager who was at the senior management level. For example, P21 said that stakeholders gave input into the Objectives at the Big Sprint Planning session every third Sprint.

> *"The Product Owners and Product Managers would have input into this [Vision] however as well as the Product Goals." (P4)*

Product Backlog Management

Based on the findings, in high power distance South African organisations, management had the most influence on the Product Backlog and the amount of work to be completed in the Sprint. The findings revealed that in organisations with a hierarchical organisational structure, decision-making power with regards to requirements of internal projects were held by managers. For example, in the case of large corporate organisations, when the Product Owner was not a senior staff member, they were less empowered to make decisions related to requirements scope, timelines and quality assurance. An Agile Coach (P8) in the banking industry was working on decentralising the decision-making power since the Platform Owner made most of the decisions related to the requirements and the Roadmap. A Platform Owner is a type of Product Owner whose product is a platform. In general, it was mostly business stakeholders who had input into the Product Backlog. In companies with a low degree of power distance, the Product Owner prioritised the Product Backlog with input from the team (P19).

"From the organisation's point of view, the Product Backlog is managed by management with business." (P9)

Sprint Backlog Management

According to the findings, most of the participants said that the Product Owner owned the Sprint Backlog. Therefore, high power distance cultures, such as South Africa, influenced Agile artifacts whereby the team did not own the Sprint Backlog. According to the Scrum Guide, the team should take ownership of the Sprint Backlog. Schwaber and Sutherland (2020) elaborate, *"The Sprint Backlog is a plan by and for the Developers"* (p. 11). This was not the case for participants in this study. P6 said that the decision about work that went into the Sprint Backlog was between the Product Owner and the Team Leader (who acted as the Scrum Master). The input into the Sprint Backlog was from the Product Owners, Developers and the Scrum Master. The Sprint Backlog consisted of the work to be done in the next two weeks and for some teams it was three- or four-week Sprints depending on their cadence.

"The Sprint Backlog was owned by the Product Owner, and the team got a chance to choose what went into Sprint Backlog as well." (P1)

The findings suggested that in high power distance teams subordinates expected to be told what to do by authority. The work that was decided to go into the Sprint was not first decided by the Developers. The fact that the Product Owner and Team Leader decided the work that was done during the Sprint relates to the Developers expecting to be told what to do during the Sprint. Team Members are everyone in the team except the Product Owner and the Scrum Master. These could include Analysts, Designers, Software Developers, Quality Assurance Testers and other. The findings suggested that for South African Agile teams, where there was a hierarchical organisational structure such as in the insurance industry, the Team Members were expected to be told what to do. P4 said that in the platform team, Developers were partially told what to do since there were dependencies on other teams. In another SAFe team, P14 said that the Developers waited for work to be delegated to them. In low power distance companies, teams where the organisation was small, Team Members took initiative and selected their own user stories from the Backlog to work on. In Scrum teams with a flat hierarchy, the team members decided what work they assigned to themselves. P23 said that the team members chose tasks based on their abilities. These tasks were selected from the Sprint Backlog and assigned to themselves.

"Their technical abilities come organically to the team as to what tasks need to be done in our Sprint events. They grab their own things from the Backlog." (P23)

Handling Definition of "Done"

Based on the findings, in high power distance teams the Definition of "Done" was determined by the Product Owner or by management. Not all teams that had high power distance had a Definition of "Done". In low power distance teams, the Definition of "Done" was decided by the Scrum team.

"The definition of done is decided by management." (P9)

Burndown Chart Management

The findings revealed that in high power distance teams the Burndown chart was managed by the Scrum Master. In low power distance teams, the Burndown chart was managed by the Scrum team. Some Scrum teams did not use the Burndown chart because they did not find it useful, or management used it to blame team members. The Burndown chart was mostly used by the Scrum Master to track the team's progress against the Sprint Goal as well as to evaluate team health.

"The team manages the Burndown chart and quite a few of the artifacts in general." (P19)

Responsibility for the Increment

The findings suggested that high power distance influenced the Agile artifact, i.e., the Increment, whereby input and responsibility were with the Product Owner instead of the team. This is against what the Scrum Guide prescribes. Moreover, where high power distance was prevalent, more roles from outside the team provided input into the Increment. For example, P4 said that the Product Owner had input into the Increment, and every two or three Sprints they had a solution demo where everyone who worked on the same platform had a big Sprint Planning session, and then other Business Owners from various domains gave their input. While the teams in high power distance environments decided on the technical solution for the product, the actual input into the Increments included management and stakeholders alike. Furthermore, in high power distance teams, the Scrum Master was responsible for the artifacts and the Product Owner owned the Increment that met the definition of done. In contrast, low power distance influenced the Agile artifacts whereby the team delivered Increments regardless of whether the client wanted the release. P20 said that the team notified clients of upcoming releases and went ahead with Sprints even if all clients were not interested in the Increment for release. In summary, in hierarchical teams, the Scrum Master was held responsible for the Increment although the Scrum Guide prescribes that the Scrum team is collectively responsible and accountable.

"The Scrum Master is responsible for the artefacts and the team owns the Increment of done." (P13)

5.3.2. Influence of Individualism (opposite is collectivism) on Agile Implementations

Individualism refers to the acceptance of people in a society to either act as individuals or as a group of people. In this section we will discuss the influence of individualism on Agile roles, processes, and artifacts.

5.3.2.1. Influence of Individualism on Agile Roles

Agile software development favours individualistic cultures because individualistic teams exercise democratic practices (Zhao, 2015). The individualism national cultural dimension influences Agile roles in relation to heroism, preference toward loosely knit relationships, expectation to be looked after and protected by the Scrum Master, the expectation to be unquestionably loyal to the Scrum Master / Team Leader, and how roles are defined.

Heroism / Individual Performance

Heroism refers to a hero-culture where individual performance is valued more than team performance. The Agile framework prescribes collaboration and collective accountability. According to the findings, Agile teams with a high degree of individualism often demonstrated a hero-culture whereby the teams were highly dependent on certain key individuals. Furthermore, success was defined in terms of individual performance as opposed to team effort. More mature Agile teams had good collaboration and a hero-culture was not as present.

In contrast, collectivist teams worked together, and shared duties and heroism did not prevail. P20 said that Developers were paired together to encourage a variety of opinions. In matured Agile teams, people were familiar with each other's blind-spots and played to each other's strengths. Collectivist teams operated together and in harmony.

> *"Initially, there was some heroism but we are trying to get rid of it. We do this by motivating people to share knowledge so that multiple people can do the same job or task, and so that there is less dependency on one person." (P18)*

Loosely Knit versus Sense of Family in Team Preference

Literature points out that individualistic cultures tend to have a preference toward distant relationships whereby each member has their own identity and preferences. This theme describes the preference of Agile teams to have distant relationships with each other or toward having a sense of family within the team. According to the findings, most software development teams in large corporate organisations were transactional and there was not a sense of family; therefore, they were individualistic. Individualism therefore influenced Agile roles whereby the roles related to each other on a transactional basis. They preferred to be loosely knit in their interactions with one another. Both

P4 and P21 said that in the organisations where they worked, which were in the banking and financial industry, had a hero culture. A hero culture is where there are high performing individuals who the team relies on and may become dependent on. P21 attributed this to the organisation being more individually orientated than team orientated. P21 elaborated there was a move toward rewarding the collective instead of only individual performance.

The length of time a team was together could indicate whether a team was individualistic or collectivistic. P26 said that this could be due to team members not being long enough in the same team, since changes are often made to teams in large corporate organisations. Team members in large corporate organisations were placed between various teams and did not get a chance to form relationships. P4 mentioned that their team members were often swapped between various projects and could not really form relationships. Teams that were together for several years were generally close and knew each other personally, as explained by P23. Therefore, one could say that these teams became collectivists.

Smaller Agile teams of eight or fewer members were very family-orientated as a team. P12 explained the Scrum team was involved in each other's lives and were connected on a personal level first before engaging with work activities. P22 stated the importance of individuals bringing their whole self to the workplace and that a whole Sprint was allocated to form relationships. In fact, P22 elaborated that having had a Sprint assigned for team building assisted the team to get to know each other's weaknesses and strengths, and to find out the team's experience and passion. P14 said that in their team in the retail industry people were not involved in one another's personal lives although it was welcomed. P14 elaborated that on a professional level people were understanding with one another and there was open communication. In many large corporates, team building happened every quarter and there was an assigned budget for these exercises. Another process used were coffee sessions with the team to assist with becoming a family. The team recognised the importance of those sessions for collaboration since they were culturally diverse and there were different personality types. P22 mentioned that in a Scrum team they allocated a Sprint to get to know each other in a series of team-building exercises. For many Agile teams that were close, the meetings started with team members asking about other team members' personal lives. They celebrated and supported life events together such as when a team member graduated. P23 mentioned that the team had gatherings at each other's homes as well.

> *"As an organisation, we are very much about the collective and bringing your whole self to the workplace. This team is still relatively new with only our second Sprint in. So, we still obviously forming all of those relationships. We've actually dedicated a whole Sprint just to*

get to know each other, doing team-building exercises which were a bit challenging to do virtually." (P22)

Protected by the Scrum Master Expectations

Literature suggests that collectivist cultures tend to expect to be looked after by their leaders (Yaggahavita, 2011; Brewer & Venaik, 2011). According to the findings, it was the individualistic South African Agile teams in general that had an expectation to be protected by the Scrum Master and, over time as the team matured, the team would be less dependent on the Scrum Master. Independent teams informed the Scrum Master when they needed assistance. Individualism influenced Agile roles whereby the Scrum Master had their own duties, and they were not always available to play a role to protect and nurture a team. P4 said that the Scrum Master was generally split between teams and could not always look after a particular team, but the teams expected to be looked after by the Scrum Master. Therefore, although individualistic teams had an expectation to be protected by the Scrum Master, the Scrum Master was not always available or dedicated to a single team.

The expectation to be looked after by the Scrum Master also depended on each team. Some teams needed more attention than others. Scrum Masters in SAFe teams also had their own duties and could not always be available to protect the team (P4). In these cases, the team looked to the Agile Coach to perform the duties of a Scrum Master. P26 advised that organisations should become more creative in how teams are incentivised and to empower teams to be self-organised. In collectivist teams, there was an expectation to be protected by the Scrum Master. P24 said that it there was an expectation to be protected from interferences, and P12 said there was an expectation on the Scrum Master to ensure that nobody works overtime.

"That expectation exists in the beginning but over time as the teams mature, they become an entity that can stand on their own" (P26)

Loyalty to the Scrum Master Expectations

According to literature, in collectivist cultures, people tend to be loyal to their leaders in exchange to be protected (Hofstede, 2013). The findings revealed, on the contrary, that there was a trend toward hierarchical individualistic teams being expected to be loyal to the Team Leader. Sometimes the Team Leader or manager was the Scrum Master. Some participants from Scrum teams mentioned there was an expectation to be loyal to the team instead of the Scrum Master. Depending on the structure of the team and how long the team was together, the expectation to be loyal varied within the teams.

In some cases where the Scrum Master was the Team Leader, P6 shared that there was an expectation to be loyal to the Team Leader / Scrum Master in that the decisions of the Team Leader were final,

and the team had to accept it. This aforementioned team was individualistic. P15 said there was an expectation to be loyal to the Scrum Master. That was the case where the Scrum Master was also acting as a manager to multiple Scrum teams. These teams were collectivists. P17, who was a Scrum Master, said that any expectations were set by herself. This expectation to be loyal to the Scrum Master depended on whether that Scrum Master was the leader of the team. In one team that was new to Agile, P26 mentioned that team members did not see the need for Scrum Masters, therefore, getting buy-in from teams was difficult. In a collectivist team, P20, who had oversight of a mature Scrum team with a flat structure, said that the expectation was to be loyal to the team rather than to the Scrum Master or a person. P7 shared the same sentiment. P25 mentioned that there was more an understanding among the team members instead of being loyal to the Scrum Master. Therefore, the roles were influenced in that they were loyal to each other in mature Agile teams with a flat structure. In hierarchical teams, there was an expectation to be loyal to the Team Leader.

> *"The team wanted to be protected by the Senior Team Leader from too much interference and would be very loyal to the Team Lead." (P6)*

Role Definition

Collectivist societies, based on literature, show a clear division of labour. For example, in collectivist cultures job duties are defined by clear titles. Culture had an influence on how roles were defined in South African Agile teams. According to the findings, in individualistic Agile teams, members' roles were defined by the title instead of duties in that the title was definitive of the duties attached to their role (P14). For example, there were experts in specific fields. There was a hero culture within most SAFe teams. This was due to historical culture of teams in the corporate environment. Agile Coaches tried to address the culture by encouraging teams to work together. In Scrum teams that were large (twelve or more team members) team members defined their roles by title for example a backend-developer role was definitive of the duties they performed, as explained by P3. On the contrary, Scrum Masters or Agile Coaches felt that serving the team was important above having defined duties. While Scrum Masters felt their title was not relevant, they were there to serve the team where assistance was needed. Scrum Masters, Agile Coaches and even Product Owners embraced the Agile mind-set of being servant leaders or being flexible. Scrum Masters and Agile Coaches in South Africa insist that teams should have a sense of family. Hence, Scrum Masters and Agile Coaches can be deemed as collectivists.

> *"…an expert in a particular domain would have a title like senior mainframe developer. The organisation's culture has a bit of a 'hero culture'" (P4)*

Team Cohesion

Team cohesion in this context refers to the formation of sub-teams whereby teams were split according to domain, job function, platform, or technical architecture. Literature mentions that, although westernised South Africa may be individualistic, it desires a greater integration into smaller groups and families (Booysen & Van Wyk, 2007). According to the findings, in large-scale Agile teams, where a high degree of individualism was demonstrated, in-groups were prevalent. P16 said, “an example would be where twenty people of different races would come into a room and would most likely relate to or first interact with people of the same race”.

Sub-teams existed where multiple vendors or disciplines from various domain teams were involved as well as in large corporate organisations. In the insurance industry, as mentioned by P9, the vendor that performed the quality testing had a separate team. The Business Analysts were internal to the organisation and formed the Business Analyst team. The Lead Business Analyst played the role of the Product Owner. The Developers formed another team as well. It was a general trend according to the findings that analysts were separate from the rest of the team in large corporate organisations. In Agile/Scrum teams of eight members or less, sub-teams were not mentioned, but the team operated together (P23).

Furthermore, the Scrum Guide prescribes that the team should be collectively accountable and responsible. However, the findings revealed that individualistic teams were not collectively responsible and accountable for the product. The Scrum Master was responsible for the delivery of the team and the Product Owner was accountable for the product.

“There are sub-teams and leads because mentorship is important in the office.” (P13)

5.3.2.2. Influence of Individualism on Agile Processes

Individualism exerts an influence on Agile processes in relation to the expectation of the active involvement in Agile processes.

Participation in Ceremonies

The findings revealed that team members in individualistic teams did not participate in many of the Agile ceremonies, whereas collectivist teams were involved in most of the Agile ceremonies. In individualistic teams, team members were only expected to give feedback on their own items in the Daily Stand-up meeting, as explained by P6. In collectivist teams, everybody was expected to participate and prepare for the planning sessions and give their input, since the team was collectively responsible, as P23 explained. Most participants in this study, from individualistic and collectivistic environments alike, said that team members were not expected to be involved in all the Agile

processes and that it was based on the relevance of the roles played; for example, a ceremony that did not involve all team members in the Sprint Planning 2 session which was a session for various technical teams to break down tasks for the upcoming Sprint. This was due to the relevancy of roles in the sessions. Collectivist teams were no exception. For example, P24 said that in some teams the expectation of the involvement relied on the technical content of the meeting. P22, a participant from a collectivist environment, said that when the technical team did their break-down, they did it on their own because it would be a waste for the other team members' time to watch. However, all team members were exposed to the items during the Daily Scrum. P24 said that a Business Analyst and Quality Assurance Tester did not have much to contribute to the technical design. Therefore, the team first considered those who would add value to a meeting. It therefore depended on the meetings and the relevancy of the person's role in that meeting. Individualism influenced that in large-scale Agile teams, as members did not always participate in ceremonies or challenge due to their workload and insufficient time to reflect on the work performed, although the Scrum Master encouraged participation.

> *"Teams should be engaged. However, this requires remarkable facilitation skills and creativity to keep engaged and invested in the meetings they attend." (P26)*

5.3.2.3. Influence of Individualism on Agile Artifacts

Individualism influenced the Agile artifacts in relation to accountability for artifacts, and the priority of institutional goals versus individual goals.

Accountability for Artifacts

In literature, it is particularly important for Agile teams to work on artifacts together as a team. The Scrum Guide prescribes collective accountability for artifacts. The findings revealed that team members in individualistic Agile teams were expected to be involved in the artifacts of the team but generally they did what they were good at or what their role entailed, and group accountability was not prevalent. P4 said that the team assigned accountability of artifacts to individuals. Regarding participants in individualistic teams, P25 said, for example, that each person was responsible for their own work. Lastly, various disciplines or domains in the same team had lead roles, e.g., Quality Assurance Test Leader, Development Lead, Business Analyst Lead, etc.

In contrast, participants in collectivist teams, for example P20, said that the artifacts and metrics were everyone's responsibility in the team. There were peer reviews done as well where the work done was checked. Furthermore, Scrum teams had junior and senior Developers who were paired together, and this structure assisted with knowledge transfer (P20).

"With artifacts, there is an expectation to be involved overall for the team. Generally, there is a bit of a barrier to that and separation; for example, you would do what is in your lane instead of everyone working together on something. They were looking at who was accountable for something." (P4)

Institutional Goals versus Individual Goals Prioritisation

According to literature, institutional collectivist societies prioritise institutional goals over individual goals. Teams in large corporate organisations leaned more toward group commitment than individual goals. This was the case as well in Scrum teams in a few large corporate companies. This means these teams had high institutional collectivism. Furthermore, although companies encouraged teamwork, there was no financial reward for achieving team goals. P21 said that the influence this institutional collectivism had on Agile artifacts is that management made commitments on behalf of the team to deliver Increments by a specific deadline. P1 said sometimes people worked during their leave if there was no one else who performed that task. In most small Agile teams, individual goals rarely suffered, and it was taken seriously by management in that leave was never cancelled. P20 said that those who were available filled in for the others who were not available, and this resulted in the team supporting one another very well. There was also a reward to individuals in Agile teams. P5 said that their company used a programme called Bonusly to recognise team members for what they had done and reward them with a monetary gift. This was a system for team members to recognise one another. Teams in smaller companies were also aware of individual goals / commitments and scheduled work around availability. P18 said that when there were dependencies on people who were on leave, the team completed as much work as possible until the person returned. In addition, consensus leave for life events was offered and this only influenced how much work the teams took on during Sprint Planning as mentioned by P3. Lastly, in teams that had close personal relationships, the Product Owner did not make commitments on behalf of the team until the individual team members' availability was discussed.

"There is no commitment made by the Product Owner before it is discussed with the team or if it is something that they don't think that they can cope with. There will be a collective decision, even though we allow and encourage individual growth. We want to see growth for the person and the product." (P23)

5.3.3. Influence of Uncertainty Avoidance / Conservatism (Embeddedness) / Intellectual Autonomy on Agile Implementations

Uncertainty avoidance is the degree to which a society is comfortable with uncertainty and ambiguity (Hofstede, 2013). In the context of Agile software development, participants were asked how flexible

their roles, processes and artifacts were and whether they were comfortable with uncertainty and ambiguity.

5.3.3.1. Influence of Uncertainty Avoidance on Agile Roles

As mentioned in Chapter 3: Theoretical Framework, uncertainty avoidance will include the intellectual autonomy and embeddedness national culture dimensions as they are similar to uncertainty avoidance. The uncertainty avoidance national culture dimension influenced Agile roles in relation to the flexibility of the roles and duties within the team, and the authority to decide the workload.

Flexibility of Roles and Duties

Societies that have high uncertainty avoidance are more rigid. Uncertainty avoidance influences Agile roles in the degree of flexibility of the roles and duties of the team. Literature found that the Agile framework is suitable in cultures where there are high flexibility and spontaneity (Siakas & Siakas, 2007). The Agile framework prescribes that team members should be cross-functional in their duties. According to the findings, in low uncertainty avoidance environments, members had flexible job roles and duties. In this regard, P20 reported that everyone assisted where they could because everyone was ultimately responsible. The challenges faced by low uncertainty avoidance teams were that their job duties tended to be unclear. P8 explained that, in their support teams, the duties were muddled, which posed a challenge since team members changed their focus from their principal duty and role, e.g., a Developer sometimes assisted with software testing in a project team, since there was only one Quality Assurance Tester.

In high uncertainty avoidance teams, the team's duties were not flexible due to teams being separated according to their capabilities. P4 said that in their team the duties were not flexible due to the separation between team members with different job titles and duties.

Many participants in this study that were part of Scrum teams had high uncertainty avoidance. According to the findings, new Scrum teams had team members who were not flexible in their job duties and did not assist when idle. Therefore, this implies that novice Scrum teams had high uncertainty avoidance, while more matured teams were more tolerant of ambiguity and uncertainty. More matured Scrum teams were flexible in their job duties and assisted wherever assistance was needed. Agile Coaches coached people to be T-shaped individuals but people generally retained their own job descriptions.

> *"Our job duties were very flexible so everyone was expected to assist wherever they could because ultimately, everyone is responsible." (P20)*

Workload Authorisation

According to literature, organisations with high uncertainty avoidance revert to bureaucratic practices to lessen the impact of unpredictability of future events (House et al., 1999). The findings revealed that uncertainty avoidance influenced Agile roles based on who had the authority to decide on the workload during a Sprint. For high uncertainty avoidance, management had the authority to decide on the workload during a Sprint. For example, P14 said that the Project Manager and Product Owner could control what happened in the Sprint and the Product Manager (who was a business manager) was authorised to decide the workload for the Sprint. In low uncertainty avoidance organisations, the workload was decided by the Developers in terms of how much work they could do in a Sprint. Flexible teams had fewer rigid processes or protocols to be adhered to when decisions had to be made. P23 elaborated that an internal conversation was held between the Scrum Master, Technical Lead, the Product Owner, and Development Team regarding the workload. Furthermore, the team was empowered to decide what happened in the Sprint as explained by P19. The Scrum Master decided on the workload in cases where there were multiple teams, vendors, or sub-teams within the Scrum team. It can be derived that low uncertainty avoidance allows a team to better adhere to the Agile principles.

> *"There is no authorisation, but there would be a conversation between [Scrum Master], the Tech Lead, Product Owner and the Development Team." (P23)*

5.3.3.2. Influence of Uncertainty Avoidance on Agile Processes

Uncertainty avoidance influenced Agile processes in relation to flexibility of the Sprint duration, standard control practices, Sprint scope flexibility, strictness to follow procedure and processes, as well as comfort with uncertainty and ambiguity during Sprints.

Sprint Duration Flexibility

The findings revealed teams with low uncertainty avoidance were flexible and experimented to change the Sprint duration to suit their business practices. For example, P18 said that their team experimented with changing the Sprint duration from two weeks to three-week Sprints to accommodate their business cycles. SAFe teams typically demonstrated high uncertainty avoidance whereby the Sprint duration for all SAFe teams in an organisation or for a project had to be the same as the teams were dependent on one another for various outputs. Therefore, the cadence had to be the same to stay in sync with Increments that were rolled out. In contrast, Kanban teams demonstrated lower uncertainty avoidance and were more flexible. These teams welcomed uncertainty and ambiguity to allow for more flexibility to complete requests from the business.

> *"The Sprints are pretty much set in stone so that we can keep our cadence."*

Standard Control Practices

The findings revealed that in large corporate companies where there was typically high uncertainty avoidance, the organisation had a ceremony called Program Increment Planning, which was used to plan the work to be delivered. Project Objectives were planned for twelve to thirteen weeks in advance. P21 said that this allowed the team to meet the demands of business stakeholders while keeping in mind the complexities involved. Furthermore, Scrum teams with high uncertainty avoidance used the method of consensus to control what happened in the Sprints. For example, P24 said that when a change was proposed, the Scrum Master approached the team and they voted whether the change could be accepted for the Sprint. Teams with low uncertainty avoidance used the method of willing consent. In other words, the team knew each other well enough and trusted that the person making the decision had the teams' best interest at heart. The team was also consulted by the Scrum Master and Product Owner regarding the benefits of changes. However, there was no standard control practices or authorisations required.

> *"It happens by consensus within the team and changes are normally put forward by the Scrum Master and supported by the Product Owner." (P24)*

Sprint Scope Flexibility

According to the findings, in large corporate companies with high uncertainty avoidance, the scope was not strictly signed-off. P4 said that the scope was flexible mainly due to the SAFe framework which allows for the change of scope; however, the team was not comfortable with uncertainty. P4 elaborated new items may be placed into a Sprint based on priorities changing since the stakeholders spontaneously decide on what they plan to do for the next six Sprints and then it might change along the way when the priorities change. P14 also said that their Sprint was flexible and that the Backlog was prioritised based on urgency. Large-scale Agile teams attributed their high uncertainty avoidance or discomfort with uncertainty and ambiguity to having insufficient time to resolve queries. P4 explained, "*I would say there is too much flexibility here where there's not a lot of lead time so they're just kind of reactive.*" In mature Agile/Scrum teams where there was low uncertainty avoidance, there was a degree of flexibility within the Sprint regarding requirements while newer teams were not flexible or accepted requirements that were unclear. P20 explained, *"The Sprints were time-boxed to two weeks but there was a degree of flexibility in the Sprints. There was a definite aspect of emergence with our requirements, so there had to be a natural sense of uncertainty and ambiguity in our requirements, so it was very important for the team to be comfortable with this."* P20 further explained that their team initially, at formation, wanted the *"cast in stone set"*, but with time as trust was developed members became more comfortable with uncertainty and ambiguity.

"The scope is not strictly signed-off, although they commit to objectives. I would say there is too much flexibility here where there's not a lot of lead time so they're just kind of reactive; where things come in all the time, and they just have to deal with it. They're trying to become stricter by fixing scopes for one or two Sprints at a time, but generally there are quite a lot of things that just slip through." (P4)

Procedure and Process Strictness

According to the findings, when high uncertainty avoidance was manifested, teams had to strictly follow due procedures. P14 said that if a team member did not follow the relevant procedure, the Business Development Manager made the responsible person aware of what was not done according to procedural policies. In large corporate companies, the procedures were generally strictly enforced. This applied to their change control processes as well as their artifacts which were templatised and had to be completed in a specific manner. Smaller Agile teams, where low uncertainty avoidance was demonstrated, were flexible and not strict on policy or there was no documented policy but there was a standard way of work for the team. For example, P13 said that there were guiding principles for the team to remain Agile or to follow the Agile framework, which in their case was the Scrum methodology.

"We aren't strict with regards to policies, procedures and Scrum processes, because I think you can lose agility as this is all about change and adapting." (P23)

Pursuit to Follow own Ideas Regarding Processes

The findings revealed that in instances of low uncertainty avoidance or high intellectual autonomy team members were encouraged to pursue their own ideas. According to the findings, in large corporate companies, intellectual autonomy was encouraged in theory but not much was put in practice, as explained by P8. This was due to project time pressure as well as red-tape and bureaucracy that halted the progress of the team regarding their own ideas. In contrast, in smaller organisations where lower uncertainty avoidance prevailed, curiosity and creativity were valued by management and the team was supported to experiment with Agile frameworks. The Scrum teams were reminded by the Scrum Master of the values and principles of Agile when new ideas were presented to remain agile. Furthermore, time was set aside in the Sprint for the team to research any ideas to present back to the team.

"Well, the process is theirs. Scrum is just the beginning. I value curiosity and creativity so I would give you the framework and I expect you to explore it, pull it apart, put it back together, find a way that works for you, and if you make a mistake, I will be there to support you." (P20)

5.3.3.3. Influence of Uncertainty Avoidance on Agile Artifacts

According to the findings, uncertainty avoidance influenced Agile artifacts in relation to the team comfort with uncertainty and ambiguity in requirements, flexibility of Sprint Scope, Burndown chart management, blocker resolution, and tolerance of unorthodox methods.

Team Comfort with Uncertainty and Ambiguity in Requirements

According to the findings, large companies or new Agile/Scrum teams were not comfortable with ambiguity and demonstrated high uncertainty avoidance. Subsequently, high uncertainty avoidance influenced Agile artifacts such as the Sprint Backlog whereby the team did not take a requirement into the Sprint if there was any uncertainty or ambiguity. For example, P3 said that the team did not take on work in the Sprint if the requirements were not clear. In contrast, in support teams that used Kanban, the team had a tolerance for uncertainty and ambiguity especially when it was production issues. The issues were taken on by the team and investigated.

In smaller or more mature Scrum teams, the senior team members removed uncertainty and ambiguity while the junior staff were more apprehensive when talking about uncertainty (P5). Ambiguity and uncertainty were removed during the Sprint Planning sessions.

"We don't take on a User Story if there is uncertainty and ambiguity." (P3)

Burndown Chart Management

Literature states that Burndown charts are used for the timely completion of a Sprint (Arafeen & Bose, 2009). Therefore, it can be deduced that teams using Burndown charts want to control the time factor in the Sprint which relates to high uncertainty avoidance. Zhao (2015) said that Burndown charts were used in countries with high uncertainty avoidance. However, according to the findings, teams with low uncertainty avoidance used Burndown charts while teams with high uncertainty avoidance did not necessarily track Burndown charts. For example, in low uncertainty avoidance teams, participants such as P12 and P22 said that they did not use the Burndown chart often but when they used it, it was for tracking progress in the Sprint to meet the Sprint Goals. Scrum Masters were normally responsible for managing the Burndown chart. In some cases, the team had a Project Manager acting as the Scrum Master. Not all teams used a Burndown chart since they did not find it useful to the Sprint. Where it was in use, teams used Burndown charts to track work done in the Sprint and progress to meet the Sprint Goals, i.e., establish what the team planned to deliver and what they have delivered. P1 mentioned that the challenge with the Burndown chart was that it was inaccurate as some team members did not update their tasks, input comments, or move User Stories on time. P12, a Project Manager, used Burndown charts to track how long Developers took to close a task and to predict what

can be achieved in Sprints. P2 only used the Burndown chart to see if the team did not complete enough work, they planned incorrectly, did not break down the work in small enough chunks, or when someone went on leave. P19 said that they used the Burndown chart as a touch point in a Retrospective.

> *"Burndown charts did not add value to the Sprint, so I dropped it. We used it to establish what the team planned to deliver and what they have delivered." (P9)*

Blocker Resolution

According to the findings, blockers were resolved in the same manner for teams with high uncertainty avoidance and low uncertainty avoidance. In support teams in large corporate companies, there were Service Level Agreements (SLA) to various requests which had to be strictly adhered to. For Agile teams with a low degree of uncertainty avoidance, blockers just had to be resolved as soon as possible where an investigation would be done and decided whether the item can be unblocked in the current Sprint or had to rollover to a later Sprint depending on the priority.

> *"For blockers, we try to solve them as soon as possible most of the time because some of them are production related. But most of the work the team does has an SLA and it's quite a big thing that gets strictly adhered to." (P8)*

Unorthodox Methods and Ideas Tolerance

Conservative societies are averse to actions that may be different to the social norms of the solidarity group (Schwartz, 1999). This sub-section discusses the Schwartz national culture dimension of embeddedness which has a significantly positive relationship with the GLOBE study's uncertainty avoidance national culture dimension (Hanges & Dickson, 2004). According to the findings, conservative (high embeddedness/uncertainty avoidance) teams were not very tolerant of unorthodox ideas and methods. For example, P4 and P14 said that their project and platform SAFe teams were less tolerant of unorthodox methods as they wanted to establish a common team approach. In contrast, P8 said that, in support SAFe teams, unorthodox methods are welcome to constantly improve on the existing processes and artifacts. P8 also said that they used Kanban instead of Scrum for their support work as the framework allowed them to take on urgent work such as production issues where service level agreements applied. Therefore, support teams were less conservative or had lower uncertainty avoidance compared to SAFe project or platform teams. The general response for Scrum teams was that they were tolerant of unorthodox methods and ideas if they added value such as making things clearer. Therefore, most Scrum teams had a degree of low embeddedness or low uncertainty avoidance. For example, P12 and P3 said that their teams are not

tolerant of methods that steer away from the Scrum framework. Teams that experimented with different frameworks or that combined frameworks to suit them allowed for unorthodox ideas and methods. Therefore, teams that used mixed frameworks manifested lower uncertainty avoidance than teams that followed the Scrum framework strictly. For example, P19 said that they fostered a culture of experimentation and that the team is tolerant of new ideas and innovation such as using alternate methods, namely, Scrumban (a combination of Scrum and Kanban) and altering the methods to suit the team.

> *"If it makes sense, and it is a better way to do it we won't object. But we always stick to the Scrum framework." (P3)*

5.3.4. Influence of Masculinity / Assertiveness / Gender Egalitarianism on Agile Implementations

Masculinity refers to a society's preference for achievement, heroism, assertiveness, and material success. In the section we will discuss the influence of masculinity, assertiveness, and gender egalitarianism on Agile roles, processes, and artifacts. The researcher will conflate masculinity, assertiveness, and gender egalitarianism as masculinity.

5.3.4.1. Influence of Masculinity on Agile Roles

The findings revealed that masculinity influenced Agile roles in relation to heroism / individual performance, competition among team members, dominant relationships, moral equals, higher education, leadership, and internal commitment to cooperate.

Competition among Team Members

The findings revealed that in Agile teams with a high degree of masculinity there were high degrees of competition among team members. P6 mentioned that sometimes competitive tactics were used for individual gain such withholding information or assistance to another to be better placed for a future promotion. On the other hand, P26 said that competition can be used to create innovative ideas. In most Agile teams which demonstrated a low degree of masculinity, there were no competition among team members. There was an instance where an organisation actively promoted competition among individuals, but this was the exception rather than the norm for most Agile teams. For example, P6 explained that competitive tactics were used especially when a position became available that two individuals in the organisation stood a chance of filling as a promotion. As an example, when one of these members needed assistance, the one member did not assist the other member in the team that was also earmarked for the job promotion. Another example of competitive tactics are of withholding resources to do work for other teams. P14 mentioned that there was a lot

of competition in their team and some team members were possessive of their subordinates. Therefore, high masculinity influenced Agile roles resulting in negative competition among team members or teams withholding resources or knowledge.

> *"There is a lot of competition in other teams between the developers and some are quite territorial." (P14)*

In teams where there was a low degree of masculinity, team members supported one another. Cooperation, modesty and caring are feminine values and thus the opposite of masculinity (Hofstede, 2013). According to the findings, where a low degree of masculinity was demonstrated, teams cared for one another. P14 said that caring and cooperation mostly came from external members to the team or vendors to get solutions or input. In most Scrum teams caring for each other was a particularly important dynamic in the team. P26 said that the values of cooperation, modesty and caring acted as inspiration when things got tough, especially in stressful and conflict situations. In a mature Agile team, there was a balance between healthy competition and caring. Therefore, a mixture of feminine values along with positive competition was the hallmark of teams that did well together.

> *"As the team becomes more mature, there is a balance between the whole 'yin-yang' thing. Teams can be quite competitive but also co-operative, modest, and caring. A really well-formed Scrum team has both. If it is one or the other the team won't do well together." (P20)*

Dominant Relationships

In societies with high degrees of assertiveness, there are dominant relationships. In Agile teams in South Africa in general there were dominant team members. Dominant team members were generally those who had the most domain knowledge. Therefore, it can be derived that teams with domain experts had a high degree of masculinity. P4 said, *"it is very masculine in the sense of who knows more on a particular subject"*. However, they did not necessarily intentionally assert themselves. The team listened to those with expertise in a particular area and mature teams trusted that person's judgement. P4 said that it could also happen that a team member would assert their own agenda or take a dominant role, but the team would become accustomed to the behaviour and expected that person to be domineering and seemingly accepted it, although it caused conflict at times. P17 felt that everyone should be given the opportunity to be assertive and curbed attempts to derail the team from their goals. P20 mentioned that a dominant person may be right and therefore leaders and Scrum Masters had to be assertive as well and probe into the matter.

> *"For me, there's a difference between pushing your own agenda and pushing your opinion. There's one where the agenda is common but we have different perspectives on what or how.*

If you create the right spaces, everyone is able to be assertive. But there have been a few people who tried to drive their own agenda which wasn't in line with where the team wants to go, this I curbed within the meetings." (P17)

Moral Equals

According to the findings there was no gender inequality stated among Agile teams in terms of respect given to males and females. For example, P14 mentioned where there were female Developers, the same respect was given to the female Developer as to the male Developer whereby the same work or workload was assigned. P8 said that the fact that team members regard each other as equals reflects on the maturity of the team. P8 also said that team topics during team catch up sessions were more toward male preference, e.g., sport.

"It hasn't come up where women are put down in the company, but as far as distribution and roles, you can see the inequalities there." (P15)

Higher Education and Leadership Positions

Internal training was given to male and female staff. Furthermore, gender was not seen as a factor that can impact roles but rather the qualifications and experience of the individual. P19 said that the women in their team had higher education qualifications and professional qualifications. Furthermore, P7 said that females were encouraged more than males to pursue further studies. P1 said that gender did not impact the Agile roles and that only qualifications, experience, and negotiation with each other mattered.

"There is equality in the work environment; in fact, this is encouraged by the business. They are trying to get a lot more females to get into these leadership roles. At the moment, business is more focussed on encouraging females to be in these roles to promote a sense of equality in the workplace." (P7)

Internal Commitment to Cooperate and to Feel Concern for Team's Welfare

In high gender egalitarian societies, individuals make an internal commitment to cooperate and to feel concern for the team's welfare. In smaller organisations, where a high degree of egalitarianism manifested, team members care about each other and commit to one another even personally. This was based on an internal commitment. The Scrum Master also actively checks the team health. P6 said that when Developers started leaving, the Tech Leader became more concerned about the health of the team. In large organisations, teams had a low degree of egalitarianism since they had to be told to assist other team members and where to assist.

"The team Leader did try and make sure the team was happy as much as he could; there was a stage where a lot of the Developers were leaving and at this point, they became more concerned about people's welfare." (P6)

5.3.4.2. Influence of Masculinity on Agile Processes

The influence of masculinity, assertiveness and gender egalitarianism influenced Agile processes in how teams reach agreement during processes, team members speaking up during meetings, and commitment to assist others in meetings as a matter of choice.

Agreement during Processes

Societies with low masculinity work together to reach agreement. According to the findings, masculinity influenced Agile processes whereby teams demonstrating low levels of masculinity used a democratic process of consensus to reach agreement. A democratic process is where each team member gives their input. P2 said that the vote had to be conclusive and inclusive. P19 gave an example where in the Retrospective ceremony topics for discussion were decided by vote. When there wasn't agreement then an investigation would be done and then the matter was debated. In teams with a high degree of masculinity, team members with the most knowledge on a topic made the decision. However, according to P4, consent was not always necessarily willingly given in that the attitude was, *"I don't want to argue about it, and so I'll just go with it."*

In addition, as teams matured, they eventually used the method of willing consent. P20 made an example where the person with the most experience in a particular area of expertise made the decision and the team trusted that that person would act in the best interest of the team. P18 said that Agile Coaches could also use Team Lift-Off sessions as a team building exercise when new members joined or when new projects start. In these Team Lift-Off sessions, team agreements were created.

"Depending on the decision, you can default to democracy (the team would vote); for example, if we are having a Retrospective, we would vote on the topics brought up and which are most relevant and important. There are other scenarios where there is a bigger decision that has to be made and even if we do" (P19)

Speaking up during Meetings

Assertiveness influenced Agile processes whereby when leaders were more assertive than the team the team eventually did not speak up or give their opinion and ideas. P6 said this was because the team felt that they were not being heard. In teams with a low degree of masculinity, all members had an equal chance to speak up in meetings. The Scrum Master ensured that everyone was heard where

there were dominant people and hence they did not impact the Agile processes and artifacts too much.

> *"With dominant individuals, the team would let them speak and listen, but because of this it is important for the Scrum Master to facilitate so that everyone gets heard. This is one of the easier aspects to solve than the culture dynamics." (P16)*

Conflict Resolution

In masculine societies, conflicts are resolved through battles as opposed to understanding and negotiation (Hofstede Insights, n.d.). The findings suggested that masculinity exerted an influence on Agile processes in how conflict was resolved. In Agile teams with a high degree of masculinity, conflicts were resolved through direct confrontation. P6 said, *"There have been shouting matches and walk-outs; complaints given to managers. There were also face-to-face conflicts."* In teams where a low degree of masculinity manifested, there were hardly any conflicts in teams where there were transparent relationships. In a team where all roles were female, P17 explained that personal conflict was avoided but intellectual conflict was resolved in meetings: *"They tend to avoid conflict. We have a team who are more introverted and a culture of playing by the rules. They are good with academic conflict, but they try to avoid emotionally interactive conflict"*. During these meetings, the Scrum Master allowed each person to speak up. In addition, P19 said that in a remote setting their team struggled to express their concerns, fears, or disagreements.

> *"Things have changed in being remote, so it's one of two things; conflict can be amplified or it can be kind of swept under the carpet. The team does not have a big bravado, or masculine tendencies. People are struggling to express themselves in being remote or even express fears or disagreements." (P19)*

Commitment to Assist others in Meetings as a matter of Choice

In teams with a high degree of gender egalitarianism, team members were committed to assist each other as a matter of choice. In low egalitarian teams members expected to be told what to do (P16) and people had to request assistance where needed (P4). Smaller teams had high egalitarianism and made the teams aware when they needed assistance or when they could offer help. P12 said that their team was motivated and P21 said that management encouraged the teams to make explicit where help was needed and to indicate when they could help team members.

> *"The team just steps in and assists wherever they can. In scrum, we are motivated to work together as a team." (P12)*

5.3.4.3. Influence of Masculinity on Agile Artifacts

The influence of masculinity influenced artifact development and the presentation of blockers.

Artifacts Development

The findings revealed that masculinity influenced the Agile artifacts in how the artifacts were developed. Teams that demonstrated a low degree of masculinity voted, decided, and agreed on the approach for artifacts development. In masculine teams, where the Team Leader was a Technical Lead, the Developers had a bigger influence on the artifact development than analysts or Quality Assurance Testers. A dominant Product Owner caused the team to be unhappy and many processes and artifacts were changed. P2 said that the dominant Product Owner changed the artifacts whereas the Product Owner that included the team allowed the team to give input into the Product Backlog and other artifacts.

> *"With the dominant Product Owner, it caused a lot of frustration in the team. It was chaotic because this Product Owner would change the processes and artifacts and this caused a lot of unhappiness within the team. With the new Product Owner, the team was much happier because things were more ordered and we knew what we were doing with regards to the Product Backlog, vision and goal." (P2)*

Presentation of Blockers

According to the findings, in teams with high masculinity, Scrum Masters wrote down blockers in meetings while presenting (as teams were remote). Therefore, it can be deduced that Scrum Masters played a secretarial role in teams with high masculinity. For example, P4 said that the Scrum Master wrote notes and made it transparent. In teams with low masculinity or high gender egalitarianism, the Scrum Master did not necessarily do admin work. The team wrote down their own blockers on the Sprint Backlog and presented it to the team. P15 said that the Scrum team handled impediments whereby the subject matter expert sought to resolve the blocker. Furthermore, impediments were noted down in the ticket logging system (Jira) by the person who raised it. There was no instance where solely a woman had to write on the board.

> *"In the workspace, everyone brings their upbringing and experiences into the space. In my role, I avoid being the 'Scrummy mummy'. For example, I am not an admin fairy, I don't organize people's birthdays, or touch the board, or check anyone's artefacts, nor organise the team-builds. I think that is something that I love about this role because I can challenge those traditional views." (P19)*

5.3.5. Influence of Long-Term Orientation on Agile Implementations

In short-term societies, people prefer to maintain time-honoured traditions and norms while viewing societal change with suspicion (Hofstede Insights, n.d). Societies with long-term orientation encourage thrift and efforts in modern education to prepare for the future. Short-term societies are more normative than pragmatic. Normative people value procedure over the result (ibid).

5.3.5.1. Long-Term Orientation on Agile Roles

As it pertains to this study, long-term orientation influenced Agile roles in relation to whether growth and efforts of new ways of work are encouraged and the degree to which Agile roles are accepted.

Encouragement of Growth and efforts of new ways of Work

Long-term orientation influenced Agile roles in the encouragement of growth and efforts of new ways of work. According to the findings, organisations that had a long-term orientation encouraged team members to do training especially on the Scaled Agile Framework (SAFe). In organisations where Agile methodologies were newly introduced, teams demonstrated short-term orientation and growth in new Agile roles were not yet encouraged. P25 explained that this was due to the organisation being new to Agile methodologies. Key Performance Indicators were introduced to encourage growth for both individuals and teams.

> *"In the Scrum roles, they were looking at KPI's to encourage the growth of the team and individuals." (P2)*

Acceptance of New Roles

Societies with a long-term orientation are inclined to value *"learning, honesty, adaptiveness, and self-discipline, and see things from an overall perspective"* (Hofstede, 2013). According to the findings, teams with short-term orientation did not accept Agile roles and were set in their traditional ways of work. P4 said that most team members were not committed to cross-functionality in their job duties and Agile roles were seen as another job role added to their current role. Furthermore, P1 said that there were people who did not accept the change in roles or see the need for a Scrum Master. In long-term orientation cultures, values such as learning are embraced. According to the findings, in short-term orientation teams learning was not embraced as expected. P16 confirmed that Agile training was provided but there was not necessarily a passion for Agile and most people did not seek knowledge about it to change how they had been operating. Conversely, according to the findings, where long-term orientation was manifested, a change of roles was well accepted by members. P18 said that people in the team were open to change.

"The Agile roles have been well accepted, to a certain extent (i.e., Product Manager, Scrum Master, Product Owner, etc.). The Scrum Masters are enthusiastic of the new roles and ways of work, the Product Owners are still set in their old roles and ways of work so they are still having trouble adjusting. They haven't actually committed to the cross-functionality of their roles, including the Developers." (P4)

5.3.5.2. Influence of Long-Term Orientation on Agile Processes

The long-term orientation national culture dimension influenced Agile processes in relation to change management, and the nature of conversations in meetings, and the nature of the work done.

Change Management Process

Short-term orientation cultures have a need for absolute truth, clear structures, and well-defined rules. For instance, as explained by P19, their team displayed a need for truth by experimenting with ideas in a time-boxed environment and reflecting on it in the Retrospective meeting. P24 said that they used Scrum which had a change control process where consultations were held with teams and the Human Resource Department to assist with the transition. The researcher found that smaller Scrum teams were open to change. In small Scrum teams, there was a reluctance to change in the beginning. This was mostly a resistance in change of their own job duties. In addition, as leadership and the Human Resources Department supported change in organisations, teams *"became more understanding and supportive of change in scrum roles, processes and artifacts"* (P20). Therefore, leadership enabled short-term orientated teams to have an overall view or be long-term orientated. Long-term orientation was manifested in Agile teams in the form of team members working toward a role they wanted to become proficient in (P23). Furthermore, long-term orientated teams had Key Performance Indicators to encourage growth of teams and individuals alike.

"In the Scrum roles, they were looking at KPI's to encourage the growth of the team and individuals." (P2)

Nature of Conversations in Meetings

Societies with long-term orientation are pragmatic and accepting of change, whereas short-term orientated societies are normative (Hofstede Insights, n.d.). According to the findings, short-term orientated teams mostly had an element of reflecting on the past Sprint, i.e., *"what went well"* and *"what did not go well"* in Retrospective meetings, in comparison to focussing on the long-term results, future actions or how the team could improve. For example, P8 said that the team was not very forthcoming in ceremonies besides focussing on what they had done well. P4 said that the team did not focus too much on the future because they felt that nothing would have changed if they raised

issues or made suggestions. For many Agile teams in large corporate organisations the conversations about the future were frustrating for the team because they felt that it would not change anything. When suggestions were made there was lots of red tape since the organisations were bureaucratic. Therefore, it can be deduced that teams in large corporate companies were short-term orientated which influenced the Agile processes such as the Retrospective meeting to be more backward-looking than forward-looking.

Smaller teams were more pragmatic and most small Agile teams started with an icebreaker as well as talked about what went well to set a positive tone for the Retrospective meeting. Long-term orientation manifested in teams in the form of the team discussing the improvements for future Sprints at greater length than what normative teams did. In some of the teams, the action points were not documented as the teams felt it was not necessary. If it was a tough Sprint, the Retrospective ceremony was a longer session for long-term orientation teams. The team brainstormed ideas of how to do things better. One Scrum team renamed the ceremony as a *"Futurespective"* session (P23). Where the Development team was separate from the Product team, the Developers discussed what they wanted to change going forward, the quality of the product, and requirements they were given as well as how the various roles interacted.

> *"In Retrospective meetings, there is an aspect of focusing on continuous improvement but there is a larger aspect of focusing on the past. The conversations about the future become a frustration for the team because they feel that it won't change anything." (P4)*

Nature of Work Done

The relevance of the nature of work done is due to long-term orientation addressing past versus future practices. In this sub-section, past items would represent artifacts that arose because of the past, such as bugs and operational items, whereas artifacts that are based on the future would be new innovative features. According to the findings, normative (short-term orientated) teams mostly partake in operational tasks as opposed to innovative tasks, and additional authorisation was required for Agile artifacts such as the Sprint Backlog. P4 said that the nature of work done in their Sprint Backlog for their team was very operational with some features developed. P8 said that in their team the nature of work was a combination of operational tasks and innovation because it did production support and subject development which includes APIs in the background. Both bug fixing and feature development were done. The prioritisation depended on the importance of each item in the Sprint. Furthermore, there was also additional authorisation that happened in short-term orientation teams. In small teams, the nature of the work depended on where in the software development life cycle the team was working at the time of reference. For example, P2 said that in the beginning when the team

formed, they were mostly focussed on innovation and towards the end it was more operational issues that were resolved as the product was rolled out. Some teams after this point then introduced feature enhancements after the product was stable. Based on the findings, one can deduce that long-term orientation influenced the Agile artifacts to have innovative Increments while short-term orientation influenced the Agile artifacts to have more operational work. For example, a long-term orientated team had a high percentage of Increments being based on new work versus operational work. P20 said that the Increments were *"80% innovation and the rest was operationally supporting those products"*.

> *"It is very theoretical for the team at the moment, and one of the complaints is that there is a lot of admin involved. At this organisation, there are a few authorisations that need to happen on platforms other than Jira." (P8)*

5.3.5.3. Influence of Indulgence on Agile Implementations

According to literature, indulgent societies act on impulse. The researcher asked participants whether having fun and enjoyment were encouraged at work. The findings were that indulgence influences the Agile roles, processes, and artifacts.

5.3.5.4. Influence of Indulgence on Agile Roles

The findings suggested that indulgence influences the Agile roles in whether the roles and duties were enjoyed by the various Agile roles.

Enjoyment in Roles and Duties

According to the findings, large corporate organisations had low indulgence and the enjoyment of the roles was not encouraged by the availability of a budget or initiatives to make Agile job roles fun. P21 said that during the pandemic there was not much encouragement related to indulgent activities such as team buildings. Some roles such as the Scrum Master enjoyed their role while the other role players were not as fascinated with their roles and duties. Most Agile teams also still had formal roles and there were no fun titles or duties. P15 said that was attributed to teams being more focussed on their work and completing tasks. P19 said that the titles were not changed because they did not see a need to. However, P23 said she referred to herself as the Scrum Queen. P5 mentioned that they informally named a team member who worked on bugs as *"the bug-slayer"*. Another high indulgence team had nicknames for everyone. P2 said that some fun duties that were carried out were when somebody bought coffee for the team when they were late for a meeting. P26 gave advice related to indulgence, which was to understand the group and cater to their preference for indulgence to avoid alienating the team. In addition, a game called *"Market of Skills"* was used to facilitate a skills workshop for

various team members to identify skills they would like to learn from each other as a team. This was also a fun way for management to do a skills audit without calling it such.

> *"We had one of the testers as the queen of the team and she would dress up like a queen too. If someone was late for the scrum meeting, they would have to buy everyone coffee and we had nicknames for everyone. In the Retrospective, we always had a fun exercise or game to break the ice." (P2)*

5.3.5.5. Influence of Indulgence on Agile Processes

The findings suggested that indulgence influenced the Agile processes in relation to whether enjoyment in Agile ceremonies was encouraged.

Improved Cohesion

According to the findings, high indulgence teams influenced the Agile processes whereby team members encouraged having fun by celebrating together, playing snooker, having remote games as a team, and used humour or banter during ceremonies. P1 said it was compulsory for their team to celebrate as a team. For teams with a high degree of indulgence, fun was encouraged during ceremonies. P3 said that humour or banter was used to ease tension. The team had a fun activity in meetings where more time was allowed such as in the Retrospective meeting. P16 gave some advice as an Agile Coach stating that rewards for team-building activities should be a surprise reward instead of an expected budget for it to be effective. In contrast, teams with a low degree of indulgence, the ceremonies were formal, and people did not speak about their personal lives during meetings (P14).

> *"It is always encouraged in the processes. We always start with a bit of banter. With a retro we would have some fun in the first thirty minutes, and have lunch together offsite. When we were in office, we would get lunch every day and people might breakaway to do a puzzle or something like that." (P3)*

5.3.6. Influence of Future Orientation on Agile Implementations

Future orientation and long-term orientation did not have a significant correlation according to literature (Hanges & Dickson, 2004). Where long-term orientation is about past versus the future practices, future orientation addresses present versus future (planning) practices of societies. Teams with high future orientation engage in future-oriented behaviours such as planning. According to the findings small teams were more future orientated than teams in large corporate organisations. Future orientation influenced the Agile roles, processes, and artifacts.

5.3.6.1. Influence of Future Orientation on Agile Roles

Future orientation influenced the Agile roles in relation to roles that performed planning.

Roles that Perform Planning

Since future orientation is *"the degree to which individuals in organizations or societies engage in future-oriented behaviours such as planning, investing in the future, and delaying gratification"* (House et al., 1999, p. 25), it is fitting to discuss the influence future orientation has in relation to Agile roles involved in planning practices. According to the findings, in teams with a high degree of future orientation, the whole team was involved in planning in small Agile teams, whereas in teams with low future orientation, management or the Product Owner (if a senior staff member) was involved in planning practices in large corporate organisations. For example, in large corporate organisations, where low future orientation was manifested in the teams, little to no planning was done by the team itself (P4 & P14). Most of the planning was done by management (P8, P16 & P21). This may have been due to the workload in the team, as mentioned by P8, and the operational demands placed on the team's ability to plan. The Sprint Planning sessions were led by the Product Owner. P14 said that the Product Manager and the Business Development Manager led the Sprint Planning meeting every week. P16 said company management decided on the priorities in planning and did not empower the Product Owner (the product owner was not a senior staff member). Small teams were more future orientated than teams in large corporate organisations. All team members were involved in the Sprint Planning sessions and each team had their own format. Some teams had separate Sprint Planning sessions called a Sprint Planning 2 session where the sub-teams discussed the requirements and gave their input with estimations. Other teams had one session where they developed the Sprint Vision and Goals with the input of all team members (P19).

> *"I would facilitate the Sprint planning. We have a specific format that we have tweaked to suit us. We spend about one hour going through our metrics from the previous Sprint and making sure we've closed everything off concerning that Sprint. We would then look at a view of the next two weeks, who's on leave etc., and use that to determine what the team would want to pull in to the Sprint Backlog. By using that information, we would develop a Sprint vision and goals for the next Sprint. It would be about facilitation and the team's participation. We block out about an hour in which to do this. This is for every Sprint." (P19)*

5.3.6.2. Influence of Future Orientation Agile Processes

Future orientation influenced Agile processes in relation to how Product Backlog Refinement Sessions were conducted, whether termination of Sprints was experienced, how far in advance planning was done, how the workload was determined, and whether the Product Goals or Objectives were communicated.

Product Backlog Refinement Sessions

In Product Backlog Refinement sessions, the current future Sprints requirements are clarified and this meeting is held near the end of one Sprint to ensure the Backlog is ready for the next Sprint (Cohn, 2015). Since the Product Backlog Refinement includes discussing requirements for future Sprints, it is appropriate to discuss the influence of future orientation on the Product Backlog Refinement Agile process. According to the findings, future orientation influenced Agile processes in the Product Backlog Refinement sessions. A Product Backlog Refinement is an Agile ceremony whereby the team discusses the user stories to create a low level technical task defined as a continuous process to update or refine the Product Backlog to create a shared understanding of the user stories between the Product Owner and the Development Team. In large corporate organisations, where a low degree of future orientation was prevalent, Product Backlog Refinement sessions were not thoroughly planned. For example, P4 said that the team made up the priorities a week in advance as they proceed. In addition, the Product Owner was not fully dedicated to a team and the Scrum Master was also split between various teams along with having their own duties in other roles they fulfilled which contributed to the lack of planning activities. In smaller Agile teams, where a high degree of future orientation was manifested, members were more forward-looking in Product Backlog Refinement sessions than teams in large corporate organisations.

> *"Sprint that is starting. In terms of forward-looking, we would do that in our Refinement." (P19)*

Termination of Sprint

According to the findings, the Sprint was terminated when there was a change in strategic direction. Strategic direction refers to future planning practices. In teams with high degrees of future orientation, there was a possibility of the Sprint being cancelled even during the current Sprint when the team realised that they were not focussing on the right business objectives or that the Increment would not add value. For example, P26 said that the Sprint was terminated when a new Chief Financial Officer (CFO) started and changed the strategic direction. Furthermore, P20 said that it happened during a Stand-up meeting when the team realised they were not meeting the strategic objectives,

and the Sprint was cancelled. According to participants who were in teams that displayed a low degree of future orientation, a termination of a Sprint was never experienced.

> *"There has been a termination of a Sprint. This is when we have a Stand-up and realise that we have messed up or missed something somewhere along the way. It doesn't happen often, but if it gets to a point where it makes no sense to continue with the Sprint, it would be terminated." (P20)*

Determine Workload

Future orientation influenced Agile processes in how the workload was determined. According to the findings, future orientated teams had a good balance pertaining to the type of work undertaken in the Sprint and had sizing sessions for items in the Product Backlog. P23 said the workload was decided based on the use of story points. There were various methods used to determine the estimated sizing of a piece of work such as T-Shirt sizing, Fibonacci, etc. Team members gave their estimation and took on enough work for the Sprint. There was a good mix of work being taken on in the Sprint in terms of bugs, technical debt, new features, and enhancements. Teams with low future orientation had management decide the workload. For example, P14 said that requests were fed into a Sprint and the manager decided what work could be done.

> *"The process to determine the workload would be story points and use every Developers input as to how long it would take or how much they can take on. It is a combined process from our team and we would use one of the Sprint events to facilitate that." (P23)*

Communication of Product Goals / Objectives

Future Orientation influenced Agile processes pertaining to whether the Product Goals or Objectives were communicated and to whom they were communicated. As mentioned previously, SAFe teams had a low degree of future orientation although management was more future orientated. This was manifested in the form of SAFe teams not having Product Goals. However, one of the outputs was the Objective (created by management) which states what the mission is for the next three months. Furthermore, according to the findings, the outputs of the planning practices, namely the Goals or Objectives, were communicated to the teams. For example, P1 said that the business stakeholders communicated the goals to the Product Owner who then communicated those goals to the team. The researcher will assume that these were Iteration goals since the organisation adopted the SAFe methodology. Where a high degree of future orientation was manifested, the Product Goals were communicated to the whole team, clients and companywide. In addition, feedback was allowed into the Product Goals. For example, P20 said that feedback was important to understand the needs and

expectations of the customer. Therefore, it can be derived that future orientated teams had a feedback loop back to the customer which improved communication.

> *"The Product Goals are mostly communicated. It is communicated to everyone in the team as well as the client. It is important to get their feedback to get an understanding of what the client is expecting." (P20)*

5.3.6.3. Influence of Future Orientation on Agile Artifacts

Future orientation influenced Agile artifacts in relation to how far ahead the Product Backlog is prioritised, whether there is strategy to roll out Increments for use.

How Far Ahead Planning is Done

Future orientation influenced how far ahead planning was done. According to the findings, mature Agile teams planned for every Sprint and sometimes planned two Sprints ahead. Mature Agile/Scrum teams are more future orientated than novice Agile teams, and this translated into their level of planning of the Sprints. For example, P2 said that their team generally planned for two to three Sprints ahead by looking at the Product Backlog during Sprint Planning for items that were ready for the next Sprint. Newly formed teams were less future orientated and planned only for the next Sprint. P1 said that how far in the future the team planned depended on the requirements of the Product Owner and the business stakeholders. Furthermore, according to participants from SAFe teams, they did not necessarily plan but the planning was rather done by the Product Owner and business stakeholders. This implies that SAFe teams had a low degree of future orientation. The low degree of future orientation in the team was attributed to the planning being done by the Product Owner and business stakeholders. For example, P8 said that the planning process for SAFe teams was that the Product Owner led the sessions based on the progress made to the project Roadmap and checked the capacity of the team. The Objectives for the next 3 Sprints were also discussed by the business stakeholders in the Programme Increment Planning session and the team did detailed planning for a Sprint ahead. The planning process also depended on the size of the project. For example, P24 said that architectural sessions were held for larger projects before a Sprint Planning session. Therefore, although the organisation that used the SAFe framework may have been future orientated regarding planning ahead, the teams were not involved and thus manifested a low degree of future orientation.

> *"What we did in Refinement was to plan two or three Sprints ahead. We looked at the Backlog and see what is ready for the next Sprint." (P2)*

> *"The Product Backlog is prioritised for two to three Sprints." (P2)*

Strategy to Roll out Increments

Future orientation influenced Agile artifacts in whether there was a strategy to roll out Increments. An Increment is a usable functionality that can deliver value to the customer. According to the findings, future-orientated teams had a Roadmap for Increments or a Sprint Runway of items that should be released. A Sprint Runway was a coordinated release of working software based on components created by various teams. SAFe teams had a flexible Roadmap for Increments that was done during the Programme Increment (PI) Planning session. P21 said that SAFe had a Roadmap but it was not the same as the Vision from Scrum. P4 elaborated that the Roadmaps for Increments were done in the PI Planning, but it was not committed to, meaning that it was flexible or could change regularly. According to P8, the Product Owner was the custodian of the Roadmap, and the leadership had a strategy meeting to make sure that the leadership were aligned with the Product Owner. P19 said that they had a Most Viable Product (MVP), for example, as a strategy, and there were subsequent phased rollouts of the Increment. Furthermore, techniques such as Story Mapping were employed to populate the Roadmap and then a strategy was derived to release Increments.

"Yes, we use user Story Mapping to come up with a Roadmap and the Release Strategy." (P18)

5.3.7. Influence of Performance Orientation on Agile Implementations

Performance orientation refers to the extent to which an organization or society encourages and rewards group members for performance improvement and excellence. According to the findings, South African Agile software development teams are performance-orientated, but the performance is largely based on individual performance rather than team performance. Performance orientation influenced Agile roles, processes, and artifacts.

5.3.7.1. Influence of Performance Orientation on Agile Roles

Performance orientation influenced Agile roles in relation to how the roles contribute to high performing teams, and whether the roles are dynamic, competitive, and orientated toward success.

Contribution to High Performing Teams

According to the findings, teams with high performance orientation influenced Agile roles whereby there were high-performing individuals as opposed to high-performing teams. P21 said that orientation for success was more at an individual level than a team level. However, most matured Scrum teams were high-performing teams. P2 said that their team was seen as the best Scrum team in the organisation and that they were quite competitive. It was possible for individuals to be high performing although the team underperformed. For instance, P19 said that, although individuals were generally high performing, they have underperformed as a team in the past. In addition, where low performance orientation was manifested, team members were moved between teams often, and those teams did not have an opportunity to become high performing teams. P16 explained that resources were moved between various teams a lot which prevented teams from becoming high-performing teams.

> *"The team is all generally high-performance individually. Given their personality types, they have in the past underperformed as a team, but now they are moving to higher performance as a team. As they explore that, the more inclined they will be to achieving as a team rather than individuals." (P19)*

Dynamic, Competitive and Orientated toward Success

According to the findings, teams with a high degree of performance orientation were dynamic, competitive, and were orientated toward success whereas teams with a low level of performance orientation were stagnant. Some teams with a high degree of performance orientation were not competitive with one another while other teams actively encouraged competition among the roles. For example, P18 said that that team members were not competitive with one another, but they always tried to deliver good quality, whereas P6 said that the individuals in their various roles were

hungry for success and competitive with one another. Teams with a high degree of performance orientation expected of themselves to always deliver excellent quality products. For instance, P26 said that most people in their teams were driven to success and improvement, and P12 said that the team had a very high standard of success. Performance orientation in individualistic teams influenced Agile roles to contribute to the success of the team if the individual could be recognised. For instance, P4 said that orientation for success was more at an individual level than a team level and further described the attitude as *"I want the team to succeed as long as it makes me look good as well".*

> *"A modicum of excellence is expected within the teams." (P15)*

5.3.7.2. Influence of Performance Orientation on Agile Processes

According to the findings, performance orientation influenced Agile processes in relation to how performance is rewarded, the preparation for Sprint Retrospective meetings.

Reward

According to the findings, teams with high performance orientation influenced Agile roles whereby individual performance and not collaboration was rewarded. In most Agile teams, performance appraisals were individual based. Collaboration was encouraged but there was no financial reward for teamwork. P16 accredited the lack of self-management to the old management style where individual effort is rewarded over team success. No data was found for the reward system of teams with a low degree of performance orientation.

> *"Well, firstly, individual performance agreements are anti-Agile because it discourages collaboration, and that's why it is so difficult to get Agile management on a senior level. They would rather follow a bad plan and do it well so that they can get their bonus, whereas, with Agile, things are more transparent." (P26)*

Preparation for Sprint Retrospective Meeting

During the Retrospective meeting, the Scrum team can inspect itself and create a plan to improve during the next Sprint (Schwaber & Sutherland, 2017). Therefore, Retrospectives are used to reflect on the past Sprint and suggest ways in which the team performance can be improved. The findings suggested that most teams with a high degree of performance orientation prepared for the Retrospective meetings other than just the Scrum Master. In contrast, only the Scrum Master prepared for the Retrospective meetings in teams with a low degree of performance orientation. Varied approaches were taken by various teams to prepare for the Retrospective meetings. In some teams only the Scrum Master prepared. In most cases, a board was made available to the team so that

the learnings were visible to the team. P12 said that nothing was allowed to be added to the board when the meeting started.

> *"I try to get the team to prepare for Retrospectives. So, they would list their concerns on a board that I have provided. Nothing can be added once the meeting starts." (P12)*

5.3.7.3. Influence of Performance Orientation on Agile Artifacts

According to the findings, Performance Orientation influenced Agile artifacts in relation to commitment to the Sprint Goals, how the success of an Increment is defined, and the team's definition of "Done".

Sprint Goals Commitment

As mentioned in the literature review, the format of the Daily Scrum meeting focuses on progress toward the Sprint Goal and produces an actionable plan for the next day of work (Schwaber & Sutherland, 2020). It can be deduced that the commitment to the Sprint Goals that were set by teams indicates the level of performance orientation. Where a high degree of performance orientation was manifested, Agile teams thrived to be committed to achieving Sprint Goals and aimed to improve from the feedback in the Retrospective meetings. In teams with a lower degree of performance orientation, the team still achieved the Sprint Goal although not all items in the Sprint were delivered. Teams with higher performance orientation strived to complete and deliver every item assigned to the Sprint.

> *"Once the team has their goals, they are committed to achieving them and working together to do so." (P3)*

Success of an Increment

The Increment is usable items, whether released or not, toward the goal or vision, and it must be completed according to the team's definition of "Done" (Schwaber & Sutherland, 2017). According to the findings, in teams with a high degree of performance orientation, success was measured mostly by whether the features and stories were delivered. For instance, P16 said that success was measured by the output delivered rather than the outcome and that the ultimate measurement of success was whether the team delivered on the features and stories. In teams with a seemingly low degree of performance orientation, the success of the Increment was defined by the feedback from the stakeholders, especially for teams that were held to Service Level Agreements (SLAs) such as support teams. P8 confirmed that the success of an Increment was defined by the feedback of the stakeholders. Another reason that some teams had a seemingly low degree of performance orientation was due to those teams being mostly focussed on production issues rather than the Sprint.

"We use Jira for workflow, so the ultimate measurement would be whether you delivered on your features and stories." (P16)

Completion according to the Team's Definition of "Done"

The findings suggested the performance orientation teams influenced the Agile artifacts in relation to the team's Definition of "Done". Where a high degree of performance orientation manifested, the Definition of "Done" was defined up front and signed off after the stakeholders completed their testing during User Acceptance Testing. For instance, P2 said that the Definition of "Done" was signed-off during UAT and the work was pushed into production that afternoon. The Definition of "Done" was mostly defined as the product having passed testing and signed off on UAT. In teams with a seemingly low manifestation of performance orientation, a fixed and documented Definition of "Done" did not exist. For example, P4 said that if the Product Owner gave approval, then the Increment was done. P14 also mentioned that the person who owned the item, gave the Definition of "Done". Lastly, based on each team's definition, the percentage of items "done" were about eighty percent for performance-orientated teams. Teams that displayed a seemingly low degree of performance orientation, based on the output of items completed, about 60% of the items on the Sprint Backlog were completed.

"The Definition of "Done" was actually signed-off on UAT and then pushed into production that afternoon." (P2)

5.3.8. Influence of Mastery on Agile Implementations

This section discusses Schwartz' (1999) mastery and harmony dimensions since they are opposites of one another. Mastery societies focused on self-assertion in that ambition, success, courage, and competence are highly admired, and the belief that society needs to go through development. Harmony suggests that the culture desires to reach harmony in the environment which includes keeping unity with nature, protecting the environment, and improving the world (Schwartz, 1999). This section will be referred to as mastery. Mastery influenced Agile roles, processes, and artifacts.

5.3.8.1. Influence of Mastery on Agile Roles

Mastery influenced Agile roles in relation to roles becoming subject matter experts, organisations encouraging employees to go for Agile training.

Subject Matter Experts

According to the findings, teams with high mastery influenced the Agile roles leading to highly specialised roles and individuals being experts in various domains. P1 and P8 said that subject matter experts were sometimes consulted and provided input to the team once a week in technical sessions

or in knowledge transfer sessions. The findings for harmony teams were not conclusive regarding whether harmony teams had subject matter experts or whether knowledge was shared in their teams on a regular basis.

Encouragement in Training

According to the findings, teams that value mastery encouraged and promoted training. For instance, P4 said that their organisation encouraged the team to attend training on the Scaled Agile Framework (SAFe). P26 said that the team was allowed two hours a day to do research. P21 said that teams were allowed a day every month for teams to research anything. However, in teams that manifested the harmony national culture dimension, members accepted their roles as is. This was mainly due to their organisations cutting costs during the COVID pandemic period.

5.3.8.2. Influence of Mastery on Agile Processes

Mastery influenced Agile processes in relation to the preparation for Retrospective meetings, whether improvements were listed, actioned, tracked or measured.

Retrospective Meetings Preparation

According to the findings, high mastery influenced the Agile processes whereby teams actively prepared for Retrospective meetings, and improvement measures put in place. P20 said that teams prepared for Retrospective meetings. They had a visible board in the office where improvement items, among others, were written down for the Retrospective meetings. Teams that did not display a high degree of mastery were teams that were on the opposite side of the spectrum, namely, the harmony dimension. Teams that leaned toward the harmony national culture dimension did not prepare for Retrospective meetings (P8).

> *"They actively prepare for Retrospective meetings." (P20)*

Improvement Measures

According to the findings, teams with high mastery had measures put in place to track improvements. P3 said that their team suggested many ideas for improvement in every Retrospective ceremony. In contrast, harmony teams did not necessarily note ideas for improvement. This prevailed in teams where individuals were not really excited about the Agile framework (P16 and P26).

> *"We try to have a smart goal and we make improvements visible on the board to remind people. It depends on what the action is and we do try to come back and evaluate it at some point." (P17)*

5.3.8.3. Influence of Mastery on Agile Artifacts

Mastery influenced Agile artifacts in relation to how the content of the Increment was managed.

Increment Content Management

According to the findings, mastery influenced the management of the Increment content. Teams that leaned toward the mastery national culture dimension had many innovative features as part of their Increment. The challenge for mastery teams was with managing innovation versus delivering items from the current Sprint. P20 explained that the team struggled to do less innovation work to deliver the items in a Sprint instead. P20 also further elaborated that there was a timeline with a strategy posted on the wall for people to discuss and refer to regarding the Increment Roadmap. The findings suggested that harmony teams accepted the Agile artifacts such as the Product Backlog and the various templates as is. For instance, P14 said that their team accepted artifacts as they were and that team members left major issues unspoken that could not be fixed immediately.

> *"The team is major focused on that. The problem is sometimes to dial them back because they are always coming up with new ideas. But we are still delivering to clients, so we need to focus on improving the delivery of the product." (P20)*

5.3.9. Influence of Humane Orientation on Agile Implementations

Humane orientation in the context of the study is the degree to which Agile team members are encouraged and rewarded for being fair, altruistic, friendly, generous, caring, and kind to others. Humane orientation influenced Agile roles, processes, and artifacts.

5.3.9.1. Influence of Humane Orientation on Agile Roles

Humane orientation influenced Agile roles in relation to the tolerance with duties or responsibilities not performed, and whether the Scrum Master played a supportive role.

Tolerance with Duties/Responsibilities not Performed

The findings suggested that teams that manifested low humane orientation were not tolerant of mistakes. Tolerance depended on the maturity of the teams. Newer teams were more tolerant with one another (P22). In low humane orientated teams, a blame culture manifested. For instance, P16 said that a blame-culture was prevalent, and P4 said changes were made to the team in the event of duties or responsibilities not being performed. Furthermore, in teams with low humane orientation, mistakes were seen as failure instead of as a learning curve (P21). Lastly, in mature Agile teams, where low humane orientation was manifested, there was less tolerance for senior people as more was expected of them (P8).

Scrum Masters generally encouraged the rest of the team and created a safe space for individuals to take responsibility for a mistake or a duty not performed. Smaller Agile teams had a mix of where there was healthy tolerance when mistakes were made and where the team was not tolerant. In general, the Scrum Master was made aware and had a conversation with that person since they had the authority to do so. In some teams, team members directly challenged one another and held each to account. The mistakes were highlighted in the Retrospective meetings as well. P22 said that their team had a high tolerance for mistakes since individuals valued the relationships more. Mistakes were mitigated in the Daily Stand-up meetings since the teams coordinated daily and mistakes or duties not performed can be detected early and remedied.

The findings suggested that low humane orientation companies were mostly large corporate organisations and that the teams were not tolerant. P14 said that templates and tools had to be strictly adhered to, especially since resources were available. There was leniency toward newer members of the team. P4 said that if the mistake affected another team member's work, then that affected team member was not tolerant. The prevailing response in small Agile teams when mistakes were made with artifacts was that of tolerance and understanding that everyone was human, makes mistakes, and that mistakes will always be made. P22 said that the Scrum Master ensured that the team learnt from the mistake not to make that mistake again.

> *"We know that mistakes happen, and people fail, but the main thing is that they learn from that and then either put a process in place so that it doesn't happen again." (P22)*

Scrum Master Plays a Supportive Role

According to the findings, humane orientation teams influenced Agile roles in the supportive role that the Scrum Master plays. In low humane orientation teams, the Scrum Master had to learn to transition from an expert role such as a Project Manager to being more supportive. P4 said that the Scrum Master was transitioning from an expert role to a more supportive role. P14 said that the Scrum Master supported the teams and provided coaching where necessary. In low humane orientation teams, the Scrum Master is more objective whereby the team is reminded of the Sprint Goal, as well as the strategic objectives that the team needs to achieve. P8 said that the Scrum Master also reminded the team of the Sprint Goal to get them back on track when mistakes were made. Furthermore, Scrum Masters in large corporate organisations, where low human orientation was manifested, were more task-focused than people-focused in that they did not focus very much on soft skills. P16 said this was due to former Project Managers, who were very good at managing tasks of the team, being made Scrum Masters.

In small Agile teams in general, where the culture was more humane, the Scrum Master acted as the coach to help the team perform better. Sometimes the team does not wait for the Retrospective to discuss what went wrong and what can improve but discusses it in Stand-up or ad hoc meetings on ways to get the team back on track. The Scrum Master in high humane orientation teams, played a coaching and mentoring role such as providing technical guidance to team members. A challenge experienced regarding coaching, as explained by P17, was that the coach giving a unique perspective from a theoretical background did not translate well in virtual meetings and that moments to coach were selected carefully. At the time of the study, teams were remote, and before they would be taken off-site to re-align.

> *"To get the team back on track, the Scrum Master would go back to the very basics and see what our Sprint Goal is and what some of the strategic objectives that we need to achieve as a team. In meetings, the facilitator needs to bring the focus back to the track." (P8)*

5.3.9.2. Influence of Humane Orientation on Agile Processes

Humane orientations influenced Agile processes whereby humane orientated teams had ceremonies to get to know one another, and team members had an equal opportunity to speak in the ceremonies.

Sprint / Events Dedicated to get to know Team Members

Caring for one another, being friendly, generous, and kind to each other are encouraged and rewarded in humane orientated cultures. Therefore, this theme regarding getting to know each other arose from the findings and was found relevant. According to the findings, humane orientation influenced Agile processes in relation to how Sprints activities took place. Teams with a high degree of humane orientation had activities to foster good team relationships. P22 said that an entire Sprint was dedicated to the team to get to know each other. Various team building exercises were done during the Sprint. P1 said that they had coffee sessions to get to know each other. In contrast, no data was found for teams with a low degree of humane orientation regarding team building activities.

> *"It is important for collaboration to be part of the team working together and the coffee sessions help with this." (P1)*

Equal Voice

Humane cultures encourage fairness, and therefore an equal voice during ceremonies is deemed a relevant theme. The findings suggested that high humane orientation influenced Agile processes whereby team members had an equal voice in the various ceremonies. P7 said that the vote of each team member counted equally, and everyone had a chance to speak during ceremonies. In contrast

in teams with a low degree of humane orientation, the senior members in the team had more say (P6).

"The organisation does encourage that everyone has an equal voice." (P15)

5.3.10. Influence of Affective Autonomy on Agile Implementations

The researcher asked the respondents whether their teams were encouraged to individually pursue experiences that have a positive effect, for example pleasure, a lifestyle of excitement, and a varied life. Affective autonomy influenced Agile processes and artifacts.

5.3.10.1. Influence of Affective Autonomy on Agile Processes

The findings suggested that affective autonomy influenced Agile processes in relation to the availability of initiatives such as mental health, consensus leave, processes such as team health checks, and working at a sustainable pace.

Mental Health / Work-Life Balance

According to the findings high affective autonomy influenced the Agile roles to have a good work-life balance. Work-life balance is an equilibrium between personal life and career work. In large corporate organisations, emphasis was placed on mental health and work-life balance especially during the pandemic. P21 said that the bank placed emphasis on work-life balance and working weekends was a rarity. P1 who also worked for a different bank said that mental health was especially important to the organisation. P14 who worked at a large retail company said that the organisation was very accommodating to have positive life experiences and a varied life, especially with the impact of COVID. Small Agile teams were serious when it came to work but were also interested in each other's personal lives. P20 said that before a meeting the team asked questions pertaining to each other's personal lives. P23 said that their team members were well-rounded individuals. In teams with a high degree of affective autonomy, team members could leave work early to do fun activities or their hobbies such as cycling (P3). In teams with a low degree of affective autonomy, there was no mention of work-life balance or flexible work practices, i.e., standard working hours applied.

"The [bank name] culture is such that the work-life balance is quite important. It is rare that the team would have to work on the weekends, but this is an exception." (P21)

Consensus Leave

In teams with a high degree of affective autonomy, consensus leave was available where the team would grant leave to individuals. P3 said that this did not impact negatively on the roles and duties, processes or artifacts delivered as the team was cross-functional and someone else could take on the

work required in the Sprint. P17 said that their team would also suggest that someone should take leave when a team member was not well.

> *"It is encouraged immensely and this evident with the consensus leave which the organisation implemented." (P2)*

Team Health Checks

According to the findings, high affective autonomy influenced Agile processes whereby team health checks were done during ceremonies. Team health checks is where the Scrum Master can use various techniques to ask the team how they are doing emotionally, physically, and mentally to get a holistic view of the circumstances of the team members. P12 said that the team's health was taken into consideration when anything was discussed. P17 gave an example of when someone had a headache, the team responded and said the person should take care and do what they need to do to keep healthy. The Scrum Master coached the Scrum team members when it came to personal one-on-one coaching using the *Ikigai* approach which is a Japanese philosophy translated as "reason to live" and used as a holistic coaching approach (P26).

P16 shared some sentiments on how the affective autonomy dimension for South Africa relates to Agile methods. An example was made of how South Africans in a large corporate, where a low degree of affective autonomy manifested, is where people greeted in the corridors, and asked how the person was doing but just walked by without expecting the response. This was seen as an anti-pattern in Agile since value was not added.

> *"In the meetings, whatever is discussed or considered, we take the team's health in consideration." (P12)*

Sustainable Work Pace

According to the findings, high affective autonomy teams worked at a sustainable pace during the Sprint. This means that only enough items were included in the Sprint Backlog that could be comfortably done in the Sprint. P1 said that when there were looming deadlines, the team would split to attend company sessions or training, etc. This was to ensure that the team delivers at the end of the Sprint. The Scrum Master in small Agile teams ensured the team progressed at a sustainable pace for the team members to pursue. P6 said that team leaders in Scrum teams had the authority to push back work to allow team members to pursue a positive life. In teams with a low degree of affective autonomy, such as in support teams where members were often on standby, overtime work was a reality.

"Absolutely. We went at a sustainable pace and gave them the skills and mastery as well as autonomy to help them get the job done." (P2)

The next chapter compares the key findings with literature as well as discuss how the findings align with Agile principles and values. In addition, theories on Agility are used to explain the findings.

CHAPTER SIX: DISCUSSION

6.1. Introduction

The purpose of this chapter is to compare the research findings to literature and answer this study's primary and secondary research questions. The primary research question for this study was:

- How does national culture dimensions influence Agile implementations within the South African software development context?

The secondary research questions were:

- How do the national culture dimensions influence Agile roles within South African teams?
- How do the national culture dimensions influence the use of Agile processes within South African teams?
- How do the national culture dimensions influence the use of Agile artifacts within South African teams?

Section 6.2 will answer the posed research questions by discussing the influence of South African culture on software development implementations. In addition to the findings on the specifics of the Agile software development implementation and use thereof, the discussion proceeds to briefly compare these findings with the extant literature regarding the influence of national culture on Agile methodologies.

Sections 6.3, 6.4 and 6.5 discuss the key findings of the influence of the various national culture dimensions on Agile roles, Agile processes, and Agile artifacts, respectively.

For each section the findings are discussed in terms of its implications for agility by referring to the Agile principles and values. In addition, the findings are mapped to the Complex Adaptive Systems (CAS) theory principles. The changes in Agile practices employed by the team as a result of team dynamics or even cultural dimensions of a team changing over time can be explained by the Complex Adaptive Systems (CAS) theory since CAS is able to learn about changes in its environment or its internal state to respond to those changes (Meso & Jain, 2006). Agile teams are considered as complex adaptive systems (Appelo, 2011). CAS is defined as dynamic systems capable of adapting to its external environment and its internal state so that it survives despite the circumstances that transpire (Chan,2001). CAS consists of five characteristics: (1) diverse agents that learn, (2) nonlinear interdependencies, (3) self-organization, (4) emergence, and (5) coevolution (McDaniel, Lanham & Anderson, 2009). The study findings will be discussed in terms of eight CAS principles namely: (1) principle of open systems, (2) principle of interactions and relationships, (3) principle of transformative

feedback loops, (4) principle of emergent behaviour, (5) principle of distributed control, (6) principle of shallow structure, (7) principle of growth and evolution, and the (8) principle of least effort. Table 17 provides the definition of each principle (refer to Appendix M – Mapping Themes to CAS Principles).

6.2. Influence of National Culture on Agile Implementations

The following section addresses the primary research question:

- How does national culture dimensions influence Agile implementations within the South African software development context?

6.2.1. Influence of Power Distance (PDI) on Agile Implementations

Proposition 1: ***In South Africa, Agile teams with a low degree of power distance are inclined to be self-organised***

This study shows that power distance influenced how teams were organised. Particularly, teams with a low degree of power distance are more inclined to be self-organised. This is congruent with literature whereby Palokangas (2013) found that self-organisation takes place more naturally in cultures with low power distance. Therefore, teams with a low degree of power distance are more closely aligned to the Agile principle of having self-organising teams. In this study, self-organisation is interpreted in terms of team members updating their own tasks on the Agile boards instead of relying on the Scrum Master to update the Agile artifacts. Self-organising teams can be explained by the CAS principle of emergent behaviour since the dynamic nature of an Agile team causes the team to display emergent behaviour as a result of its interactions.

6.2.2. Influence of Individualism (IDV) on Agile Implementations

Proposition 2: ***In South Africa, Agile teams with individualistic cultures are more dynamic in their approach to Agile/Scrum implementations compared to Agile teams with collectivist traits in which the Agile/Scrum implementations are used as prescribed.***

The findings reveal that individualistic teams are more flexible in their approach to implementing and using Agile methodologies. This confirms Zhao's (2015) findings stating that individualistic cultures are more dynamic in their approach to Agile/Scrum implementations, while in collectivist countries the Agile/Scrum implementations are used in a standard manner. This study provides additional insights into how individualistic teams use various Agile methods in a dynamic manner to accommodate business needs. These include the use of Kanban for maintenance and support work, and Scrum for new product features. Individualistic teams also dynamically avoid partaking in ceremonies which do not add value. Moreover, in individualistic teams, the Product Owner does not always take part of the

Daily Scrum meetings. In contrast, newly formed Agile teams tend to demonstrate more collectivist traits. The findings confirm Zhao's (2015) finding that states that collectivist teams follow the Scrum framework rigidly. Our findings further reveal that collectivist teams also tend to employ only one Agile framework (e.g., Scrum) to manage all software development work, including handling technical debt, doing support work, new requirements and enhancements, production issues, and complex projects. Hence, it can be said that individualist teams are better able to embrace the Agile value of "individuals and interactions over processes and tools" (Beck et al., 2011). The dynamic approach of the individualistic team to Agile implementations can be ascribed to the CAS principle of emergent behaviour.

6.2.3. Influence of Uncertainty Avoidance on Agile Implementations

Proposition 3: ***In South Africa, Agile teams with a high degree of uncertainty avoidance follow Agile frameworks strictly, while teams with low uncertainty avoidance are flexible in the use of Agile processes and artifacts and even combine Agile frameworks***

The findings indicate that teams with high uncertainty avoidance sought to standardise their processes and tools, and strictly follow their Agile framework of choice, while teams with low uncertainty avoidance are flexible regarding the use of Agile processes and Agile frameworks. This agrees with literature that states high uncertainty avoidance cultures are inclined to precision and formalisation (Zhao, 2015). Therefore, low uncertainty avoidance cultures are more aligned to the Agile value of responding to change over following a plan and the Agile principle of adjusting behaviour to become more effective (Beck et al., 2011). Lastly, the change of Agile methods over time as the team matures, aligns to the CAS principle of least effort, since irrelevant processes are removed as teams become less avoidant of uncertainly and ambiguity. The change in Agile methods is also a manifestation of the CAS principle of growth and evolution, as business processes and ways of work evolve over time.

Proposition 4: In South Africa, Agile teams with a high degree of uncertainty avoidance emphasised quarterly planning sessions with larger groups of stakeholders, whereas low uncertainty avoidance environments have planning sessions within the team.

The study illustrated that uncertainty avoidance influences the use of Agile processes in the planning of a project. Past studies by Palokangas (2013) found that in countries with high uncertainty avoidance, Agile teams place more value on planning, design, testing, and activities that remove ambiguity in their software development discussions. The findings in this study demonstrate that teams with high uncertainty avoidance have a preference for more frequent and longer planning sessions to minimise ambiguity or misunderstanding. Planning sessions with more external

stakeholders could possibly display the Agile value of improved customer collaboration (Beck et al., 2001). Agile methods focus on lighter design, documentation, and processes (Abrahamsson, Salo, Ronkainen & Warsta, 2017) with more emphasis on responding to change than following a plan (Beck et al., 2001). Moreover, planning in Agile teams take place iteratively instead of only before the project commences, and is adapted during the project (Larman, 2004). Therefore, by implication, Agile methods are more suited to low uncertainty avoidance teams and are aligned closer to the Agile value of responding to change over following a plan (Beck et al., 2001). High uncertainty avoidance could also help better understand the needs of the customers as more stakeholders are involved in the planning processes (Beck et al., 2001). Teams with a low degree of uncertainty avoidance displayed the CAS principle of emergent order since planning was kept to a minimum and planning activities emerged as needed.

6.3. Influence of National Culture on Agile Roles

The following section addresses the first secondary research question:

- How do the national culture dimensions influence Agile roles within South African teams?

This research question will be addressed according to the Hofstede, Schwartz, and the GLOBE study national culture dimensions.

6.3.1. Influence of Power Distance on Agile Roles

Proposition 5: In South Africa, in Agile teams with a high degree of power distance, hierarchy and low levels of team autonomy, members have specialised job titles which prevent cross-functionality, and the Scrum Master is considered as the team leader.

The findings reveal in teams with a high degree of power distance hierarchies such as rank in titles with unequal authority were prevalent in the team and low levels of team autonomy existed. Furthermore, the unequal distribution of authority relates to the decision-making power that rests with various senior roles in authority that have to approve ideas and they have the final say. This agrees with literature that states high power distance societies, such as Eastern cultures, reinforces reference to superiors which contradicts the value of team autonomy (Ayed, Vanderose & Habra, 2017). This is further strengthened by literature that states that high power distance reduces team autonomy (Spiegler, Heinecke, & Wagner, 2019). In contrast, in teams with low power distance, a flat team structure with equal authority and collective accountability prevails, and each member can speak freely. This agrees with literature that states that software development method implementations are more successful when management involves team members in the decision-making process and when team members are allowed or do not find it inappropriate to challenge

management (Brits, 2011). Teams with low power distance also have full autonomy regarding solution decisions, and the Product Owner guides the team on the product requirements. Low power distance teams are therefore closer aligned to the Agile principle of having self-organising teams (Beck et al., 2001) and the Scrum Guide recommendation of no hierarchies (Schwaber & Sutherland, 2020). Low power distance teams also comply with the CAS principle of shallow structure due to their flat team structure, as well to the CAS principle of distributed control since they are collectively accountable for which demonstrates distributed control of accountabilities.

Secondly, the findings indicated that, when a high degree of power distance prevailed, team members tend to associate job titles with rank which often equates to their status in the team. For example, while Scrum does not advocate the use of job titles, team members are given specialised titles such as UX Designers and Automation Engineers. In addition, Product Owner or Scrum Master roles are also considered as senior roles. In Agile teams where a low degree of power distance is demonstrated, team members have titles to describe their roles and duties, but it is not of significance to the team during discussions. Literature states that teams with low power distance have no job titles and are referred to only as team members (Zhao, 2015). Low power distance Agile teams have a degree of cross-functionality where the developer also does the testing when assistance is required. This agrees with literature that states national culture has an impact on the implementation of the “no title” practice, whereby formal job titles are not prevalent in low power distance cultures (Zhao, 2015). Teams with a low degree of power distance are closer aligned to the Scrum recommendation of having cross-functional teams (Schwaber & Sutherland, 2020). Team with a low degree of power distance also comply with the CAS principle of shallow structure since their job titles are flexible which aids cross-functionality to better achieve the objectives of the team.

Thirdly, the findings show that high power distance influenced Agile responsibilities whereby leadership roles and accountability are assumed by the Scrum Master or Product Owner. This finding agrees with literature that states that Scrum Masters and Product Owners cling to power that prevents developers from taking on leadership roles while in other teams with low power distance the teams are empowered to take on responsibility (Spiegler, Heinecke & Wagner, 2021). In contrast, findings reveal that Scrum teams with a low degree of power distance are taught to take collective ownership. Our findings confirm those of Veerla and Subrahmanyam (2011), who state that shared leadership is favoured by low power distance Agile teams where each member takes on a certain amount of responsibility and every person in the team is held accountable. Low power distance teams are closer aligned to the Scrum recommendation of the entire Scrum team being accountable for creating a valuable, useful Increment every Sprint (Schwaber & Sutherland, 2020). The shared responsibilities

manifested by teams with a low degree of power distance comply with the CAS principle of distributed control.

Lastly, although Scrum Master responsibilities in both high and low power distance teams involve removing impediments as prescribed by the Scrum Guide, the findings are congruent with literature that states that where a low degree of power distance was demonstrated, the leadership qualities of the ideal Scrum Master are that of a servant-leader (Sutharshan & Maj, 2011). In contrast, in teams where a high degree of power distance is manifested, their responsibilities include being a manager of the team such as approving leave. This finding builds on past studies which indicated that high power distance teams had authoritative leadership (Schwartz, 1999), while in low power distance teams a participative leadership style was demonstrated. Low power distance teams are more closely aligned to the Scrum Guide that states Scrum Masters are leaders who serve the Scrum team and the larger organisation (Schwaber & Sutherland, 2020). In summary, low power distance is required for greater agility in terms of roles.

6.3.2. Influence of Individualism on Agile Roles

Proposition 6: ***In South Africa, Agile teams with a high degree of individualism have a hero culture and are expected to be loyal to the Scrum Master / Leader in exchange for protection from the Scrum Master***

According to the findings, individualistic teams have a hero culture which is also stated in the literature (Sahota, 2012). In contrast, collectivist teams performed as a collective unit and, therefore, this finding corroborates the literature that collectivist cultures are less inclined to stand out from the group (Ramesh, Cao, Kim, Mohan & James, 2017). For example, in collectivist teams, the entire team works together to achieve the Sprint Goal and there is not a case of relying on a single individual to perform a certain task. Study participants of collectivist teams emphasised that the team is aware of the Sprint Goals and is committed to assist one another. Therefore, collectivist teams are closer aligned to the Scrum value of commitment to achieving the goals of the Scrum team. Collectivist teams working together to achieve the Sprint Goal complies with the CAS principle of distributed control since the entire team focusses their energy on a Sprint Goal instead of only a single member in the team using their energy per Sprint Goal.

According to the findings, it is the individualistic Agile teams that expect to be protected by the Scrum Master, and this is in exchange for their loyalty to the Scrum Master. This implies that transactional relationships with one another are prevalent. Based on literature, this result was only expected of collectivist teams (Hofstede, 2013); however, the findings demonstrate such a behaviour can also

prevail in individualist teams. This may be due to a desire for in-group collectivism in South Africa, although those teams were in individualist companies. The extent of the protection is to ensure team members do not have unrealistic expectations of one another. Similarly, in collectivist teams there is an expectation to be protected from interferences by the Scrum Master and from having to work overtime. This agrees with the literature that states collectivist cultures tend to expect to be looked after by their leaders (Yaggahavita, 2011; Brewer & Venaik, 2011). Protection required for the purpose of not having to work overtime aligns with the Agile principle of promoting sustainable development (Beck et al., 2001).

The findings indicate that there is a trend toward hierarchical individualistic teams being expected to be loyal to the Team Leader, in contrast to collectivist teams. This is opposite to the literature, which claims that in collectivist cultures people tend to be loyal to their leaders in exchange for protection (Hofstede, 2013). Collectivist teams have a sense of loyalty to each other instead of exclusively to a Scrum Master or a person. Loyalty to the team instead of a person is aligned to the Scrum value of commitment to the goals of the Scrum team and not a single person (Schwaber & Sutherland, 2020).

Lastly, the findings reveal that individualism influenced team cohesion whereby members of the same race group first interact with one another in a meeting. This could be due to the desire for South Africans to have greater integration into smaller groups. The high levels of aspired (To-Be) in-group collectivism influences the team whereby sub-teams are formed. This is congruent with literature that mentions that, although westernised South Africa may be individualistic, it desires a greater integration into smaller groups and families (Booysen & Van Wyk, 2007). In addition, while individualistic organisations exist, within a large team sub-teams were formed within South African software development teams, which supports literature that states Agile roles are influenced by team cohesion whereby collectivistic members form sub-teams within the larger Scrum team. Furthermore, collectivist Scrum teams have junior and senior Developers who are paired together, and this structure assists with knowledge transfer. The findings are contrary to literature, as South African Agile software development collectivist teams are found to be more inclined to practice pair-programming than individualist teams (Darwish & Henryson, 2019). The practice of pair-programming aligns to the Agile principles of face-to-face conversation, and of working together daily throughout the project (Beck et al., 2001). The change from individualism to collectivism over time aligns to the Complex Adaptive Systems (CAS) principle of emergent behaviour due to predictions of the team's behaviour emerging in the form of becoming family over time. The CAS principle of interactions and relationships is also manifested since South African Agile software development teams form sub-teams due to the need for in-group collectivism.

6.3.3. Influence of Uncertainty Avoidance on Agile Roles

Proposition 7: In South Africa, in Agile teams with a high degree of uncertainty avoidance, the job roles are not flexible, and the workload is determined by management.

According to the findings, in low uncertainty avoidance environments, members have flexible job roles and duties. Conversely, in high uncertainty avoidance teams, the team's job duties are not flexible due to teams being separated according to their capabilities. In addition, according to the findings, new Scrum teams have team members who are not flexible in their duties and do not assist when idle. This is particularly visible in novice Scrum teams which tend to have high uncertainty avoidance, while more matured teams are more tolerant of ambiguity and uncertainty. More matured Scrum teams are flexible in their job duties and assist wherever assistance is needed. Findings concurred with literature that Agile teams with low uncertainty avoidance have team members who are flexible in their roles and duties (Yaggahavita, 2011). Flexibility in duties relate to the Scrum practice of having cross-functional team members being called Developers as per the Scrum Guide (Schwaber & Sutherland, 2020). Teams with a low degree of uncertainty avoidance display the CAS principle of emergent order by having flexible roles since role responsibilities emerge as the need arises.

The study findings indicate that uncertainty avoidance influenced Agile roles based on who had the authority to decide on the workload during a Sprint. In particular, in high uncertainty avoidance teams, the workload is authorised by a Product Manager, whereas in low uncertainty avoidance teams, the Developers decided on the workload and no authorisation was needed. It can be concluded that low uncertainty avoidance allows a team to better adhere to the Agile principles. Therefore, the findings confirm the literature that claims that the Agile framework is suitable in cultures where there is high flexibility and spontaneity (Siakas & Siakas, 2007). Low uncertainty avoidance teams more closely follow the Scrum Guide recommendation that states that the Sprint Backlog is a plan by and for the Developers (Schwaber & Sutherland, 2020). Team with a low degree of uncertainty avoidance display the principle of distributed control when the workload in the Sprint is determined by the team instead of determined or authorised by an individual.

6.3.4. Influence of Masculinity on Agile Roles

Proposition 8: ***In South Africa in Agile teams with a high degree of masculinity, team members display competitive and assertive behaviour toward one another.***

The findings reveal that in Agile teams with a high degree of masculinity, competition among team members prevails, causing team members to not be inclined to share knowledge and resources. Literature corroborates this finding and states that cooperation, communication, and pair-programming that are advocated by Agile methods can be hindered by a high masculinity index (Brockmann & Thaumuller, 2009). Furthermore, team members in masculine teams assert themselves by directly challenging one another and members are accustomed to such assertive behaviour. In contrast, in most Agile teams with a low degree of masculinity or a high degree of femininity, competition among team members do not exist. Instead, members support each other and work together in harmony. Literature states that femininity supports values such as working together and understanding each other (Veerla & Subrahmanyam, 2011). Agile teams with a low degree of masculinity are better aligned with the Agile value of individuals and interactions over tools and processes (Beck et al., 2001), and the Scrum value of focussing on the work in the Sprint and the goals of the Scrum team (Schwaber & Sutherland, 2020). Teams with a low degree of masculinity supporting each other and working together in harmony illustrates the CAS principle of interactions and relationships since the team dynamically exchange energy and information with each other by assisting one another.

6.3.5. Influence of Long-Term Orientation on Agile Roles

Proposition 9: In South Africa, Agile teams with a high degree of long-term orientation are highly adaptable to a change of roles from traditional roles to Agile roles.

Findings reveal that long-term orientation influences Agile roles in relation to the degree to which Agile roles are accepted. For instance, teams with short-term orientation that start with their Agile transformation, do not accept certain Agile roles such as the Scrum Master role, are set in their traditional ways of work, i.e., Waterfall methodology, and learning about Agile methods is not embraced. Conversely, where long-term orientation is manifested, a change of roles and responsibilities from the Waterfall to Agile methodology is well accepted by members. These are new findings which have not yet been identified in literature. However, literature does state that societies with long-term orientation are more harmonious with others and have higher adaptability (Zhao, 2015). Hence, we can deduce that the finding is in line with similar behavioural insights pertaining to long-term orientation. This also suggests that teams with long-term orientation are more suited to the Scrum practice of cross-functional teams and the Scrum pillar of adaptation (Schwaber & Sutherland,

2020). Members adapting to new Agile roles, is an indication of the CAS principle of growth and evolution applied.

6.3.6. Influence of Indulgence on Agile Roles

Proposition 10: In South Africa, Agile teams with a high degree of indulgence show increased motivation.

The findings suggest that indulgence influences the Agile roles whereby enjoyment of roles and duties increase motivation to improve and to collaborate with customers. Teams with a high degree of indulgence have nicknames for everyone, fun activities, or punishments when people are late, and team building initiatives which contribute to team members' motivation to improve as a team and to collaborate with other parties such as promoters to create excitement for customers. The findings agree with literature that indulgence increases motivation (Ayed, Vanderose & Habra, 2017). This is aligned with the Agile principle of building projects around motivated individuals (Beck et al., 2001). High indulgence thus displays the Scrum value of openness where the Scrum team is open about the work and their challenges (Schwaber & Sutherland, 2020). In contrast, in teams with low indulgence, the enjoyment of the roles is not encouraged enough, especially due to the cost reduction of team initiatives or being remote during the pandemic which led to reduced communication among team members regarding where coaching is required. Literature states that teams with low indulgence have reduced internal communication as well as communication problems with the external environment (Ayed, Vanderose & Habra, 2017). Low indulgence is therefore contrary to the Agile principle of face-to-face conversation for efficient and effective means of conveying information (Beck et al., 2001). Indulgent teams show motivation which translates to customer interactions and the customer feeding back. Motivation is emergent in engagement with the team. When teams communicate, they demonstrate the CAS principle of interactions and relationships since the team interacts with one another. The resulting feedback from customers due to collaboration is the manifestation of the CAS principle of transformative feedback loops being applied.

6.3.7. Influence of Future Orientation on Agile Roles

Proposition 11: In South Africa, in Agile teams with a high degree of future orientation, the whole team is involved in planning practices.

Findings revealed that in future orientated teams the whole team is involved in planning processes. In contrast, in teams with low future orientation, management and the team leaders such as the Scrum Master and Product Owner are involved in planning practices. Literature does not include information regarding future orientation and the influence on Agile implementations. Future orientation teams

are more closely aligned to the Scrum practice of having the Developers accountable for creating the plan for the Sprint and adapting the plan toward the Sprint Goal (Schwaber & Sutherland, 2020). The entire team being involved in planning processes, as future-oriented teams do, is an indication of the CAS principle of distributed control applied. The involvement of the team in planning processes shows that control is distributed among team members during planning processes.

6.3.8. Influence of Performance Orientation on Agile Roles

Proposition 12: In South Africa, in Agile teams with a high degree of performance orientation, the roles are competitive, flexible, and robust to handle change in the environment.

The findings revealed that teams with a high degree of performance orientation are dynamic whereby the roles were flexible and robust to handle any change in the environment, roles are competitive (not necessarily with one another, but rather challenged ideas), and roles are orientated toward success, whereas teams with a low level of performance orientation are stagnant in their roles. Furthermore, individualist teams with a high degree of performance orientation reward high-performing individuals as opposed to high-performing teams. For example, performance orientation in individualistic teams influences Agile roles to contribute to the success of the team if the individual can be recognised. In contrast, where low performance orientation is manifest team members are moved between teams often, and those teams do not have an opportunity to become high performing teams. Literature does not provide information regarding performance orientation and its influence on Agile implementations. However, based on the findings, teams with a high degree of performance orientation align with the Agile principles of building projects around motivated individuals, working daily together (Beck et al., 2001). Team roles being competitive, flexible, and robust to handle change in the environment is the application of the CAS principle of growth and evolution.

6.3.9. Influence of Mastery versus Harmony on Agile Roles

Proposition 13: In South Africa, in Agile teams with a high degree of mastery, team members become subject matter experts.

Mastery influenced Agile roles in relation to roles becoming subject matter experts and organisations encouraging employees to go for Agile training. According to the findings, teams with high mastery had highly specialised roles and individuals who are experts in various domains. Moreover, teams that value mastery, encourage and promote training. In contrast, in teams that manifest the harmony national culture dimension, members accept their roles as is and further training is not provided or available. Based on the findings, teams with a high degree of mastery are closely aligned to the Agile principles of “build projects around motivated individuals. Give them the environment and support

they need, and trust them to get the job done" and "continuous attention to technical excellence and good design enhances agility" (Beck et al., 2001). Mastery is also tightly coupled with lean principles of "continuous improvement" due to the belief in mastery cultures that societies need to go through development (Schwartz, 1999). The prevalence of expert roles and having training provided is an indication of the CAS principle of growth and evolution applied.

6.3.10. Influence of Humane Orientation on Agile Roles

Proposition 14: In South Africa, in Agile teams with a low degree of humane orientation, a low tolerance of mistakes and a blame culture is prevalent, mistakes are seen as failure instead of a learning curve, and the Scrum Master is task-focussed instead of people-focussed.

The findings suggested that teams that manifested low humane orientation are not tolerant of mistakes. Tolerance depended on the maturity of the teams i.e., newer teams were more tolerant with one another. In low humane orientated teams, a blame culture prevails. Furthermore, in teams with low humane orientation, mistakes are seen as failure instead of as a learning curve. In addition, the Scrum Master in low humane teams is more task-focused (administrative) than people-focused. For example, they do not focus very much on soft skills due to the Scrum Master primarily fulfilling the Project Manager role, which is an expert role and not a people-focussed role. Tolerance of mistakes and the Scrum Master being people-focussed shows that the relationship is being valued, and therefore an indication of the CAS principle of interactions and relationships being applied.

In contrast, in teams with a high humane orientation, the Scrum Master acts as the coach to help the team perform better and this even involves coaching based on technical skills. No prior research investigated the influence of humane orientation on Agile implementations or more specifically Agile roles. Therefore, no comparison can be drawn with literature. However, based on the findings, it can be deduced that a high degree of humane orientation is suited to Agile roles since the Scrum Master role in humane orientated teams played a supportive role as prescribed by the Scrum Guide (Schwaber & Sutherland, 2020). The Scrum Master coaching the team shows that the relationship is being valued and interactions are taking place, and therefore an indication of the CAS principle of interactions and relationships being applied.

6.4. Influence of National Culture on Agile processes

The following section addresses the following secondary research question:

- How do the national culture dimensions influence the use of Agile processes within South African teams?

This research question will be addressed according to the Hofstede, Schwartz, and GLOBE national culture dimensions.

6.4.1. Influence of Power Distance on Agile Processes

Proposition 15: In South Africa, in Agile teams with a high degree of power distance, decisions are made by senior roles, management assigns new tasks to teams, and the team faces numerous interruptions where management is allowed to change the scope of the Sprint.

Findings reveal that in high power distance teams decision-making power was unequal within Agile teams and top-down decision-making is prevalent whereby decisions are made by senior roles. The Scrum Guide does not propose this method of decision-making, but rather that the organisation respects the decision of the Product Owner (Schwaber & Sutherland, 2020). In contrast, findings agree with literature that states that power distance impacts the use of Agile practices whereby in countries that have a low degree of power distance, importance is placed on shared understanding and consensus, while discussions are emphasised multiple times (Zhao, 2015). Therefore, greater agility is prevalent in low power distance teams where the team is empowered to make decisions. Low power distance teams comply with the CAS principle of distributed control since the team is empowered to make decisions.

High power distance influenced Agile processes whereby management assign new tasks to teams. This is not a recommended practice according to the Scrum Guide (Schwaber & Sutherland, 2020). In contrast, where low power distance is prevalent, management is not empowered to assign new tasks to the Agile team during Sprints. Instead, a negotiation is to be held with the Product Owner and the Scrum Master first. This finding does not agree with literature that states that power distance did not influence whether a leader is required to assign tasks (Zhao, 2015). Findings further reveal that in low power distance environments management approaching the team for new tasks does not occur often and whenever there was a change of requirements, the benefits to the organisation of the new work to be done are explained to the team to get their buy-in. Literature states that low power distance teams pick their own tasks and that team leaders assign tasks to members only when the team lacks product knowledge (Moe, Cruzes, Dybå & Engebretsen, 2015). Therefore, in the context of South

African Agile software development teams, greater agility is achieved in low power distance teams due to the team being involved in the Sprint Planning ceremony where work is assigned for the Sprint ahead as recommended by the Scrum Guide. Low power distance teams comply with the CAS principle of distributed control since team members assigned tasks from the board to themselves instead of having a central source of control assigning the tasks.

In companies that manifest a high degree of power distance, the team face numerous interruptions whereby management is allowed to change the scope of the Sprint. This agrees with literature that states interferences are experienced in high power distance cultures since it is acceptable for management to have such privileges (Zhao, 2015). The findings also revealed that in high power distance teams more senior roles such as the Product Manager exist in some companies and could change the scope of the Sprint. In low power distance teams, interferences are not allowed, and the Scrum team can change the Sprint scope. Findings agree with literature that states that no interferences are allowed in low power distance teams (Zhao, 2015). Moreover, in teams that manifest a low degree of power distance, the Sprint scope is fixed but anyone in the team can change the scope if the reason is good enough. The updated Scrum Guide (2020) excludes the practice of "no interferences" but emphasises that the Scrum team must be self-managing. Therefore, given their ability to change the scope of the Sprint, low power distance teams are closer aligned to the recommendation of self-managing teams (Schwaber & Sutherland, 2020). The behaviour displayed by teams with a low degree of power distance where the whole team is held accountable for the Agile artifacts comply with the CAS principle of distributed control.

6.4.2. Influence of Individualism on Agile Processes

Proposition 16: In South Africa, in Agile teams with a high degree of individualism, team members do not participate in all Agile ceremonies.

Findings reveal that in individualist teams members did not participate in many of the Agile ceremonies, whereas in collectivist teams members were involved in most of the Agile ceremonies. Collectivist teams used the Scrum ceremonies as prescribed, while individualist teams eliminate some recommended processes or do not use all aspects of a ceremony. Literature does not explicitly mention whether individualist teams or collectivist teams are involved in all Agile ceremonies or the extent to which the ceremonies are used. However, literature does state that individualist teams require workshops and group social events to increase group cohesiveness (Brockmann & Thaumüller, 2009). Team cohesiveness alludes to involvement of team members working together. We can deduce that individualist teams require more initiatives such as contracting workshops for the team to work better together which implies that they do not work well together as per the findings where

ceremonies are abandoned by individualist teams to avoid conflict and shifting blame. Therefore, it can be deduced that South African Agile software development collectivist teams tend to be more Agile than South African individualist teams. The CAS principle of distributed control is displayed in collectivist teams since the whole team is actively involved in the Agile ceremonies.

6.4.3. Influence of Uncertainty Avoidance on Agile Processes

Proposition 17: In South Africa, Agile teams with a high degree of uncertainty avoidance strictly follow policies and Agile frameworks as prescribed, and the Sprint Backlog was fixed.

According to the findings, when high uncertainty avoidance is manifested, teams tend to strictly follow due procedures. This agrees with the findings that states that high uncertainty avoidance Agile teams plan to minimise risks as early as possible (Darwish & Henryson, 2019). Low uncertainty avoidance teams are flexible and not strict on policy adherence. At times, there is no documented policy but there is a standard way of work for the team. This agrees with literature, whereby teams with a higher uncertainty avoidance index have more rigorous planning practices and use tried and tested tools instead of being open to risk-taking (Darwish & Henryson, 2019). By definition of agility, low uncertainty avoidance teams are more Agile than high uncertainty avoidance teams due to low uncertainty avoidance teams experimenting with various Agile methods and adapting Agile practices based on their business processes. Low uncertainty avoidance teams applied the principle of empiricism in which transparency, inspection and adaptation are pillars (Schwaber & Sutherland, 2020). The CAS principle of emergent order is displayed by low uncertainty avoidance teams since processes are flexible and there is no strict adherence to policy, which allows for processes to change as needed.

Lastly, findings reveal that in mature teams, where low uncertainty avoidance prevail, the Sprint Backlog scope items are flexible, whereby they are not locked in or formally signed-off before the work commenced. Conversely, in novice teams, where high uncertainty avoidance teams prevail, the Sprint Backlog and the Sprint scope are fixed, and the team is not flexible to accept requirements that are unclear. In this regard, low uncertainty avoidance teams have more agility and displayed the Agile principle of (willingly) welcoming changing requirements, even late in development. Low uncertainty avoidance teams display the principle of emergent order by having flexible Sprint Backlog scope items because they allow changes to emerge on the Sprint Backlog when priorities change.

6.4.4. Influence of Masculinity on Agile Processes

Proposition 18: In South Africa, in Agile teams with a high degree of masculinity, team members with the most knowledge on a topic make the decision in their respective area of expertise, conflicts are resolved through direct confrontation, team members expect to be told what to do, and members must request assistance where needed.

According to the findings, masculinity influences Agile processes whereby teams demonstrating low levels of masculinity use a democratic process of consensus to reach agreement. A democratic process is where each team member gives their input. In teams with a high degree of masculinity, team members with the most knowledge on a topic make the decision. In addition, as teams mature, they eventually use the method of willing consent. Therefore, matured teams manifest a lower degree of masculinity / assertiveness over time regarding decision-making as they learn to trust each other. The Scrum value of commitment proposes that team members come to an agreement on the commitments they make as a team and as individuals (Schwaber & Sutherland, 2020). Therefore, we can deduce that both values of femininity (such as working together) and masculinity (assertiveness to voice views and strength / courage to change direction) are required for agility in software development. Furthermore, the change in the method of agreement over time may align to the CAS principle of distributed control as a previously highly masculine team become less masculine over time, and as a result control is distributed across the team.

In Agile teams with a high degree of masculinity, conflicts are resolved through direct confrontation or in the presence of management. In teams where a low degree of masculinity manifests, conflict (especially personal conflict) is avoided or resolved by conversation that the Scrum Master facilitated. Furthermore, there are hardly conflicts in teams where there are transparent relationships. Sutharshan and Maj (2011) posit that conflict resolution has a relationship with power distance; however, the national culture dimension questions about conflict resolution are more closely related to masculinity since in masculine cultures conflicts are resolved by fighting (Hofstede, 2013). Brockmann and Thaumüller (2009) posit that cooperation, communication and pair-programming that are advocated by Agile methods can be hindered by a high masculinity index. However, teams with low masculinity avoid conflict and the Scrum Masters have challenges being remote to choose a suitable time to address issues in the team. Therefore, a balance of masculine and feminine values is required to address conflict with harmonious accountability. Teams with a low degree of masculinity resolving conflict by conversations demonstrate the CAS principle of interactions and relationships since they value the relationship by resolving conflict by conversation.

Lastly, in teams with a high degree of gender egalitarianism, team members are committed to assist each other voluntarily in meetings. In contrast, in low egalitarianism teams, members expect to be told what to do and people had to request assistance where needed. In teams with a high degree of egalitarianism, members indicate when they need assistance or when they could offer assistance. There are no specific empirical outcomes in literature for the influence of gender egalitarianism on Agile processes; however, egalitarianism has a negative correlation with masculinity (Hanges & Dickson, 2004). Egalitarian cultures have values of cooperation and are committed to assist others, which translates to the Scrum value of commitment, and the Agile value of individuals and interactions over processes and tools (Schwaber & Sutherland, 2020). Therefore, egalitarian cultures are more suited to Agile methods. In teams with a low degree of masculinity, members indicating they need assistance illustrates the CAS principle of interactions and relationships because they interact when they have a problem that needs to be resolved. Members assisting where they can when they are available or when someone in the team needs assistance, shows that teams with a low degree of masculinity applied the CAS principle of emergent order since team members respond with emergent information to resolve the problem.

6.4.5. Influence of Long-Term Orientation (past vs future) on Agile Processes

Proposition 19: ***In South Africa, Agile teams with long-term orientation display habits that show consideration for future events.***

Findings were as expected based on literature for long-term orientation, whereby the Developers display habits that show consideration for future events by preparing for them in the present (Darwish & Henryson, 2019). Furthermore, in long-term orientation teams continuous improvement is a bit of a longer conversation where they brainstormed how to do things better. Literature states that long-term orientation cultures emphasise schooling (learning) and have conversations about the effectiveness of Agile methods to achieve the goal of working software (Brockmann & Thaumüller, 2009). In contrast, short-term orientation teams do not prepare for Retrospective meetings and the nature of the conversations are more backward-looking (“what went well” and “what did not go well”) than forward-looking (actions that can be taken to improve). Therefore, in this regard, long-term orientation teams better demonstrate the following Agile principle: “At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly” (Beck et al., 2001).

Long-term orientated teams also mostly focus on innovative work and enhancement features with a smaller percentage of the work on bugs and technical debt to get the most valuable software to the customer first. This finding agrees with literature that states that long-term orientation is critical in

value creation (Chikhale & Mansouri, 2015). In contrast, according to the findings, normative (short-term orientated) teams mostly partake in operational tasks as opposed to innovative tasks for future features that the customer may have access to. Since operational tasks are generally time-critical, one can deduce that these tasks are part of the businesses short-term stabilisation strategy especially after an initial launch of a project as revealed in the findings. Literature states that short-term benefits and long-term sustainability must be considered in business strategy formulation (Chikhale & Mansouri, 2015). It can therefore be deduced that short-term benefit or "quick wins" is a short-term orientation trait which can be related to daily operational work done. Furthermore, additional authorisation is required for Agile artifacts such as the Sprint Backlog. This finding was expected based on Hofstede (2013), the short-term orientation trait being respect for tradition. As a caveat, the nature of the work also depends on where in the software development life cycle the team is working at the time of reference. Assuming that short-term orientated teams are more focussed on making the system work where it once was not working as it should instead of on new features, short-term orientated teams are displaying the Agile principle of working software being the primary measure of progress. Since long-term orientated teams focus mostly on innovative work than bugs or technical debt which is important for value creation, they demonstrate the Agile principle: Our highest priority is to satisfy the customer through early and continuous delivery of valuable software (Beck et al., 2001). The prevalence of the team continuously learning is an indication of the CAS principle of growth and evolution applied.

6.4.6. Influence of Indulgence on Agile Processes

Proposition 20: ***In South Africa, Agile teams with a high degree of indulgence improve cohesion and motivation by encouraging having fun by celebrating together, engaging in team games, and the use of humour or banter during ceremonies.***

Findings indicate that teams that emphasise indulgence have better team cohesiveness. This agrees with literature that states that in societies with a high degree of indulgence, individuals tend to show a positive attitude which helps to maintain team motivation (Ayed, Vanderose, & Habra, 2017). Furthermore, findings reveal that teams with a high degree of indulgence encourage having fun by celebrating together, playing snooker, having remote games as a team, and using humour or banter during ceremonies. In contrast, literature states that teams with a low degree of indulgence display fatigue (Ayed, Vanderose, & Habra, 2017). The findings reveal a similar trend where low indulgence teams do not have fun activities due to being busy with projects and not having time to build team morale. Moreover, team morale increases commitment to the Scrum team Goals and the Sprint goals. Therefore, teams that manifest a high degree of indulgence are closely aligned to the Scrum value of

commitment and the Agile principle of building projects around motivated individuals (Beck et al., 2001). When teams participate in team building activities, they display the CAS principle of interactions and relationships.

6.4.7. Influence of Future Orientation (present vs future) on Agile Processes

Proposition 21: ***In South Africa, Agile teams with a high degree of future orientation are authorised to terminate a Sprint.***

Findings corroborated literature that teams with a high degree of future orientation had the authorisation to cancel the Sprint (Zhao, 2015). Furthermore, findings reveal that the Sprint is allowed to be cancelled during the current Sprint when the team realise that they are not focussing on the right business objectives or that the Increment would not add value. In contrast, in teams that display a low degree of future orientation, termination of a Sprint is never experienced. This agrees with literature that demonstrated that cultures with a low degree of future orientation never terminate Sprints and do not have authorisation to cancel Sprints but would rather continue with the Sprint if the Sprint Goal will not be achieved (Zhao, 2015). This finding illustrates that high future orientation in South African software development teams are more Agile in their approach to requirements in Sprints, and displays the Agile principle of welcoming changing requirements, even late in development (Beck et al., 2001). The termination of a Sprint due to strategy changing is an application of the CAS principle of emergent order. As strategy changes it might be necessary to cancel a Sprint to focus on the new emergent strategy if the Sprint Goal is not aligned to the broader strategy.

6.4.8. Influence of Performance Orientation on Agile Processes

Proposition 22: In South Africa, Agile teams with a high degree of performance orientation performance is rewarded, and the entire team prepares for the Sprint Retrospective meetings.

According to the findings, teams with high performance orientation influence Agile processes whereby individual performance and not collaboration is rewarded. No data exists for the reward system of teams with a low degree of performance orientation. Although limited data exists for this national culture dimension, the issue of rewarding performance for teams is viewed as important to increase team motivation. Rewarding of performance is the application of the CAS principle of interactions and relationships. Reward shows that the individual is recognised for their contributions and the relationship is valued.

The findings suggest that most teams with a high degree of performance orientation prepared for the Retrospective meetings other than just the Scrum Master. In contrast, only the Scrum Master prepared for the Retrospective meetings in teams with a low degree of performance orientation.

Teams with a high degree of performance orientation are more Agile regarding planning ways to increase quality and effectiveness since this is the purpose of the Sprint Retrospective. The entire team being involved in the Sprint Retrospective meetings shows that the team wants to inspect and adapt its processes which is the application of the CAS principle of growth and evolution.

6.4.9. Influence of Mastery versus Harmony on Agile Processes

Proposition 23: In South Africa, Agile teams with a high degree of mastery actively prepare for the Sprint Retrospective meetings and have improvement measures to take action.

The findings indicated that high mastery influences the Agile processes whereby teams actively prepare for Retrospective meetings and have improvement measures to action. This aligns with the Scrum Guide's recommendation to address improvements from Sprint Retrospective meetings as soon as possible or even to add to suggested improvements to the Sprint Backlog for the next Sprint (Schwaber & Sutherland, 2020). Conversely, teams that display traits from the harmony dimension instead, do not prepare for Retrospective meetings other than the Scrum Master. In addition, the findings also reveal that teams with high mastery have measures put in place to track improvements. In contrast, harmony teams do not necessarily note ideas for improvement. In terms of the theme related to improvement measures, mastery teams better display the Agile value of the team reflecting on how to become more effective, then tuning and adjusting its behaviour accordingly at regular intervals (Beck et al., 2001). Improvement measures being noted and tracked is an indication of the CAS principle of growth and evolution being applied.

6.4.10. Influence of Humane Orientation on Agile Processes

Proposition 24: ***In South Africa, Agile teams with a high degree of humane orientation have activities to build relationships and have equal voice in meetings.***

Humane orientations influenced Agile processes whereby humane orientated teams have ceremonies to get to know one another, and team members have an equal opportunity to speak in the ceremonies. In contrast, teams with a low degree of humane orientation do not make mention of team building activities due to high project pressure and stakeholder demands. Humane teams have more agility in terms of the Agile principle of building teams around motivated individuals and providing the environment and support they require (Beck et al., 2001). Activities to build relationships is centred around the CAS principle of interactions and relationships applied and valued.

6.4.11. Influence of Affective Autonomy on Agile Processes

Proposition 25: In South Africa, Agile teams with a high degree of affective autonomy have a good work-life balance and work at a sustainable pace during the Sprint.

According to the findings, high affective autonomy influenced the Agile roles to have a good work-life balance. In teams with a high degree of affective autonomy, team members can leave work early to do fun activities or their hobbies such as cycling. In teams with a low degree of affective autonomy, there was mention of work-life balance or flexible work practices (i.e., standard working hours applied) and teams have a schedule for when members would be on standby over weekends. Literature states that members can effect changes in their workplace learning environment which result in improvement in team members' concentration, focus, motivation, and engagement (James, 2011). High affective autonomy teams have more agility in terms of their schedules and fit the Agile principle of promoting sustainable development by working at a constant pace indefinitely (Beck et al., 2001). Lastly, the prevalence of work-life balance, shows the CAS principle of emergent behaviour being applied due to the idea such of work-life balance emerging. The CAS principle of distributed control is also applied due to self-organisation of team members i.e., members managing their own schedules.

Findings reveal that high affective autonomy teams work at a sustainable pace during the Sprint. This means that only enough items are included in the Sprint Backlog that can be comfortably done in the Sprint. In teams with a low degree of affective autonomy, such as in support teams where members are often on standby, overtime work is a reality. Teams with a high degree of affective autonomy working at a sustainable pace translates to the Agile principle: "Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely" (Beck et al., 2001). Lastly, the prevalence of working at a sustainable pace shows the CAS principle of emergent behaviour being applied due to the idea of sustainable development emerging.

6.5. Influence of National Culture on Agile Artifacts

The following section addresses the third secondary research question:

- How do the national culture dimensions influence the use of Agile artifacts within South African teams?

6.5.1. Influence of Power Distance on Agile Artifacts

Proposition 26: In South Africa, in Agile teams with a high degree of power distance, the Scrum Master and Product Owner instead of the whole team are held accountable for the Agile artifacts.

According to the findings, in companies where a low degree of power distance is manifested, the team is responsible for the product vision, the Product Owner prioritised the Product Backlog with input from the team, the Sprint Backlog is owned by the team, members take the initiative by selecting user stories from the Backlog to work on, the Definition of "Done" is decided by the Scrum team, the Burndown chart is managed by the Scrum team, and the team delivers Increments regardless of whether the client wants the release.

In contrast, in companies that manifest a high degree of power distance, the vision is the responsibility of management and at the business stakeholder level, management has the most influence on the Product Backlog and the amount of work to be completed in the Sprint. The team does not own the Sprint Backlog, subordinates expect to be told what to do by authority, the Definition of "Done" is determined by the Product Owner or by management, the Burndown chart is managed by the Scrum Master, and the Increment is the responsibility of the Product Owner and the stakeholders give input.

In summary, in hierarchical teams, the Scrum Master is held responsible for the Agile artifacts although the Scrum Guide prescribes that the Scrum team is collectively responsible and accountable (Schwaber & Sutherland, 2020). This is congruent with literature that states that in high power distance teams the Scrum Master is responsible for the Agile artifacts such as the Burndown chart, whereas in low power distance teams a different team member is responsible for updating the Burndown chart everyday (Zhao,2015). The Scrum Guide emphasises that the team should take ownership of the Sprint Backlog. Schwaber and Sutherland (2020) elaborate, "The Sprint Backlog is a plan by and for the Developers".

6.5.2. Influence of Individualism on Agile Artifacts

Proposition 27: ***In South Africa, in Agile teams with a high degree of individualism, each member is accountable for their own artifacts produced.***

The findings reveal that team members in individualistic teams are accountable for various artifacts. In contrast, collectivist teams work together on Agile artifacts and review each other's work. There was no literature to compare the study findings to. Working together on artifacts relate to the Agile values of collaboration and interactions (Beck et al., 2001). The CAS principle of distributed control is also applied in the Agile practice of pair-programming in collectivist teams.

6.5.3. Influence of Uncertainty Avoidance on Agile Artifacts

Proposition 28: ***In South Africa, Agile teams with a high degree of uncertainty avoidance do not commit to a requirement in the Sprint Backlog if there are any uncertainty or ambiguity, do not willingly welcome changing requirements, and are averse to the use of Burndown charts.***

According to the findings, large companies or new Agile/Scrum teams were not comfortable with ambiguity and demonstrated high uncertainty avoidance. Subsequently, high uncertainty avoidance influenced Agile artifacts such as the Sprint Backlog whereby the team does not take a requirement into the Sprint if there is any uncertainty or ambiguity. This supports past findings that states that uncertainty avoidance plays a role in certain software practices, such as requirements being specified upfront, test-first programming, and making early design decisions, in countries with a higher uncertainty avoidance index (Darwish & Henryson, 2019). In contrast, in support teams that used Kanban, the team has a tolerance for uncertainty and ambiguity, especially when related to production issues (i.e., bugs). The issues are accepted by the team and investigated. As a result, teams with low uncertainty avoidance are more Agile and embrace the Agile value of responding to change over following a plan (Beck et al., 2001). By teams with a low degree of uncertainty avoidance welcoming changing requirements, they display the CAS principle of growth and evolution since the Product Backlog evolves and grows over time.

Lastly, findings revealed, teams with low uncertainty avoidance used Burndown charts while teams with high uncertainty avoidance do not necessarily track progress with Burndown charts. This finding does not support literature that states that Burndown charts are more prevalent in uncertainty avoidance cultures (Zhao, 2015). This finding could be different due to two reasons: 1) teams with a high degree of uncertainty avoidance are novice teams and do not get to explore Burndown charts and 2) management uses the Burndown chart to blame teams for not performing. Regarding Burndown chart management, high uncertainty avoidance teams seem more flexible with the use of

Burndown charts; however, low uncertainty avoidance teams use the Burndown chart only when the team is in danger of not reaching the Sprint Goal. Therefore, low uncertainty avoidance teams are more flexible in the use of the Burndown chart tool. Low uncertainty avoidance teams allowing for flexible use of the Burndown chart, they display the CAS principle of emergent order since the use of the Burndown chart emerges based on the situation at hand.

6.5.4. Influence of Masculinity on Agile Artifacts

Proposition 29: ***In South Africa, in Agile teams with a high degree of mastery the Scrum Master plays a secretarial role in the resolution of blockers.***

According to the findings, in teams with high masculinity, the Scrum Master plays a secretarial role where blocker resolution is concerned. In teams with low masculinity / or high gender egalitarianism, the Scrum Master does not necessarily do admin work such as writing down blockers on the board, but rather acts more as a coach to the team. The team writes down their own blockers on the Sprint Backlog and presents it to the team and resolves its own impediments. This agrees with literature that states in masculine teams the Scrum Master writes down the impediments on the board (Zhao, 2015). In terms of the implication for agility regarding blocker resolution, teams with a low degree of masculinity take accountability for their artifacts and making their impediments transparent. In teams where each member updates the board, such as in teams with a low degree of masculinity, the CAS principle of distributed control is demonstrated since each team writes their own blockers on the board, and the board is not controlled by any individual.

6.5.5. Influence of Future Orientation (present versus future) on Agile Artifacts

Proposition 20: ***In South Africa, Agile teams with a high degree of future orientation prioritise the Product Backlog for two Sprints ahead, and have a Roadmap for Increments that should be released.***

According to the findings, teams with a high degree of future orientation plan for every Sprint and sometimes prioritise the Product Backlog for two Sprints ahead. Teams with a low degree of future orientation plan only for the next Sprint. Literature states that limiting planning to only a Sprint prevents Developers from thinking ahead, while planning for two or more Sprints ahead helps the Developers focus on the Product Vision and to maintain the bigger picture (Cockton, Lárusdóttir, Gregory & Cajander, 2016). Therefore, while Scrum proposed only planning for the next Sprint ahead due to the future being uncertain beyond two weeks, there is value in helping teams see the bigger picture. The lower the degree of rigid Product Backlog prioritisation, the more the flexible the Sprint prioritisation can be to grow and evolve over time, which is an indication of the application of the CAS

principle of growth and evolution. Allowing planning sessions to be scheduled as and when needed is an indication of the application of the CAS principle of emergent order.

6.5.6. Influence of Performance Orientation on Agile Artifacts

Proposition 31: ***In South Africa, Agile teams with a high degree of performance orientation thrive to complete all items in the Sprint, are committed to achieving Sprint Goals, and have a fixed Definition of "Done".***

The outcome of the findings for the performance orientation dimension was as expected from the Globe studies. Findings reveal that in Agile teams where a high degree of performance orientation is manifested, the artifacts are influenced whereby the team strives to complete all items in the Sprint and are highly committed to achieving the Sprint Goals. In Agile teams with a lower degree of performance orientation, due to the teams valuing relationships over results, the team is lenient and has a lower sense of urgency since all items in the Sprint are not delivered. The commitment to achieving Sprint Goals to improve the Increment is an indication of the application of the CAS principle of growth and evolution

According to the findings, in South African Agile software development teams in general, success is measured mostly by whether the features and stories in the Sprint are delivered. In teams with a high degree of performance orientation, the Sprint stories and features are approximately 80% completed. In contrast, in teams with a seemingly low degree of performance orientation, items on the Sprint Backlog are approximately 60% completed. This is due to teams being mostly focussed on production issues rather than the Sprint. Therefore, we can deduce that there are no implications for agility since production issues and new feature work contributed to the Increment. In addition, where a high degree of performance orientation is manifested, the Definition of "Done" is defined up front and work done is signed off after the stakeholders complete their testing during User Acceptance Testing. In teams with a seemingly low manifestation of performance orientation, a fixed and documented Definition of "Done" does not exist. The Definition of "Done" not having a fixed definition may align to the CAS principle of emergent behaviour to allow the team to have emergent criteria. The Definition of "Done" being fixed is an indication of the CAS principle of growth and evolution applied since the Increment is released into production to once the Definition of "Done" is met.

6.5.7. Influence of Mastery versus Harmony on Agile Artifacts

Proposition 32: ***In South Africa, Agile teams with a high degree of mastery has many innovative features or improvement items as part of the Sprint Backlog based on the feedback in the Retrospective meetings.***

The findings reveal that teams that lean toward the mastery national culture dimension have many innovative features or improvement items as part of the Sprint Backlog based on the feedback in the Retrospective meetings. This finding was expected based on the mastery trait of the belief that society needs to go through development (Schwartz, 1999). In contrast, the findings suggested that harmony teams accept the Agile artifacts such as the Product Backlog and the various templates as is without the need to change these artifacts. This finding was expected based on the harmony trait of being at harmony with the environment without wanting to change, direct or exploit (Schwartz, 1999). Agile Coaches interviewed recommend that newer teams use Agile practices as prescribed, and then adapt based on the results inspected. Mastery teams display the Agile principle: At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly (Schwaber & Sutherland, 2020). Innovative features or improvement items being logged by the team is an indication of the CAS principle of growth and evolution being applied. Secondly, the prevalence of activities to build team relationships is an indication of the CAS principle of interactions and relationships being applied.

6.6. Summary

In summary, this research study aimed to investigate how South African culture influenced Agile implementations as well as how the various cultural dimensions influenced the aspects within the Scrum methodology such as the practices (ceremonies), roles, and the artifacts utilised. The main research question was whether South African national culture influences Agile implementations. The findings revealed that South African culture indeed exerted an influence on the implementation and use of Agile methodologies. The findings were compared to literature and discussed considering the implications for agility as well as the principles of the Complex Adaptive Systems (CAS) theory.

The propositions are tabled in Appendix J – Summary of Findings. The next chapter will present the conclusions of this study.

CHAPTER SEVEN: CONCLUSIONS

7.1. Research Summary

This concluding chapter outlines how the research problem identified in Chapter 1 was addressed. It will identify the highlights of each chapter, present this study's contributions to theory and implications for practice, discuss the limitations of the study and make proposals for future research.

7.2. Chapter Highlights

The problem statement in Chapter 1 was progressively responded to in the chapters that followed. Chapter 2 revealed that national culture dimensions could potentially exert an influence on Agile implementations in software development teams. Chapter 3 illustrated how this study adapted and applied national culture dimensions of the Hofstede, Schwartz, and GLOBE models to describe how culture influences Agile implementations (roles, processes, and artifacts) within the South African software development context. Chapter 4 presented this study's research methodology and explained the descriptive nature of this research, which was executed using a qualitative, semi-structured interview strategy. Chapter 5 presented the findings of the study. Chapter 6 compared the findings with literature and found that similarities and differences occurred.

7.3. The Contributions of the Study

This thesis provides a useful contribution to research and practice as it provides insights into the role of a consolidated set of cultural dimensions on Agile roles, processes, and artifacts during Agile implementations.

A key finding is that South Africa does not demonstrate a homogenous cultural trait across teams whereby each team can be identified as manifesting the same degree of national culture dimensions and consequently the same implementation of Agile methodologies in the team. Instead, various traits per national culture dimension are revealed, which brings more complexity to the Agile implementations.

Although in South African culture hierarchical order is accepted to a greater extent (Hofstede, 2013), the hierarchical dynamic in the team assisted the Scrum Master to manage the team, give direction, and coach the team to get them back on track. In addition, the collectivist cultural trait is more suitable to Agile implementations than the South African individualistic cultural trait. Contrary to the literature, individualistic teams are more dependent on the Scrum Master for protection and are expected to be loyal to the Scrum Master. Teams that are together for a long time become collectivist teams and become less dependent on the Scrum Master. They are loyal to each other, and their duties are more

definitive of their roles at work. Collectivist teams assisted one another. While individualistic organisations existed, within a large team sub-teams are formed within South African software development teams due to a desire for in-group collectivism. In collectivist South African software development teams, democratic decisions (consensus) are mostly used but over time as teams trust one another they use the method of willing consent. Therefore, the Ubuntu collectivist culture is leaner over time as collectivist teams experiment with other Agile methodologies to optimize for continuous flow, and community-orientation. Furthermore, teams with low masculinity are better suited to Agile implementations in terms of the team's interactions and the team's focus on the work in the Sprint and the goals of the team.

National culture dimensions influenced small-scale (e.g. Scrum) and large-scale (e.g. SAFe) Agile implementations (roles, ceremonies, and artifacts) differently. For example, although large-scale implementations such as SAFe allowed flexibility regarding project requirement scope, the teams are not flexible. The teams become inflexible due to being inundated with requests, leaving the team with little lead time to handle queries, and insufficient time to reflect on the work performed. Subsequently, the aforementioned influences the team to withdraw from meetings, or not participate due to feelings of not being heard and enough action being taken by management to address matters that arise in the team, although the Scrum Master encouraged participation in the meetings. Therefore, in large-scale implementations, management is more involved than the teams in planning processes. In this regard, it can help inform Agile implementations in practice, and therefore help managers and teams curate Agile teams for appropriate environments.

Lastly, a contribution to theories around agility is made by illustrating how national culture dimensions influence Agile implementations in South African Agile software development teams, and in turn how Agile teams as a CAS respond to external (national culture dimensions) and internal (emergent themes in the study findings) environmental changes. The CAS principle of emergent behaviour and the CAS principle of interactions and relationships are observed for the change of teams becoming collectivistic over time; the CAS principle of distributed control is manifested for teams becoming less masculine over time; and the CAS principle of least effort, well as the CAS principle of growth and evolution is displayed in teams becoming less avoidant of uncertainty and ambiguity over time. Table 15 shows the mapping of themes from the study findings to CAS principles where there was a change in cultural traits for an Agile software development team over time. The rest of the study findings, were considered as the internal state of the team mapped to CAS principles in Table 16 (refer to Appendix M – Mapping Themes to CAS Principles).

7.4. Researcher's Reflections

The study was done during the second wave of the COVID-19 pandemic (December 2020 to May 2021) in South Africa. Most teams were remote and were formalising new ways of work to improve the work-from-home culture. The culture was being formalised due to the team dynamics that were different when the teams were located at an office. Furthermore, much of the interactions and team building techniques changed to an online setting. This impacted the strategies various teams employed to create their team culture.

Furthermore, the nature of the work and practices depended on the where in the project/product lifecycle the team was at the time of the interview with the participant. This was taken into consideration for generalisation and the researcher probed into various project contexts. Lastly, Scrum Masters and Agile Coaches were more willing to participate and referred the researcher to potential participants. This could be due to them being part of the Agile community and seeking to expand it. The findings were impacted in terms of the perspective given from a management or leadership view.

Between waiting for Ethics Approval and conducting the research study interviews, the Scrum Guide was updated, and some of the terms used regarding Scrum roles, processes and the artifacts were changed or removed from the Scrum Guide. The literature review was updated while data collection was in progress. The semi-structured interview questions were updated as interviews were being held based on feedback from participants. P16 made the following commentary on the change of the wording in the Scrum Guide specifically related to the "Development Team" replaced by the "Scrum team".

> *"The wording has changed, but the meaning is the same. The idea is that there is a dev team but they (Scrum Master and Product Owner) are part of the Scrum team. The Scrum Master and Product Owner are equal and just as accountable as the team." (P16)*

Lastly, when the research was conducted, the researcher discovered that there were participants interviewed who used Scrum in a large-scale Agile environment where Scaled Agile Framework (SAFe) was the overarching methodology. This impacted on the original study for Scrum software development specifically. The research then changed to Agile methodologies in general which included the SAFe methodology.

7.5. Limitations of the Research

The limitations of the research are as follow:

1) The lack of Black African and Indian/Asian and Coloured participants in this study is a limitation as White participants contributed to (58%) of the population sample, while the Black African sample only accounted for (11%).

2) Not all Agile methodologies were included in this research study. The Agile methodologies were limited to Scrum and SAFe. The questions were generic to Agile and there was not detailed probing into the inner workings of a set framework such as the SAFe framework.

3) Interviewees were mostly located in the Western Cape region of South Africa.

4) A limited set of data collection methods were used.

5) The time horizon was cross-sectional.

6) The scope of this research focussed on software development teams.

7) In this study there were no software developers who were willing to participate. The other team members such as analysts and specialists were the researcher's personal contacts.

8) In this study, there were no female participants in roles such as Developer, Analyst, or Quality Assurance Tester from various cultures other than females in roles such Scrum Masters and Agile Coaches. This could be due to the Information Technology (IT) industry being predominantly male dominated, especially among the Developer roles. Furthermore, findings suggested that women from some African cultures do not speak up often in meetings due to the cultural norms whereby women are not permitted to speak in the presence of their male counterparts. The education levels and qualifications between male and female were not requested. However, findings revealed that education was not seen as a factor that influenced the relationships among team members in the South African context.

7.6. Suggestions for Future Research

Future research based on the limitations are:

1) Increase the demographic dispersion.

2) Future research can investigate the influence of national culture dimensions on other Agile methods. With a wider variety of Agile teams using various Agile methods, the rigor of the research can be improved. Specifically, a larger sample size of Agile teams that use the Scaled Agile Framework (SAFe) is required.

3) Interviews could be more equally spread in geography and industry.

4) More data collection methods could be employed to triangulate such as using observational data collection, focus groups, and even access to participants' artifacts to verify the results.

5) A longitudinal study could be done with the same group of people to compare the results of Agile methodology implementations over time, i.e., from the start of an Agile implementation to when the team has matured in the use of Agile methods.

6) The researcher interviewed one participant who used Scrum in a sales environment. Based on the findings which are not included in this study, the researcher suggests further investigation is done into the influence of national culture dimensions on Agile implementations in teams other than those in software development. The researcher found interesting insights into how Scrum has improved the way of work for the sales team, the compatibility of the methodology with the sales environment, and how the Scrum framework was used. For example, one of the artifacts used in the sales team was a sales bell which created an exciting atmosphere during meetings. The Scrum Master was a trained facilitator and Executive Coach who drives teams to deliver and helped team members drive their personal goals. Salespeople were also used to using unorthodox methods to achieve their sales targets whereas in software development teams there was a mix between tolerating new ideas if they worked and between tolerating new ideas but having a preference to stick to a framework or how the team always worked.

7) The researcher feels that if Developers were interviewed there would have been more in-depth responses in terms of the dynamics of the team since Developers have meetings among themselves and will be able to give feedback into those sessions.

8) More female participants in roles other than Scrum Masters and Product Owners can be interviewed. More female team members should be included in future studies for more representative responses as this may impact the dynamics of the team.

9) Lastly, in addition to the suggestions based on limitations, recent themes from the study that arose are themes such as the Agile mind-set, the importance of character of the team

members, empowerment of the team to be self-organised and self-managed, motivation and passion for Agile, output versus outcome-based performance measurement and reward, and can be explored as well.

7.7. In Conclusion

This study sought to describe how national culture dimensions influence Agile implementations (roles, processes, and artifacts) within the South African software development context. The influences studied will be on the Agile aspects, namely roles, ceremonies, and artifacts. It is hoped that the utility of the findings will be established by its uptake amongst the IS community and Agile software development professionals. To conclude, we would like to assure the reader that the conclusions and knowledge claims made in this study are the result of a thorough and detailed data analysis and triangulation to ensure consistency and reliability of the findings. Keen (1980) posits that good IS research should demonstrate rigor and relevance. Furthermore, Konda (2012) urged IS researchers to focus on the pluralistic tradition of research methodologies appropriate to the specific areas of IS and business problem domain. It is hoped that the rigor and relevance of the study has been proven throughout this thesis and that the findings will prove useful to Agile practitioners and IS researchers alike.

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Appendix A – Qualitative Questionnaire

Table 7: First Question List for Interview

No.	Interview Question
1	What is your role in the organisation? How long have you been in your role?
2	What is the size of the Scrum team?
3	What is your team composition?
4	How does your team use Scrum from a framework perspective?
5	What activities do you have in a Sprint?
6	What are the artifacts that the team produces?
7	Does the Scrum team have a **Daily meeting**? Do you meet online and what time is the meeting? Who are the attendees in the Stand-up meetings?
8	Do you have a **Kick-Off** meeting before a project? If so, how long does the meeting take and who attends the meeting?
9	Do you have **Sprint Planning** sessions? If so, how long does the meeting take and who attends the meeting?
10	Do you have **Sprint Retrospective** meetings? If so, how long does the Sprint Retrospective meeting take? Who attends the Sprint Retrospective meeting?
11	How many hours do team members work every week (Core hours, flexitime)? And **how many projects** do they work on at a time?

Table 8: Second Question List for Interview

National Culture Dimension	Interview Question
Power Distance	· How is **decision-making power** distributed in the Scrum team regarding, roles, artifacts, and processes? **Roles** · What is the **hierarchical order / power-structure** in the Scrum team? · Are there **sub-teams** in the Scrum team? · Are there **titles** in the team? · Does the Scrum team have a **clear leader**? If so, what is the role of the leader? · Describe whether the hierarchical distribution of roles within the Scrum team impacts on **compliance with the obligations and rules attached to their roles**. · Is there an expectation for the **Developers to be told what to do**? · How is **inequality regarding decision-making** among the Scrum team members handled? · What are the **qualities** of the ideal Scrum Master, Developers, and Product Owner, and Management? · What are the **Scrum Master's responsibilities**? · Have you ever experienced that **a manager assigns new tasks** to the Scrum team? Is this allowed? **Processes** · Who has the mandate to **change the Sprint scope or duration**?

	· Who role facilitates the **Scrum Daily Meetings**? · Are there **interferences** during the Sprint from individuals or bodies outside of the Developers? If so, who are these individuals? **Artifacts** · Who has input into the **Product Vision, Product Goals, Product Backlog, Sprint Backlog, Definition of "Done", manage Burndown Chart, Increment, and other artifacts** respectively? · How often does the **Product Owner attend the Scrum Daily Meeting**?
Individualism (opposite is in-group collectivism)	· To what degree does the team prefer a **loosely knit / distant relationships** when it comes to the Scrum team? In other words, are you only concerned with the **well-being of yourself and your immediate family** or is there an expectation for a sense of family in the Scrum team? **Roles** · Is there an **expectation to be looked after/protected** by your Scrum Master? How so? · Is there an **expectation to be unquestionably loyal** to the Scrum Master? How so? · How do you **define your role at work**, by duties or by title (what carries more weight)? **Processes** · What is the **expectation of the involvement of the Scrum team** in meetings? **Artifacts**

	· What is the **expectation of the involvement of the Scrum team** in the artifacts?
Masculinity	· Please describe the importance of achievement, heroism, assertiveness, and material rewards for success in the Scrum team? · How do you experience competition within the Scrum team? **Versus** · Please describe the relevance of cooperation, modesty, caring for the weak, and quality of life in the Scrum team? **Roles** · How are **conflicts resolved** in the Scrum team? **Processes** · How important is working together during ceremonies (Print Planning, Daily Scrum, Sprint Review) **to reach agreement** in the Scrum team? How so? **Artefacts** · How important is **working together on artifacts to reach agreement** in the Scrum team? How so?
Uncertainty Avoidance / Conservatism (Embeddedness)	· Describe the importance for the Scrum Yeam value **social order, respect for tradition, security, and wisdom**? · Describe the extent to which the **status-quo** regarding roles in the team, Scrum processes, Scrum artifacts is maintained. **Roles**

	· How flexible are **job duties**? **Processes** · How **flexible** are your Sprints? Is a Sprint strictly time-boxed? · Is the **scope strictly signed-off?** Must all the user stories be delivered in the Sprint? · How comfortable is the team with **uncertainty and ambiguity** during Sprints? · How does the Scrum team **control** what happens in the Sprint? How accommodating are they to change · How strict are your **policies to follow procedure** and Scrum processes? **Artifacts** · How tolerant is the team of **unorthodox methods and ideas** when it comes to artifacts produced? · Are **Burndown charts** still used and why? How are they being used? · Are **interferences** in Sprints allowed, even internally to the Scrum team? How are these interferences handled? · Is there a **timeframe** to have blockers resolved early?
Long-term Orientation (Past (tradition) versus future (thrift) aspect of societies)	· How is **growth and efforts in new ways of work** encouraged when it comes to Scrum roles, processes, and artifacts? · What is the process to determine the **workload**? Based on Burndown charts? **Role**

	· How is **change** in Scrum roles, processes, artifacts viewed and accepted? **Processes** · Describe the nature of the conversation between team members in the Sprint Retrospective Meeting (**What went wrong (past) vs continuous improvement (future)**). **Artifacts** · Describe the nature of the work done (**operational vs innovation**)
Indulgence	**Roles** · Describe whether **enjoyment in Scrum roles titles** and duties are encouraged. **Processes** · How freely is **enjoyment and having fun** at work and personal life encouraged within the various Scrum meetings? How so? **Artifacts** · Explain whether **enjoyment in producing Scrum artifacts** is encouraged, e.g., humorous comments in code.
Institutional Collectivism	· Do leaders (Scrum Masters, Product Owners, management) encourage **group loyalty and commitment** to the Sprints even if **individual goals** suffer? How so? How does it influence the Scrum roles, processes, and artifacts?

Gender Egalitarianism	· To what degree are males encouraged more than females to attain a **higher education or leadership roles** within the Scrum team? · To what degree do people seek to induce people to recognise one another as **moral equals** who share basic interests as human beings? · To what degree do people internalise a commitment to cooperate and to **feel concern for everyone's welfare**? · To what degree are people expected to act for the **benefit of others** as a matter of choice? (How does it influence Scrum roles, processes, and artifacts?) **Roles** · Describe whether there are **differences in duties** between males and females. **Processes** · Describe whether team members **commit to assist** others in meetings as a matter of choice? **Artifacts** · What will the Scrum Master do if a team member **proposes an impediment**? Will he/she write it down on the whiteboard/presentation?
Assertiveness	· To what degree are people in the Scrum team generally **dominant in their relationships** with each other? · What are the dynamics among the various Scrum roles in your Scrum team? How does this **influence** the Scrum processes and artifacts?
Future	**Roles**

Orientation (**present versus future (planning) practices of societies**, and GLOBE FO values reflect societal aspirations and preferences for planning)	· Which roles are involved with Sprint Planning? How long are Sprint Planning sessions and **how often** are they held? How often are Sprint Refinement sessions? **Processes** · Have you ever experienced **termination of the Sprint**? How often? · Describe the **planning process** for the various meetings? Preparation for planning sessions? **How far ahead is planning done?** **Artifacts** · Are the Product Goals communicated and to whom? · To what degree is the Product Backlog prioritized? · Is there a strategy to roll-out Increments for use? Roadmap
Performance Orientation	· To what degree does the Scrum team contribute to a high-performance team by suggesting how technology, roles, artifacts, and Scrum processes can **change the environment** to attain Sprint goals? **Roles** · To what degree would you say is the Scrum team dynamic, competitive, and **orientated to achievement and success**? **Processes** · How is performance rewarded? **Artifacts** · How do you **define success** for an Increment?

	· To what degree are items **completed** according to the Scrum team's definition of "done"?
Mastery	**Roles** · How is training encouraged in current roles? **Processes** · How do teams prepare for Sprint Retrospective meetings? · During the Retrospective meetings, does the team put **measures** in place to improve? Is it documented and visible? **Artifacts** · How was the contents of the Increment managed?
Humane Orientation	**Roles** · How tolerant are Scrum team members of certain **duties** and responsibilities that were not performed by certain roles? **Processes** · Describe whether the Scrum Master **coaches** the Scrum team and plays a supportive role in terms of responsibilities, artifacts, and processes **to get the team back on track**. **Artifacts** · How tolerant are people in the Scrum team of **mistakes** in the development of artifacts?
Intellectual Autonomy	· To what degree are individuals in the Scrum team encouraged to **pursue their own ideas and intellectual directions independently** when it comes to Scrum roles,

	processes, and artifacts (important values: curiosity, broadmindedness, creativity)?
Affective Autonomy	· To what degree is it encouraged in the meetings to **pursue positive life experiences such as pleasure, and a varied life**? Does this come through in the artifacts, processes, and role titles?
Harmony	· To what degree do people in the Scrum team **accept** the Scrum roles, processes, and artifacts as it is, trying to understand and appreciate rather than to change, direct or exploit?

Appendix B – Initial List of Prospective Interview Participants

Table 9: Possible Roles To Interview

Role	Relevance to Research Topic
Product Owner	This person makes functional decisions for the final product.
Scrum Master	This can be a Team Leader
Business Analyst	These formal roles are part of the Developers.
Developer	
Quality Assurance Testers	
Customer	The customer requests the product
Management	Management will enable the team to be self-managed and oversees the work being done
Users	These will be end-users of the product/system

Appendix C – Literature review codes

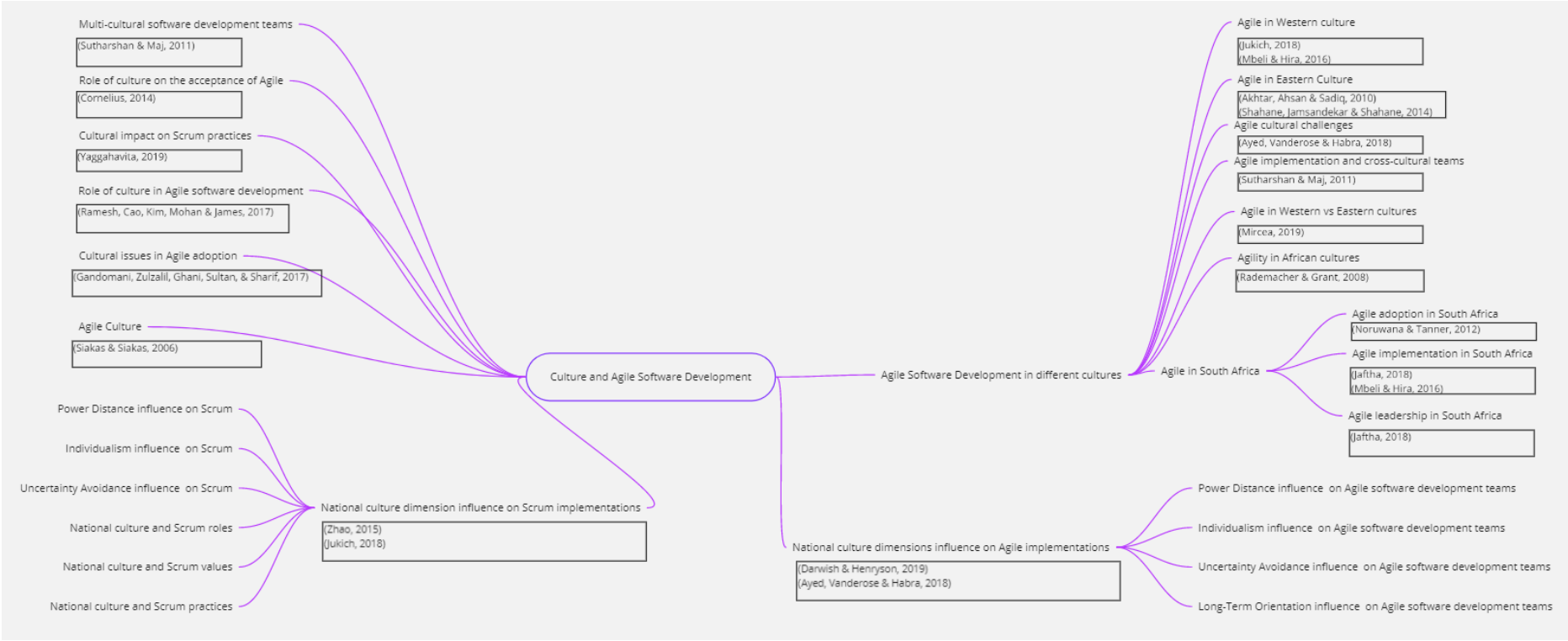
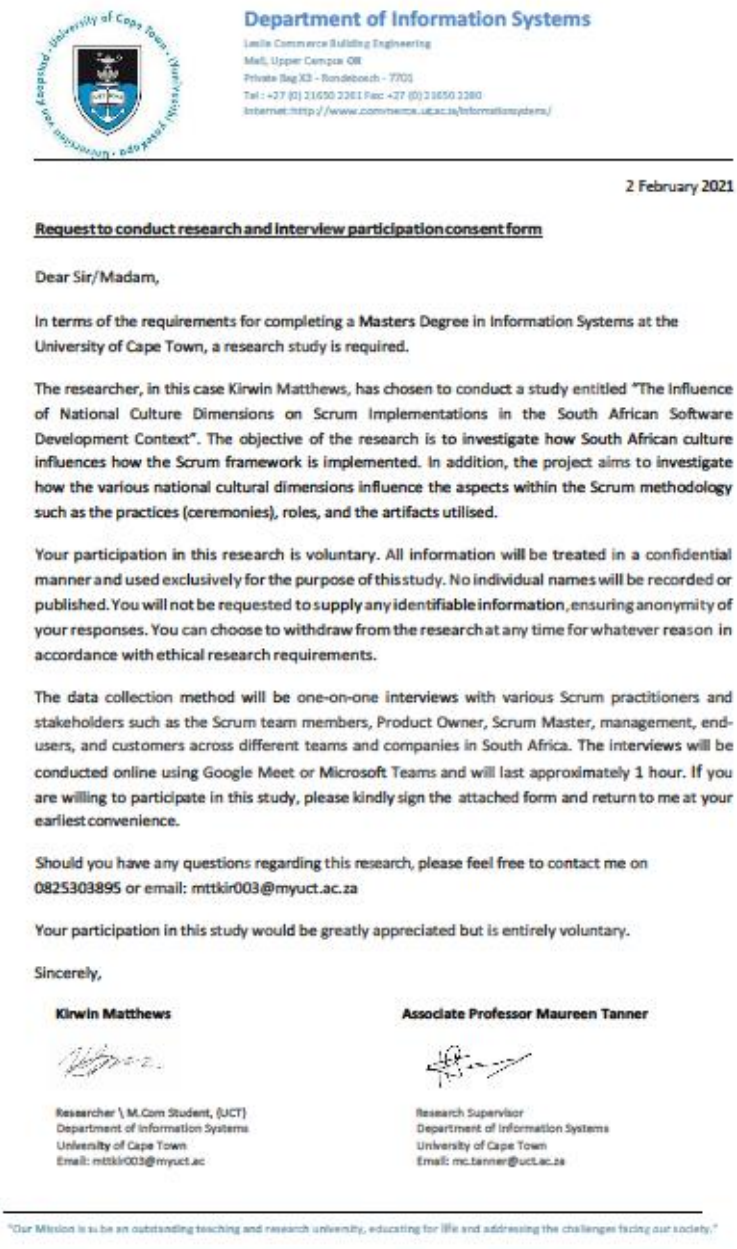


Figure 4: Literature Review Codes

Appendix D – Consent Form



Department of Information Systems

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2 February 2021

Request to conduct research and interview participation consent form

Dear Sir/Madam,

In terms of the requirements for completing a Masters Degree in Information Systems at the University of Cape Town, a research study is required.

The researcher, in this case Kirwin Matthews, has chosen to conduct a study entitled "The influence of National Culture Dimensions on Scrum Implementations in the South African Software Development Context". The objective of the research is to investigate how South African culture influences how the Scrum framework is implemented. In addition, the project aims to investigate how the various national cultural dimensions influence the aspects within the Scrum methodology such as the practices (ceremonies), roles, and the artifacts utilised.

Your participation in this research is voluntary. All information will be treated in a confidential manner and used exclusively for the purpose of this study. No individual names will be recorded or published. You will not be requested to supply any identifiable information, ensuring anonymity of your responses. You can choose to withdraw from the research at any time for whatever reason in accordance with ethical research requirements.

The data collection method will be one-on-one interviews with various Scrum practitioners and stakeholders such as the Scrum team members, Product Owner, Scrum Master, management, end-users, and customers across different teams and companies in South Africa. The interviews will be conducted online using Google Meet or Microsoft Teams and will last approximately 1 hour. If you are willing to participate in this study, please kindly sign the attached form and return to me at your earliest convenience.

Should you have any questions regarding this research, please feel free to contact me on 0825303895 or email: mttkir003@myuct.ac.za

Your participation in this study would be greatly appreciated but is entirely voluntary.

Sincerely,

Kirwin Matthews

Researcher \ M.Com Student, (UCT)
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University of Cape Town
Email: mttkir003@myuct.ac

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Research Supervisor
Department of Information Systems
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"Our Mission is to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society."

Figure 5: Consent Form

Appendix E – Ethics Approval

Faculty of Commerce

Private Bag X3, Rondebosch, 7701
2.26 Leslie Commerce Building, Upper Campus
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E-mail: jacques.rousseau@uct.ac.za
Internet: www.uct.ac.za
@Commerce UCT **UCT Commerce Faculty Office**

We are pleased to inform you that your ethics application has been approved. Unless otherwise specified this ethical clearance is valid until .

Your clearance may be renewed upon application.

Please be aware that you need to notify the Ethics Committee immediately should any aspect of your study regarding the engagement with participants as approved in this application, change. This may include aspects such as changes to the research design, questionnaires, or choice of participants.

The ongoing ethical conduct throughout the duration of the study remains the responsibility of the principal investigator.

We wish you well for your research.

Commerce Research Ethics Chair
University of Cape Town
Commerce Faculty Office
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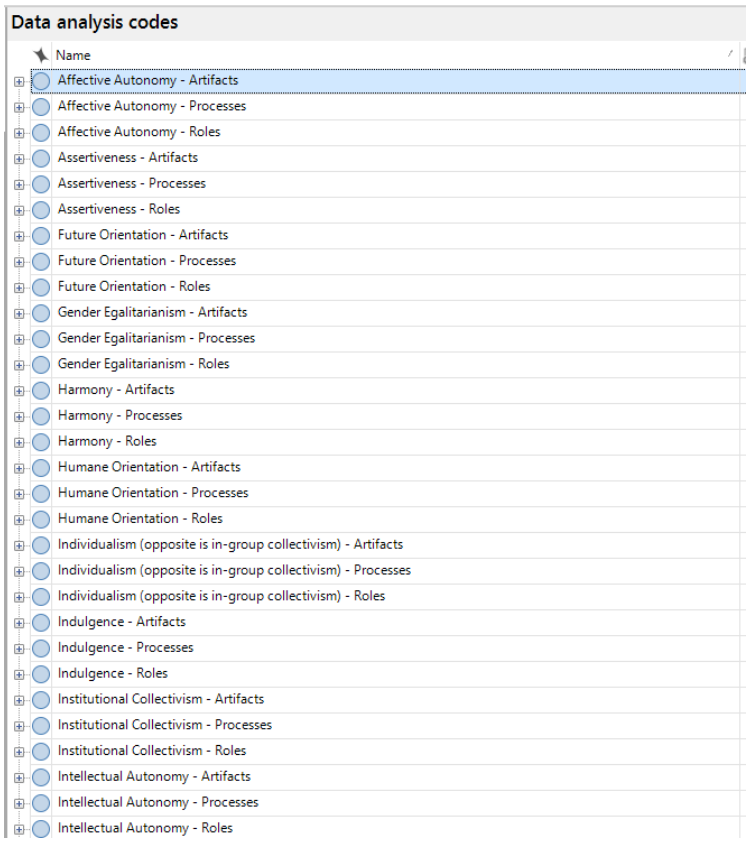
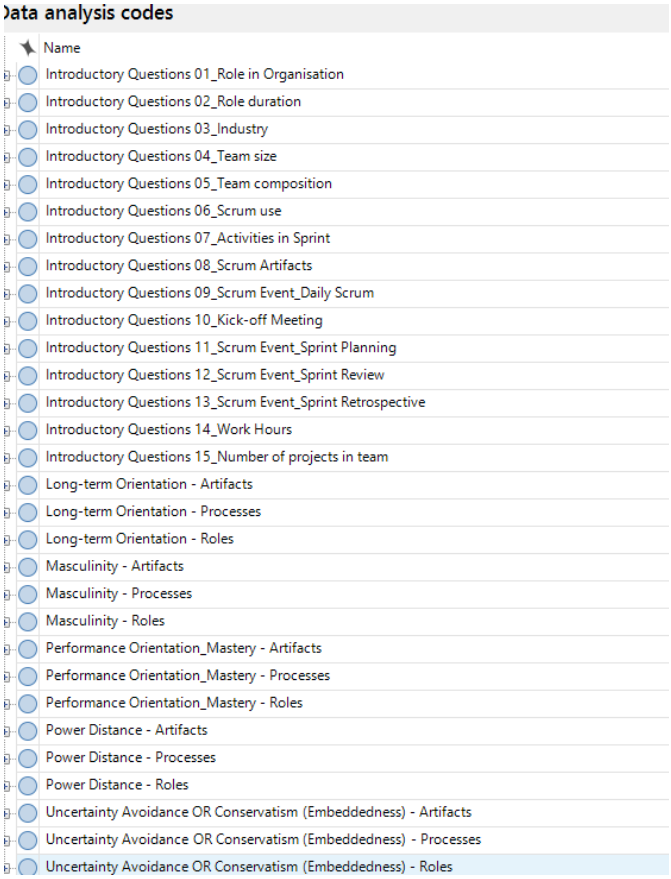
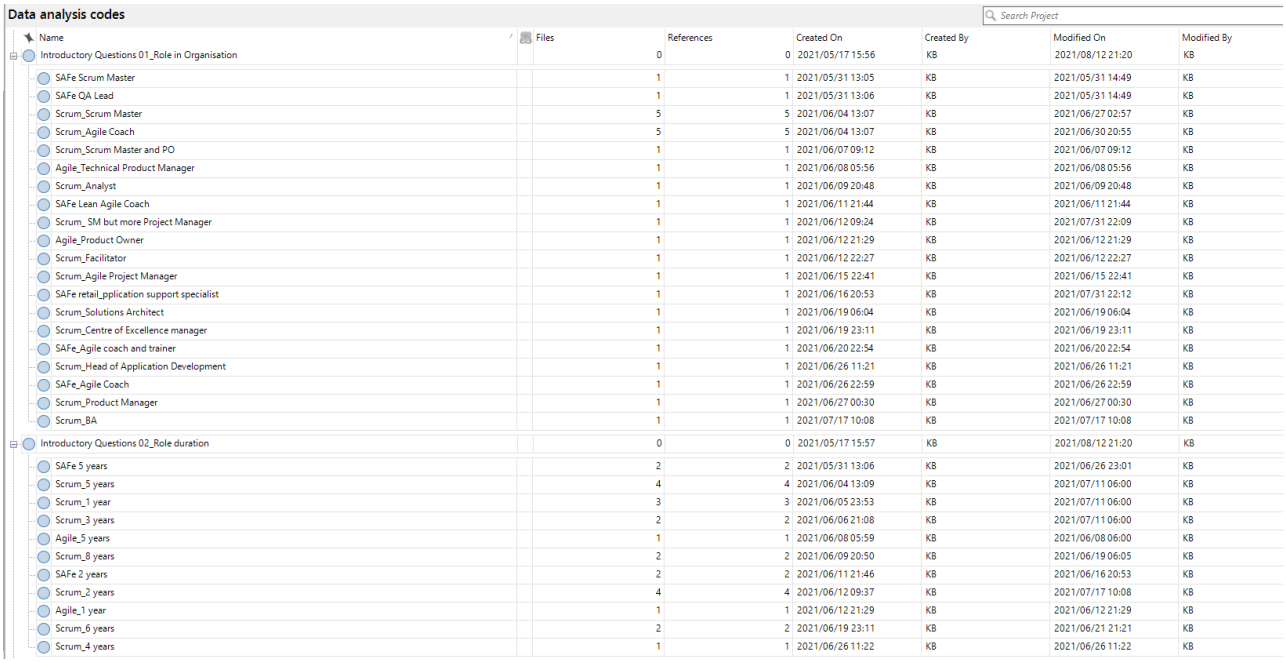
Website: https://www.commerce.uct.ac.za/Pages/Ethics-in-Research

Figure 6: Ethics Approval

Appendix F – Interview Codes







Data analysis codes

Search Project

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SAFe QA Lead	1	1	2021/05/31 13:06	KB	2021/05/31 14:49	KB
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Scrum_Scrum Master and PO	1	1	2021/06/07 09:12	KB	2021/06/07 09:12	KB
Agile_Technical Product Manager	1	1	2021/06/08 05:56	KB	2021/06/08 05:56	KB
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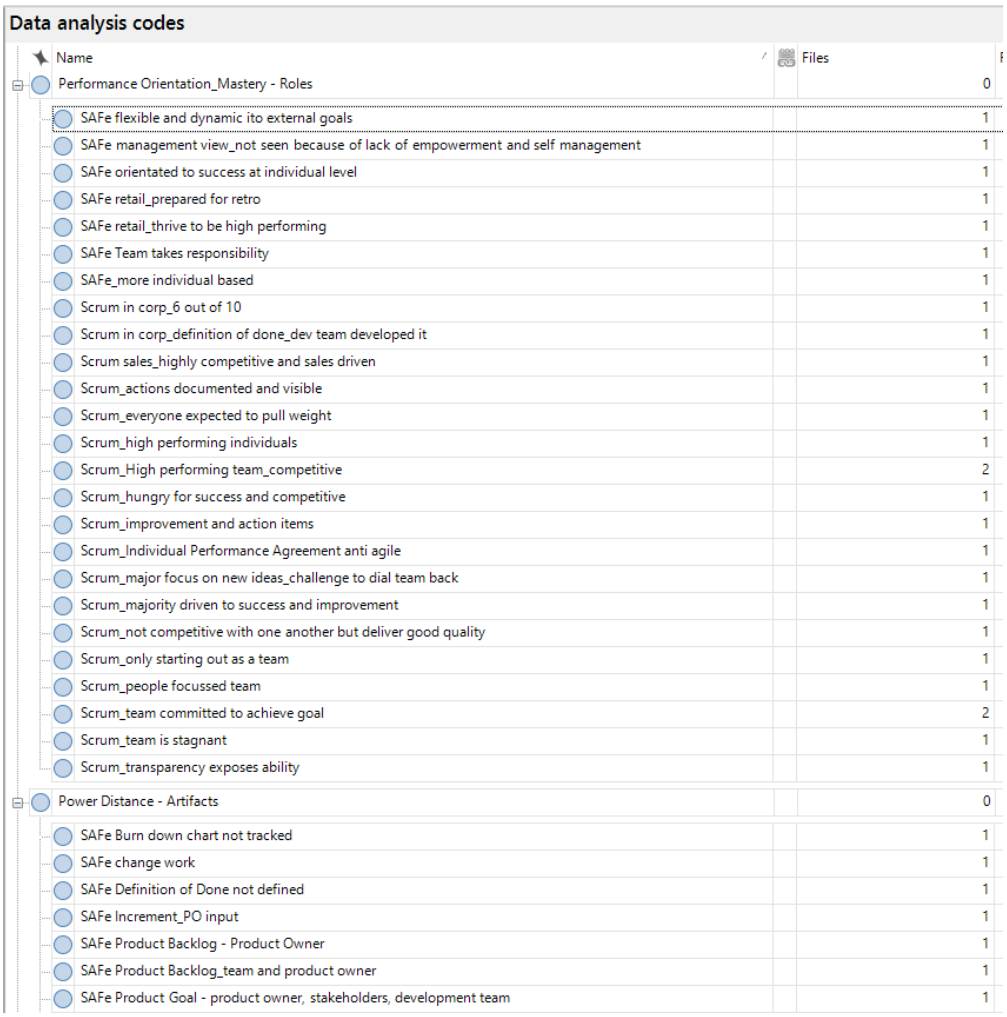
Scrum_6 years	2	2	2021/06/19 23:11	KB	2021/06/21 21:21	KB
Scrum_4 years	1	1	2021/06/26 11:22	KB	2021/06/26 11:22	KB



Data analysis codes

Name	Files
Performance Orientation_Mastery - Roles	0
SAFe flexible and dynamic ito external goals	1
SAFe management view_not seen because of lack of empowerment and self management	1
SAFe orientated to success at individual level	1
SAFe retail_prepared for retro	1
SAFe retail_thrive to be high performing	1
SAFe Team takes responsibility	1
SAFe_more individual based	1
Scrum in corp_6 out of 10	1
Scrum in corp_definition of done_dev team developed it	1
Scrum sales_highly competitive and sales driven	1
Scrum_actions documented and visible	1
Scrum_everyone expected to pull weight	1
Scrum_high performing individuals	1
Scrum_High performing team_competitive	2
Scrum_hungry for success and competitive	1
Scrum_improvement and action items	1
Scrum_Individual Performance Agreement anti agile	1
Scrum_major focus on new ideas_challenge to dial team back	1
Scrum_majority driven to success and improvement	1
Scrum_not competitive with one another but deliver good quality	1
Scrum_only starting out as a team	1
Scrum_people focussed team	1
Scrum_team committed to achieve goal	2
Scrum_team is stagnant	1
Scrum_transparency exposes ability	1
Power Distance - Artifacts	0
SAFe Burn down chart not tracked	1
SAFe change work	1
SAFe Definition of Done not defined	1
SAFe Increment_PO input	1
SAFe Product Backlog - Product Owner	1
SAFe Product Backlog_team and product owner	1
SAFe Product Goal - product owner, stakeholders, development team	1

Figure 7: Interview Codes

Appendix G – Demographic Graphs

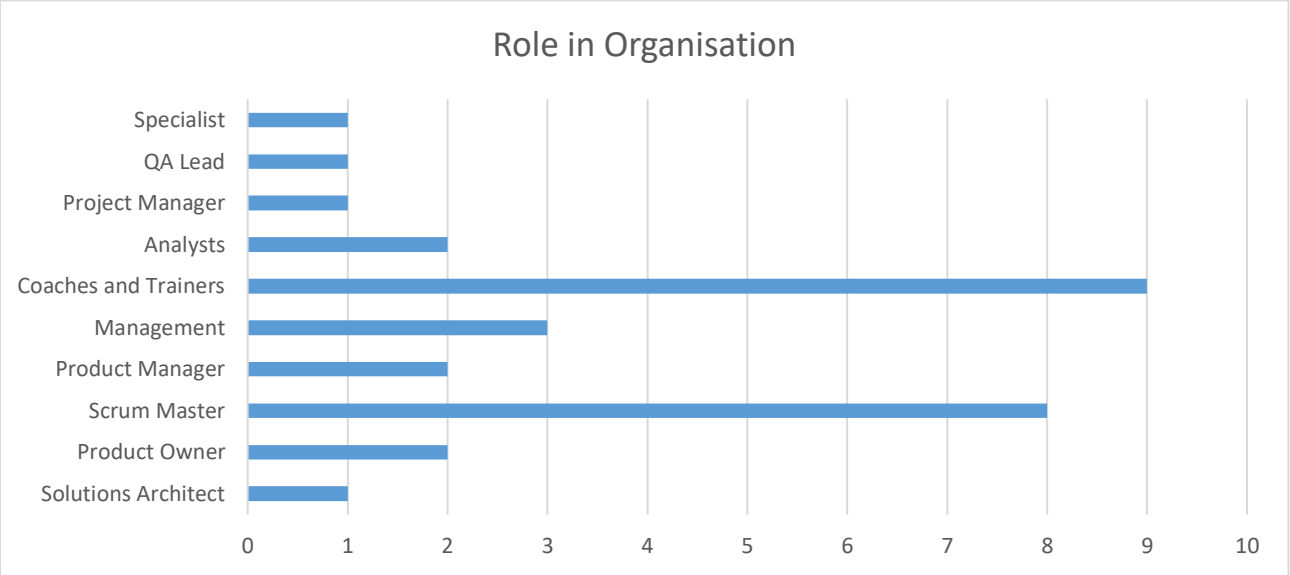


Figure 8: Role in Organisation

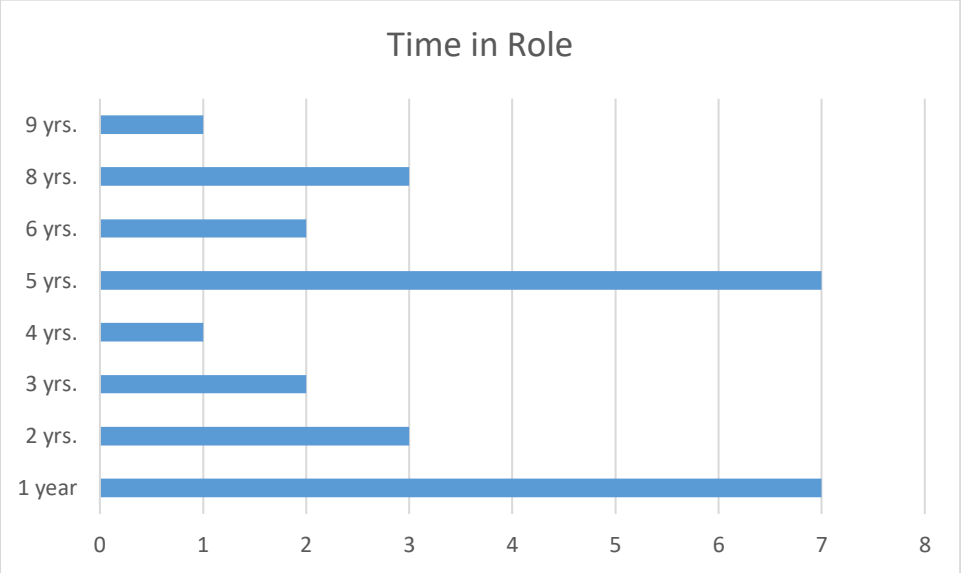


Figure 9: Time in Role

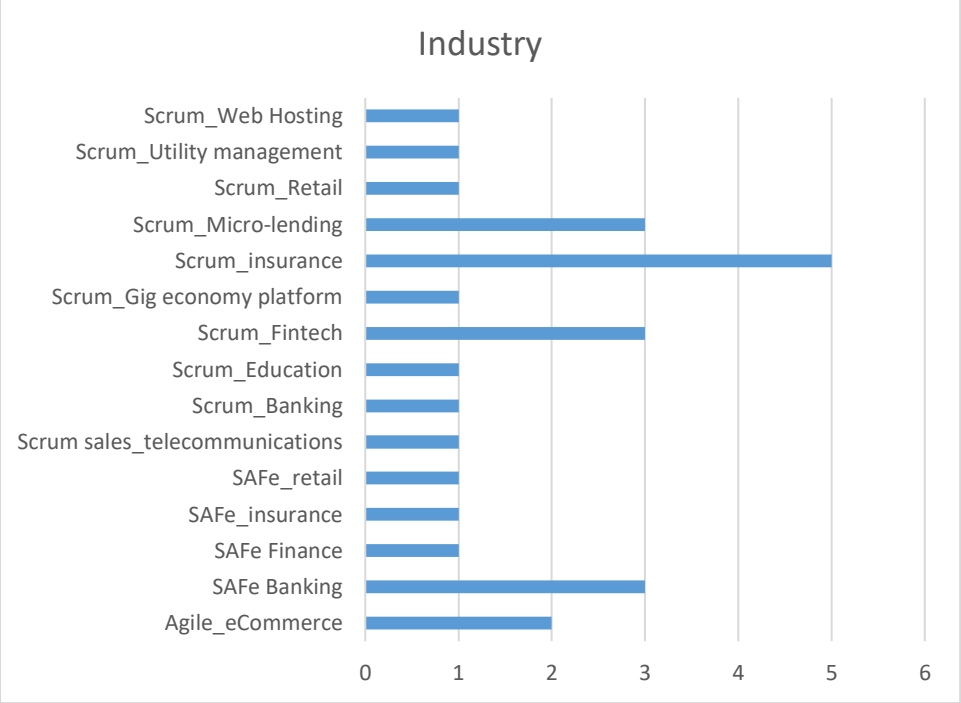


Figure 10: Industry

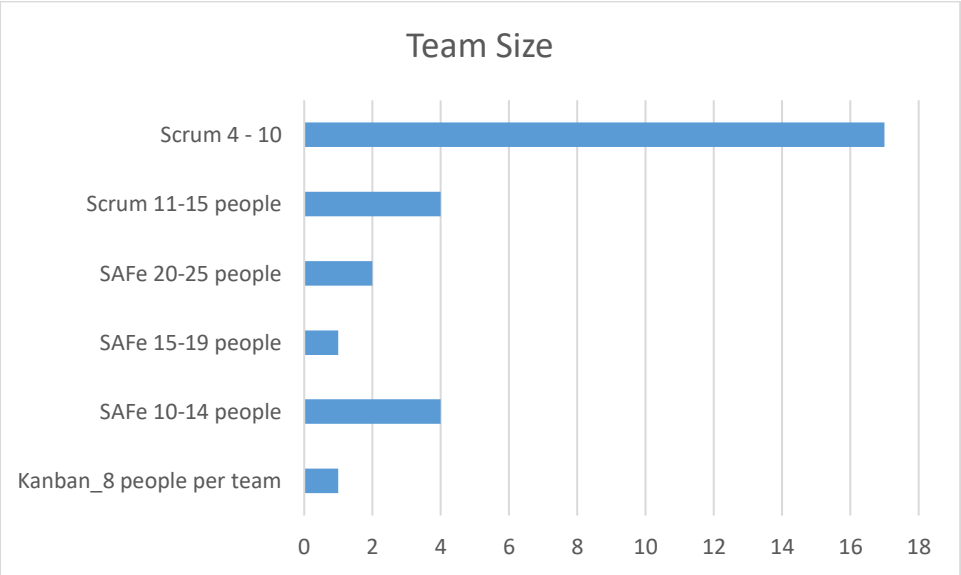


Figure 11: Size of Teams

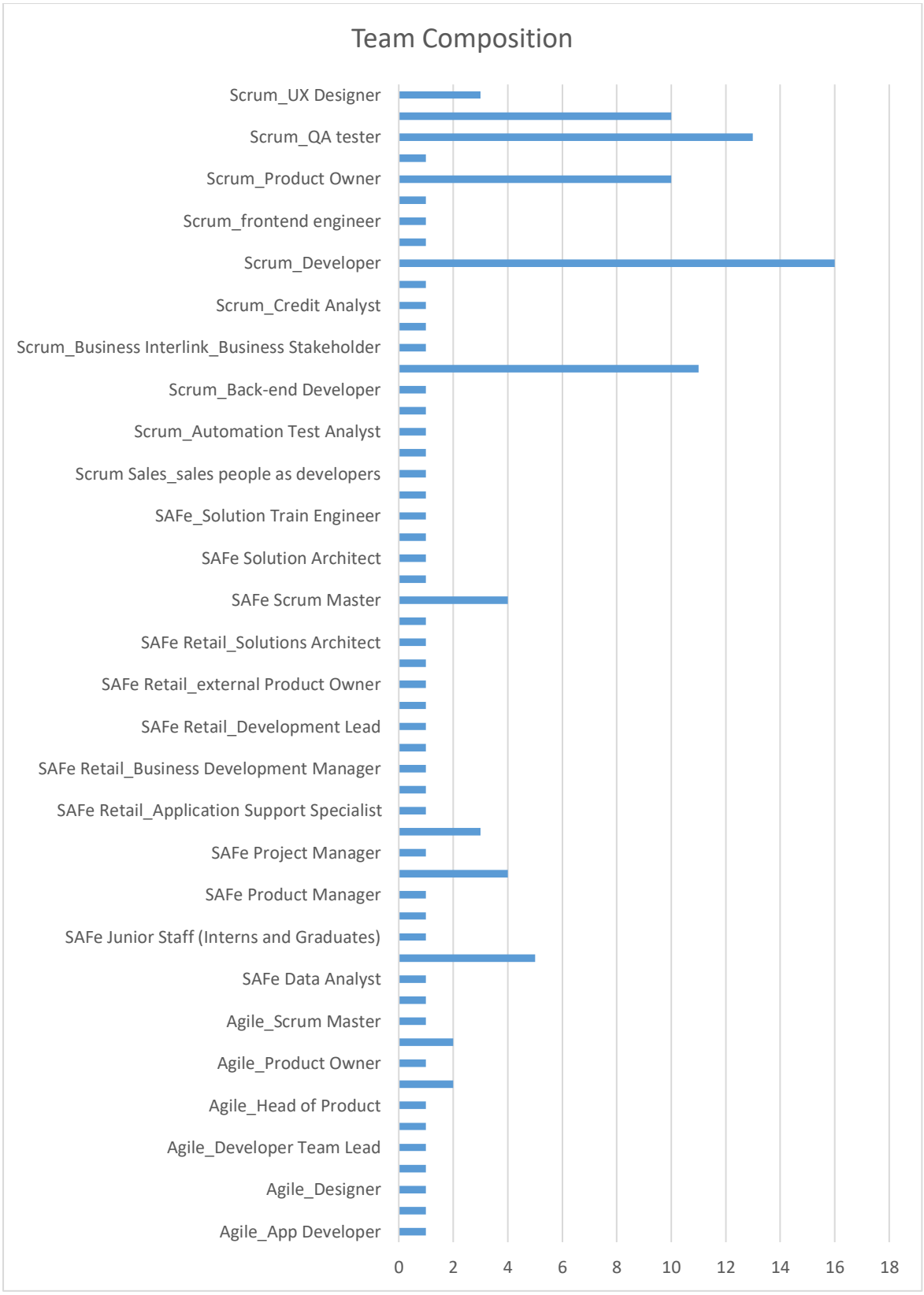


Figure 12: Team Composition

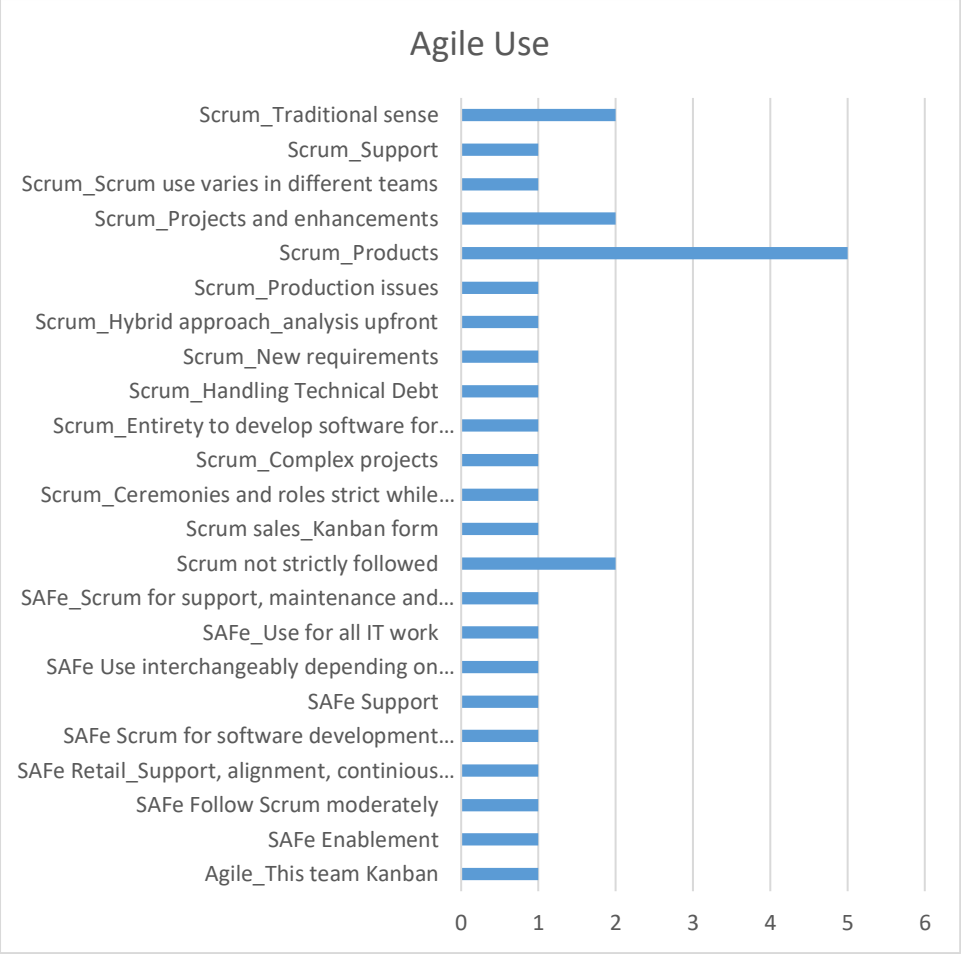
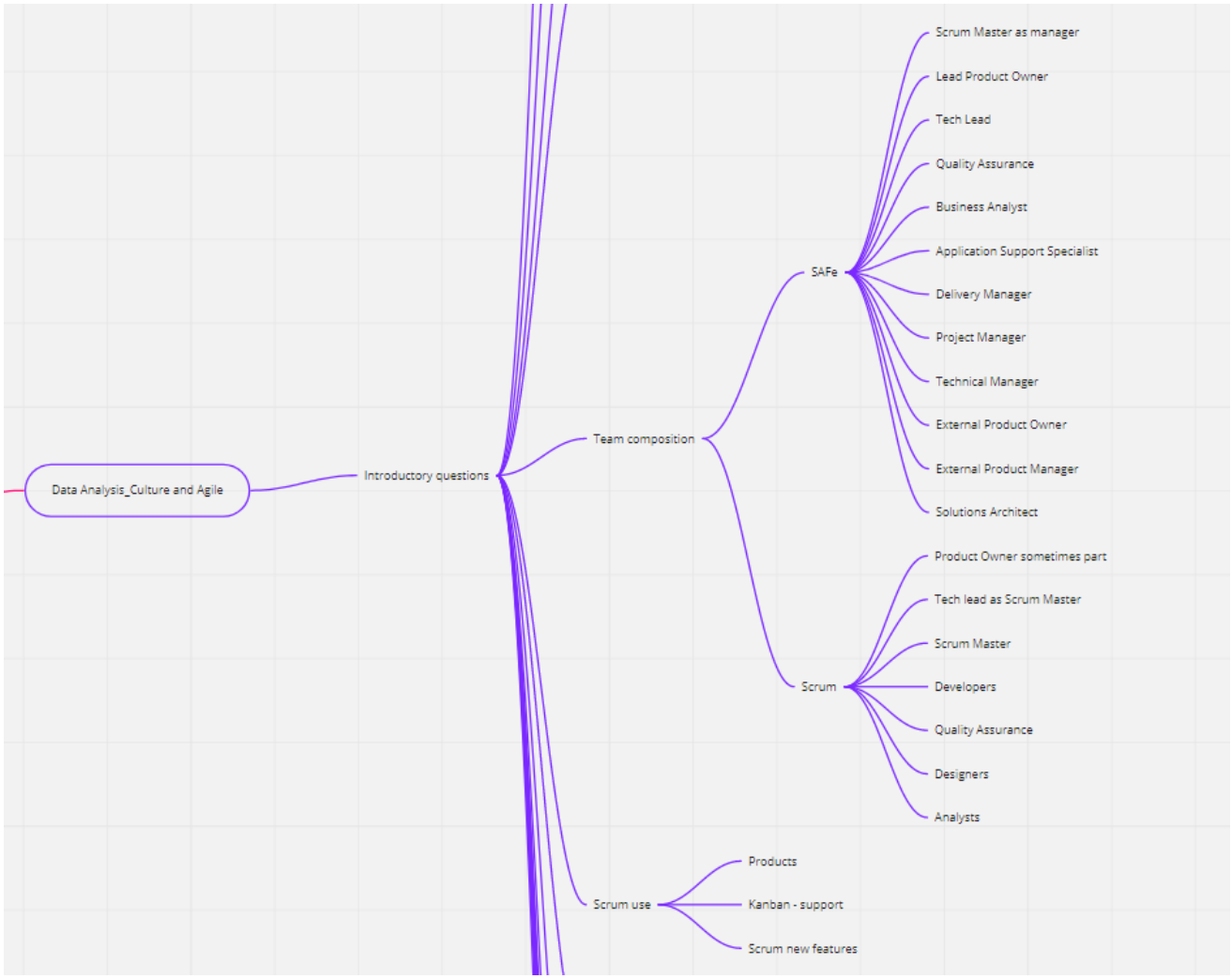


Figure 13: Agile Use

Appendix H - Initial Mind Map of Study


Data Analysis_Culture and Agile
Introductory questions
Team composition
SAFe
Scrum Master as manager
Lead Product Owner
Tech Lead
Quality Assurance
Business Analyst
Application Support Specialist
Delivery Manager
Project Manager
Technical Manager
External Product Owner
External Product Manager
Solutions Architect
Scrum
Product Owner sometimes part
Tech lead as Scrum Master
Scrum Master
Developers
Quality Assurance
Designers
Analysts
Scrum use
Products
Kanban - support
Scrum new features

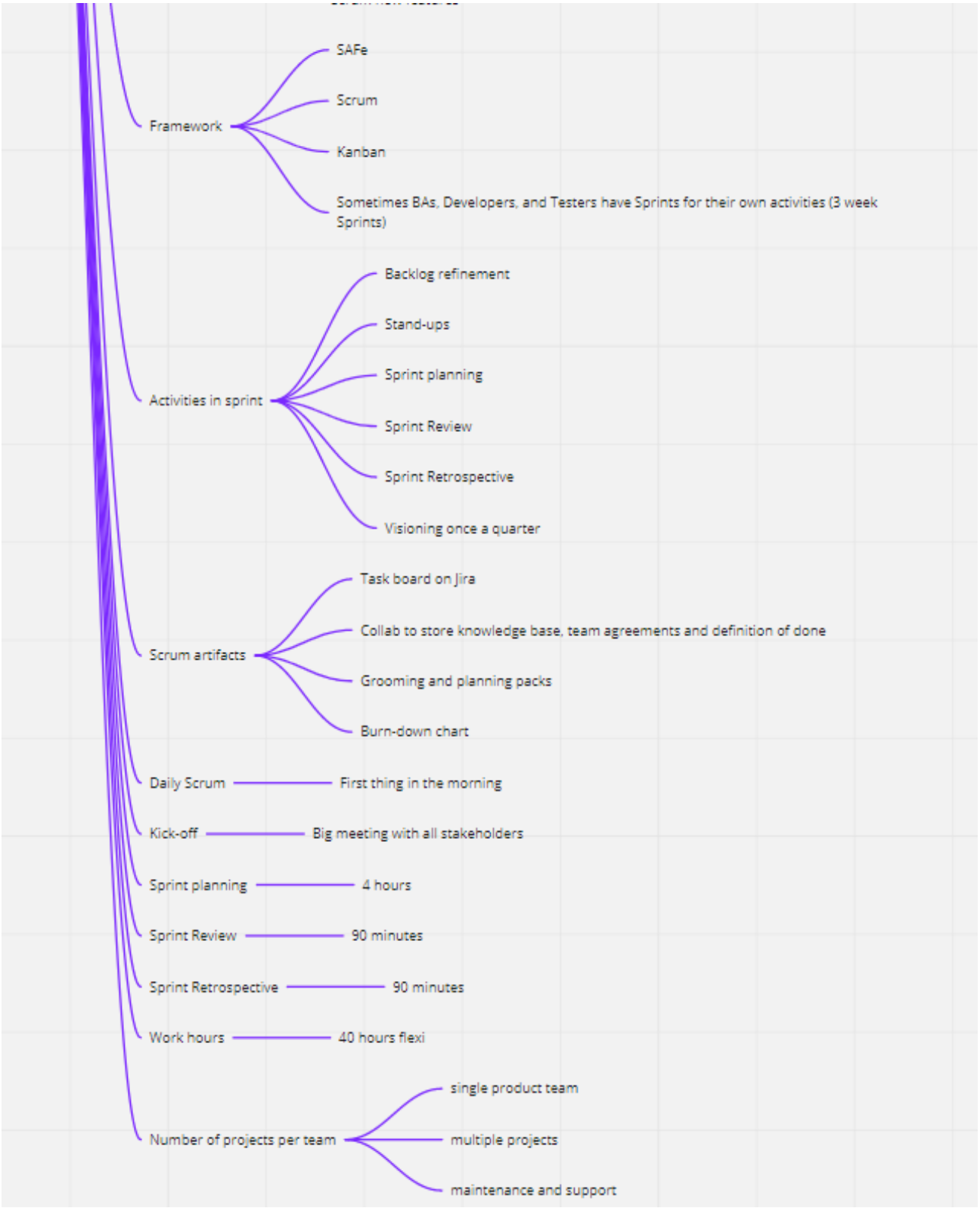
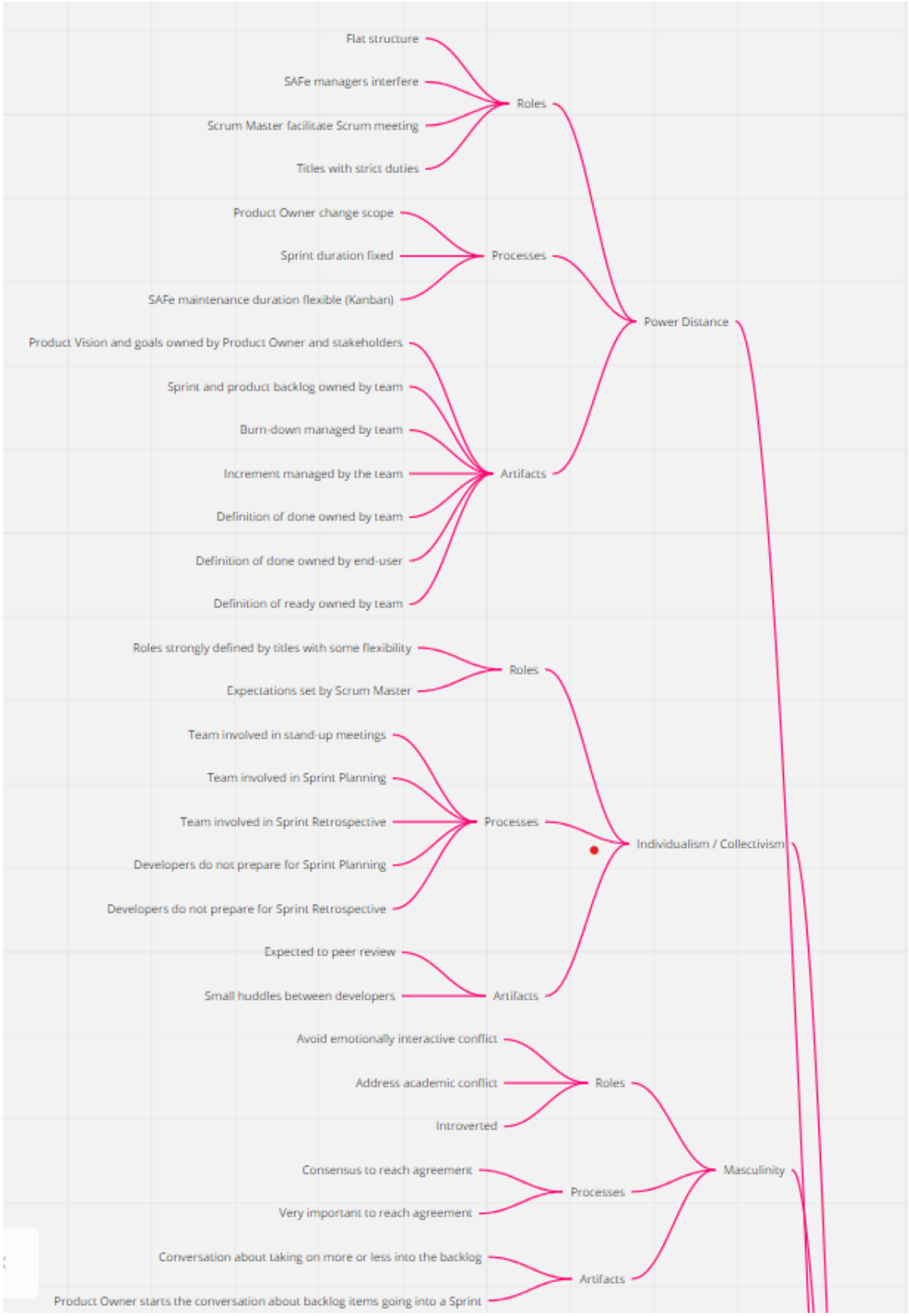
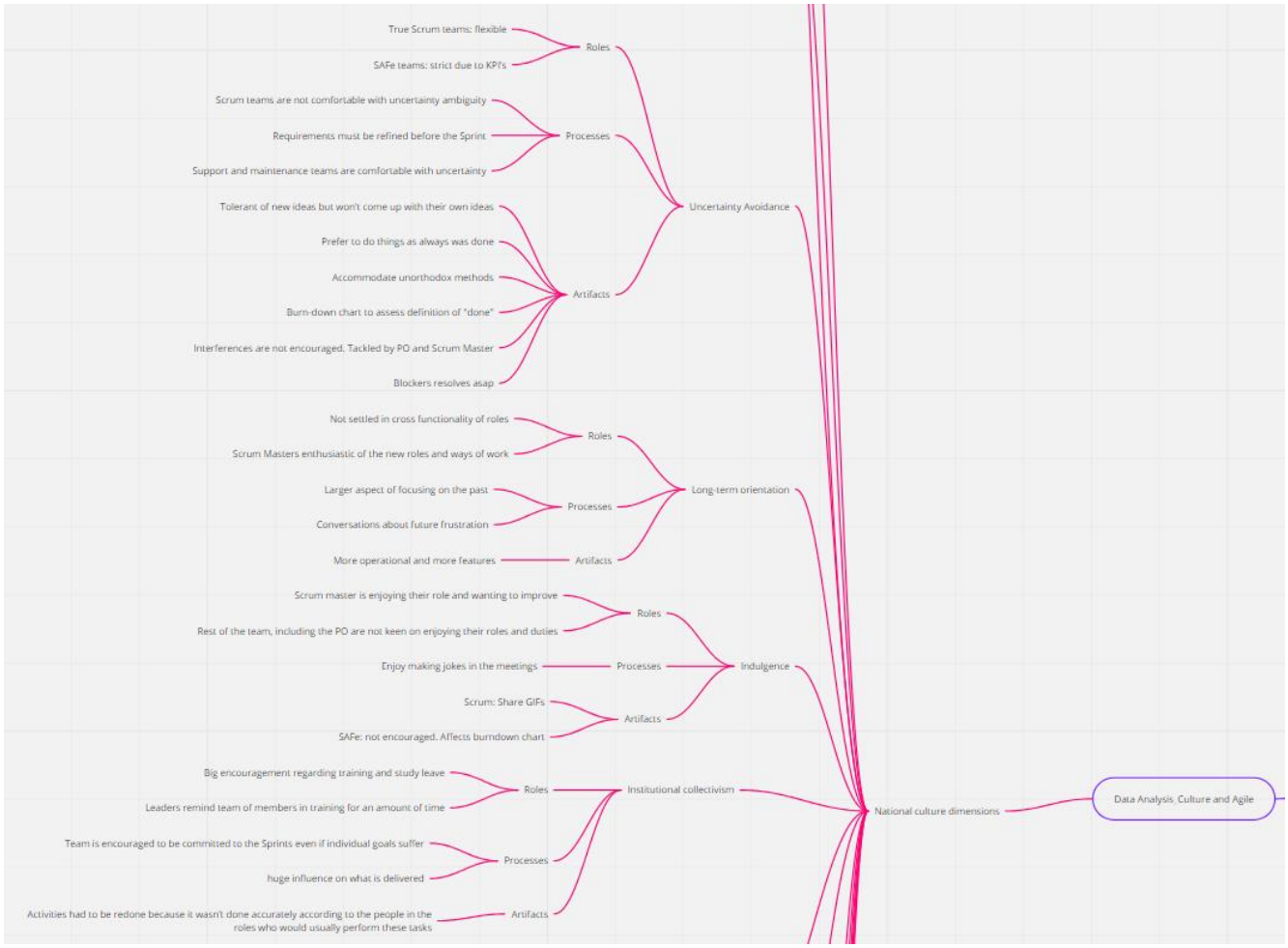


Figure 14: Initial Mind Map of Study

Appendix I - Research Study Mind Map




Data Analysis, Culture and Agile
National culture dimensions
Uncertainty Avoidance
Roles
True Scrum teams: flexible
SAFe teams: strict due to KPI's
Processes
Scrum teams are not comfortable with uncertainty ambiguity
Requirements must be refined before the Sprint
Support and maintenance teams are comfortable with uncertainty
Artifacts
Tolerant of new ideas but won't come up with their own ideas
Prefer to do things as always was done
Accommodate unorthodox methods
Burn-down chart to assess definition of "done"
Interferences are not encouraged. Tackled by PO and Scrum Master
Blockers resolves asap
Long-term orientation
Roles
Not settled in cross functionality of roles
Scrum Masters enthusiastic of the new roles and ways of work
Processes
Larger aspect of focusing on the past
Conversations about future frustration
Artifacts
More operational and more features
Indulgence
Roles
Scrum master is enjoying their role and wanting to improve
Rest of the team, including the PO are not keen on enjoying their roles and duties
Processes
Enjoy making jokes in the meetings
Artifacts
Scrum: Share GIFs
SAFe: not encouraged. Affects burndown chart
Institutional collectivism
Roles
Big encouragement regarding training and study leave
Leaders remind team of members in training for an amount of time
Processes
Team is encouraged to be committed to the Sprints even if individual goals suffer
huge influence on what is delivered
Artifacts
Activities had to be redone because it wasn't done accurately according to the people in the roles who would usually perform these tasks

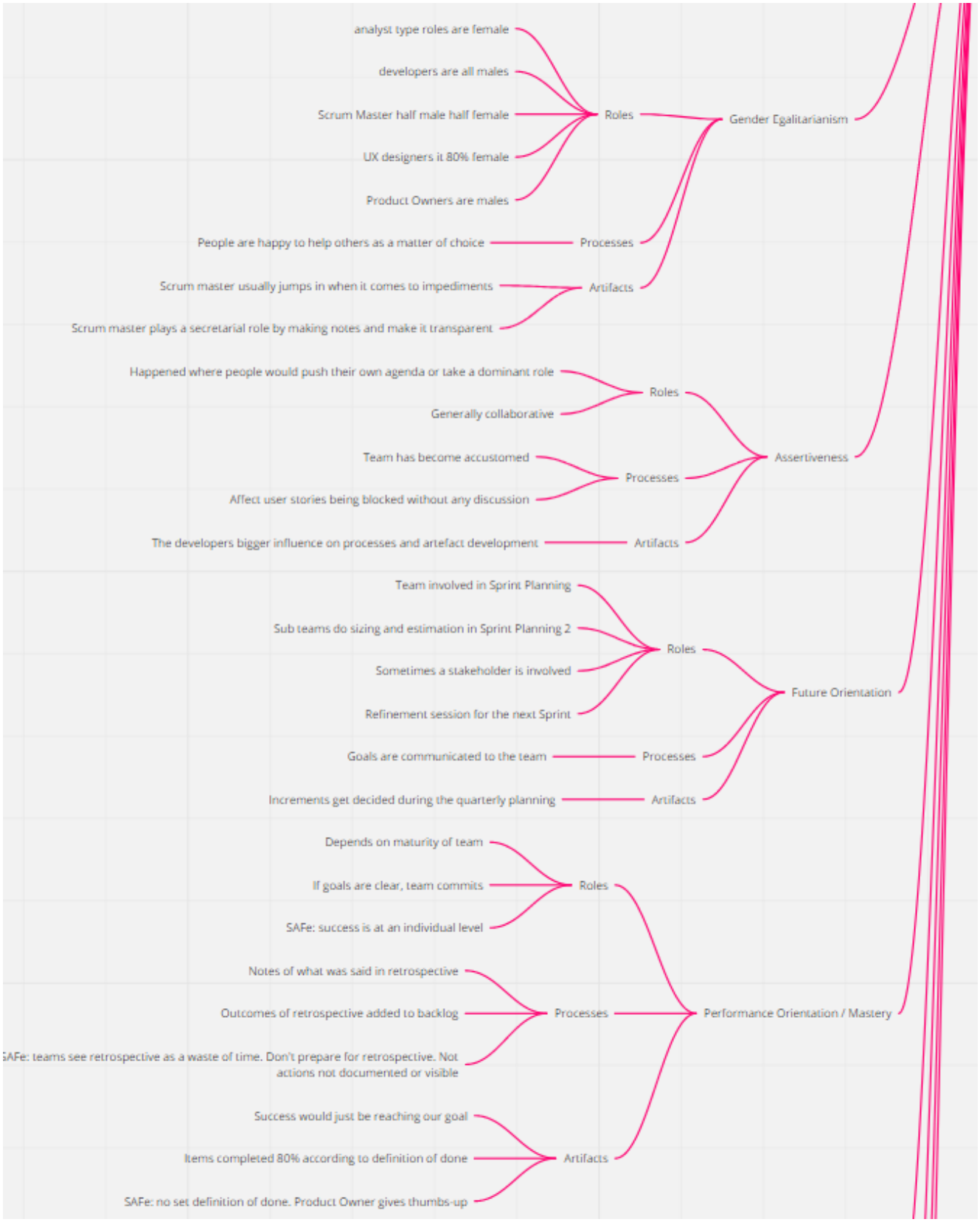

analyst type roles are female
developers are all males
Scrum Master half male half female
UX designers it 80% female
Product Owners are males
Roles
People are happy to help others as a matter of choice
Processes
Scrum master usually jumps in when it comes to impediments
Artifacts
Scrum master plays a secretarial role by making notes and make it transparent
Gender Egalitarianism
Happened where people would push their own agenda or take a dominant role
Generally collaborative
Roles
Team has become accustomed
Affect user stories being blocked without any discussion
Processes
The developers bigger influence on processes and artefact development
Artifacts
Assertiveness
Team involved in Sprint Planning
Sub teams do sizing and estimation in Sprint Planning 2
Sometimes a stakeholder is involved
Refinement session for the next Sprint
Roles
Goals are communicated to the team
Processes
Increments get decided during the quarterly planning
Artifacts
Future Orientation
Depends on maturity of team
If goals are clear, team commits
SAFe: success is at an individual level
Roles
Notes of what was said in retrospective
Outcomes of retrospective added to backlog
SAFe: teams see retrospective as a waste of time. Don't prepare for retrospective. Not actions not documented or visible
Processes
Success would just be reaching our goal
Items completed 80% according to definition of done
SAFe: no set definition of done. Product Owner gives thumbs-up
Artifacts
Performance Orientation / Mastery

Figure 15: Research Study Mind Map

Appendix J – Summary of Findings

Table 10: Influence of National Culture on Agile Implementations

National Culture Dimension	Finding	Literature
Power Distance	In South Africa, Agile teams with a low degree of power distance are inclined to be self-organised.	Palokangas (2013)
Individualism	In South Africa, Agile teams with individualistic cultures are more dynamic in their approach to Agile/Scrum implementations, compared to Agile teams with collectivist traits in which the Agile/Scrum implementations are used as prescribed.	Zhao (2015)
Uncertainty Avoidance	In South Africa, Agile teams with a high degree of uncertainty avoidance, follow Agile frameworks strictly, while teams with low uncertainty avoidance are flexible in the use of Agile processes and artifacts and even combine Agile frameworks.	Palokangas (2013)
	In South Africa, Agile teams with a high degree of uncertainty avoidance emphasised quarterly planning sessions with larger groups of stakeholders, whereas low uncertainty avoidance environments have many planning sessions within the team.	Palokangas (2013) Abrahamsson, Salo, Ronkainen & Warsta (2017

Table 11: Influence of National Culture on Agile Roles

National Culture Dimension	Finding	Supporting Literature
Power Distance	In South Africa, in Agile teams with a high degree of power distance, hierarchy and low levels of team autonomy, members have specialised job titles which prevent cross-functionality, and the Scrum Master is considered as the team leader.	Ayed, Vanderose & Habra (2017) Spiegler, Heinecke, & Wagner (2019) Brits (2011) Veerla and Subrahmanyam (2011) Sutharshan and Maj (2011)
Individualism	In South Africa, Agile teams with a high degree of individualism has a hero culture and are expected to be loyal to the Scrum Master/Leader in exchange for protection from the Scrum Master.	Ramesh, Cao, Kim, Mohan & James (2017) Yaggahavita (2011) Hofstede (2013) Darwish & Henryson (2019) Zhao (2015) Booysen & Van Wyk (2007)

Uncertainty Avoidance	In South Africa, in Agile teams with a high degree of uncertainty avoidance, the job roles are not flexible, and the workload is determined by management.	Yaggahavita (2011) Siakas & Siakas (2007)
Masculinity	In South Africa, Agile teams with a high degree of masculinity, team members display competitive and assertive behaviour toward one another.	Veerla & Subrahmanyam (2011) Brockmann & Thaumuller (2009)
Long-Term Orientation	In South Africa, Agile teams with a high degree of long-term orientation are highly adaptable to a change of roles from traditional roles to Agile roles.	Zhao (2015)
Indulgence	In South Africa, Agile teams with a high degree of indulgence show increased motivation.	Ayed, Vanderose & Habra (2017)
Future Orientation	In South Africa, in Agile teams with a high degree of future orientation, the whole team is involved in planning practices.	None
Performance Orientation	In South Africa, in Agile teams with a high degree of performance orientation, the roles are competitive, flexible, and robust to handle change in the environment.	None
Mastery vs Harmony	In South Africa, in Agile teams with a high degree of mastery, team members become subject matter experts.	None
Humane Orientation	In South Africa, in Agile teams with a low degree of humane orientation, a low tolerance of mistakes and a blame culture is prevalent, mistakes are seen as failure instead of a learning curve, and the Scrum Master is task-focussed instead of people-focussed.	None

Table 12: Influence of National Culture on Agile Processes

National Culture Dimension	Finding	Literature
Power Distance	In South Africa, in Agile teams with a high degree of power distance, decisions are made by senior roles, management assigns new tasks to teams, and the team faces numerous interruptions where management is allowed to change the scope of the Sprint.	Zhao (2015) Moe, Cruzes, Dybå & Engebretsen (2015)
Individualism	In South Africa, in Agile teams with a high degree of individualism, team members do not participate in all Agile ceremonies.	Brockmann & Thaumüller (2009)
Uncertainty Avoidance	In South Africa, Agile teams with a high degree of uncertainty avoidance strictly follow policies and Agile frameworks as prescribed, and the Sprint Backlog was fixed.	Darwish & Henryson (2019)
Masculinity	In South Africa, in Agile teams with a high degree of masculinity, team members with the most knowledge on a topic make the decision in their respective area of expertise, conflicts are resolved through direct confrontation, team members expect to be told what to do, and members must request assistance where needed.	Sutharshan and Maj (2011) Brockmann & Thaumüller (2009)
Long-Term Orientation	In South Africa, Agile teams with long-term orientation display habits that show consideration for future event.	Darwish & Henryson (2019) Brockmann & Thaumüller (2009) Chikhale & Mansouri (2015)

Indulgence	In South Africa, Agile teams with a high degree of indulgence improve cohesion and motivation by encouraging having fun by celebrating together, engaging in team games, and the use of humour or banter during ceremonies.	Ayed, Vanderose, & Habra (2017)
Future Orientation	In South Africa, Agile teams with a high degree of future orientation are authorised to terminate a Sprint.	Zhao (2015)
Performance Orientation	In South Africa, Agile teams with a high degree of performance orientation performance is rewarded, and the entire team prepared for the Sprint Retrospective meetings.	None
Mastery	In South Africa, Agile teams with a high degree of mastery actively prepare for the Sprint Retrospective and have improvement measures to action on.	None
Humane Orientation	In South Africa, Agile teams with a high degree of humane orientation have activities to build relationships and have equal voice in meetings.	None
Affective Autonomy	In South Africa, Agile teams with a high degree of affective autonomy have a good work-life balance and work at a sustainable pace during the Sprint.	James (2011)

Table 13: Influence of National Culture on Agile Artifacts

National Culture Dimension	Finding	Literature
Power Distance	In South Africa, in Agile teams with a high degree of power distance, the Scrum Master and Product Owner instead of the whole team are held accountable for the Agile artifacts.	Zhao (2015)
Individualism	In South Africa, in Agile teams with a high degree of individualism, each member is accountable for their own artifacts produced.	None
Uncertainty Avoidance	In South Africa, Agile teams with a high degree of uncertainty avoidance do not commit to a requirement in the Sprint Backlog if there are any uncertainty or ambiguity, do not willingly welcome changing requirements, and are averse to the use of Burndown charts.	Darwish & Henryson (2019) Zhao (2015)
Masculinity	In South Africa, in Agile teams with a high degree of mastery the Scrum Master plays a secretarial role in the resolution of blockers.	Zhao (2015)
Future Orientation	In South Africa, Agile teams with a high degree of future orientation prioritise the Product Backlog for two Sprints ahead, and have a Roadmap for Increments that should be released.	Cockton, Lárusdóttir, Gregory & Cajander (2016)
Performance Orientation	In South Africa, Agile teams with a high degree of performance orientation thrive to complete all items in the Sprint, are committed to achieving Sprint Goals, and have a fixed definition of “done”.	None

Mastery	In South Africa, Agile teams with a high degree of mastery has many innovative features or improvement items as part of the Sprint Backlog based on the feedback in the Retrospective meetings.	None

Appendix K – Literature Review Relevant Papers

Table 14: Literature Review Relevant Papers

No:	Title	Author/s
1.	Enhancing Agile Methods for Multi-cultural Software Project Teams	Sutharshan & Maj (2011)
2.	The Value of Scrum to Organisations: A case study	Cornelius (2014)
3.	Challenges in Applying Scrum Methodology on Culturally Distributed Teams	Yaggahavita (2011)
4.	Conflicts and Complements Between Eastern Cultures and Agile Methods: An Empirical Investigation	Ramesh, Cao, Kim, Mohan & James (2017)
5.	How Human Aspects Impress Agile Software Development Transition and Adoption	Gandomani, Zulzalil, Ghani, Sultan & Sharif (2014)
6.	The Agile Professional Culture: A Source of Agile Quality	Siakas & Siakas (2007)
7.	Impact of National Culture Dimensions on Scrum Implementations	Zhao (2015)
8.	Multicultural Understanding: Leveraging the Advantages of Cultural Diversity in Scrum Adoption	Jukich (2018)
9.	How do Cultural Characteristics and Software Engineering Practices Interplay? A Comparative Study Between Indonesia and Sweden	Darwish & Henryson (2019)
10.	Agile Cultural Challenges in Europe and Asia: Insights from Practitioners	Ayed, Vanderose & Habra (2018)
11.	The Perspectives of Agile Methodology in South Africa	Mbeli & Hira (2016)
12.	Scrum Adoption, Acceptance and Implementation (A Case Study of Barriers in Pakistan's IT Industry and Mandatory Improvements)	Akhtar , Ahsan & Sadiq (2010)
13.	Factors Influencing the Agile Methods in Practice - Literature Survey & Review	Shahane, Jamsandekar & Shahane (2014)
14.	Project Management Using Agile Frameworks	Mircea (2019)

15.	Understanding the Structured Processes Followed by Organisations Prior to Engaging in Agile processes: A South African Perspective	Noruwana & Tanner (2012)
16.	Leadership and Culture in an Agile Framework in a South African Financial Services Organisation	Jaftha (2018)
17.	Out of Africa A new perspective on digitalisation in Africa	Rademacher & Grant (2008)

Appendix L – Interview Study Themes

Table 15: Interview Study Themes

National Culture Dimension	Agile Practice	Theme
Power Distance	Agile Roles	Team Hierarchies
		Agile Job Titles
		Compliance with Obligations and Rules Attached to Roles
		Agile Team Leadership Role Responsibilities
	Agile Processes	Decision-Making
		Task Allocation
		Scope Management
		Scrum Ceremonies Facilitation
		Sprint Interruptions and Interferences
	Agile Artifacts	Management Input on Product Vision and Goals
		Product Backlog Management
		Sprint Backlog Management
		Handling Definition of “Done”
		Burndown Chart Management
		Responsibility for the Increment
Individualism	Agile Roles	Heroism
		Loosely Knit versus Sense of Family in Team
		Protected by Scrum Master Expectations
		Loyalty to Scrum Master Expectations

		Role Definition
		Team Cohesion
	Agile Processes	Participation in Ceremonies
	Agile Artifacts	Accountability for Artifacts
		Institutional Goals versus Individual Goals
Uncertainty Avoidance	Agile Roles	Roles and Duties Flexibility
		Workload Authorisation
	Agile Processes	Sprint Duration Flexibility
		Standard Scope Flexibility
		Procedure and Process Strictness
		Pursuit to Follow Own Ideas Regarding Processes
	Agile Artifacts	Team Comfort with Uncertainty and Ambiguity in Requirements
		Burndown Chart Management
		Blocker Resolution
		Unorthodox Methods and Ideas Tolerance
Masculinity	Agile Roles	Competition Among Team Members
		Dominant Relationships
		Moral Equals
		Higher Education and Leadership Positions
		Internal Commitment to Cooperate and Feel Concern for Team's Welfare
	Agile Processes	Agreement During Processes
		Speaking Up During Meetings

		Conflict Resolution
		Commitment to Assist others in Meetings as a Matter of Choice
	Agile Artifacts	Artifact Development
		Presentation of Blockers
Long-term Orientation	Agile Roles	Encouragement of Growth and Efforts of New Ways of Work
		Acceptance of New Roles
	Agile Processes	Change Management Process
		Nature of Conversations in Meetings
		Nature of Work Done
Indulgence	Agile Roles	Enjoyment in Roles and Duties
	Agile Processes	Improved Cohesion
Future Orientation	Agile Roles	Roles that Perform Planning
	Agile Processes	Product Backlog Refinement Sessions
		Termination of Sprint
		Determine Workload
		Communication of Product Goals/Objectives
	Agile Artifacts	How Far Ahead Planning is Done
		Strategy to Roll Out Increments
Performance Orientation	Agile Roles	Contribution to High Performing Teams
		Dynamic, Competitive, and Orientated Toward Success
	Agile Processes	Reward
		Preparation for Sprint Retrospective Meetings

	Agile Artifacts	Sprint Goal Commitment
		Success of an Increment
		Completion According to Team's Definition of "Done"
Mastery	Agile Roles	Subject Matter Experts
		Encouragement in Training
	Agile Processes	Retrospective Meetings Preparation
		Improvement Measures
	Agile Artifacts	Increment Content Management
Humane Orientation	Agile Roles	Tolerance with Duties/Responsibilities not Performed
		Scrum Master Plays a Supportive Role
	Agile Processes	Sprint/Events Dedicated to Get to Know Team
		Equal Voice
Affective Autonomy	Agile Processes	Mental Health/Work-Life Balance
		Consensus Leave
		Team Health Checks
		Sustainable Work Pace

Appendix M – Mapping Themes to CAS Principles

Table 16: External Changes (Cultural Trait Changes Over Time)

National Culture Dimension	Agile Use	Theme	CAS Principle
Uncertainty avoidance	Implementation	Remove irrelevant processes as teams become less avoidant of uncertainly and ambiguity	CAS principle of least effort
		Business processes and ways of work evolve	CAS principle of growth and evolution
Individualism	Roles	Becoming family over time	CAS principle of emergent behaviour & interactions and relationships
Masculinity	Processes	Change in the method of agreement over time	CAS principle of distributed control

Table 17: Internal State Changes

National Culture Dimension	Agile Use	Themes/Issues	CAS Principle
Power distance	Implementation	Self-organising teams	Principle of emergent behaviour
	Roles	Flat team structure	Principle of shallow structure
		Team autonomy	Principle of distributed control
		Specialised titles	Principle of shallow structure
		Shared responsibilities	Principle of distributed control
	Processes	Team empowered to make decisions	Principle of distributed control
		Own tasks taken from the board	Principle of distributed control
		Allowed to change scope	Principle of distributed control
	Artifacts	Whole team held accountable for the Agile artifacts	Principle of distributed control
Individualism	Implementation	Dynamic in approach to Agile / Scrum implementations	Principle of emergent behaviour
	Roles	Entire team works together to achieve the Sprint Goal	Principle of distributed control
	Processes	Involved in Agile ceremonies	Principle of distributed control

	Artifacts	Work together on Agile artifacts and review each other's work	Principle of distributed control
Uncertainty avoidance	Implementation	Planning kept to a minimum and emerge as needed (also in literature)	Principle of emergent order
	Roles	Flexible roles	Principle of emergent order
		Workload in Sprint determined by team	Principle of distributed control
	Processes	Flexible and not strict on policy adherence	Principle of emergent order
		Sprint Backlog scope items are flexible	Principle of emergent order
	Artifacts	Welcome changing requirements	Principle of growth and evolution
		Flexible Burndown chart use	Principle of emergent order
Masculinity	Roles	Members support each other and work together in harmony	Principle of interactions and relationships
	Processes	Conflict resolved by conversation	Principle of interactions and relationships
		Members indicate when they need assistance	Principle of interactions and relationships
		Members assist where needed	Principle of emergent order
	Artifacts	Scrum Master does not necessarily do admin work such as writing down blockers on the board	Principle of distributed control

Long-term orientation	Roles	Members adapt to new Agile roles	Principle of growth and evolution
	Processes	Continuous learning	Principle of growth and evolution
Indulgence	Roles	Motivation	Principle of interactions and relationships & Principle of transformative feedback loops
		Communication	Principle of interactions and relationships
	Processes	Team cohesion through team building activities	Principle of interactions and relationships
Future orientation	Roles	Whole team is involved in planning processes	Principle of distributed control
	Processes	Sprint termination	Principle of emergent order
	Artifacts	Degree of Product Backlog prioritisation (Literature: Planning kept to a minimum"	Principle of emergent order & Principle of growth and evolution
Performance orientation	Roles	Competitive, flexible, and robust to handle change in the environment	Principle of growth and evolution
	Processes	Reward performance	Principle of interactions and relationships
		Entire team prepares for the Sprint Retrospective meetings	Principle of growth and evolution
	Artifacts	Achieving Sprint Goals	Principle of growth and evolution

		Definition of "Done" is defined up front	Principle of emergent behaviour & Principle of growth and evolution
Mastery versus harmony	Roles	Expert roles prevalent and training provided	Principle of growth and evolution
	Processes	Improvement measures to take action	Principle of growth and evolution
	Artifacts	Innovative features or improvement items	Principle of growth and evolution
Humane orientation	Roles	Tolerance of mistakes	Principle of interactions and relationships
		Scrum Master task-focussed versus people-focussed	Principle of interactions and relationships
	Processes	Activities to build relationships	Principle of interactions and relationships
Affective autonomy	Processes	Work-life balance	Principle of emergent behaviour (due to idea of emergent theme of work-life balance) & Principle of distributed control (due to self-organisation)
		Work at a sustainable pace	Principle of emergent behaviour (due to idea of emergent theme of sustainable development) & Principle of distributed control (due to self-organisation)

Table 18: Definition of CAS Principles

CAS principle	Definition
Principle of open systems	A CAS is an open system that interacts with its environment and information with its environment (Meso & Jain, 2006)
Principle of interactions and relationships	Constituent elements of a CAS interacts dynamically and exchange energy or information with each other (Meso & Jain, 2006)
Principle of transformative feedback loops	Feedback loops between systems are formed where feedback from one system causes a reaction from another (Meso & Jain, 2006)
Principle of emergent behaviour	A CAS is rich, dynamic, nonlinear, and feeds back, hence the prediction of its emergent behaviour is needed (Meso & Jain, 2006)
Principle of distributed control	Control should be distributed across the system for the CAS to thrive (Meso & Jain, 2006)
Principle of shallow structure	The minimum amount of structure is necessary for a CAS to effectively achieve its objectives (Meso & Jain, 2006)
Principle of growth and evolution	Survival of a CAS is improved through continuous growth and evolution as it responds to change (Meso & Jain, 2006)
Principle of path of least effort	A CAS will take the path of least resistance or use the minimum energy or time to solve a problem (Meso & Jain, 2006)