Assessment of preparedness for the mitigation of technological unemployment

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ABSTRACT

Implementation of technology could exacerbate the existing South African unemployment problem. This study aimed to assess the readiness of firms for the mitigation of these job losses, specifically amongst knowledge workers. Awareness of technological change and mitigation activity within firms was explored and responsibility levels for job loss mitigation between government, firms and civil society was queried. The application of the complexity leadership theory framework (CLT), to navigate the changing technological environment was investigated.

A qualitative study using semi-structured in-depth interviews was conducted with 23 senior executives from 22 different sized firms in 10 industries.

The results indicated a high level of awareness, but insufficient unemployment mitigation activities. Shared responsibility between government and firms, with support from civil society is recommended. Individual responsibility is crucial. The CLT framework is usable, but in conjunction with other leadership models, with a strong added focus on culture, transparency and technical knowledge.

The research is an in-depth look at the status of technological unemployment in South African companies in 2018, creating awareness for leadership, providing a toolkit to manage and overcome challenges. Limitations include a dominance of financial and tech companies in the sample and limited application of the research outside of South Africa.

KEYWORDS

Technological change
Technological unemployment
Unemployment
Complexity leadership
South Africa

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Signed: Valerie Wiggett **Date**

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CHAPTER 1: INTRODUCTION TO RESEARCH PROBLEM

1.1 Background

There are several jobs at various levels of risk due to technological change, and the evolving nature of work across industries and occupations could lead to substantial unemployment (Autor, 2015; Clemons, Dewan, Kauffman & Weber, 2017; Cortes, Jaimovich & Siu, 2017; Frey & Osborne, 2013; Katz & Krueger, 2017; Silva & Lima, 2017). This has been substantiated by World Economic Forum (WEF) reports ("Future of jobs", 2016; "Future of jobs", 2017; "Eight Futures", 2018) and media articles about the fourth industrial revolution (Brynjolfsson & McAfee, 2015; Brynjolfsson & Mitchell, 2017; Knoess, Harbour & Scemama, 2016; Mzekandaba & Pazvakavambwa, 2018).

Klaus Schwab (2016) coined the term fourth industrial revolution, following on the first to the third industrial revolutions (steam, electrical power and digitization), to describe a technological change that is exponential and disruptive in nature and that will affect most industries. Schwab (2016) states "the possibilities of billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited" (para. 4) These technological changes include but are not limited to; artificial intelligence (AI); digitalisation; the internet of things (IOT); digitisation; robotics and data analytics and are having a major impact on business. In this research paper the terms technology and tech are used interchangeably and mean the same.

David Autor (2015) believes that even though automation may replace workers, it can also create different types of jobs and complement any labour output, especially outside of the manufacturing environment and amongst knowledge workers. Brynjolfsson and Mitchell (2017) state that very little data exists relating to the scope of job changes and the type of transformation required in the workplace, as well as the status of any new work opportunities that technological change could create.

Frank, Roehrig and Pring (2017) refer to "digital that matters" and claim that the new technologies will fundamentally "transform how we are educated, fed, transported, insured, medicated, and governed" (p. 17). Technology could be used to improve many of societal ills. For example, through better management of global supply chains, food wastage could be averted to rather feed the poor, or with the implementation of

driverless cars, the trillion-dollar cost of vehicle accidents could be diverted for better causes (Frank et al., 2017). Therefore, within these technological and societal improvements may lie many new types of employment opportunities. However, Frank et al. (2017) are clear that the digital revolution may create "prospects and prosperity" (p.21) for those who stay ahead of the curve, but like the previous industrial revolutions, any organisations or entities playing the wait-and-see approach may be left behind and not survive. The sense of urgency about the technological changes and the impact thereof cannot be ignored.

1.2 Importance of the Issue

Silva and Lima (2017) believe that although product innovation may create some jobs, automation and the adoption of new technologies for productivity improvement, could lead to technological unemployment. Frank et al. (2017) refer to it as a worker's nightmare. These workers who lose jobs may find that their skills are no longer in demand. This is important because as the rate of technological change increases, this situation will be exacerbated globally.

This issue is significant for an emerging economy like South Africa, as it is another extremely critical, fast approaching predicament which will only add to the existing economic challenges and income inequality that the country is already experiencing (BusinessTech, 2018). South Africa's existing unemployment rate in Q3 of 2018 is 27.5% (Statistics SA, 2018). In 2017, South Africa's gross fixed-capital formation continued to decline, and the unemployment statistics were the highest they have been since 2003 (Department of National Treasury, 2018). In the 2018 budget overview, it was stated that private-sector job creation remains the only sustainable way to reduce unemployment. However, since 2015, the private sector's contribution to job creation has fallen (Department of National Treasury, 2018).

If business is already unable to create additional jobs, technological unemployment will make the problem worse. The social impact of increased unemployment due to technological change could result in greater dependency on government social welfare, increased poverty and even slower economic growth.

Brynjolfsson and McAfee (2014) believe that the biggest impact of automation will be on developing nations who currently provide low cost labour options for developed nations. Examples of this would include outsourced call centres in India or the

Philippines, or textile factory workers throughout South East Asia. Both functions can now easily be replaced by chatbots, interactive voice response systems and robots, at a much cheaper rate. It may no longer make economic sense for companies to use this outsourced labour. This is also relevant in South Africa where many companies are outsourcing staff at very competitive global rates to first world countries for services including finance, investment, project management and digital analysis (Brits, 2017; White, 2018). These are roles that are already being replaced by AI or IOT (WEF "The Global Risks", 2018). Regardless, technological change does not take geographical borders into consideration when it comes to the automation and replacement of work and South Africa cannot exclude itself from this event and remain competitive globally.

Frank et al. (2017) describe a new wave of automation that is going to fundamentally change nine to five for white-collar workers. The Oxford dictionary (2018) defines white collar workers as people engaged in non-manual work, that is office workers doing work of administrative, managerial, or clerical nature (as opposed to manual labour). Although the terms of white collar workers and knowledge workers are often used in conjunction, the Oxford dictionary (2018) defines a knowledge worker, in comparison, as a person whose job involves dealing with and using information. Information or the use of data is often the basis of any technological change or digital process initiative.

Phillips, Seedat and van der Westhuizen (2018) in an Accenture report on the future of the South African workforce, believe that one-in-three jobs will be replaced by digital technology. That number encompasses white and blue-collar workers. However, they also believe that digital can be an economic growth multiplier. It may be exactly the injection that the laggard economy needs, to get it back on its feet. So technological change poses both a huge threat and an opportunity. The speed with which South Africa reacts to this change will determine the outcome. What is clear from the literature, is that urgent action is needed.

1.3 Significance of Research

Within South African organisations, there is a level of leadership responsibility, not only towards sustaining the organisation, but also towards the mitigation of risk. Business and Civil Society in South Africa are having to share the economic responsibility with government, to create sustainable employment and boost productivity (Department of National Treasury, 2018). However, the definition of where business leadership responsibility for unemployment starts and ends is a grey line. The Oxford dictionary

(2018) defines responsibility as “a moral obligation to behave correctly towards or in respect of.” The level of responsibility for technological unemployment may fall more within the realm of business’ responsibility, but this needs to be clarified and established, so that there is a clear path forward for business to mitigate this potential risk.

As part of leadership responsibilities, leaders need to interpret the systems within which they operate to ensure sustainability. If leadership do not adapt to the complex adaptive systems (CAS) that they are surrounded by, it could contribute to the downfall of organisations (Metcalf & Benn, 2013). This explains the importance of having to explore this issue from a leadership perspective and through a leadership theory lens.

Strong leadership and the correct leadership behaviours will be critical to managing these risks. Uhl-Bien, Marion and McKelvey (2007) describe the leadership paradigm well “Leadership models of the last century have been products of top-down, bureaucratic paradigms. These models are eminently effective for an economy premised on physical production but are not well-suited for the more knowledge-oriented economy. Complexity science suggests a different paradigm for leadership—one that frames leadership as a complex interactive dynamic from which adaptive outcomes (e.g., learning, innovation, and adaptability) emerge” (p. 298). Because of this, they developed the Complexity Leadership Theory (CLT) framework, with focus on development in the knowledge area. This is the lens that will be used to assess the readiness of organisations in South Africa for job loss mitigation, specifically amongst knowledge workers.

1.4 Business Need for the Research

The business need for this research is to create awareness for South African organisations of the risks and responsibilities associated with technological change and job loss mitigation, both in terms of the readiness for mitigation of job losses, as well as the ability to adapt and enable the knowledge workforce skillset to meet the future requirements.

Mokyr, Vickers and Ziebarth (2015) describe the history and various aspects of technological anxiety and state that “The path of transition to this economy of the future may be disruptively painful for some workers and industries, as transitions tend to be” (p.47). Fin24 reported in March 2018 that 3000 jobs will be lost at Nedbank due to the

future use of robotics (Brown, 2018). ITWeb reported in October 2018 that Liquid Telecom will be having massive job cuts because the firm is looking at a digitally-enhanced operating model (Moyo, 2018). This type of dramatic headline is becoming more and more common in the South African media, as evidence of this technological anxiety. This research aims to assess the impact of the situation on the ground and investigate at what stage of the transition South African organisations are, how they got there, or are planning to get there and how the transition could be made smoother through leadership capability.

The assessment will focus on job loss mitigation for knowledge workers. Drucker (1999) describes knowledge workers as wanting to have autonomy over work and be able to define individual tasks, with a high level of problem solving. Examples of knowledge workers can include career professionals like doctors, lawyers, engineers and accountants. Goos, Manning and Salomon's (2014) hypothesize that technological change is biased toward replacing labour in routine tasks and that task offshoring occurs, which is also influenced by technological change. They further claim that ''both of these forces decrease the demand for middling relative to high-skilled and low-skilled occupations'' (p. 2509). However, Godin (2010), refers to the myth of white collar workers, stating that even if your work is in an office and not a factory environment, if it is planned, controlled and measured, it can be automated, done faster by a machine or outsourced.

In the South African context, it has already been established that unemployment is very high amongst the unskilled labour force. Any additional risk of job losses amongst the skilled labour force too, would have far reaching and serious implications, hence the need to focus on knowledge workers in this research.

1.5 Theoretical Need for the Research

The theoretical need for this research is to explore and identify if the frameworks of CLT (Uhl-Bien et al., 2007; Uhl-Bien & Marion, 2009; Uhl-Bien & Arena, 2017) and its emerging derivative, leadership for organisational adaptability (LOAT) (Uhl-Bien & Arena, 2018) are being, or can be succesfully applied by leaders within the sample organisations, to enable and adapt to the changing technological environment.

Cummings and Worley (2015) refer to dynamic capability organisations which can change continually and still achieve high performance in complex changing

environments. These organisations are encouraged to build change capabilities that will assist them to keep the competitive edge and stay ahead of competitors, as well as mitigate any threats or risks to the environment, to remain sustainable.

Enabling organisations for adaptability may be one of the greatest challenges that leaders are currently confronting (Uhl-Bien & Arena, 2018). Unfortunately, many of today's leaders are lacking the required skills to cope with the changing environment and uncertainty. Can CLT be successfully applied in this environment to mitigate unemployment? The researcher will seek to identify required leadership traits or behaviours from the frameworks, which the leadership of the sampled organisations believe are required, during this time of tech change.

1.6 Research Objectives

To summarise, the purpose of this research is to assess the current readiness, of organisations in South Africa, for the mitigation of job losses, related to technological change. The focus will be on technological unemployment relating to knowledge workers, from the perspective of complexity leadership theory.

The research questions that need to be answered relate to the status of the situation, what actions are being taken, who is responsible for the required action and what leadership theory can be applied to manage in the technological change environment.

1.7 Overview of the Research Report

Following will be an outline of literature relating to technological change and unemployment. An overview will be provided of CLT and its emerging derivative, LOAT (Uhl-Bien & Arena, 2018), and its attributes. It is important to determine how these leadership theories could be applied towards mitigation or resolution of the combination of these two challenges. The third chapter includes the four research questions derived from the literature review, in relation to the topic of the research paper. The fourth chapter details the research methodology design, explains the research process and how the four themes were explored, and the research approach that was used. The final two chapters will be an analysis of the exploratory research results and the discussion of these results, with a view to answering the research questions. The last chapter will include recommendations for management, based on

the results of the research, limitations of the research and recommendations for future research.

1.8 Conclusion

Unemployment due to technological change is a pressing global challenge, but for South Africa specifically, it could have dire consequences for the economy. This research paper aims to add to the awareness of the challenge and solution driven literature to tackle and combat the issue.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Literature (Autor, 2015; Frey & Osborne, 2017; Brynjolfsson & Mitchell, 2017), focuses on technological change and unemployment in the European and American, or first world economies. Besides the WEF reports ("Future of jobs", 2016; "Future of jobs", 2017) and occasional mention in the global multinational business reports or working papers (Arntz, Gregory & Zierahn, 2016; Bakhshi & Windsor, 2015; Shook & Knickrehm, 2018; Stanford University, 2016; Wright, Dudler, Scully, & McMillan, 2018), limited academic research on the current state of this issue exists, specifically relating to emerging economies or Africa.

The WEF "Towards a reskilling" report's (2018) question for all stakeholders facing these disruptions, and those seeking to support them, is how to better predict and proactively manage the re-alignment and transition of the labour market to shape a future of work that creates economic growth and opportunities for all. The 2018 Accenture report on the future of work in South Africa states that to ensure stimulated economic growth and in order to maintain or reduce the number of jobs at risk, the principal intervention will be to increase how quickly the workforce can acquire the relevant and essential skills needed to maximise the benefits of human-machine collaboration, and that these initiatives must start immediately (Phillips et al, 2018).

2.2 South Africa's Technological Change Environment

Brynjolfsson and McAfee (2014), state that when things are digitized they acquire certain properties that are subject to different economics, which could promote abundancy as opposed to scarcity and that in many ways digitization is improving the physical world. Frank et al. (2017) refer to it as "'abundance markets in a digital economy" (p. 159).

Being in the second machine age means that three situations exist. The first one is that digital technologies, including hardware, software and networks are progressing exponentially. Secondly, that the benefits will be profound in that the variety and volume of consumption will be increased, but lastly that it will disrupt economies, some of which will be left behind (Brynjolfsson & McAfee, 2014). They speak of work automation that will not require sleep, food breaks, health care, HR issues or payroll

tax burdens. For an organisation or economy to grow, it needs to make better use of its resources to grow its output. The option of automation does therefore make sense. However, in a struggling economy, bigger issues are at stake.

There are three factors that make South Africa a compelling case to study for technological change and the affect on labour (Le Roux, 2018). The first reason is because of its racial and colonial history and resulting high level of economic inequality. Secondly, the existing high unemployment rate. Lastly, even though it is a developing nation, it has a few technologically advanced industries that match global standards, especially in the financial services and health sectors (WEF "Global competitiveness", 2017). Corporate examples include Discovery health and FNB, Capitec and Absa's innovating digital online banking systems and services.

South African corporates, though loathe to retrench workers, will compare the costs of technology and human labour, consider the high level of labour-related components like strikes, wage increase demands, and negative union activity and may decide that automation is a better option, despite higher implementation and capex costs (Le Roux, 2018). They may also be driven to this to sustain competitiveness in the global markets that they are already competing in.

Le Roux's (2018) research provided some interesting statistics with regards to the increase and decrease of certain types of roles in South Africa. Labour Market Dynamics in South Africa (LMDSA) datasets were used from 2008–2014 and compared against the work done by Frey and Osborne (2013) with the US department of labour occupations list, where they identified the jobs at most risk of automation. The research provided trends for South African occupations and was able to match 285 of the 377 occupation types, with the only differences being traditional roles within the South African context.

Statistics from Le Roux's (2018) research showed that IT developers, electronics and telecommunications engineers, clerks, secretaries and receptionists had decreased but that there were more computing services managers, computer systems designers, analysts, computer assistants, public sector office clerks (unique to South African situation), as well as accountants and bookkeepers. Whilst this may not necessarily be related to technological unemployment, the trends and requirements for different skills are interesting. Le Roux's (2018) study suggests 3.6 million South African jobs, approximately 27.3% countrywide, are highly vulnerable to computerization, because of

tech developments in robotics and AI. In addition “over 3.2 million of these workers are from previously disadvantaged population groups (Black, coloured and Indian). While almost 400,000 white South Africans also fall in the high-risk category, there is clear evidence that the proportion of white workers in low-risk occupations is greater” (p. 515).

Dr Roze Phillips (2018) says that 35% of jobs are at risk of total automation due to tech innovation, affecting both white and blue-collar workers in South Africa. The WEF “Future of jobs” (2017) report on Africa, has a higher percentage at 41%. To be part of the global economy, South Africa must advance technologically, but as previously mentioned, there also must be a strong focus on job creation to build the economy.

Dr Phillips (2018) believes the economy must move from workforce planning to work planning and reskilling for the changing workplace as a matter of urgency, with more opportunities for collaboration and learning opportunities to unlock the potential of the workforce. Whilst literature stresses the importance for organisations to prepare (Aggarwal, Posen, & Workiewicz, 2017; Bianco, 2018; Birkinshaw, Zimmermann & Raisch, 2016; Shook, & Knickrehm 2018; WEF “The Global Risks”, 2018), this research aims to discover if this is happening in practice, the nature of this preparedness and the impact this is having in the organisation.

A 2016 African Union education policy for Africa document states that Africa only contributes 1% to research and innovation knowledge globally and that given the rapid technological changes in the labour market “flexibility, adaptability and continuous learning in training programmes has become a major requirement” (p.16). The WEF “Future of jobs” (2017) states that 39% of core skills required across occupations in South Africa will be completely different by 2020. This is why it will be important to establish what level of reskilling, if any, is currently happening within organisations. If organisations are not reskilling, what are the alternative plans or ideas to address this issue and what leadership capability is evident to achieve this?

Raphulu (2018) believes that the positive side to automation must also be a focus area. This includes new jobs that can be created due to innovation and the enhancement of working conditions and general lifestyle improvements. The positive aspects like increased efficiency, improved productivity and increasing profitability are also highlighted by Raphulu (2018).

Based on the above literature, there is an opportunity to explore what the status of technological change is for various South African companies. During the research process it will be necessary to see if any of the organisations are experiencing positive aspects of technological change and to determine how and why they are enabling this. Identifying any unique or principal leadership behaviours that have helped create these positive effects will be key to linking the leadership framework theories being researched, to the topics being explored.

2.3 Roles that will be Affected

With the focus of the research being on knowledge workers, these are the roles that will be looked at specifically. As defined previously, knowledge workers are white collar workers who use information to do work and must use that knowledge to problem solve. However, in the literature, the white collar and knowledge worker terms are often used interchangeably.

Knowledge worker roles can include, but are not limited to, engineers, doctors, pharmacists, architects, scientists, design thinkers, accountants, auditors, lawyers, sales people, teachers and academics (Autor, 2015; Brynjolfsson & McAfee, 2014; Cohen, 2011; Drucker, 1999; Frank et al., 2017). There are already digital solutions or replacements for some of these roles, from IBM's Watson being used to diagnose illnesses, to online teaching, financial services software and AI being able to read every legal case in history and being able to offer legal advice (Brynjolfsson & McAfee, 2014; Frank et al., 2017). Online shops and chat bots are replacing sales people and retail environments. 3D printing is changing the design and engineering worlds and machines can easily dispense medicine based on digital prescriptions (Brynjolfsson & McAfee, 2014; Frank et al., 2017).

Cortes (2016) uses the term "routinization," or routine-biased technical change (RBTC) (p. 64) to describe tasks that have a high routine content and that have been (since the 1980s) and will be, replaced by computers and machines. These are the roles that will require redeployment and changes in responsibility for the existing incumbents (Frank et al., 2017). Cortes (2016) further states that although technology has often been seen as a driver of economic change, it has only recently been linked to occupations and task content through the theories of RBTC, based on work by Autor, Levy and Murnane (2003) and Autor, Katz and Kearney (2006) and others.

The detail of the work is too extensive to cover here, but the premise is that technological change will create a hierarchy and that “RBTC induces workers at the bottom of the ability distribution within routine occupations to switch to nonroutine manual jobs, while it induces those at the top to switch to nonroutine cognitive jobs” (Cortes, 2016). Basically, workers who are not willing to change routine jobs or upskill will lose jobs. Le Roux (2018) also refers to the fact that as technology becomes more advanced, it will require higher skillsets and therefore higher education.

Regardless, as much as knowledge workers are the possible victims of technological unemployment, these are also the workers that could be the solution to the unemployment problem. Skills can be changed or adapted to work alongside or in collaboration with technology, to develop better solutions, analyse data and provide higher output from any technological change (Frank et al., 2017; Brynjolfsson & McAfee, 2014; Phillips et al, 2018).

The question has to be asked what will organisational leadership look like in the technological future? Will organisational heirarchy even exist, if work is organised and done by machines in such a way that instruction or guidance is not needed? Self-organised teams working in collaboration with machines, delivering the same or better outputs, in partnership with customers, may create entirely different business models. Self leadership and autonomy may become the order of the day.

All of the interviewees in the research process were knowledge workers themselves. As much as they were having to think about employees, and what skills are needed to mitigate job losses, they also had to consider their own situation and how they could possibly be impacted and what this would mean for their organisations, their industries and ultimately the country as a whole.

The research seeks to explore what roles may be lost within the sample organisations and whether it aligns with what is currently happening globally, and what organisational plans are for the current employees within these roles.

2.4 Responsibility for Job Loss Mitigation

The South African government’s 2030 National Development Plan has a requirement to focus on the critical capabilities needed to transform the economy and society, as well as finding ways to urgently reduce the high levels of youth unemployment and provide

them with broader opportunities (p.16).

Reuel Khoza (2006) believes that African's leadership imperative is to encourage South African enterprises to participate in development and the goal of sustainability as a means to growth and that the African leadership style of consulting, listening, setting objectives and insisting on delivery are key and must be applied for the greater good. Twelve years later, his concepts of Ubuntu could not be more relevant, especially in the context of technological change and its possible ramifications.

Business leaders have a responsibility to keep businesses sustainable and create value for stakeholders. One of the key stakeholders are the employees. Any risk of unemployment or changes to employment and work-related status is important to leadership. Because of South Africa's poor economic performance, business has had to shoulder some of the burden of resolving and delivering on some of the government's development initiatives. The mitigation of any job losses becomes an important aspect of this, sometimes even at risk to the sustainability of the organisations, as has been observed in the mining industry in South Africa (Baxter, 2016).

Bezuidenhout (2018) quotes Fayol's (1949) fourteen principles of management as: "division of labour, authority and responsibility, unity of command, line of authority, centralization, unity of direction, equity, order, initiative, discipline, remuneration, stability of tenure, subordination of individual interests to the common interest, and esprit de corps" (p. 23). Four of these principles directly address the responsibility towards employees and the employment status.

The researcher aims to explore if the sample organisations believe that they are entirely responsible for the reduction of job losses, and it not, who should share the burden of the problem and what level of responsibility should any other stakeholders own for mitigation, offsetting and any reskilling required?

2.5 Required Action by Leadership

Forman, King and Lyytinen (2014) state that the issue of what effects are happening because of technological innovation and the time frames in which they take place are a challenge to those who need to understand possible work-related changes. As such, leadership that is adaptive within this dynamic environment is a requirement.

Aggarwal et al. (2017) state that some firms build capacity to adapt to technological change through building adaptive capacity into routines, thereby strengthening organisational capacity for change. They believe that this capacity is led by managers who prepare for this change through implementation of the correct policies. How do these leaders know when this is needed?

Metcalf and Benn (2013) believe "leadership for sustainability requires leaders of extraordinary abilities" (p.370), that is "leaders who can read and predict through complexity, think through complex problems, engage groups in dynamic adaptive organisational change" (p.369).

Godin (2010) stated that any white-collar worker who has a job description that can be put in a procedure manual, has a job that can be easily automated. Based on this, a list was provided of the seven abilities of organisational linchpins, who could survive the technological change unemployment wave. This list included five leadership activities; managing a situation/organisation of great complexity; providing a distinctive interface between members of the organisation; leading customers; inspiring staff and providing deep knowledge of any existing domains (Godin, 2010). These are valuable tools. However, when talking about a complex environment that requires an essential and unique set of skills, the environment of an emerging or developing economy is more complex than most.

Emerging economy leaders face many challenges that require this type of leadership but may have yet to use it in the context of this topic. Olalere (2015) mentions a myriad of problems confronting African leaders, including but not limited to, flailing economies, tough operating environments, state legitimacy issues, weak political systems, economic challenges, poor governance, corruption and abuse of power.

Some may have adopted a wait-and-see approach while confronted and dealing with these other challenges. This is not known. Often in tough environments, it is easier to stick to routines and not make any required changes until one is forced to (Rautenbach, Scheepers and Sutherland, 2015). Rautenbach et al. (2015) believe that "Unlearning is therefore critical as it makes it possible to alter inappropriate frameworks and responses" (p. 146). Technological change could be the impetus to create this transition in the leadership's thinking. Based on Phillips et al (2018), the choice of

doing nothing, versus doing something is no longer negotiable, as South Africa is putting its economy at risk by doing so.

Frank et al. (2017) suggest that leaders apply “digital Kaizen” . This is a term used by the Japanese which is explained as continuous, small, incremental improvements. By incrementally making small tech improvements in the business which may change R&D or field service operations, improve workflows, upgrade functions or remove bottlenecks, systems can be upgraded and revolutionised and, in conjunction with customer led innovation, customer service can be differentiated, thereby keeping firms ahead of competitors.

Education and upskilling is a common theme across all of the literature as a notable and compulsory action. Frank et al. (2017) state that “even when machines can do everything, it will still be people who are the ultimate X factor” (p. 198). They will still need to make the investing decisions, train the machines and harvest the data, Frank et al. (2017) advice to leaders is to move ahead as quickly as they can, and to automate as much as possible, while enhancing every person they can. They believe that by enhancing people, systems and processes, human perrformance levels will be improved.

Brynjolfsson and McAfee (2015) also believe that technology will not be able to replace human creativity, curiosity, mobility or dexterity and social interaction and new skill mapping has been suggested for certain types of roles (WEF “Towards a reskilling”, 2018). However, questions have to be asked about whether the skill mapping could be applied generically worldwide, or if unique challenges face emerging economies. The work by Le Roux (2018) has already provided some interesting insights for South Africa. Whether this work can be applied to other emerging economies remains to be seen. Existing educational systems in South Africa will need to evolve to meet the demand for the new skills required to operate in the tech environment.

There are options for companies and possible solutions to the dilemma of technological unemployment. This research aims to find out what action, if any, organisations in South Africa are taking. Besides the changing world itself being a complex environment to navigate, South Africa as a country, has its own set of complex challenges. As such, complexity theory was seen to be the most appropriate theory to use for this research study. Many of the issues being faced by South Africa, are leadership challenges and therefore, complexity leadership theory is used as the focus lens.

2.6 Complexity Theory and Complex Adaptive Systems

Complexity involves interconnectivity in that when things interact, they alter one another in unforeseen and irreversible ways and the distinction between complexity and complicated is that with the latter, the interacting parts do not alter each other at all (Uhl-Bien & Arena, 2017). In **complex systems**, things can never return to the way they were, and this very much describes the new technological age. Complexity is happening on multiple fronts and in many different sectors and contexts. This can be attributed to many different factors. However, Uhl-Bien and Arena (2017) believe that "the underlying factors are greater interconnectivity and redistribution of power resulting from information flows that are allowing people to link up and drive change in unprecedented ways" (p. 10).

Osborn and Hunt (2007) discuss **complexity theory** and the concept of a fitness landscape, saying that the effectiveness of an organization can equate to its fitness and its ability to adapt, thrive and survive. However, Uhl-Bien and Arena (2017) although stating that many complexity theorists believe that "it takes complexity to beat complexity" (p. 10) many organisations, when having to deal with complexity, revert to control, bureaucracy and hierarchy, trying to establish order in the chaos. This is known as the order response. Organisations tend to revert to traditional and previously successful top-down leadership styles to try and regain control. Unfortunately, this can suffocate any dynamism that might be required to adapt to the new complexity (Uhl-Bien & Arena, 2017).

Complexity as a research field includes the study of **complex adaptive systems** (CAS). Organizations are legitimate collective systems that set out to achieve multiple goals and may evolve into CAS (Osborn & Hunt, 2007). Uhl-Bien and Arena (2018) quote Holland's definition of CAS "Complex adaptive systems are those that adapt and evolve with the environment" (Holland, 1995, 1998) (p. 96). CAS will also naturally self-organise to perform better in an uncertain world (Osborn & Hunt, 2007). These sub-systems are therefore self-organising mechanisms and effect their own system changes (Olalere. 2015).

Some of the forms in which they appear include: eco-systems, economies, thermodynamical systems, or computer-generated algorithms and the defining characteristics of such systems are that they are composed of large numbers of agents

in linear and nonlinear relationships, and they exhibit emergent properties and order (Colbert, 2004).

Schneider and Somers (2006) state that chaos is critical to evolution and adaptation because CAS are “most adaptive when near the edge of chaos” (p. 355). Leaders embracing a CAS will adjust through the evolving characteristic of self-organisation, which comes from the inter-dependency of the sub-systems (Schneider & Somers, 2006).

Schneider & Somers (2006) further demonstrate that unforeseen results are a defining characteristic of a CAS framework and that leadership should then be encouraged to create an organizational identity that reflects variation and similarities, thereby inhibiting any possible negative outcomes. In other words, strong teams generally overcome adversity and any unexpected negative circumstances. Teams may bond over shared goals and needs to deal with this challenge together In the context of this research, any threats posed by technological change could possibly be averted by strong teams working together to avert job losses and collaborate with technology.

What is clear from the literature and problem statement is that the existing environment relating to technological change in the workplace is both complex and continually changing and evolving. Managing and leading organisations within this complex environment requires a strong skillset to develop and sustain the organisations.

Uhl-Bien and Arena (2018) state that “Innovation, networks and complexity allow us to see leadership for organisational adaptability as enabling an organisation to operate as a complex adaptive system by leveraging network dynamics and structures” (p.96). An adaptive response is the antithesis of the order response and involves engagement of the network, collective intelligence and resources to enable the emergence of a new order (Uhl-Bien & Arena, 2017). Leaders enable adaptability by creating conditions that nourish emergence and the changing environment generates pressure that creates space and opportunities for innovation to emerge (Uhl-Bien & Arena, 2017).

The application of this within the technological change environment is that even though disruption may occur, with either positive or negative ramifications, the system will adapt to create another system that could also either be a positive or negative environment. In both cases this could happen in a chaotic or orderly way. The research has identified a need to determine how this is evolving within South African

organisations, so that leadership can respond appropriately.

2.7 Complexity Leadership Theory

The leadership framework chosen to assess how this is evolving within South African organisations is complexity leadership theory (CLT) (Arena & Uhl-Bien, 2016; Uhl-Bien et al., 2007; Uhl-Bien & Marion, 2009; Uhl-Bien & Arena, 2017). CLT helps to reframe the lenses through which we focus on leadership, by suggesting that the capacity to influence change, is caused through the interaction between interdependent component parts, emerging within the system, either via chaos or order. (Olalere, 2015 quoting Obolensky, 2010).

CLT is made up of the interaction between three leadership functions: administrative; adaptive and enabling which are intertwined via entanglement. These terms are further defined below. These are the four components that will be used to assess the response of leadership to technological change and the possible resulting unemployment or new job creation. What will be important is which attribute is most prominent and how it interacts with the others to influence change within the organisation to deal with the issue.

Mendes, Gomes, Marques-Quinteiro, Lind & Curral (2016) believe that innovation and learning at work can be better understood through CLT, which is also significant in the context of this research, as this is what will be needed for the organisations to adapt for technological change.

Tourash (2018) argues that CLT is not an actual theory of complex leader–follower interactions and that it is rather a theory of how leaders, are separated from complex processes, who then attempt to influence them and that "Often, CLT is really traditional leadership thinking inserted into a complex organizational context" (p.15). Tourash (2018) believes that theorists of CLT are not consistent in the application of the theory or fully developed. However, Presley (2014) argues that CLT acknowledges and theoretically includes informal dynamics or organisation, which is normally ignored in traditional leadership. It is because of this that this theory has been chosen.

The 4 elements of the CLT framework are briefly defined below as per Uhl-Bien et al. (2007). Additional context is provided from Uhl-Bien and Marion (2009) and Arena and Uhl-Bien (2016).

2.7.1 Administrative Leadership

Administrative leadership entails formal managerial activities of an organisation, such as planning and coordinating of any tasks. It is a top-down function and is based on authority and status. It is the ordered part of CLT. This leadership attribute will be key to the implementation of technological change. A criticism of administrative leadership is whether top-down leadership still applies in a technologically changing environment, where flatter structures and more autonomous teams are becoming more common.

2.7.2 Adaptive Leadership

Adaptive leadership is informal, emergent, complex and dynamic. It is created through the conflict preferences and ideas. From this conflict interaction, creative, adaptive and learning actions emerge within the CAS and struggle to adjust to the tension. Uhl-Bien et al. (2007) label it leadership, because they believe that it is the main source of change in an organization.

Arena and Uhl-Bien's (2016) research in CLT is that adaptive organisations are really good at enabling adaptive space. “Adaptive space occurs in the interface between the operational and entrepreneurial system by embracing, rather than stifling, the dynamic tension between the two systems” (p.24). Channel opening, and barrier removal is not permanent and hence it being called adaptive space, which is regarded as temporary or fluid, and not system, which would be regarded as permanent or fixed. It works to initiate the flow of information and thereby engage complexity dynamics and network structures to allow for the emergence of innovation and originality, which is needed for adaptability, to emerge (Uhl-Bien & Arena, 2017). Further “CLT proposes that adaptability, which enhances performance and innovation, occurs in the everyday interactions of individuals acting in response to pressures and opportunities in local contexts” (p.23).

Within network structures, brokerage connects groups to one another. It creates conditions to promote new ideas which can then be scaled and magnified throughout a system. The concept of group cohesion is important to connect agents within a group which allows for pressure testing and the iteration of ideas in a safe environment, which can then be successfully scaled (Uhl-Bien & Arena, 2017). Another reason why group cohesion is important is because information can be shared quickly, and trust is created. Ideas will also be adopted and enhanced more easily. Trust and culture is

therefore important to adaptability where positive learning and risk-taking leads to more creativity within the cohesive group. (Uhl-Bien & Arena, 2017)

Uhl-Bien and Arena (2017) also refer to a term called conflicting, which provides diversity of thought and includes ideological differences in which creativity can thrive. This happens when entrepreneurial leaders operate across different networks. Uhl-Bien and Arena (2017) further believe that diversity is vital to adaptive space, because if everyone has the same perspective, rich interconnectivity cannot happen and limited conflict or opposing views will not generate tension to adapt or change. This is where brokerage acts to connect diverse groups and allows for linking up to find solutions to challenges. However, a balance of diversity must be found so that chaos is not created instead. (Uhl-Bien & Arena, 2017).

The diversity needed in the adaptive space could create a situation where South Africans could thrive (being so multi-cultural) through rich interconnectivity, thereby driving more innovation and opportunities. This attribute will be key to allowing for innovation and creativity to emerge from any changes, as well as any positive results of technological change and reskilling opportunities.

2.7.3 Enabling Leadership

The enabling function acts between administrative and adaptive leadership. Its purpose is to product the conditions for complex interactive dynamics of adaptive leadership to emerge and to manage and amalgamate the administrative-adaptive interface (Uhl-Bien and Marion, 2009). This will provide an environment for any technological changes to happen successfully with minimum negative impact.

2.7.4 Entanglement

Last of the four “entanglement describes the dynamic relationship between the formal top-down, administrative forces (i.e., bureaucracy) and the informal, complexly adaptive emergent forces (i.e., CAS) of social systems” (p. 305), that is the adaptive and enabling leadership. (Uhl-Bien et al., 2007). This is about co-ordination of the various leadership styles to ensure success of any changes.

Based on the definitions of CAS and CLT and its four leadership components, it should be clear why this lens has been chosen to review changes that technological change could be having on organisations. However, leadership theory is constantly evolving,

and the new LOAT model may be more relevant. This will have to be explored during the research process.

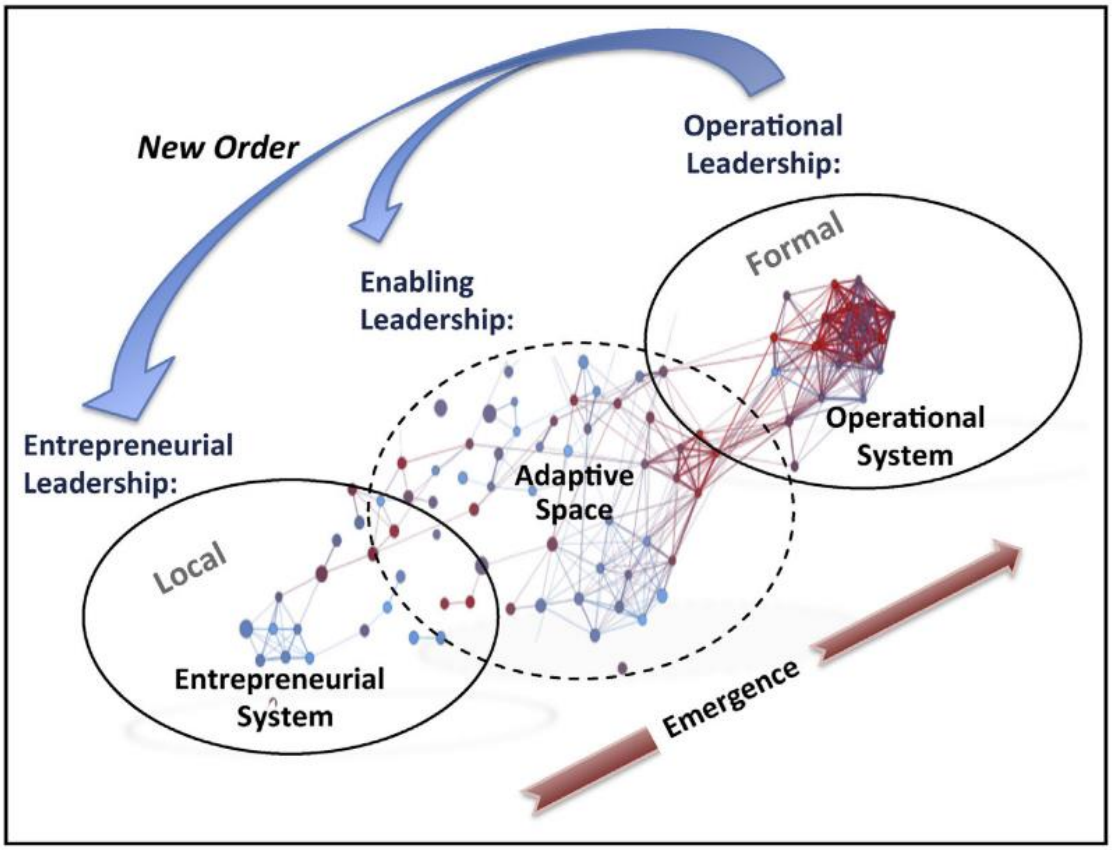
2.8 Leadership for organizational adaptability theory

Uhl-Bien and Arena (2017, 2018) have built on the foundation of CLT to create the leadership for organisational adaptability theory (LOAT) which they believe is in response to the new dynamic working environments. They surmise that the CLT categories of administrative, adaptive and enabling leadership are not accurate and "can benefit from grounding in theoretical perspectives on organizational adaptability" (p. 98).

They amend the model to focus on empower the adaptive process and space within a firm and balance the need to innovate and the need to produce by "engaging the tension" (p. 98) between the two. This is also referred to as organizational ambidexterity. This is done via various means of collaboration, decentralization, network cohesion and more. Adaptability becomes central to the model. The other change is that administrative leadership is changed to operational leadership of the formal systems. The research will test the viability of the LOAT model against the foundations of CLT.

Below is a summary of the three new components of leadership, as summarized by Uhl-Bien and Arena (2017) which they believe are required for adaptability. These leadership components are also graphically depicted in Figure 1. Examples are provided to demonstrate how these attributes have been used successfully to date and therefore could serve as model for future complex and changing environment.

Figure 1: Components of the LOAT Model



The Complexity Leadership Model (Uhl-Bien & Arena, 2017, p. 15)

2.8.1 Operational Leadership

This is the component that is the closest to the administrative leadership of CLT. It involves the alignment and design of systems and processes to efficiently execute ideas and convert them into productive outcomes. Even in complexity, the power of operational systems is still needed to create efficiency and produce sustainable results. However, they do not stifle innovation or entrepreneurship in bureaucracy but work more towards enabling and accommodating innovation and adaptability which are vital to the survival of organizations and achieving results. The most important role of operational leadership is converting innovation into reality and sustaining the results. Operational leaders achieve this by sponsoring (supporting ideas), aligning (positioning and getting buy in/support from other stakeholders) and executing (Uhl-Bien & Arena, 2017).

An example of this could be Apple's roll out of the first iPhone to market which was a like a well-executed military operation and ended up creating even more demand for the product in the market. Further examples in the technology environment include

Amazon's distribution network which is purely based on operational effectiveness.

2.8.2 Entrepreneurial Leadership

This component is the exploration and origin of new ideas, which involves learning, innovation and growth within the organization and the birth place of innovative solutions, new products and services, which create and capitalise on additional opportunities and assist the organisation in adapting to complexity pressures (often a motivating factor) which challenge the individuals and teams to create new ways of working or products/services. The creativity is more often than not, a collective, cohesive process of trust. This type of leadership is often biased for action and works quickly to get ideas implemented, with limited resources and tight deadlines. These leaders are flexible, tenacious, patient and persistent and understand the importance of timing to get new ideas to market (Uhl-Bien & Arena, 2017).

Netflix and Discovery are good examples of companies who have used this leadership style effectively and successfully.

2.8.3 Enabling Leadership

Lastly, according to Uhl-Bien and Arena (2017) "it is the enabling of conditions that effectively support and sustain adaptive space" (p. 14) They believe that it is the enabling leadership which is the unique complexity leadership attribute. Combined and engaged with operational and entrepreneurial leadership, this attribute allows organizations to be agile and operate as complex adaptive systems.

Uhl-Bien and Arena believe that although operational and entrepreneurial leadership are in the leadership model glossaries, enabling leadership is not, emerging in response to complexity. They state that even though many leaders practise it, it remains unrecognised, as no terminology has existed to describe it before and therefore it is often misunderstood or misconstrued. "Understanding, developing and rewarding enabling leadership practice could be critical for organizational success and survival in today's complex world" (p. 16). Enabling leadership is the link between entrepreneurial systems and operational systems within organizations and nurtures/enables adaptive space and the emergence of adaptive responses in a system. It initiates and amplifies support for originality, innovation and change.

Examples of enabling leadership include people like Geoff Bezos and Elon Musk who

have created organisations where innovation and entrepreneurship thrive. Failure is accepted as part of the innovation process.

These three attributes of complexity leadership can be combined or used independently by any leaders in any role. Highly agile and successful complex leaders should be able to transition between all three proficiently to adapt and take advantage of new opportunities and innovation (Uhl-Bien & Arena, 2017). The examples provided are proof that these leadership attributes are already working successfully in global organisations. The research will determine if any or some of these attributes are being used by South African leaders in the technological change context, successfully or not.

Brynjolfsson and McAfee (2014) state that although machines could replace workers one by one, businesses generally will require a larger reorganisation of business culture, which will drive the requirement for different skills and therefore adaptability. Reorganisation and the removal of routine work will require the redesign of business processes. This requires enablement, adaptability and more creativity and innovation. As the literature shows, technological change will require major adaption and LOAT provides a framework that could be used by organisations to enable the required changes.

2.9 Conclusion

Wajcman (2017), raises the question of whether all the 'hysteria' about technological unemployment is justified, or any different from previous technological change and sums up individual levels of responsibility and those of leaders aptly.

"'We need to conjure up our own Angels of the Future, which stand on the shore of society, their gaze fixed on the horizon, alert to the winds of change. They must be both several and diverse. The homogeneity of the Silicon Valley creators is a more dangerous threat to the future than any perceived robotic apocalypse. Too often these purveyors of the future have their backs to society, enchanted by technological promise and blind to the problems around them. It will require more than robots to ensure that the future really is different this time" (p. 68).

Research and further investigation is needed to confirm how serious this issue is and what further action is needed from South African leaders to not be blind to the issues. South Africa needs an alternative future to guarantee growth and it needs to be

“different this time”.

In conclusion, the scope of possible technological change and the impact thereof on employment has been explained within the South African context. The importance of job loss mitigation for the South African economy has also been clarified. The research will therefore need to assess how organisations within South Africa are currently being affected by these technological changes amongst knowledge workers and who is responsible for job loss mitigation and the possible reskilling of these workers. Lastly, the research needs to confirm what actions are being taken by leadership within South African organisations to attend to this issue and what evidence there is of CLT and/or LOAT behaviours. Based on the literature review, the developed research questions are listed in section 4.

CHAPTER 3: RESEARCH QUESTIONS

The aim of the research is to assess the readiness of South African companies in their ability to mitigate job losses due to technological change, in the context of the South African business environment, through the lens of the complexity leadership theory model. The aim of the research questions is to establish what is known, what can be done, who it should be done by and what complexity leadership tools could be used to achieve the required outcome of job loss mitigation.

3.1 Research Question 1 (RQ1)

The PWC CEO survey report (2018) states that Africa CEOs have the lowest level of optimism regarding economic growth at 38% versus the global number of 97%. The availability of important skills and the speed of technological change is a perceived threat for CEOs in every region, except for Latin America and Africa, respectively. As such, the first research question must be about the level of awareness amongst senior leadership about technological unemployment.

Question

What level of awareness exists amongst senior executives in terms of job loss mitigation due to technological change within organisations?

Explanation/probing questions;

This is to establish the level of awareness and current stage of the issue within the organisation, that is, what is known? Is this a current issue or challenge for the organisation? Does it feature in strategic planning?

3.2 Research Question 2 (RQ2)

Phillips et al. (2018) on the future of the South African workforce, states that 5.7 million jobs or 35% of jobs are at risk due to automation. If it is established that senior executives have any level of awareness as per RQ1, what should they be doing to mitigate these job losses, what are they doing about it? This leads to RQ2.

Question

What mechanisms are being utilised by the senior executives to mitigate job loss and which factors support this action within the organisations?

Explanation/probing questions;

This is to determine what companies are actually doing in this regard. Are employees being reskilled or redeployed? Are there any potential retrenchments? What can be done?

3.3 Research Question 3 (RQ3)

Engineering News (2018) and Mail and Guardian (Mhlanga, 2018) articles give examples of how business and government can work together to create employment and training to mitigate job losses through Ramaphosa's YES foundation "New Dawn" initiatives. However, comprehensive collaboration and investment is required. These types of initiatives require considerable investments of time, money and resources. Who should be providing these resources and how should the investment be divided? Hence the third research question.

Question

Where does the level of responsibility lie for the mitigation of technological unemployment between business, government and civil society?

Explanation/probing questions;

This is to establish where the responsibility lies for job loss mitigation, that is, who should it be done by? Are firms entirely responsible? Should government share some of the responsibility or have it included in schooling curricula? Should employees be upskilling themselves?

3.4 Research Question 4 (RQ4)

Gustein and Sviokla (2018) discuss seven skills that cannot be automated for people to remain employable and relevant. They refer to communication, content, context, emotional competence, teaching, connections and an ethical compass. However, for employees to learn these skills, they will need leadership that can either teach them these skills, lead by example, or provide an environment where these skills can be learnt. Which leadership theory would be most applicable? This leads to the final research question.

Question

Can complexity leadership theory provide a framework to assist senior executives to better prepare for the mitigation of job losses due to technological change?

Explanation/probing questions;

What role does complexity leadership theory play in the mitigation of job losses? What CLT/LOAT attributes are being displayed by the leaders? How are they leading? Can the CLT or LOAT frameworks be built on? What complexity leadership tools can be used?

The research methodology and research questionnaire used in the research interviews will seek to either answer these questions or explore them further and thereby find possible areas for future research.

CHAPTER 4: RESEARCH METHODOLOGY

The purpose of this research was to assess business readiness for job loss mitigation, due to technological change for knowledge workers, within South African organisations. This is being investigated from the perspective of senior executives, using CLT and LOAT theory and attributes as described in the literature review. This chapter focuses on the methodology employed in this research study to achieve the relevant research objectives. Following is a discussion on the choice of methodology; the philosophy; approach; methodological choices; purpose of the research; design; strategy; time horizon as well as the techniques and procedures that were used.

4.1 Choice of Methodology

Saunders, Lewis and Thornhill (2009) describe an exploratory study as a way of finding out what is happening and gain new insights. Gray (2014) elaborates by saying that exploratory study seeks to establish what is happening and investigate further, especially when not enough is known about the subject or circumstances. This is what this study aimed to do. Considering the type of problem in the research topic, especially its ambiguity and complexity, a qualitative and exploratory research method was chosen. Exploratory questions were used to identify themes. After exploring the main constructs, it was then possible to interpret the research (Gray, 2014).

Complex adaptive systems are somewhat unpredictable, and changes often emerge from this dynamic interactive process (Uhl-Bien et al, 2007). To investigate the adaptive and enabling aspects of CLT, and because there was a level of uncertainty from the interviewees about forthcoming technological changes, some responses required further exploration. By definition, a qualitative study was conducted. Even though this resulted in a smaller sample, it allowed for a more in-depth study. A descriptive study of this problem would have limited any exploration of unique issues that organisations could be dealing with.

To be able to assess the level of awareness and strategic plans of the organisations, senior executives were interviewed, with a focus on HR senior executives. However, only HR executives who had an awareness of the related technology strategy were interviewed. This included HR executives, HR managers, HR talent acquisition leads, senior business partners and HR consultants (as part of the category of HR experts).

When HR executives were not available, or did not have knowledge of the technological strategy, other senior executives were interviewed who had an in-depth knowledge of the organisation's strategy for technological change and its plans with regards to the management of staffing requirements and/or training.

Of the 23 interviews, only 11 were HR senior leaders. Other senior executives interviewed included CEOs, MDs, senior partners and directors, a learning specialist, a risk and trading manager and IT consulting experts. Each interviewee was chosen because of specific knowledge they had about technological change in the business and industry.

Autor (2015) is adamant about automation having a positive effect on the labour force and could possibly raise output leading to higher demand for labour, not only negative effects or unemployment. PWCs (2018) 21st CEO survey states that globally CEOs must play a role in fostering "a beneficial place for technology in our society" (p. 27). Only the senior executives in the sample organisations were able to indicate if technological change would have a positive or negative impact for the labour force. This feedback was key to the validity of the research.

Saunders and Lewis (2012) state that for business and management research, interpretivism is relevant in organisational behaviour. It is relevant because it represents a particular point in time, in a specific set of circumstances, with a group of individuals in certain roles, which creates a unique social phenomenon. The researcher had to understand and interpret the complexity of the situation at a certain point in time and see the leader's perspective in the research, to understand what was happening within the organisations.

Most of the information obtained was based on the opinions of those interviewed. The relevance of the data and interviews was to obtain information that could provide a snapshot of the existing situation with regards to technological change within the organisation, to determine if any job losses would occur, and whether any plans were in place to mitigate any potential job losses or reskill the workforce who may be affected. Leadership responsibility was investigated, and the adaptability and enablement activities displayed by the leaders were identified where possible.

Based on the results of the research, recommendations have been made for additional research needed and for follow up actions. The benefit of the research has been the creation of awareness of the issues and to highlight the need for proactivity amongst

leaders, as well as to identify where there are shortfalls in job loss mitigation activities or possible required reskilling opportunities within organisations.

Bezuidenhout (2018) identified the requirement for studies that "identify the management and leadership characteristics that would be most valuable in firms and industries that are undergoing technological disruption" (p. 93). Positive examples of complexity leadership behaviour can encourage further research on how to apply this type of leadership in other organisations under similar circumstances.

Although extensive studies have been done worldwide on the subject of technological unemployment, (Arntz et al., 2016; Autor, 2015; David, 2017; Frey & Osborne, 2017; WEF "Future of jobs", 2016; WEF "Future of jobs", 2017; WEF "Global Risks", 2018), information relating to what is specifically happening on the ground in South African companies has been limited. However, 2018 has seen far more literature on this subject, as the South African unemployment issue becomes more and more pressing. The need for and sense of urgency is becoming palpable based on daily press reports.

The research conducted was qualitative in nature and therefore exploratory. As such, an inductive approach was followed, combined with a deductive approach to test the usability of the complexity leadership theory models and other research constructs. The nature of the first three research questions had to be exploratory and allowed for change in emphasis and flexibility as the research progressed, which encouraged more exploration of the existing circumstances within the organisations. This approach also allowed the interviewer to be able to adopt an empathetic approach and build trust with the interviewees. Saunders et al. (2009) state that even if research is exploratory, it must have a theme or be grounded in theory, to commence interviews and to enable discussion with the participants and as such, the nature of the fourth research question allowed for a more deductive approach

The complexity and dynamism of technological change allowed for the theory base of CLT (Uhl-Bien et al. 2007) and its derivative, LOAT (Uhl-Bien & Arena, 2018) and the application thereof to be used. Based on the research results and after the information was collected and data was analysed, as recommended by Saunders and Lewis (2012), the complexity model could be used by leaders, in conjunction with other leadership models and with additional themes added.

Qualitative data was collected using non-standardised, semi-structured, in-depth, face to face interviews which was a mono approach to data collection. (Saunders et al., 2009). These interviews were conducted with senior executives of various South

African companies. Kline (2008) states that “the extent to which researchers’ assumptions form the content of interview questions defines whether questions are open and exploratory, or limited in the potential to discover new and possibly unanticipated information” (p. 214). This confirmed the need to do unstructured interviews instead of a set questionnaire. with open-ended questions to allow for new emerging themes. This method was chosen to allow for exploratory questioning.

The semi-structured interview’s purpose was to explore the leadership’s perception of the organisation’s readiness for technological unemployment. As there are various types of technological change in different organisations, a standard interview format would not have been able to explore the range of responses from the different leaders, or the different responses to the challenges. Responses to the challenges may have included reskilling, outsourcing, relocating and retrenchment and each one of these themes needed to be explored further in interviews, within the context of leadership theory.

The research design was exploratory, and the purpose was to understand exactly what was happening in the workplaces, how it was happening and why it was happening. The opportunity was to gain insight as to what stage the organisations were at in terms of planning for technological unemployment. The senior executives described and explained the organisational structures, technological change strategies and different workforce structures for the business of today and the business of tomorrow.

The purpose of the research design was an assessment and by its very nature, information from the different interviewees had to be evaluated and themes linked, where possible. Pre-coding of possible themes from the theory and literature were required for trustworthiness and to enable analysis during the research process (deductive approach), as well as to allow for any new themes that may develop during the research process (inductive approach).

Interviews times ranged from half an hour to over an hour and took into consideration time constraints and logistics. Four interviewees were not available for face to face interviews, and electronic (Skype) interviews were conducted, as a plausible alternative, and agreed to by the interviewee.

Saunders et al. (2009) explain a time horizon as the option of researching a situation over a period of time (longitudinal study) or taking a snapshot of it at a point in time

(cross sectional study). This research was a cross sectional snapshot of the existing situation in organisations at the time of the interview. The researcher would not be returning to investigate any changes in the organisation later and measure the change over a period of time. This method was selected because of time constraints and accessibility to the senior interview interviewees who had limited time available for interviews because of busy schedules. No causal research was conducted. This research was purely aimed at establishing the existing state of job loss mitigation due to technological change. Once the research was completed, it provided the basis for any future research or recommended actions.

A pilot test interview was conducted with a senior HR practitioner, prior to the start of research. This was done to test the structure, flow of questions and validity of the questions. It was found that the pilot interview was too unstructured, and many topics were discussed that were not relevant to the research. As a result, the pilot interview was not included in the research results. In the subsequent interviews, the way the questions were asked had to be changed, as well as the order of the probing questions, to create a more logical flow that aligned with the research objectives.

In addition, based on the pilot interview, the researcher changed the interview style to be slightly more formal and improvements were made to how the probing questions were asked in following interviews, to explore the research questions more. What was further highlighted by the pilot interview was that senior HR employees may not always be aware of any plans for technological change in a company and that other senior employees would have to be considered for the research, where this was apparent. This strategy was then applied throughout the rest of the research process.

Research was done on the organisation and the interviewees in advance to prepare for the interviews. Consent forms (example available in Appendix 3) were completed in advance and anonymity was guaranteed for all the interviewees. Several interviewees requested anonymity and therefore any reference to them personally, or their connection to their companies, has been excluded from the research results and discussions.

A suitable time and location was selected to ensure minimum disruption and comfort as recommended by Saunders and Lewis (2012). The sessions were recorded (with the interviewee's permission) and additional notes taken. None of the interviewees asked to see the questions prior the interview, but this option was available if required.

Appendix 5 provides a breakdown of the interview dates and interview times. The interviews were transcribed by the researcher, with the assistance of two speech to text online tools called Speechnotes (Interviews 1 to 9) and Sonix (Interviews 10 to 23). These details are included in Appendix 5 for reference. The tool was changed because the second tool (Sonix) was found to be more accurate and efficient than the first, thereby saving more time. Once the interviews had been transcribed by the speech to text tool, the researcher had to review and correct the transcriptions, as the transcriptions had on average, only a 75% accuracy rate, due to poor audio quality or language translation issues. The transcriptions were then imported into Atlas TI, a qualitative data analysis and research software, to analyse and code the data, as well as to identify any new key themes that could be included in future interviews. Coding of terms and themes was done post the interview process.

4.2 Population

The population included senior executives of companies operating within South Africa, across multiple industries with the majority of the employees being knowledge workers. Most of the companies were South African, with head offices, or the largest office in South Africa. Several operated locally and internationally. Besides three consultants interviewed, the size of the companies ranged from just over 50 staff to over 263000, globally.

The population specifically excluded manufacturing companies, because the focus of the study was on job loss mitigation for knowledge workers. Manufacturing was also excluded because of the plethora of literature available about the impact of automation or technological change in this sector, since the early days of the first industrial revolution.

4.3 Unit of Analysis

To ensure that the assessment objective was achieved, the chosen unit of analysis was the beliefs, opinions and behaviours of the executives interviewed, based on their roles and experience within the organisation.

4.4 Sampling Method and Size

Research by Frey and Osborne (2017) states that occupations mainly consisting of tasks which follow well-defined procedures, which can easily be performed by sophisticated algorithms, are the ones that will be most easily affected by technological change. These are the companies where employees will be most susceptible to technological unemployment and disruption.

However, for this study, sample companies were chosen from a range of industries, including, but not limited to; financial services, technology, consulting, telecoms, retail services, legal services, healthcare and mining. These industries and professions were also specifically identified in the literature review as being susceptible to technological change and unemployment. The sample was limited to companies of 50 employees or more, except for three consultants.

Non-probability, purposive (judgemental), convenience sampling was done, with interviewees chosen from the interviewers' network and from recommendations or introductions within the network, also known as snowballing. The target sample size was a minimum of 20 companies, depending on access and availability. However, eventually, 23 interviews were conducted at 22 companies. Regrettably, two companies approached, who are experiencing high volumes of technological unemployment, were not available for interviews within the time constraints, which would have added valuable insights to the research. However, the data obtained was used to understand what was happening and make logical generalisations (Saunders & Lewis, 2012) to answer the research questions.

Although similar themes kept presenting themselves (Saunders et al., 2009), data saturation was not evident during the coding process. Due to the nature of the topic and different industries being included in the sample, the trend was that more data was generated by the companies with a higher volume of technology being implemented.

4.5 Measurement Instrument

The measuring instrument was a semi structured, face to face interview. The interview times ranged from 17 minutes to 57 minutes (refer Appendix 5). The questionnaire is attached for reference in Appendix 6. Gray (2014) suggested a basis and concise list of standard research questions, with three or four probing questions per each standard question. For this research, eight specific questions were asked in line with the

research questions and literature review and as can be verified from the consistency matrix in Appendix 1. Probing questions were also added per question as recommended. However, additional exploratory questions were asked in the interview when interesting points were raised by the interviewee that could add value to the research. As such, the questions were open ended and probing to find out more detail, where applicable. It was found that because of the flow of the interview, many of the questions were answered by the interviewee, prior to the interviewer having to ask them.

The key theme of the research was shared with the interviewees in a written brief when requesting the interview, to provide them with context for the nature of the interview and to give them an opportunity to prepare. As mentioned previously, a pilot test interview was done to confirm responses are what was required, and so that no misunderstandings would occur during the research process.

Validity and reliability of the responses was obtained by the researcher taking notes on the interview sheet, recording the interviews, (with the interviewee's permission) and a written transcription of each interview recording. Where information about the company was not known by the interviewees, the information was verified from the company website. The interviews were transcribed as soon as possible after the interview, to identify any new emerging themes for future interviews. Some interviewees were contacted post the interviews via email and the WhatsApp messaging service, to verify or clarify missing information.

To further ensure that the research was credible, confirmable, dependable and transferable, the researcher asked an objective outsider to verify the transcriptions and recordings. This was also done to prevent any researcher-on-interviewer bias and testing issues during the interviews, especially when interviewing associates and colleagues within the researcher's network. During this process, some errors were found in the transcriptions and these were fixed in the transcriptions and quotes used in the research results. These were also noted as memos in the coding process.

4.6 Data Gathering Process

Once ethical clearance (GIBS, 2018) was obtained for the research proposal, the chosen interviewees were personally contacted both telephonically and via email to introduce the interviewer and request the interview (See Appendix 4 for example of

Email Brief). When the interviewee agreed to an interview, a suitable time and place was arranged, as requested by the interviewee. It was crucial that the venue and time were conducive to the type of interview being conducted, to ensure the best results from the interview with limited distractions or noise, and to maintain a level of professionalism.

Interviews were conducted at the interviewee's offices, at the GIBS campus in a syndicate room or via Skype. Written pre-approval had to be obtained from the interviewee to include the anonymous responses in the data gathering process (GIBS, 2018). The relevant consent and release form was signed prior to the start of the interview by both parties (See Appendix 3). Objectivity by the interviewer was very important to ensure that no preconceived ideas distorted any of the responses.

4.7 Analysis Approach

Data was analysed using non-numerical (qualitative) methods and term coding for ease of reference and analysis. A final list of codes is available in Appendix 7 for review. An initial list of codes was created from the literature and theory and grouped per research question. Examples of themes included the constructs of technological change, unemployment, complexity leadership and job loss mitigation and all the CLT and LOAT constructs.

The interviews were transcribed, and the transcriptions were imported into Atlas TI to analyse the data. Each transcript was analysed and coded into groups of relevant data according to the key constructs (deductive approach). Coding was done line by line, as recommended by Saldaña (2013) for new researchers. This information was to justify or explain any points made by the interviewees and assist in answering the research questions to complete the required assessment of business preparedness for job loss mitigation. This process is suggested by Kline (2008).

Any new themes that emerged from the research were grouped into similar categories and aligned with the research questions and complexity leadership constructs (including LOAT), where possible (inductive approach).

As part of the second cycle coding process, referred to by Saldaña (2013), which involves "classifying, prioritizing, integrating, synthesizing, abstracting, conceptualizing, and theory building" (p.58), once all the transcriptions were coded, many of the codes

were collapsed into similar categories, in order to interpret, understand and explain the data (Gray, 2014). The categorised data was then aligned with the research questions as the main themes and in line with the previously mentioned constructs. Throughout the process, the codes were reviewed and changed if needed, to align with the literature, thus ensuring trustworthiness. Coding was double checked and reviewed more than once for credibility. An initial list of 400 codes was reduced and refined to 125 by the end of the research process.

4.8 Limitations

The concept and components of technological change are extensive and had to be limited for the study. Initially, as the topic was being viewed from a leadership perspective, the technical aspects of technology were to be ignored and grouped under the category of technological change. However, during the research process, it was found that the technology could not be ignored, as each type of technological change presented its own unique challenges to the working environment and the stage that the company was at, in terms of technological change, determined the responses to the research questions.

Some organisations were reluctant to share information regarding strategic plans and job losses for fear of confidentiality breaches, competition issues or reprisal. Even though the information was confidential, the organisation experienced subject bias and did not want to be perceived in a bad light (Saunders & Lewis, 2012). This also applied where some senior managers interviewed, only had specific knowledge of their area of operation within the organisation.

There were accessibility issues and time constraints for executives and senior leadership of the organisations, which created interview scheduling problems. The accessibility issues also meant that there was not a balanced representation of industries and businesses in the study, which could question the validity thereof.

Qualitative research by its nature, is limited in scope due to the sample size and issues of bias and possible errors. Validity can always be a challenge depending on how the data is interpreted by the researcher, who may impose their own bias on research. Open ended questions can affect the reliability of the interview, if asked in a different way. Further quantitative research will have to be conducted to a larger sample of firms, over a longer period (longitudinal study) and depending on the results of this or

other research, possible causal investigations will have to be done.

Although every effort was made to ensure accuracy of the transcriptions prior to data analysis, the use of an online speech to text transcription tool led to some spelling errors, words being transcribed incorrectly and poor punctuation. Errors were picked up during the coding process and verification process as mentioned above, which were then fixed in the transcriptions and quotes used in the results, but some may have been missed due to the volume thereof.

Repetition, colloquialisms and frequently used terms like “you know” and “like” were transcribed directly and had to be removed when using the quotes in the research results, to make them easier to understand. This could detract from the weight or meaning of some of the quotes used.

In conclusion, below is a summary of the research methodology and design.

Table 1 Summary of Research Method and Design

Technique and procedure	Data collection and analysis - 20 Senior Executives and 3 Consultants
Time Horizon	Cross sectional – Snapshot
Choices and method	Mono methods – Semi structured interviews
Strategy	Qualitative
Approaches and type	Combination of Inductive (exploratory) and Deductive
Philosophy	Interpretivism

CHAPTER 5: RESULTS

5.1 Introduction

This section will present the results and key findings of the research to assess the readiness of companies to mitigate jobs losses due to technological change. As per the research methodology, to explore the topic and answer the research questions, 23 interviews were conducted, which included 11 females and 12 males.

Firstly, to confirm the validity of the research, a description of the firms and participants interviewed will be provided. The research results will then be presented in order of the four research questions from chapter three. As an exploratory research method was used, important observations are aligned with the research questions where applicable.

5.2. Description of Firms and Interviewees

Table 2 below provides a description of the roles of the interviewees, arranged alphabetically according to their titles. Several of the interviewees asked to remain anonymous, and as such, names have been withheld. As can be seen from Table 2, of the 23 interviewed, 12 were in senior HR roles, including talent acquisition and career management. The balance included senior executives in the businesses, who had knowledge of the strategic intent of the business regarding technological change. Two interviewees were founding members of their firms. Two interviewees were from the same company but gave very different insights based on their specific roles and portfolios within the business.

Three consultants were interviewed, who work at multiple companies. The content of these interviews related to the companies where the consultants spend most of their time. Two were IT consultants and one was a HR consultant. These interviewees were selected to be interviewed as subject matter experts, because of their extensive industry experience, exposure to multiple companies and resulting substantial insight into the topic.

Included in Table 2 is the length of tenure, both in the organisation and within the existing role. Length of tenure ranges from three weeks to 31 years. One interviewee changed companies after agreeing to the interview and hence the three-week tenure. This interviewee's content focused on the tenure at the previous organisation, with

some comparison to the new company, when it gave additional insight to any questions asked during the interview.

Table 2 List of Interviewees

Role	Length of Tenure within role	Length of Tenure with the current company	Gender
Chief Executive Officer	18 months	5 years	Male
Chief Executive Officer	5 years	5 years	Male
Chief Executive Officer	2.5 years	17 years	Male
Compliance Learning Consultant	3 weeks	2 years	Male
Ex Executive Director & CIO/IT Consultant	3 years/6 months	14 years/ 6 months	Male
Group HR Manager	4 years	12 years	Female
Group HR Technology Manager	2 years	2 years	Female
Head of Careers	4 years	5 years	Female
Head of Talent Acquisition	9 years	9 years	Female
HR Consultant	31 years	N/A	Female
HR Executive	8 months	8 months	Female
HR Manager	6.5 years	6.5 years	Female
Managing Director	2 years	3 years	Male
Partner Director	11 years	11 years	Male
Regional Head of Recruitment	4 years	4 years	Female
Risk and Trading Manager	5 years	5 years	Male
Senior Business Partner	2 years	7.5 years	Female
Senior Consultant	2.5 years	2.5 years	Female
Senior Executive HR	4.8 years	4.8 years	Male
Senior HR Business Executive	4 years/3 weeks	4 years/3 weeks	Male
Senior Partner	8 Years	8 Years	Male
Software Manager/Professional IT Consultant	9 months	9 months	Female
Talent Lead	7 years	10 years	Male

Table 3 below details the firms from which the interviewees were chosen that were discussed during the research interviews. The companies are arranged alphabetically by title. It was important to include multinational companies to measure whether there was any push or pull relationship between the international entities and the South African entities with regards to technology or policy. Global and South African employee numbers were included to provide a comparison of the South African business as a percentage of the global business. The size of the firms ranged from 50 to 263900 people globally. Where companies are part of a larger group, the group name is included. Some of the firms operate in multiple industries and this is identified where it occurs.

The age of the firms ranges from five years to 206 years. Where companies have been acquired, the age of the new company is mentioned in brackets in Table 3, if it's relevant to the research topic. The business age information, areas of operation and number of people were verified from the company websites (where available), as some of the interviewees were uncertain of this information or did not mention it.

Table 3 List of Companies

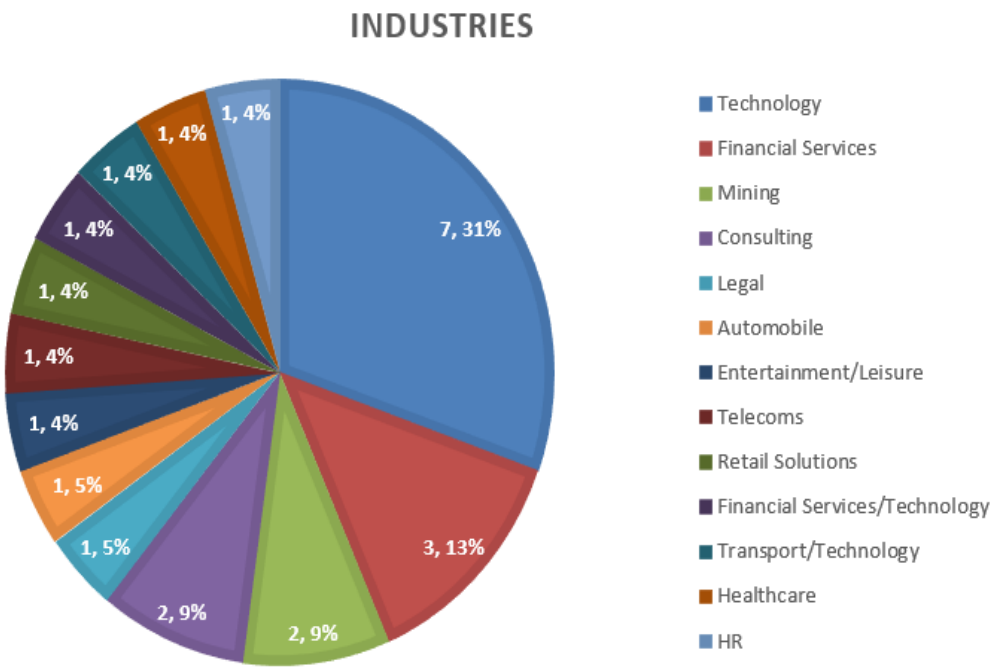
Company	Type of Business	Age of Business (As per company website)	Size of Business / Division in South Africa	Size of Business Globally	Industry	Area of Operation
Adapt IT	ICT	16 years	1,000+	1,000+	Technology	Global
Aha!	Software company / IT Consulting	5 years	N/A	Unknown	Technology	Global
BBM Attorneys	Attorneys	15+ years	130	130	Legal	South Africa
CitiBank	Banking	206 years	350	215,000	Financial Services	Global
CloudSmiths	Software Developer & Implementer	5 years	50+	50+	Technology	Global
Deloitte Consulting	Consulting	150+ years	4,000	263,900	Consulting	Global
Fedgroup	Insurance, Property management, IT & other Financial	28 years	240	240	Financial Services / Technology	South Africa
Imperial Holdings Ltd	Logistics and Vehicles	70 years	39,000	52,000	Automobile	Global
Investec	Banking	44 years	5,000	10,000	Financial Services	Global
Karabina - ISP Partners (Now Altron)	Software company	18 years (71 years)	200	200	Technology	Global
Liquid Telecom	Telecoms	21 years	1,100	1,100	Telecoms	Global
MAC Consulting	Consulting	24 years	75	75	Consulting	South Africa & Africa
Minopex	Mineral processing operations	22 years	1,900	1,900	Mining	Global
Moipone Fleet	Fleet Management &	16 years	56	56	Transport/IT	South Africa & Lesotho
Morningside Hospital (Mediclinic)	Hospital	34 years	384	19,000	Healthcare	South Africa (Global)
Pinnacle ICT	ICT Distribution Company	20 years	650	650	Technology	South Africa & Africa
Rand Merchant Bank	Banking	31 years	750 (IBD only)	3,000	Financial Services	Global
Smollan	Retail Solutions	87 years	59,000+	59,000+	Retail	Global
Sun International	Entertainment & Gaming	51 years	4	20,000+	Entertainment/Leisure	Global
Three6five	IP networking systems integrator	12 years	212	212	Technology	South Africa & Africa
Shaft Sinkers (UMS Group)	Engineering & Contracting	50 Years (3 years)	300	400	Mining	Global
Various	HR Consultant	Various	N/A	N/A	HR	South Africa
Xlink (Vodacom)	Connectivity Solutions	14 years (24 years)	140	140	Technology	South Africa & Africa

As per the research methodology, companies were chosen from a range of industries

(except manufacturing). As can be seen from the Figure 2 below, nine firms (including two operating in other industries) are operating in the technology space. These firms were chosen because of the high rate of technological change occurring in this industry and the types of choices that leadership are having to make, which provided insights across all the research questions. However, the balance of 14 firms came from a range of industries to provide different insights and answer questions raised from the literature review.

Except for the two mining companies, the focus was on companies with a high percentage of knowledge workers vs blue collar workers. The two IT consultants were included in the technology category, whereas the HR consultant was classified separately. Four of the interviewees referred to their firms as industry leaders and trailblazers in technological innovation, leadership programmes and customer service.

Figure 2 Range of Industries



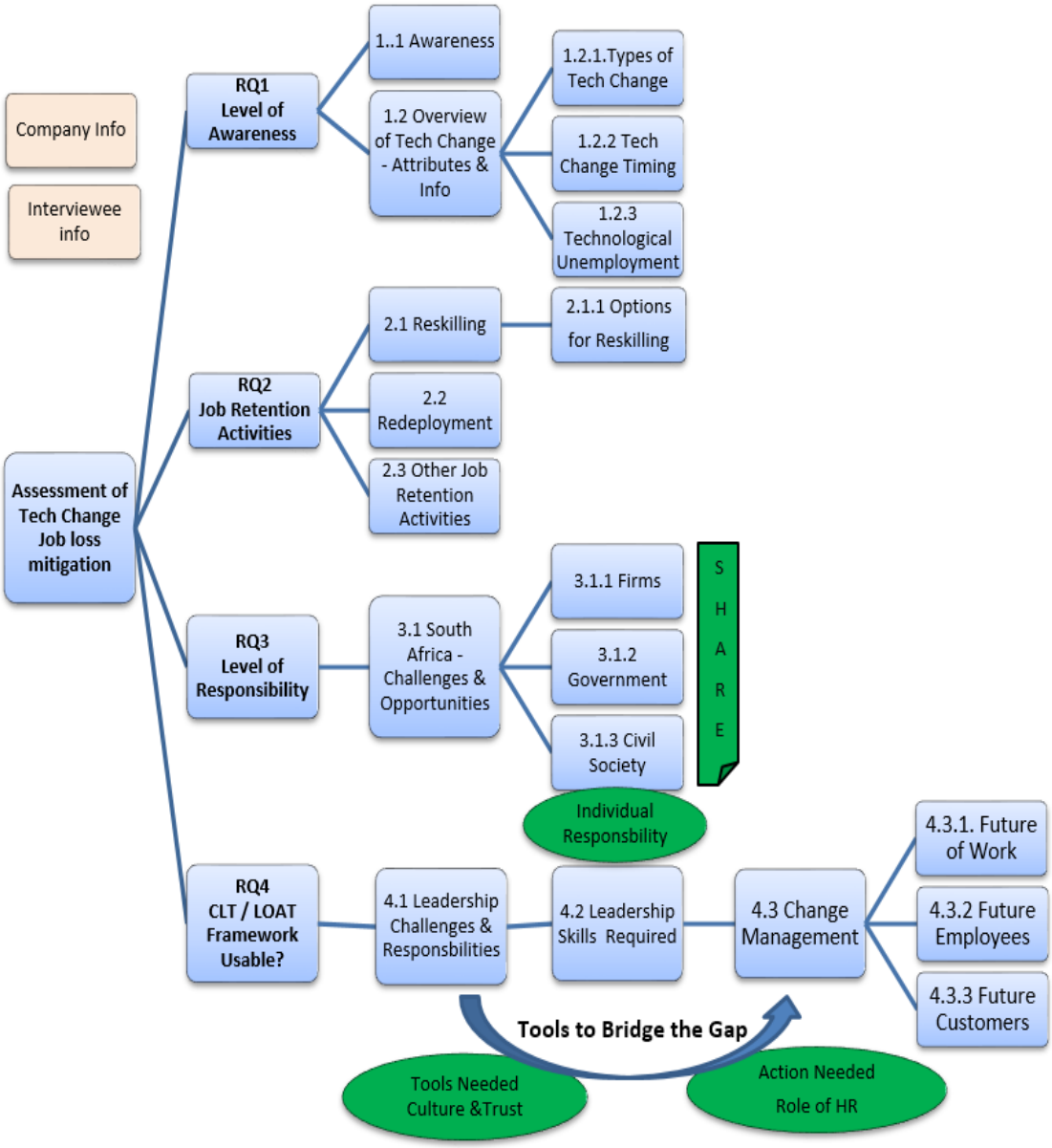
The 23 interviews were conducted from 25th July to 14th September 2018 (Refer Appendix 5 for interview date and times). The average length of the interviews was 36 minutes within the range as discussed in the research methodology (Refer Appendix 5). The research was conducted using a combination of a deductive and inductive approach, to identify key themes relating to technological change, technological

unemployment, job loss mitigation, levels of responsibility and leadership attributes or tools that could be used to mitigate any job losses.

5.3 Codes, Categories and Themes

Figure 3 depicts the key themes and categories that will be reviewed in this chapter as per the research results. The results and themes are sorted per research question. The items highlighted in green are new themes that emerged during the research that needed to be explored further.

Figure 3 Categories and Themes



5.4 Research Question 1 (RQ1):

What level of awareness exists amongst senior executives in terms of job loss mitigation due to technological change within the organisations?

This research question was to establish the level of awareness and current stage of technological change or technological unemployment within the organisations and whether it was evident in current strategic planning.

Five key themes emerged from the interviews as aspects of awareness including; overall awareness between leadership, staff and customers; the knowledge about and attributes of the technological change that is happening; the types of technological change; the timing of the technological change and the possibility of technological unemployment.

5.4.1 Level of Awareness

A summary of the findings relating to level of awareness can be seen in Appendix 8, which describes the various stages per firm. Several of the interviewees contradicted themselves when questions were probed about job losses, and this inconsistency is evident in Appendix 8.

Of the 23 interviewees, 18 confirmed that technological change was included in strategic planning, or that their firms were in the process of aligning business strategy to technology.

> Interviewee 4: "We think that should help us in terms of retention. We have what is called the movement and the movement in XXX is really about our view in terms of what we need to do as a firm by 2023. Which I think is 5 years from now. It's a 5-year plan. And within that movement construct we have got what is called bold plays. So, data is one of those bold plays or big things or big initiatives."

> Interviewee 11: "Currently what our vision is, is to automate a lot of things throughout the company but not to lose people, just to free up their time with mundane like stuff repetitive stuff doing on a daily basis they could be easily automated.''

> Interviewee 16: "They obviously continue with the business strategy to see how they can transform the business from a digitisation and robotics point of view. We are then on another strategy from a human capital perspective to see how we then best

support the business going forward, when that does happen, and it has already happened”

Of the 18 firms, 11 confirmed that the technological change that was being implemented could create job losses, but nine anticipated no job losses at their firm. The tech implementation was already in progress in all.

Interviewee 1: “…We are actually developing an artificial intelligence division now. Whereby we want to do predictive maintenance for vehicles. So, people who usually used to book vehicles for services and maybe monitor the service cycles are more or less not going to do that, because that it is going to be done via the AI part of the business… that is where I see a lot of change happening.”

Interviewee 12: “I think if we get the scheduling bot right, I think that that will affect a number of heads quite quickly”.

One firm had already gone through technological unemployment, without it featuring in the company’s strategy or being communicated to the team, despite it happening over a three-year period. Another firm anticipated no job losses from any planned technological change. However, another interviewee from the same company, in a different department, believed differently.

In six of the firms some technological change is being discussed, is available, or has been purchased, but has not been implemented, because the firms do not know what to do with the existing workforce.

Interviewee 10: “I think there's a strong will to move to automation and technology and digital from the company side, but I don't think enough time has been spent and how that's going to happen, or how that impact is going to be mitigated on the workforce in terms of that. And I think that's one of the reasons why we haven't gone to that level as yet.”

Interviewee 23: “We currently in this building, have the technology that could replace almost every one of our administrators. In terms of the emails that they read and do. Tomorrow. Not theory. Not could. Would. We can. We have built our own machine learning capability that would replace those jobs. But it's not right to do so”

One of the firms has adopted a “wait and see” approach because of industry related issues. “Everybody is just sitting back, waiting for something to change. And the industry, it makes it very difficult to be creative and think outside of the box” (Interviewee 18).

Of the firms, five were looking at technology as a cost saving option, had cost concerns with regards to funding or priorities of spend for technology or were cost cutting as can be seen by the two contrasting comments below.

> Interviewee 4: “We are able to be more nimble and agile in terms of the time it takes from the onset of the audit to the time we finalise that audit. It also allows us to reduce our costs because we are starting to take more and more people out of the system.”

> Interviewee 17: “That's been put on hold just from a cost perspective and the implementation perspective. Projects are a little bit slow at the moment.”

Twelve of the firms were experiencing a slow-down in recruitment or were not replacing staff who were leaving because of technology.

> Interviewee 10: “Before we appoint more people, let's see how we can adopt within the systems, that we don't need to appoint extra people. And typically, where a person leaves an organization, they have second thoughts of just replacing that position and rather look at what is a need for having that position, with the systems coming in.”

> Interviewee 15: “No. We plan to in terms of at least stabilization from not growing of headcount in order to leverage bigger projects. So, we're hoping that technology will enable us to do more with the same resource headcount. So that's more the strategy than reduction of headcount.”

Eighteen of the firms are starting to employ people with different types of skills to align with the strategic intent.

> Interviewee 11: “We would have to change our engineering team cause at the moment they are very like hands-on routing and switching. we would need to get a lot more software developers, that kind of thing.”

> Interviewee 12: “We need to be developing different types of skills so, for me it is a big drive towards meta skills. So, that idea that we don't necessarily know the answer for everything, but we know where to find that information or how to learn.”

> Interviewee 16: “So, you don't just look at a CA anymore, you look at a CA who can code….everything's moving towards data coding all of those sorts of things….Seeing if that skill is within your organization and can that be a transferable skill…”

Technological anxiety was apparent in just over a third (34%), where interviewees were concerned about technological unemployment and the future of jobs, not only in the firms being discussed, but countrywide and worldwide.

> Interviewee 7: “but I think that there is an element where you feel terribly sorry for what is going to happen to people, not just in this industry, I think it's going to be a problem throughout every company as we get more automated. They will train them up, but I can’t see that it’s going to be a silver bullet for everybody. A lot of people are going to get hurt along the way.”

A similar theme of awareness is being experienced by the customers of the sample firms interviewed.

> Interviewee 2: “So, I’ve seen where there was a possible chance that it would affect people, [at their customers] they generally thinking about it in advance and either redeploying people or upskilling them or just doing more with the same people.”

When discussing whether the topic of job loss due to technological change comes up with clients, one interviewee explained that it does “and it normally comes from the operational staff themselves than management…and I think there are almost different interests and there is a need to reconcile the two” (Interviewee 9).

Comparing overall awareness between leadership and the staff within the organisations provided varied replies. Two of the leaders when asked, replied as follows “…they don't really feel like it's going to impact their jobs…as senior managers we can already see that in some way their jobs will be impacted” (Interviewee 1) and “at this point it is only strategic senior level. I think our workforce is not mature yet for these conversations...they just start getting into panic mode...” (Interviewee 5).

Whereas, Interviewee 8 felt that CEOs and COOs had to be thinking about how any tech change could affect the entire business, not just the area it was being implemented in “Like when your finance team decides that they are changing the Invoicing system and it’s all going to be automated. Does it affect developers? People wouldn’t even think of thinking of how it would affect the developers, but someone should be thinking about that and looking at the whole ripple effect throughout a business when they implement a system”.

Contrary to the above, when asked if there were concerns in the passages amongst staff, Interviewee 13 said “Well right now, I would say it's more excitement. Because what we're seeing is people's jobs being enhanced…people's jobs being made easier…but it might be a little bit short-sighted."

Unfortunately, in complete contrast to the excitement, Interviewee 13 also described another scenario regarding staff awareness, that was not as positive, and of concern to the interviewee “…I've been involved in the project for months, looking at new processes…we are automating, and it was it was only when I got in a room and I was talking to a specific team, that I had two people in the back say, sorry, so we don't have jobs anymore? Because … we do that thing that you just automated? ... So, the consideration upfront is bad.” When asked if there was a lack of transparency about the automation, Interviewee 13 continued “I just don't think it's thought about.… like in the project manager’s list, there's not a box that says, please think about whether we're getting rid of jobs...I haven't been there that long, but I can't think of many systems that came in and got rid of jobs to this point. This is the sort of the first wave…”

The above example is evidence of pockets of innovation having an influence on head count, that may not be seen or planned for at a strategic level. There was no consistent messaging across any of the firms regarding tech change. However, open communication came up as key theme in leadership behaviours required and will be discussed further in the results of RQ4.

The above section provided a high-level overview of the awareness of technological change by leadership within organisations. Aspects of the technology topic were explored further in the interviews and are explained in the following section.

5.4.2 Overview of Technological Change

Within the firms there were varying stages of technological change happening. However, when discussing the change overall, themes that emerged included; remaining competitive through technology; the benefits of technological change and its role as a growth multiplier; resistance to change and the rate of change. Interviewees also discussed technological change within the industries and that the change seems to be happening in pockets. Data cholesterol was also mentioned as an attribute of the change.

The theme with the highest density related to the benefits of technological change, internally for the business, for customers and quality of life overall. This was mentioned by 18 of the 23 interviewees.

> Interviewee 2: "...I'm not naive enough to think that no job will ever be lost through the technology that we do, but I also kind of believe that if you make the company better, more productive, faster growing, more profitable, that … the knock-on effect of that on the economy, will somewhere along the line, make up for the job loss at that business. So, I think we help companies grow, become more competitive and become more profitable and ultimately, in a … capitalism world, that's what drives the growth of the whole and that's what drives the total job growth."

> Interviewee 14: "it's actually been a huge improvement. Our numbers have gone up in terms of the profit we make, the active XXX we have, because our product went from basically offering ten XXX events, to a stage where we are now offering up to 80. So, it did give the client a whole new, better experience….We've seen better numbers in turnover… the amount of XXX on our actual website and in essence profit, and it also reduced a lot of the problems that we had with the people problems…where people didn't show up for work, there were scheduling issues and stuff, that's also now gone."

In line with the benefits of technological change, of the total 23 firms, five anticipated, or had already experienced, an increase in head count because of technological change within the sample firms.

> Interviewee 2: "We had a target to grow by 20% headcount this year. We are not quite on track, because we had a few resignations as well. Literally the goal…was to increase the headcount by 20%."

Interviewee 12: "…So, what's interesting is, we're actually taking the RPO's business or candidates and bringing them in-house. So, it's almost the reverse of what you were talking about earlier. Instead of having people leave, we're actually increasing headcount here."

Interviewee 23: "Even though our tech makes us efficient, I needed more staff and then I've hired a lot of knowledge workers."

Several (15) of the interviewees discussed how technology provides a competitive edge and that not using technology could lead to the business being unsustainable.

Interviewee 8: "I think again this is the longer-term view, versus the short-term view. I think that today you can carry on being competitive in the short term, but you will be overtaken in the medium term to the point where you will be closed down, because the innovative companies did change"

Interviewee 21: "if we do not make certain changes are we going to survive? In the next five or six, seven years, how competitive are we going to be if we not going to make the changes?"

The rate and volume of change was mentioned by twelve of the interviewees as well as it's scalability and the results thereof.

Interviewee 2: "People can connect with companies 24 by 7, asynchronously, through all sorts of channels. So, in the old days your bank said, we open at 9 and we close at 3. If you were standing outside at 3:01 they just didn't deal with you. So, they knew exactly how many hours a day they had to deal with customers and how many customers could get through the door in a day…what queues they would have. Now they've got customers talking to them 24hrs a day, on every conceivable channel and they can't say, well, we closed for business…. They've got staff working shifts 24 hours a day, to deal with clients who want to tweet negative things about them at 2 o'clock in the morning. We never needed to have that. All of them used to be able to go home at 3 o'clock and come to work the next morning at 9 o'clock."

These interviewees also referred to the push and pull effect of customers and global partners, that is driving them to evolve technologically.

> Interviewee 4: “So, there are those pull dynamics from the clients. As much as if you look at a Public Sector, it’s still a push dynamic. …on the other side of the continuum, with financial services particularly, its largely a pull dynamic.”

> Interviewee 9: “The rate of change technologically, it almost outpaces people. People just cannot keep up.…every day you go to the media, there is something new … I must keep up but … looking at all these new apps that are coming … there is blockchain … there is 5G … all these different things…”

Less than half of the interviewees (six) referred to resistance, denial or push back against technological change, citing the need for a human element, which is discussed further under the results for RQ4.

> Interviewee 5: “I think people are in denial that it’s only going to be blue-collared workers... they themselves … actually are in denial. So, when we talk about digital disruption and all the emerging technologies that one sees, and think are happening around us, they are like but no, our world of the last six decades has been like this then it’s not going to change.”

> Interviewee 17: “Our in-between age people are more open to it [technology]. They trying to embrace it a little bit more. And I think that's what you would probably find in most organisations. There is always that, well why do we have to change? That kind of attitude? I think I am a very people orientated person so, it's hard to think of something positive [about technology being implemented]."

With regards to the technological change in various industries, a few interviewees believe that financial services are leading in South Africa, but that public sector, mining, legal services and healthcare are lagging behind global counterparts. An anecdote told by the interviewee in healthcare, regarding a machine replacing four pharmacists (see Appendix 10) confirmed the work by Brynjolfsson and McAfee (2014) and Frank et al. (2017) regarding these possibilities. Appendix 10 provides some examples of these quotes and comparisons and Figure 4 substantiates this, with a breakdown per industry, as per the sample, where the range and count of technological change is the highest in the financial services and technology sectors.

Eight of the interviewees agree that the change is occurring in pockets, that is incrementally, as opposed to large scale ‘big bang’ types of change, to the point that it is hardly noticeable. Some of the firms have been implementing technological change for the last five to ten years and have fundamentally been changing the business over this time.

> Interviewee 2: "Not in big batches … I can't prove it [job losses] …but I would imagine that the composition of people in the workforce is evolving all the time, because of the effect of technology”

> Interviewee 13: "But it's happening...it's happening fast, but slow enough that I don't think people are really noticing...The worry is that it'll happen without us really being aware of it, because that's what I'm seeing happen. I'm not saying this like we're going to wake up on Monday morning and there's a computer sitting in your chair. It's incremental. It's the little pieces and we tend to accept them because they do help.”

> Interviewee 22: “Bits and Bits. I think it's slowly happening. It’s slowly filtering down."

In discussions about the use of data and data analytics, a theme of data cholesterol emerged. This was defined by the first interviewee and mentioned by several others afterwards. This theme will be discussed further with the types of technological change.

> Interviewee 1: “I've heard of a new term called data cholesterol. Companies having too much data, but not being able to use all of it and it blocks the IT infrastructure and it’s just a lot of information, but it’s not used usefully.”

> Interviewee 2: “Well just because you've got all this data and all this access to information that you didn't have in the past. It's almost like there's too much to process. So now you need a whole lot of other people, who spend their lives figuring out all the data that you’ve generated, that you didn't have before you had technology.”

> Interviewee 13: “We almost have to say you're more than your data, because we don't actually know how to deal with your data.”

The above themes provided an introduction and overview of technological change within the firms interviewed to answer the research question in relation to level of awareness and concern. However, the attributes of technical change raised were further explored and divided into three clearer aspects including; the types of technological change; the timing of any changes that may result in job losses, and lastly, evidence or components of technological unemployment that became apparent during the interviews.

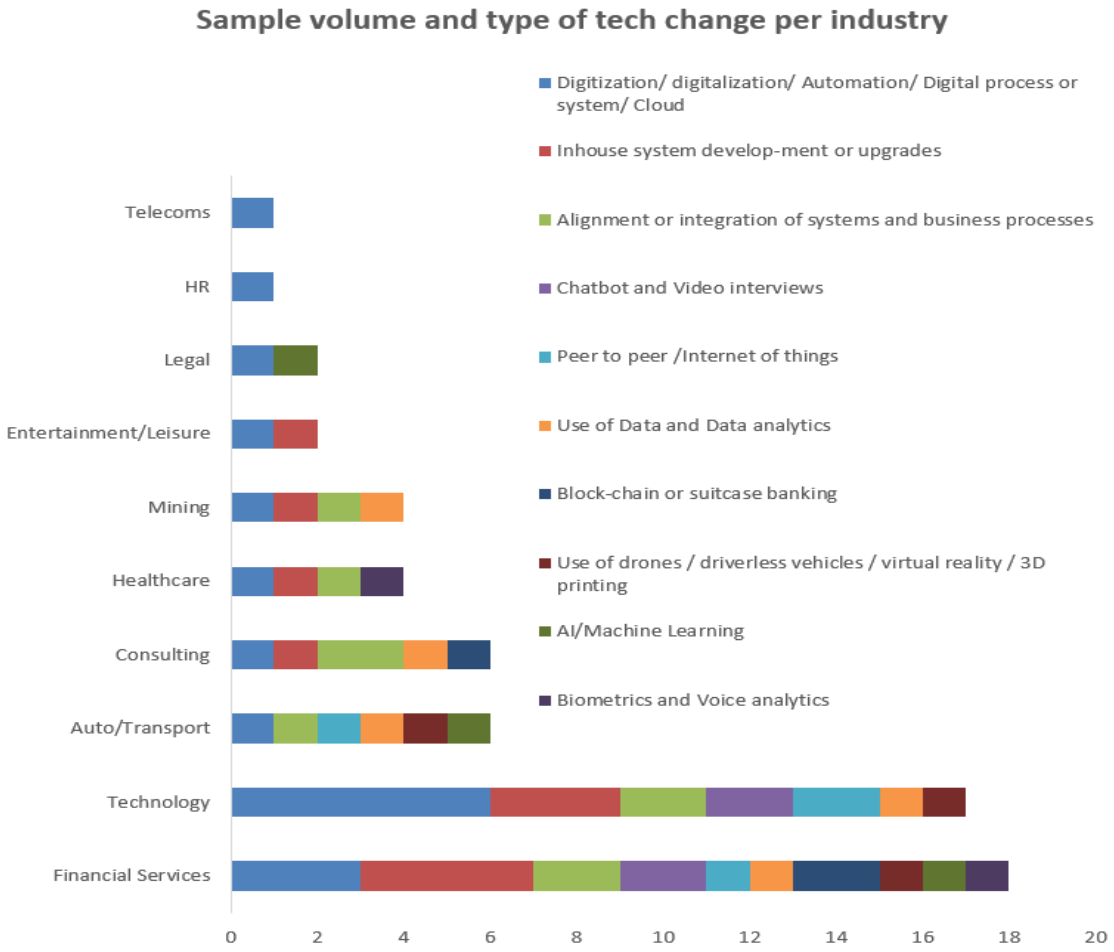
5.4.2.1 Types of Technological Change

The types of technology that are being implemented in the sample firms can be seen in Appendix 9. The most prolific (17 of the 23) included digitisation, digitalisation (digital processes/systems or cloud applications) and automation. Many of the interviewees used the terms digitisation and digitalisation interchangeably, despite the different meanings. In-house system development was the second most common which included a range of technologies, from basic automation to robotics. These are classified separately because of relevancy to specific businesses.

Nearly half of the firms (nine) were busy integrating multiple systems to reduce manual input and take advantage of data opportunities that existed across the businesses. The balance is made up of chatbots, video interviewing, IOT and peer to peer platforms, blockchain and digital banking platforms (referred to as suitcase banking), drones, driverless vehicles, virtual reality, 3D printing, AI and machine learning, biometrics and voice analytics, as well as the use of data and data analytics.

Figure 4 reflects the type of tech change happening per industry as per the sample interviewed. External systems purchased were 35% vs in-house system development of 8%, with a combination of both being 39% and 17% not implementing any tech.

Figure 4 Volume and Type of Tech Change Per Industry



Finally, four of the firms were implementing no technological change because of industry and business challenges, or limited technological change happening within that industry, in South Africa. An example was the mining industry, when asked about technological change happening in the one firm, the interviewee responded “And this is part of I think the challenge that we have. We need to look at new mining methods, especially with the impact on fatality in the industry, which is at the top of the media, and the DMR and the unions and everyone's focusing on that. But we haven't… [in the company]."

A similar response was given by the legal firm “If I if I look at the industry per se, there's not really anything majorly unique that's happening with regard to the influence of technology in it. There's always new and innovative ways coming through of, for example, billing systems. There's a drive towards becoming more paperless, because paper is one of the biggest expenses in the firm, but in so far as, for example, artificial intelligence coming in, that type of thing? Not really."

This category sought to provide depth and summarise the various stages of technological change within the firms in the sample to answer the probing questions of RQ1. It was clear from the interviews that each of the different types of technology brought specific challenges to the firms, not only the risk of job losses.

5.4.2.2 Timing of Technological Change and Possible Job Losses

Appendix 8 summarises the stages the firms were at regarding tech change. Of the firms, 15 were already in progress of implementing major tech changes and one had already completed the implementation, resulting in the loss of 16 jobs. This category explored this construct further and was split into two components. Firstly, the timing of protentional job losses within the firm due to technological change and secondly, how long the interviewee thought it would be, before technological change started to significantly create technological unemployment, not only in the firm, but within South Africa. This theme talks to the level of awareness of the senior executives.

A table of the detailed quotes, and results can be seen in Appendix 11. Timing for possible technological unemployment within the sample firms ranged from already completed and in progress, to an estimated five years away. Interviewees who were asked how long it would be before technological unemployment started happening in South Africa, had answers ranging from it is happening already, to 20 years away. Most interviewees believed it was happening already.

The timing of technological unemployment introduces the last theme in RQ1, regarding the level of awareness and stage of technological change in companies, which is the visibility and occurrence of technological unemployment within firms.

5.4.2.3 Visibility of Technological Unemployment

This theme covers the following aspects of technological unemployment that have not been discussed in previous sections which includes; affected roles; evidence of early retirement or natural attrition; generational issues; industry shrinkage and growth; redundant jobs and limited jobs and evidence of no job loss.

Further to the timing theme (see Appendix 8 and Appendix 11), 48% of the interviewees provided specific examples of technological unemployment happening or anticipated within the firms and at customers (11 interviewees).

Interviewee 1: “It’s going to be mostly the call centre agents, about 15 people”

Interviewee 7: Well it will affect about 30% of the company. So, it will affect a lot of people.

Interviewee 16: "So, it cuts out a whole lot of people in the middle."

Roles that could possibly be affected by technological employment that were mentioned by the interviewees are mentioned below;

Interviewee 5: “So, now we have all these dealerships with all these staff that are okay for now, but we worry in the next 3-5 years they’ll soon become redundant. “

Interviewee 7: “If you looking at more the knowledge workers, the admin staff are under the biggest threat, because once processes get automated, for example, if you look at HR. You automating HR processes, the HR administrator is less necessary”

Interviewee 13: “So again, each little area of the business would have their own QA team. So, you could you could possibly be talking 200 people.”

Appendix 8 reflects 12 of the firms slowing down recruitment and trying to achieve more with less people due to the implementation of technology and increased efficiencies. Interviewees also mentioned relying on natural attrition and early retirement packages, and then not replacing people who leave, to lower the head count as an alternative to retrenchment.

Interviewee 10: “We haven't had more job losses but it's more per se before we appoint more people, let's see how we can adopt within the systems, that we don't need to appoint extra people. And typically, where a person leaves an organization, they have second thoughts of just replacing that position and rather look at what is a need for having that position, with the systems coming in.”

Interviewee 21: Since December to now June, I've lost two of my positions. It was myself and then 3 HR Admin officers … if you look in the new structure, or the new org alignment for HR going forward, I won't have 4 ladies again, or 3 ladies.”

Older generational issues were mentioned by several of the interviewees. Millennials will be discussed further in RQ4, however, seven of the interviewees spoke specifically about issues being experienced with older employees not being able to adapt to technological change.

> Interviewee 9: “One of the ladies here said, [on age and adapting to technological change] I know I’m in the bracket of 55 plus, I could but I’m not, I’ve got responsibilities, I look after my grandkids, I have to do ABC and D. [end of quote] I am finding it to be a challenge and do not really think that I have the magic wand. It’s that the rate of learning, or even unlearning as people say. I think people struggle to acquire new knowledge at a pace that is required....”

> Interviewee 17: "We have got a couple now … newly appointed executives that are sort of late 30's and their mindset in terms of the approach to the way we work is completely different. So, the old school they are very set in their ways. This is the template. This is how it works. We don't change the font size. It's very structured, very static. Whereas our younger ones are very open to explore. How can we do things differently? How can we make things more sexy? What visual impact do we have on the client in terms of presentations, or reports or proposals?”

> Interviewee 18: "One of my managers that I'm working with, one of the directors, he made a, literally, a cognitive decision, where he says, I will not employ people older than 50…every new person coming in, must be between 30 and 48, oldest.

Changing roles or roles that no longer exist and new roles that are being created was discussed by 7 of the interviewees. The mining industry was specifically referred to as a shrinking industry, with less jobs existing and many qualified people being available for employment.

> Interviewee 10: “The opportunities are getting less but the skills are getting more. So, you are going to end up with a highly qualified workable workforce, but less opportunities to apply their skills…the skills are not becoming redundant. The opportunities for applying skills are becoming redundant.”

> Interviewee 22: “In the Microsoft space …. when I first started, everyone was looking for SharePoint consultants… SharePoint developers or SharePoint administrators. …

> Now I'm getting the SharePoint consultants phoning me to say, what's going on in the market? I can't find anything? But what has happened is that there are still roles available, but if the guys haven't kept up to date with their skills and got really to grips with D365 and skilled in that area, there's no jobs that are actually saying SharePoint consultant, they actually D365 consultants."

Lastly, as indicated in Appendix 8, nine of the interviewees believe that the technological change will not result in job losses within the firms. When asked if there would be any impact on the business headcount, interviewee 15 responded "Not at the moment." The response from interviewee 21 was similar "The changes that's currently happening doesn't have an impact on job losses." One interviewee expanded more.

> Interviewee 19: "There is a lot of change in terms of technology all the time…. what I find quite interesting is that, there is a general belief that when technology comes in, you need fewer people and I've found that that's not always been the case…sometimes, you actually need more people to make that system work, or the same number of people."

5.4.3 Summary RQ1

This last section relating to the visibility of technological change, provided an overview of actual technological unemployment happening within the sample firms and the roles that are being affected. It is clear from this section that there is a relatively high level of awareness about technological unemployment, its status and attributes within the sample firms.

5.5 Research Question 2 (RQ2):

What mechanisms are being utilised by the senior executives to mitigate job loss and which factors support this action within the organisations?

As confirmed by the results of the first research question, technological unemployment is happening, or may be happening in a number of the firms in the sample. However, some firms are saying that no job losses will happen, despite the technological change. This research question looks at what these firms are doing to mitigate job losses and what activities are supporting this. The results obtained are broken down into three categories, reskilling, redeployment and other job mitigation activities.

Within the reskilling category, there were different methods being employed by the firms, which mostly included on the job training, online learning or a combination of online learning and classroom training. However, some of the firms were only talking about these activities, as opposed to implementing them.

5.5.1 Reskilling

Within the reskilling theme, the following results are discussed; attributes of reskilling; continuous learning and the openness to learning; the learning and unlearning of behaviours and multi-skilling. Within this theme, options for reskilling are then explored.

Eleven (47%) of the interviewees made specific reference to the requirement for reskilling, as a tool to mitigate job losses. Two discussed how important it was to reskill in a technological environment. Two benefits included, as a skills driver "it also creates an opportunity to improve skills within the business. So, people move away from semi-skilled and the opportunities to be more skilled definitely are available to people…as a business you get a far more skilled workforce through technology." (Interviewee 6) and secondly, as an impetus to the tech change "it does require upskilling, constant upskilling to allow that shift to happen" (Interviewee 8). Skills gaps analysis seemed to be managed between line management and HR within the sample firms. However, it was not practised consistently across the sample.

The urgent requirement for reskilling was raised by a few of the interviewees, but for one firm, it was critical, being left with very few options other than retrenchment as a result of delaying reskilling "if there is going to be a change in technology, the business hasn't necessarily thought how it would deal with the loss of skill, where the gap is so large that there is not a sufficient amount of time to train in order to get the value out of the capability that the business has through the data centre" (Interviewee 6).

Responsibility for training and the payment thereof was also raised by "I think it's also a bit of a... both parties.… I think by staying relevant in your environment, within your function, you'll know sort of, what could be coming. So, from a digital perspective and where you might need to get the skills. … if you are going to be replaced by automation or whatever, I think the business should give you opportunities or options, in terms of what you can study, just for guidance and some support from that perspective. I am not saying that they should pay for you to get new skills to go and be hired somewhere

else, but I think just that support … for people who are going to leave or whatever the case may be" (Interviewee 17). The individual responsibility mentioned is discussed further under RQ3.

The importance of keeping system training simple was discussed and this leads further into the human machine collaboration discussed in RQ4.

> Interviewee 23: "So, we've got the iPad principle that we try to stick to. If you having to train people on a system you've done something wrong. So, we still largely try and abide by that … someone who uses Photoshop or someone who uses a really complex program, they typically need to go on some training."

The need for continuous learning and an openness to learning, was spoken about by 47% of the interviewees. The generational issue, discussed in RQ1, was often raised in conjunction with this. An example of one response, when asked if staff did not want to be reskilled "Yes, there were staff members and it didn't come from the younger generation. It was more from the older generation. With the younger generation, they are accustomed to the digital aspects of more change. There is always an inertia with business, where complacency sets in. To actually get over the inertia, to do the change, and it's very difficult for some staff, to actually do a change" (Interviewee 3).

The importance of unlearning existing and changing behaviours in a technology environment was also raised.

> Interviewee 5:" It's not about learning a skill, it's about learning a behaviour...And the behaviour is how do I unlearn my old habits and learn new habits"

> Interviewee 13: "If you look at what's happening in learning in business, it's all e-learning, because on paper, e-learning just makes so much sense. You have one person developing it. You can stick it on a computer and deploy it to thousands of people, you could track it and you can get your numbers. But if you take a step back and you start asking the questions, what behaviour did we change?"

Multi-skilling was specifically mentioned as a requirement in the mining industry.

> Interviewee 18: "You have to re-skill, but I don't want to use the word re-skill, you actually have to multi-skill. You need to have people who can do more than one thing,

and not just focus on the specific one thing. Because if you look at the Australian and Canadian way of mining, you will have one person that currently in South Africa five people do that job. And the only way you can keep up with that technology, is by ensuring that you are upskilling and multi-skilling, that you can, not only operate the machine, you can also fix it and you can read the plans and you can make an area safe."

Based on the attributes, the openness to learning, multi-skilling and the ability to learn and unlearn behaviours, most of the interviewees were clear that reskilling is needed. However, how this reskilling is to be executed, is the next challenge. Many of the firms are using multiple different options for reskilling, which are explored further below.

5.5.1.2 Options for reskilling

Amongst all the interviewees, the most prolific form of reskilling was in-house bespoke training programmes (56%), many online, followed by graduate learnerships and bursary schemes (30%). A few of the interviewees mentioned external training (17%), but even the external programmes were designed or aligned with the organisation's specific learning requirements. A few interviewees discussed how training was changing to align with new skill requirements for the organisations.

Interviewee 15: "We've got a combination of both. We look externally to certain suppliers of pieces of training and learning that we like that suits the strategy that we are trying to enable, and then very specifically we do have a key learning focus internally that we obviously design solution per individual per team, just depending on where they are in a life cycle, or a career cycle from their perspective."

Seven of the interviewees discussed learnership and bursary programmes and how important it is within the South African environment.

Interviewee 9: "We've hired in this division, the highest number of interns at XXX…I think we have a quota of about 30…. We have very deliberately exposed those young people to the very latest from a technological point of view, so that they can acquire new skills… now they are being hired by other divisions here and others are going to get work outside. If I could, I would take a 1000 young people. I would take a 100 at XXX because, in terms of answering your question, who has or should have responsibility? I think that companies like ours. While we watch the bottom line, part

of our performance metric not just in word, but part of our performance metric must be how much we are investing in the provision of those skills. And I don't just mean in a manner of malicious compliance, but I mean like really, we pay."

Interviewee 12: "So, this year we're probably going a to spend about 10 million just on bursaries that are not actually going to be helping our business at all. Besides possibly a recruitment pipeline. With the graduate learnerships, when we hire them we say to them at the community social investment program, our job here is not to give you a permanent job but to upskill you, so that at the end of your year that you're with us, that you've got transferable skills, that you've got marketable skills and that you are more easily able to join the workplace. We do have a good retention rate on that, every year we're keeping about 80 percent of them. So, another 20 percent … we've pumped back into the market. And it's bridging that gap between theoretical and being able to actually work in the workplace."

As mentioned, external skilling was specific to business requirements "A lot of their products and training on their products is provided, but that only relates to their products which we sell on … in terms of the capability [new technology], we don't have that inhouse and therefore people would have to be trained externally on that. (Interviewee 6).

Reskilling was perceived to be a very important job loss mitigation activity by those practising it. However, this was only happening in just over half of the sample firms. Additional mitigation activities are discussed below.

5.5.2 Redeployment

Redeployment involved moving employees who were being displaced by technology into other roles or creating new roles that were aligned with the employee's skillsets. Redeployment was described by 70% (more than reskilling). Of the 16 interviewees who discussed redeployment, challenges were being experienced with skillsets not being suitable to the new roles or the employees not being happy with the new roles. So, the effectiveness of this mitigation activity long term, may not be sustainable.

Interviewee 1: "They are going to play a role of trying to assist in building the system more, so they are going to be more or less like business analysts, because these are people who have a wealth of knowledge and experience in the field, and these are

the people who can help us to really pick up some of the stuff that we will need the system itself to be able to pick up."

Interviewee 7: "It's easier to redeploy sort of admin staff member like an HR administrator would be a slightly easier position to redeploy into sales or something like that. But… they would have to have the aptitude for it."

Interviewee 16: "A lot of the time we've been able to absorb those people … into other areas because obviously its transferable skills."

Redeployment was therefore seen as an effective job loss mitigation activity, except where there were not enough positions available, or suitable positions to move people into.

5.5.3 Other Job Retention Activities

Besides reskilling and redeployment, the interviewees described several other job mitigation activities or areas of focus to work at retaining employees. Several of these were related to different types of company activities that could proactively lead to the retention of staff in the wake of technological change, even if these were not referred to specifically as job loss mitigation activities. These included the teams focusing on creating learning paths as opposed to career paths and the acceptance of a fail fast ethos; the creation of innovation teams and the use of company development resources to build in house capability and skills depth, new skill mapping and skill realignment, job creation, rehiring, new role creation and work force planning. Firms also discussed outsourcing and offshoring new work and two of the interviewees believed that no mitigation activities were required at all. Appendix 13 gives a breakdown per interviewee of the different mitigation activities being followed within the firms.

Of the 23 interviewees, 15 spoke about new skill mapping and skill realignment. This was in order to prepare employees for new types of roles.

Interviewee 3: "...but the majority is the soft skills. Soft skills on how to work with people … your contextual intelligence of your environment to make actual business decisions."

> Interviewee 5: “So, how do I train them to become more generic in their thinking? … How do I help you to create a skill to solve complex problems? How do I help you to create innovation and think creatively? How do I help you think critically? And instead of teaching you a particular skill and competency… I would rather teach you that when you are in that situation, that you would be able to apply yourself. It’s becoming increasingly difficult to train some people to say, this is the old way of doing things. Like in finance you have debits and credits and I am like, the computer is going to do it for you.”

> Interviewee 16: “So, we are working closely with our org design team and our learning and development team, because that's when you then identify the gaps, the skills gap, do a gap analysis, understand what the future skill is that is required for, because that will change. Because now you've got a system, where you've got a robot, or you've got some sort of digitisation happening. How does that impact the individual? and can you upskill? Is there a gap and can you then fill that gap? That's what we will try first and then it will be to upskill the individual and whatever future skill we see for that area.”

Nine firms are using workforce planning proactively to mitigate job losses, as well as projects to actively manage the retention of the workforce. These projects had names like Next, GenXGenY and Bold Plays, and the organisation’s workforce are aware of the projects and purpose.

> Interviewee 4: “… the commitments and value propositions that we have made to our people to say if you come into this environment this is the kind of career you can expect to build over time. This is the kind of growth you can expect to have over time. So, we are very steadfast and committed in terms of that. So that doesn’t change.”

> Interviewee 16: “so, it's also works very closely with talent and workforce planning and understanding who your key talent, and your current players, your key players are within that business unit.

Firms discussed rehiring after retrenching people or created jobs elsewhere in other organisations for the employees retrenched. Firms also wanted to create new roles that did not exist before.

Interviewee 14: “Yes, so most of them have already been employed. We did do a lot of effort in that in our like sort of network within the industry. To get them interviews.”

Interviewee 16: “I think the only way you can mitigate it is by creating opportunities that could be different to the opportunities that currently exist.”

Four of the firms spoke about special innovation teams to focus on new opportunities in the tech space and by doing this, creating new jobs and roles.

Interviewee 1: “It focuses on analysing data, doing machine learning and artificial intelligence and all those genius things.”

Interviewee 9: “I have set up a digital innovation unit, that didn’t exist before. So, research and development. It does not have immediate financial gains, but it is supposed to be an area where we incubate new thoughts, new ideas, new solutions.”

Interviewee 16: “The foundry focusses on innovation. So, whether it's digitization anything that's innovative…digitalization, computerised stuff, whether it's finding better ways of doing recruitment.…The foundry is a budget that is dedicated to growing, finding new and innovative ways of doing things.”

Learning paths vs career paths with fail fast thinking was mentioned by four interviewees.

Interviewee 12: “We have started recently a campaign called Fail fast… what it is encouraging is for people to try things out and if it doesn't work, well we move on, but that kind of culture of - it's okay to fail.”

Interviewee 15: “We starting to speak quite a lot about learning paths versus career paths. And careers can't be seen as something linear anymore.”

Ten of the interviewees were open to offshoring, outsourcing and labour broker activities to provide jobs and to avoid increasing headcount, or having to retrench, by moving more towards a project or gig economy-based model with new work. One company provided resources to a major Telecom provider for project work “we have a whole Department that's off site” (Interviewee 11).

Interviewee 12: “So the guys are working on sort of technology infrastructure. We've outsourced to low cost locations like India.... our finance functions also been increasingly off-shored… I am one of the only areas that have onsite resources. The rest of the countries that I have throughout sub-Saharan and Middle East are actually off-shores. So, they are what we call an RPO, which is another company that we pay to do a piece of work. They sit on site though, and that's how we deliver a lot of our recruitment. We do that for two reasons, because it makes it easier to flex up and down when we have volumes, just gives us a lot more flexibility, when we are in a state of flux.”

Interviewee 17: “I think that's why the contractor model works quite nicely because they would be contracted for a specific project if it happens. So, if we put their CV's into the proposal, if we win the work and we have got the contract with the client, we would then contract them and bring them in.”

Lastly, two of the interviewees had an opinion on the non-requirement of job mitigation activities. The one firm still believed that job losses due to technological change are not going to happen any time soon “I haven't seen major impact of technology in the time that I've been practicing. I think things are still being done by far and large the same they were when I started eight years ago and even before that. So, bearing that in mind I don't really see many job losses on the cards. Therefore, the need to mitigate against that is obviated, I think.” (Interviewee 20) and the other believed that progress must run its course, that new opportunities would be created after the fact and the system would adapt accordingly. (Interviewee 16)

5.5.4 Summary RQ2

To answer RQ2 regarding the mechanisms being utilised by senior executives and firms to mitigate job losses due to technological change, more than half of the firms are actively attempting to mitigate planned job losses. However, it was very specific to the industries that were implementing technological change. It was not top of mind for firms that were lagging technologically.

5.6 Research Question 3 (RQ3):

Where does the level of responsibility lie for the mitigation of technological unemployment between business, government and civil society?

This research question was to establish where the responsibility lies for job loss mitigation between government, firms and civil society. Appendix 12 provides an overview and breakdown of the various responses, based on the number of times responsibility was mentioned by interviewees in different contexts. Individual responsibility was a notable addition. The coloured blocks are where the interviewees specifically spoke about shared responsibility for job loss mitigation. The legend below Appendix 12 provides the details on this and will be discussed further in each section.

Within the responses to this research question, the challenges and opportunities for South Africa were raised by most of the interviewees, with several calls to action for the government.

5.6.1 South Africa - Challenges and Opportunities

In these results interviewees discussed and raised concerns about; the high unemployment rate; immigration of knowledge workers; comparisons between South Africa and the international community; the lack of opportunity creation or availability; challenges within the economy and the standard of education.

Economic challenges were discussed by 52% of the interviewees claiming it was due to government inefficiency and how important it is for the government to create a positive economic environment in which firms can operate to ensure jobs can be maintained "As an employer knowing that this could happen [technological unemployment], how do you ensure that given the … the difficult economic conditions in which your business operates. Are you able to maintain jobs and have a workforce that can deal with these changes?" (Interviewee 6). An additional point about the emergence of a parallel state in South Africa was raised "We have seen in South Africa in the last 20 years… the emergence of what I call a parallel state, where certain services that the state was meant to provide public health, education, policing. Those services have collapsed and to a degree they have been hollowed out by the fact that in public health, public education institutions, we have not been able to provide compelling value propositions for people to want to go work there" (Interviewee 4).

The high unemployment rate in South Africa was top of mind for 12 of the interviewees. Comments included "the level of unemployment is quite high, particularly youth unemployment." (Interviewee 4) and "South Africa has got one of the highest unemployment rates in the world" (Interviewee 9). Unions were mentioned as

mitigators of job losses, but only amongst blue collar workers.

The issue of immigration of the knowledge workforce from South Africa was discussed by 30% of the interviewees, with the resulting shortage of important skills being a challenge, thereby emphasizing how important it is to create opportunities for jobs.

> Interviewee 3: “When you look at a knowledge worker from a labour perspective, if you can only offer labour as your skill, you have very limited opportunities. From a knowledge worker perspective, what the businesses ... and the government need to understand is that if anything goes wrong, they can look for work overseas ... they have more mobility from a migration perspective ... and we have seen that in the country in the past couple of years, where people are moving abroad for better employment.”

> Interviewee 16: “I think the only way you can mitigate it [unemployment] is by creating opportunities that could be different to the opportunities that currently exist. But we're not even leveraging that correctly, so we we're not even utilising the skills that we do have in the market. We've got such a high level of unemployed young educated individuals.”

> Interviewee 22: “With difficulty, you can sometimes find people locally [finding tech skills]. In the South African market at the moment, there's a lot of people who are immigrating. There seems to be like a second wave of immigration happening...but I'm seeing it within our own company… a lot of people are being headhunted out of South Africa, because it doesn't take much to convince the South Africans that they should be immigrating with our unstable economy, political climate, all of those things. So, we seem to be losing a lot of consultants to UK, New Zealand or Australia. So, as soon as they get a good certification, or really proficient at say a Microsoft CRM, we tend to lose them"

Six of the interviewees spoke about the need for more of a knowledge economy and an improved standard of education. Interviewees saw this as an area where firms could contribute “In a knowledge economy… especially from an IT point of view, what companies need to do is to invest substantially in the training and upskilling of people.”

Lastly, more than half (13 interviewees) drew comparisons between South Africa and the international community or global company counterparts. The concern was that

South Africa is lagging behind the rest of the world due to a level of complacency and lack of innovation and as such, will just follow the larger overseas company trends with regards to job losses.

> Interviewee 3: “The status quo and complacency of a large part of organisations in S.A. … their business model has worked for 10-15 years and they are not willing to change it.”

> Interviewee 8: “I must say the level of innovation coming out of South Africa does appear to be very slow and very low… There are some really great innovative projects going on, but it’s not at scale.”

> Interviewee 22: “The U.S. and Europe are going to know what's coming our way, and they may have an advantage. So, I think you've got to keep up with trends, because let's face it, we not trend setters in the tech space in South Africa, as much as we like to think we are. I don't think that we are, so we can see what's going to be happening and we'll see if a massive company, like IBM or Microsoft suddenly has a massive restructuring and gets rid of a whole lot of roles.”

Overall, the commentary regarding the challenges and opportunities for South Africa were not positive. Many of the issues are not unique to South Africa, as an emerging economy, but the operating environment for firms, who are having to balance the needs of various stakeholders, is a sustainability risk, creating the possibility of more unemployment.

5.6.2 Firm Responsibility

Firm responsibility was discussed specifically by six of the interviewees (26%) on its own. As per Appendix 12, an additional three thought responsibility was shared between firms and individuals, six thought responsibility was shared with government and four thought it was shared with government and civil society (total of 82%). Various topics were raised with regards to firm responsibility for job loss mitigation including; balancing shareholder interests, commitment to corporate social responsibility, charity fatigue and corporate greed.

Employer responsibility quite clearly confirmed, specifically with regards to training “…Just by the very nature of being an employer, whether you are a small business, a

large enterprise recruiting 50000 people internationally, or whether your government is the large employer, you have a responsibility to your existing workforce to ensure that they have the skills to do their current job and are ready to take on new jobs. So, they should be ready to be trained. There should be structures in place to train people to get them there and that is a responsibility on everybody as an employer." (Interviewee 6)

Firm responsibility with system implementation and training was also confirmed "I think if you are a corporate and you have got 1000's of employees and you decide to bring in a new flashy system, that is going to do what everyone else was doing manually, you owe, you have the responsibility to upskill those people who were doing the manual work to be better at something else or to be more skilled … give them a chance in the business or elsewhere … there's definitely a responsibility of the corporates. Right from the beginning, before the systems are even thought of, to continually upskill their staff." (Interviewee 8)

Interviewee 23 was one of two who touched on the topic of less corporate greed and the reduction of layers of waste in the market, created by middlemen, as a firm responsibility "I think less greed and less focus on money as a starter. It is not to say there is something wrong with luxury and whatever … I could charge everyone an extra couple of Rand and buy a helicopter, but it's wrong. It has to be at the right level. …. I just think that corporate South Africa, especially, is greedy.... unfortunately, the current funding mechanisms encourage greed."

Responsibility to shareholders was also raised as a firm responsibility by five interviewees "There is obviously a list of priorities, and the immediate one is obviously returning the current returns to shareholders. That takes priority" (Interviewee 5) and shareholder interests vs. mitigation of job losses "They can try [mitigate job losses], but I don't think it's going to be the ultimate. Ultimately, they are going to do what's going to make them the most revenue, because they've got shareholders that they've got to pay dividends to and they are you. They will try and retain as many staff as possible" (Interviewee 7)

Interviewee 22 was one of five, who discussed charity fatigue being experienced by individuals and firms "So, I think that people do what they can on an individual basis, like I do. I like to think that other people do that. But, people have been doing that for now 10, 15, 20 years and feel that while we've been working hard trying to uplift society and giving back, the Government's been squandering our taxes and funds and building

things like Nkandla. So why should we keep trying to help? … I think is a massive problem because you don't want a country now, that is not interested in helping, because they feel like they've done everything that they could, and the government hasn't assisted."

Social responsibility was non-negotiable for five of the firms “we cannot, it’s our social responsibility, we cannot dispose of this labour force” (Interviewee 5) and “There is always a tension between financial short-term goals versus the long term financial goals, but also in South Africa the social investment that companies are supposed to make for no direct immediate benefit to them, but for the greater good of the country.”

Based on the above results, there is a high level of firm responsibility for job loss mitigation and balancing the firms interests vs the employee’s interests and the possible social issues that could arise as a result, are key and top of mind for many of the business leaders.

5.6.3 Government Responsibility and the Role of the State

Government responsibility was discussed specifically by 11 of the interviewees (42%) on its own. As per Appendix 12, an additional six thought responsibility was shared between firms and government, and four thought it was shared with firms and civil society (total of 91%). Several topics were raised by the interviewees, including; corruption and a lack of trust; bureaucracy and enablement; the need for education and policy; improved infrastructure; awareness, the ability to deliver and leadership being needed. Many continued the theme of the challenges facing South Africa.

Five interviewees mentioned bureaucracy and business enablement and one summed it up well “The government has to sort out their side of things...They have to sort out how easy it is to do business in the country, they’ve got to sort out policy...they’ve got to take the necessary steps to stimulate the economy...and eliminate corruption etc…Because there's going to be no job preservation, if we can't sort that out” (Interviewee 2). Improved infrastructure was also raised by five of the interviewees and put succinctly “I think the government obviously needs to invest in the infrastructure, to start with”. (Interviewee 8).

Responsibility in terms of corruption and the resulting lack of trust was raised by five interviewees “The problem is the misuse or misappropriation of funds. Will the actual

money go towards where it is supposed to? I think from a mining industry point of view it's the fraud and corruption, everything, it doesn't help the situation and I think it has to start at government, definitely" (Interviewee 18).

Thirteen of the firms discussed the need for education of required skills and policy to improve it. Interviewee 9 discussed the need for IT and technology skills in the existing education system "So, then the key difference there is that people have not been learning the right vocations." Interviewee seven summed it up well "I think that for me it's going to come down to the education system. I think they are going to need a lot more knowledge workers ... they push these learnerships … but the learnerships are so low level…just the basic education needs to happen in schools, so that people can get more knowledge worker kind of roles, because the reality is that these junior rules are not going to exist… In South Africa we have so many people who are not knowledge workers… haven't even finished matric. So, we can take those people on at the moment, but we won't be able to take them on in the future, we will have no roles for them." (Interviewee 7)

Four of the firms spoke of strong leadership being needed in government and more awareness of the technological age. One discussed the July 2018 visit and speech of Barack Obama. "'I really do think that if we really want to transform at a macro grand strategy perspective, we need to have strong government leaders that can become credible and responsible and reliable, that when they reach out to business, business is willing to invest…I went to the Barack Obama lecture…and he said…You have got a good government now… and he said the 4th Industrial Revolution is upon you and you already have high unemployment and now you have got to put your heads together and think. How are you going to embrace this technology to still be part of a global trade, plus ensure your unemployment rate doesn't increase? He sees it. And our government leaders just don't think it is something that is going to happen. And this is where I think business leaders who get it, or understand it, who are on the ground running and seeing the impact of technology in their businesses, actually need to start making sure that they start engaging and influencing government to see it as well" (Interviewee 5).

Government responsibility was the highest level of responsibility for the mitigation of technological unemployment, in response to RQ3. However, as confirmed by a number of the interviewees, the government challenges cannot be overcome without partnerships and collaboration with mostly business and other stakeholders.

5.6.4 Civil Society Responsibility

Civil Society responsibility was discussed specifically by only one of the interviewees (0.04%) on its own. As per Appendix 12, an additional four thought responsibility was shared between firms and government (total of 22%).

Interviewee 23 summed up the civil society responsibility challenge “In terms of your thinking that the problem's gone away it hasn't. It's much like living in Sandton and then thinking that Alex has got nothing to do with you, Soweto has nothing to do... It does. It's just we're a little bit insular…I enjoy my life here in Sandton in my protected environment, but unless you are actively trying to make a difference, the world is screwed.”

Civil Society was therefore seen to have the least level of responsibility for job loss mitigation due to tech change as per the research sample.

5.6.5 Individual Responsibility

Individual responsibility for technological unemployment was the additional notable theme from the research. It was discussed specifically by eight of the interviewees (35%%) on its own. As per Appendix 12, an additional three thought responsibility was shared with firms (total of 48%). Eleven Interviewees discussed motivation, commitment and attitude of individuals and then how-to performance manage individuals and keep them accountable for their own employability.

> Interviewee 2: “I think you can give up or you can fight. So even if you now have skills that are simply no longer needed…you were a fax machine repair technician, and there are no more fax machines to repair, you can either give up, or you can find a way to re-apply those skills to repair some other electronic device, or start a garden services company, or whatever, maybe at half the salary that you used to.”

> Interviewee 11: “It comes down to the person themselves. They have to want to do it, whether it be whatever it is, any opportunity that's given to them should want to.”

> Interviewee 13: “Individual responsibility … would be to actually take that journey and not be a Luddite essentially. As new tech comes in, you have got to be open to it, you got to learn it, you've got to see how you can be more efficient with it.”

Performance management and accountability was discussed by five of the interviewees. The firm that is operating entirely online, discussed how this is done in a remote working environment "We are measured… it is not a strict KPI system. …because it's so transparent with the kind of work we are doing. We are measured in terms of how responsive we are to our customers… that is the key measurement. … not in terms of only how quick, but the kind of quality engagements we are giving to our customers. … because by having more quality engagements with our customers, we will sell more" (Interviewee 8).

One interviewee discussed an implemented gamified performance management system with complete transparency, where every employee knows exactly how or what the others are doing, or not doing. However, people had questioned whether it wasn't too transparent "People say isn't that a bit big brother? Big brother is fantastic. If you are being fairly treated and the like. If it's big brother to try to punish people, then it's a problem. If you've got information that's secret, then I have got a power relationship that is unhealthy. If we are measuring everything, it's open for everyone to see. So, we have got a game" (Interviewee 23).

All five of these firms were working in a highly technological environment and stressed the need for true measurement and transparency and therefore accountability to operate more effectively. Individual responsibility for technological unemployment mitigation was the third highest level of responsibility, based on the sample results.

5.6.6 Shared Responsibility

The results for this theme were discussed previously and can be seen in Appendix 12. Mostly the responsibility was shared between firms and government, then firms, government and civil society and lastly, firms and individuals.

A view on shared firm and individual responsibility "So, it's more of the business side doing the communication and educating, and it's also from the individual's perspective, to take that responsibility themselves, to say I'm willing to learn, so that at least when this happens, I've got different skills and new skills, that can be useful in the organisation" (Interviewee 1). On shared responsibility amongst all, the following comments were made.

Interviewee 5: Where business has the money to invest, government has the power to make policy changes and civil society has got the power to basically say how do we roll this out, how do we triangulate this stuff?"

Interviewee 9: "From a South African context point of view. Who must mitigate job losses? I think all of us have a responsibility to create jobs."

Interviewee 15: "It is very specifically in the relationship with government. And if that is lending skill, lending resource, lending ideas, hosting challenging conversations in order for government to participate in a way that is going to create success for all of us, … I think that corporate South Africa has a responsibility to do so and I believe that they are taking up their space …"'

The above is a number of quotes confirming interviewees' views that responsibility for job loss mitigation due to technological change will succeed more if it is shared and the various stakeholders collaborate effectively.

5.6.7 Summary RQ3

The results for RQ3 indicate that the highest level of responsibility for the mitigation of technological unemployment lies with government and firms. Individuals also share responsibility to maintain relevant skills. Most interviewees believe that responsibility must be shared to be effective, with civil society playing an important supporting role.

5.7 Research Question 4 (RQ4):

Can complexity leadership theory provide a framework to assist senior executives to better prepare for the mitigation of job losses due to technological change?

To answer RQ4, leaders were asked what skills were needed to manage and lead in a time of technological change. Where evidence of CLT and LOAT attributes were obvious, this was identified during the coding process. Themes raised by interviewees in question four included leadership challenges and responsibilities and the skills required to bring about and enable change towards the future of work, future employees and consumers. Additional themes that emerged were the important role of HR and the additional tools of culture and trust.

5.7.1 Leadership Challenges and Responsibilities

Various points were raised by 13 interviewees regarding the responsibilities and challenges of leadership. Responsibilities included keeping the business sustainable and challenges included silo-behaviour, and the need for flatter structures and less hierarchical behaviour. Interviewees raised the level of responsibility of leadership when asked who was responsible to mitigate job losses.

> Interviewee 3: “Ultimately it’s the CEO’s responsibility. … when a staff member works for an organisation they entrust their livelihood …and their development going forward with the actual company itself. And from a CEO perspective his role is to … from a strategy perspective, the implementation thereof, make sure the shareholders are happy, make sure the business is healthy. If the business is not healthy you can’t look after any of the staff.”

> Interviewee 10: “Obviously there's a strategic role from the Executive Committees, the top leadership of organizations because they are the ones going to make the decision whether we implement or not “[new technology].

The unknown results of the technological change environment were raised as a challenge for leaders, in terms of involving employees in the process “And until we know what the starting point for other solutions could mean, they [the affected staff] don’t get involved in it. Because if we don’t know, we have got no sense of guiding principles to help them as leaders” (Interviewee 5).

The need for less bureaucracy and flatter structures to be able to be more agile in the changing environment, but not losing sight of the technological change environment. We have far less politics of having to get a million sign offs all the way up. Whereas XXX was heavy like that because your leader had to sign off and their leader had to sign off and the head of that area had to sign off. And then only it went to (laughs) the next... It took years to get some stuff moving. Whereas XXX, if the time is right it can be moving in a week. So that's in our favour “(Interviewee 13)

Examples of flatter structures and less siloed behaviour were provided. “If you still have a hierarchy, ideally you shouldn’t. We are in the process of deconstructing, all these hierarchical structures even within our environment…. the office to where we are moving into in 2020, even the XXX Africa CEO is not going to have an office like this. Everyone is going to be sitting in open spaces” (Interviewee 4).

Legacy and sustainability was discussed by four of the interviewees “And why I did it [set up digital innovation team] is because I feel that the future sustainability of this business and my future success in my role and in this business depends on that” (Interviewee 9).

> The need for visionary and inspirational leadership and a leadership community to deal with technological change was mentioned by five of the interviewees “It has to be a proper leadership community, where we all actually set the culture and the trend”. (Interviewee 18). When describing the type of leader needed, “A leader is going to be someone who is inspires everyone… and gets people to focus on the business and their work and then to work together as a team. It's about creating a cohesive team because people are your biggest asset … and you can get your team of brilliant people to all work together to create something even bigger and brilliant. That's going to be the, for me, the epitome of a good leader” (Interviewee 22) and “I like what Elon Musk and them... I like those type of visionary thinkers. We don't agree with what he's doing, or his mechanism of getting it right, but this point of no, we want to make a difference!”’ (Interviewee 23).

The above describes some of the responsibilities and challenges of leadership raised by interviewees in a time of technological change. Following is the type of leadership skills required.

5.7.2 Leadership Skills Required

When asked what leadership skills were required in a time of technological change, a number of skills and behaviours were identified by the interviewees. Components of the CLT and LOAT models were discussed but were named in conjunction with other leadership styles and some additional leadership behaviours, including; adaptive or adaptive capacity or creating capacity; the presence or requirement for agility and digital kaizen, authentic, empathetic, as well as optimism and positivity, entrepreneurial and ethical leadership, transparency and open communications; leading by example as opposed to top-down; problem solving; enabling and engaging; flexibility and fluidity; inclusivity and diversity and the ability to empower and repurpose people to believe in themselves. Interviewees also believed that leaders needed to have a clear understanding and knowledge of technology.

The requirement for adaptive capacity was mentioned by 61% of the interviewees (14), specifically with regards to dealing with the millennial workforce as well as technological change.

> Interviewee 4: “So, you got to be adaptive. The pace of change is just so fast it almost sounds like a cliché… that is a reality. Adaptive leadership”.

> Interviewee 11: “the people that are coming through into the workplace now are also different. The whole millennial thing. I also don't like labels but in the next year to 2 years, 50% of our workforce is going to be millennials and you have to adapt to the way they need to be managed. You can't expect them to adapt to you. I'm not saying you must bend at every whim, but you've got to get used to, because people like us we not used to that, they are so entitled (laughs). So, you have to adapt to it and I think if you're a good leader, you would want to adapt to it, because they the ones with the knowledge as well and they the can take your company forward.”

> Interviewee 12: “So, I think as leaders we should be able to embrace different types of working styles. I think we absolutely have to acknowledge that each generation, work generation, brings with them different sets of values and interests and things that are important to them. I think we've also become lazy in innovating.”

The need for transparency and open communication was also regarded as important by 61% of the interviewees.

> Interviewee 8: “…autocratic and keeping the information to myself and giving people information on a need to know basis, I don’t think that is valid anymore… it’s changing because of the transparency. You need to be more open, you need to be more detailed of the information that you share, to enable your staff to do a better job and help you achieve your goals.”

> Interviewee 9: “It’s more a lack of communication than transparency [regarding tech change]. Sometimes the sponsors, or the drivers of the project, sometimes fail to articulate the benefits of that intervention to the stakeholders and more than anything else, to also address their concerns, which are legitimate concerns to many of them.”

Interviewee 13 referred to a conversation that flowed both ways between management and employees and vice versa, as an important requirement of the process. This was

as a result of someone's job being automated, without them knowing about it and only finding out when training was available for the tech change. "I think people should be having the conversation because I think the problem with big industry is it's very hard for leaders to understand the impact to the guy at the bottom. And when I say awareness, that's not just an e-mail to say ah there is a new system. I think it's more... what I guess XXX's company would call town hall type discussions. … I have hope that that will actually happen at XXX because that is part of our culture…. I am talking about conversation, not a communication a conversation…. So, for instance the example I gave earlier about the two guys that literally had their jobs automated, with no one thinking about it. If that conversation had been had earlier on, I think it would have been caught. , The people that made the decision to automate this piece of work were not, not being transparent. They just didn't think about the implication, if that makes sense…So, I don't think it's transparency, I just think it's allowing information to flow both ways." (Interviewee 13)

The third highest leadership behaviour requirement was enabling and engaging leadership, or a requirement for ambidexterity. This was spoken about by 12 of the interviewees.

> Interviewee 4: "or I enable it knowing fully well that some of the best and greatest ideas about what we do with our clients, where we take the organisation those ideas will actually bubble from below."

> Interviewee 6: "So, we are dealing a lot with that ambidexterity, where you need to manage the tensions between the conflicting priorities."

> Interviewee 8: "if I knew that soon, in the next 5 years there would be no need for java script developers it would be irresponsible of me as a manager to not start at least pointing the current java script developers in the right direction to have skills that are valuable for them in 5 years' time. Do I need to teach them myself? I don't think so, but I certainly need to upskill and give those people the right direction based on the information that I know."

A need for authentic, empathetic leadership was discussed by 11 of the interviewees as well as the need for leaders to show optimism and positivity with regards to the technological change.

Interviewee 9: “It’s the best thing as a leader…you have to walk the walk …and people always need someone they can identify with and you have to be authentic. Also, if you fake it they can see right through that.”

Interviewee 15: “It's about leaders that can really open up their own minds and constraints around understanding people and how to engage them and how to drive performance. And how to remove blockages for people.”

Interviewee 17: “I think there is a level of understanding that needs to happen. So, you will always need leaders, you will always need managers. So, their jobs may not be in jeopardy, but I think there's levels...they need to understand perhaps what their employees may be going through. Just to manage that.”

Of the 23 interviewees, nine mentioned the need for agility or showed sign of digital kaizen, implementing changes in small stages.

Interviewee 4: “So, I think for me it’s the kind of leadership and ecosystem that embraces uncertainty, is adaptive and is agile. It’s a kind of leadership that is constantly scanning the market for trends and being led by those trends, being responsive to those trends”

Interviewee 6: “So, agility I feel the organisation needs to be agile and adapt very quickly to change because technology changes quite quickly and you need a leadership that is open to that and a culture that supports that. So, that for me is key.”

Interviewee 18: “You need to have the right agility I think, to set that culture as well...”

Several of the interviewees (seven) were clear that top-down or control leadership will no longer work in the technological change environment.

Interviewee 3: “Leadership of that autocratic that top-down approach will not work today in the knowledge economy that we are in, because what happens is the younger generations are cleverer, faster than the older generation and you need to know what makes them tick and how do you actually lead and how do you work with the younger generations.”

Ethical leadership was regarded as important by five of the interviewees, especially

when it came to managing any job losses and tech practises.

> Interviewee 5: “It purely stems down to your leadership and your ethics and your values as an individual. Some are in to make the big buck and run, we know that. Some feel they have worked all their life, it’s their time to take their money and go.”

> Interviewee 18: “You need to go back to having the inspirational ethical leader, leadership. If you have people running the business that only have their own interests at heart and not company interests. That's your first mistake.”

Entrepreneurial leadership was also discussed by five of the interviewees.

> Interviewee 15: “…It’s also about organizations potentially creating and developing entrepreneurial skill within people. So, if we, for example, wouldn't retain people in our organization but they went out to start businesses, well that's a massive success story. So, I think it is also around creating this entrepreneurial skill in enabling people to go out and start businesses, cause it's the only way that we are going to start creating more jobs than current status quo.”

Operational formality and problem solving were discussed by five of the interviewees.

> Interviewee 5: “If I need to get the staff to start thinking critically. How are you giving them tasks and leading them to allow them the space to think critically? Leaders today will say I need ABC, go and get XYZ in order to build ABC. They will tell you what to do. Right. And it’s about the different types of leaders, the leadership styles, leadership thinking and leadership creating that space and ability for problem solving and critical thinking and for them to be able to demonstrate it themselves. So, if I want to develop the skill they must also know to challenge those employees in order to develop the skills that they need.”

The need for flexibility and fluidity was raised by three of the interviewees.

> Interviewee 15: The only other thing would be around creating an incredibly flexible workforce. … so being future fit around the way in which people would like to see careers the way in which people would like to operate

> Interviewee 19: “They need to be flexible and adaptable to the followers that they

have. So, a leadership style for unskilled workers would look very different to a leadership style for other managers and so again it's not one type of style it would that would necessarily be successful in all situations. … you need the right leadership style for the right situation the right kind of followers."

The importance of cultural diversity and inclusivity was only raised by four of the interviewees.

Interviewee 22: "I think in South Africa from a leadership perspective, we need people who are very, very understanding, definitely the whole thing of like leading by example, and you're not going to manage people, you're not going to come down with a big stick kind of approach but you need to understand the different cultural groups that you're dealing with."

Lastly, five of the interviewees believed that it was important for leaders to have a good understanding of technology to work better in the environment of tech change and to keep skills up to date as much as possible.

Interviewee 17: "I think leadership always needs to develop and always needs to learn new skills. And also, to stay relevant and keep up to date."

This section discussed the skills needed by management to operate in a technological changing environment, with the highest three being enabling, adaptive and open communication/transparency. Following on the skills needed, was how to bring about the change or manage it.

5.7.3 Change Management

Change management capability was raised as a topic by six of the firms, the need to be capable of change and the need to manage the change correctly.

Interviewee 5: "Everybody says they can manage change, but how do I manage change in a digital environment is something I am grappling with and what do I do that will help leaders to manage change in this transitional environment?"

Interviewee 8: "To change that is a huge deal. Everything changes, and you have to go through a proper transformation programme, led by people who know what they

are doing and that costs a lot of money to change, it doesn't just happen overnight."

Change culture and change readiness was discussed by four of the interviewees

Interviewee 4: "We tend to attract people that have a mindset of, I am going in there to learn as much as I can, and I am going to leave. So, already they are wired in embracing uncertainty and change. So, that's what I mean when I say already we have got a leg up on other industries. People understand that."

Interviewee 12: "I think there's also an element of creating a culture of change and embracing that change so, that people can still feel secure in their positions but not be scared when things naturally evolve."

Future proofing of the business and concern about the unknown was raised by five of the interviewees.

Interviewee 13: "Everyone knows we got to plan. We got to future proof. We've got to think what's coming. I just think we're at a point in our human existence where it is incredibly hard to predict what's coming.…For me future proofing means when you're planning, you must always build in enough agility that you can be ready for something that you're not ready for… I think the unexpected is so unexpected that it's virtually impossible to future proof. We don't know the impact of some of the things coming down the line. We don't even know what they are yet?"

Another challenge raised was that for leaders, the future is unknown and therefore a challenge for leading "Because if we are blind and we are leading people, where are we going to lead them to?" (Interviewee 5).

Change management and the readiness for change or change fitness led to further discussions on the future of work and the different needs of employees and customers.

5.7.3.1 Future of Work

When discussing leadership skills required in a technologically changing environment, the future of work was raised by several interviewees. Topics discussed included, human machine collaboration and the requirement for a human element, working online and remotely and team collaboration and communication, flexible working hours,

changing or decentralised business models, the gig economy and different work teams.

Less than half of the interviewees (eight) felt that there would always be a need for the human element in a technological age, especially in the legal and medical professions.

> Interviewee 20: “the legal industry or the legal… system or the framework within which we operate, it's human and it will be human indefinitely.”
> Interviewee 21: “Patient care is one on one, so it's very direct. It's going to be very difficult to do something like that."
> Interviewee 8: “There is still a human element that is needed to analyse the information that is coming through. I think jobs will change but I don’t think jobs will be lost necessarily as a result quickly and at scale.”

Working remotely and online was a topic raised by eight of the interviewees. One described a purely online working environment with no physical offices and the benefits thereof.

> Interviewee 8: I think we can collaborate more as a team through remote work than when we sat next to each other in an office. …You almost make up for the fact that you are not in the same room by talking more. So, we talk all day long. Video calls are essential. So, we don’t do calls with the cameras off. Cameras are on, so you are engaged. Those meetings where you are in the same room and everyone is sitting on their laptops and looking at you, but also typing and looking at their screen, it doesn’t happen in a remote role. We have video calls with each other, we look each other in the eye and we talk. You can’t play around on a phone when you are in a video call. People will be like do you need to go and come back later? You don’t type.... So, I think the meetings you have are more engaged and you communicate constantly. I think it would fail if you did not communicate constantly. We use collaboration tools. We use Slack, it’s our key means to communicate. We use Go to meeting for video calls and all of our calls with our customers have the same experience. We video call our customers. We turn our cameras on, we ask them to turn their cameras on.”

An increasing number of employees seem to be wanting flexible working hours and to be able to work remotely and four of the interviewees are actively implementing or investigating options for enabling this in the workplace.

> Interviewee 22: “A lot of candidates these days want to work from home. They want

their flexibility.... either a combination of flexible working hours, but proper flexible working hours, where they can leave at 3, get in at 6 … and also the work from home option does really go a long way, especially that travel…it's the time spent in traffic. It's the petrol. It allows them to go and watch maybe a kid's sports match in the afternoon."

Interviewee 15: "Could you contract people to work just for a certain period of hours? and where they worked or how they work those hours could be totally fluid, versus stipulating that people work from 830 to 5 from Monday to Friday, with the lunch break between 1 and 2. So I think that they are obviously ensuring that everyone is compliant. But I think that there is lots of creativity in the way that you can engage the workforce very differently. In a way that you are still adhering to whatever policy etc that you need to."

Some of the interviewees (six) believe that technology is changing the business models of the firms or firms need to adapt the business models accordingly "'Companies have to change the way they look at technology and the effects of it and change their business models" (Interviewee 3) and evidence of it happening "In the last two three years we've had quite a lot of restructuring and we have off-shored a couple of positions." (Interviewee 12).

The influence of millennials in the workplace was discussed by five of the interviewees.

Interviewee 4: "I mean these millennials they are fundamentally reshaping and challenging our assumptions of what the nature of work is in the 21st Century. There must be a way to tap into that and there must be a way to make sure that we keep them engaged."

Interviewee 18: You also have the impact of the millennials, the millennials entering the world, where its instant gratification and those kind of things, where in our world, it's, it's really difficult, because you'll have shifts still to work, it doesn't matter how mining gets better, you will still have shift workers and the youngsters coming in, they not, they want to be volatile and flexi time and technology and social media and all of that, but our requirements will still have, this 66 sort of shifts . And in the communities as well where everybody has cell phones, whether it's a relatively poor or a rich community, you want to create employment there, but you still challenged with that sort of attitude of the millennials, as well as having to meet the technological thing,

and make the community and anything happen happy. So, it's really difficult."

Project work (gig economy) and job sharing was discussed by four of the interviewees. One firm is actively investigating and implementing the options where possible.

Interviewee 15: "What people would want out of jobs in future, so for example. Could you create spaces like that would allow for job sharing where two people actually hold the responsibility of one role…Could you look at talent from a gig economy perspective which is very much around the mentality of you bring people in to do a gig and then they leave, and they come here to learn or to deliver a piece etc and so this fundamental mindset shift around what does a workforce have to comprise itself around."

What is clear from the above is that less than half of the firms are actively looking or thinking about what the future of work entails, but those that are thinking about it are actively investigating alternative options for businesses and adapting accordingly.

5.7.3.2 Future Employees

When discussing the future leadership skills, a topic that was raised by the interviewees (39%) was providing employees with a new value proposition, empowering them and given them a new sense of purpose in the technologically changing environment.

Interviewee 1: "They adding more value because every time when they learn something new, and they come up with new ways of doing things, we don't take them lightly, we look into them and then we, some, most of them, we really implement them and I think that's one way to make them feel they are contributing positively in the course of the business."

Interviewee 4: "Your ability to provide a compelling employee value proposition. People like to work in environments that are engaging, that give them the space and the platform to grow. Over time what is going to happen is that if those people don't feel like they are growing, over time they will leave."

Interviewee 23: "And so, we need to work out how we how we repurpose those people."

Eight of the interviewees believed that more employee engagement could be secured through rewarding employees differently.

> Interviewee 12: "'We need to put more emphasis on rewarding people for good ideas. Make sure that that the young people coming in feel like they're changing the world, that they have influence over what they're doing, that they're not just a big cog in the machine, that eventually they'll get to a point that they can contribute."

> Interviewee 19: "So, you see that emphasis on managing and getting the most out of people, managing them and managing their time more effectively, having the reward systems in place that measure people and reward them for their efforts."

Less than half of the interviewees are thinking about how to adapt employee value propositions and rewards systems to operate in a technological environment. However, those who are, are researching and looking at innovative ways of getting the best out of teams in the future workplace.

5.7.3.3 Future Customers

The push and pull effect of customers in the technological environment was also raised by three of the interviewees. Customer led innovation and the change in consumer buying habits is affecting many of the firms. Many of the firms interviewed had customers who were going through technological changes which was proving demanding on them as suppliers.

> Interviewee 4: "Before people used to believe for industries like public sector you didn't really need to do any of this stuff. But what we are finding is huge pressure from the clients that we are serving, even in that space, to be more digitally savvy in terms of the conversations and to help them leverage what is happening. In fact, the clients are looking to us to provide the insights to be the thought leaders, so to speak educate them around the trends that are happening and how they can better position themselves to leverage those things to be successful."

Changing consumer buying habits was an issue for six of the firms interviewed and some were having to evolve business models as a result.

Interviewee 5: “The younger generation don’t want to own, so they are more for a leasing model and then secondly with the car space is that they also don’t, they are more virtual. They would rather do an online order and experience than going into a dealership.”

Interviewee 12: “So, increasingly I think banks are having to realise that bricks and mortar institutions don't really work. People don't necessarily want to have to go in to do their transactional banking. They want online mobile, those kinds of digital solutions.”

Less than a quarter of the interviewees raised changing customer requirements as a concern. However, for those that did, the customer requirements are stimulating changing business models.

5.7.4 Action Needed - Role of Human Resources

The role of human resources (HR) was a topic raised by several of the interviewees. Concerns were raised about HR thought leadership and preparation; credibility as a challenge facing HR; the importance of recruitment and job evaluations and the role of employment legislation.

Questions were raised by 10 interviewees about how prepared HR the level of thought leadership around technology and being able to partake in the important discussions that were happening regarding technological change, to prepare adequately for job loss mitigation.

Interviewee 5: “’In order for that to change once HR executives need to become more knowledgeable, and more influential in the space and push the agenda. And it’s not talking the buzz words but translating that to business value. That’s what those executives want to hear…And often they because they don’t understand the content and their environment they don’t push it hard enough. So, if I am going to tell you example if I am sitting with the C-suite and I am saying guys there’s a system out there. It can automate or it’s coming into this field of work, this is what it’s going to mean for our employees this is what it means for our productivity but here’s the flip side of how it is going to impact the economy … If I am able to take data and argue my points I am able to become credible in their eyes. But right now, HR is worried about all the fluffy things that just don’t add any value to business. "

Interviewee 10: “HR sits in the middle. You have got the organization hat and you've got the people hat on it. So, the end of the day from HR is you need to be the middle man to be able to look at it realistically and where there is going to be impact. To mitigate that impact through planning and preparation for whoever is going to be the impact on. If it's on the organization. “

Interviewee 21: “they require the HR people to be more strategic and operationally involved in the business and not only in HR, the administration side.”

The need for HR to be more tech savvy and to be active participants in the process was also raised. The credibility of HR was questioned by five of the interviewees.

Interviewee 5: “So, I think it’s a fantastic phenomenal moment for HR to be lead advisors in this space, but they themselves are not clued up. They are not knowledgeable, they are not reading around what is happening. They all use the buzz words.”

Interviewee 13: “If I look at our HR community we're not very IT savvy just in general. If I look at our system and I look at how we do things, it's more people focused, which I think has really worked for us in the past. But now that you're finding that IT is coming in and it's affecting people's lives quite seriously, we're definitely behind again on that. So that's the one reason, but the second reason is we're just not involved… at a project level like this…it's not common practice that HR will get involved…”

Employment legislation was seen as both a deterrent for job losses and an inhibitor for technological change, both from a retrenchment perspective and from the ability to find the right skills. This point was raised by nine of the interviewees.

Interviewee 17: “Because of the possible people impact, it’s going to take longer because ... we do have quite stringent employment legislation and equity, even equal pay for equal work and that type of thing. We do have those, not restraints or constraints, but it needs to be taken into consideration. So, we can't just put in machines and get rid of people.”

Interviewee 18: “The challenge now with the legislation that changed recently with the whole temporary contract, you still have a liability, whether you employ people for two

years or three years and you defined it very clearly, you still have to pay retrenchment costs, for an example."

Lastly, six of the interviewees discussed how important recruitment was becoming to ensure that the right people were being hired for the type of work required in the future. This included being a good culture fit to the organisation.

Interviewee 9: "We once did a survey, a sort of a discussion strategy. We concluded that the most important thing that you can do in a business, for a business is to hire the right person. Forget anything else, it's to hire the right person. You hire the right person, things are going to be fine."

Interviewee 15: "We very seldom would say that we need in a specific space in our business a certain qualification with certain marks etc. We would far more. I think we'd rather take the person that had 80 percent of what we were looking for but had an attitude that we believe that we could work with, far more than a person that came with 120 percent of the capability in terms of experience or skill."

The importance of HR and the role of HR in managing the change within organisations to proactively mitigate job losses through active participation in recruitment and decision making and involvement in the technological change process was clear in the organisations who were actively engaging in this process.

5.7.5 Tools Needed - Culture and Trust

Culture was a key theme discussed by 70% of the interviewees. The sample believed that having a strong culture, would assist in mitigating job losses, so that organisations could continue to thrive and be sustainable.

Interviewee 3: "There was not so much churn in the organisation and that specifically due to the way that we ran the company, with the specific culture of belonging that we created within the organisation that made the organisation tick."

Interviewee 13: "So, XXX is very concerned with its culture. It's something we always talk about. It's something we always trying to define. The magic is in the culture. But I think what will hopefully work for us is that our definition of a strong culture is based on its ability to adapt. … What is our acid test that our culture is healthy? We're going

to test it on its ability to adapt" [through technological change].

Trust was regarded as important by four of the interviewees as a means of ensuring that key staff do not leave.

> Interviewee 16: "I think it's going to be tough in an organization where they don't trust a leader. So, if it's already an organization where I think there's a lack of trust in your leadership then it's going to be a tough sell. I think that we have got... luckily, we have got that trust in our leadership and I think I know it's definitely in this space."

Culture was the most spoken of component of any of the leadership and organisational requirements for job loss mitigation amongst all the interviewees. Organisations having a strong culture seemed to believe there was a limited likelihood of losing people due to technological change.

5.7.6 Summary RQ4

In response to RQ4, complexity leadership theory can provide a framework to assist senior executives to better prepare for mitigation of job losses. Most of the components of the CLT and LOAT models were named by the interviewees as being required skills for leaders in managing technological change. However, the additional components of focusing on culture and trust could be added to the model. The importance of involving HR in the process can also not be ignored.

5.8 Conclusion

In conclusion, the results for the research questions can be summarised as follows.
There is a relatively high level of awareness amongst senior executives about job loss mitigation due to technological change within the sample firms. Mitigation activities are being actioned where technological change is happening, but in some cases, not being proactively implemented or managed. Leadership believe that job loss mitigation is a shared responsibility mostly between government and firms, but that there is also a high level of individual responsibility to remain employable. Lastly, complexity leadership theory can be used as framework to assist senior executives, in conjunction with other leadership models and with an additional important focus on culture. The above results are discussed further in chapter six.

CHAPTER 6: DISCUSSION OF RESULTS

The purpose of this research was to explore and assess the readiness of organisations within South Africa for the mitigation of job losses due to technological change, by interviewing a sample of 23 senior executives. The four research questions were to provide answers on the level of awareness and status of the situation within the workplaces, what actions were being taken by the employers, to determine responsibility for any required actions and to establish whether complexity leadership can provide a framework or toolkit for leaders to manage in the technological changing environment.

This chapter discusses the results and findings as presented in chapter five in context of the literature from chapter two and is organised as per the research questions in chapter three.

6.1 Discussion of Research Question 1 (RQ1):

What level of awareness exists amongst senior executives in terms of job loss mitigation due to technological change within the organisations?

The awareness of senior executives of the risk of job losses within their organisations because of the implementation of tech is what the research needed to explore. If any tech was being implemented, what plans were being made for the workforce who might be displaced and how was it changing the organisation's business model and ways of working? The results indicated a range of responses from minimal awareness to extensive awareness and advanced tech being implanted. This is discussed further below.

6.1.1 Level of Awareness and Strategic Planning

Frank et al. (2017) refer to an urgency for organisations to stay ahead of the curve with technology, to continue to be competitive and not be left behind. This was evident in the research results, where more than half of the firms believed that sustainability may be an issue if technology was not adopted and that remaining competitive would be challenging. Only a quarter of the firms referred to push back or denial regarding any tech changes. The urgency referred to by Frank et al. (2017) was confirmed by 12 of the interviewees who said that the rate and volume of change is a challenge and that the push and pull effect of customers and global partners is driving quicker change.

In summary, 18 of the 23 firms had strategic intentions with regards to the implementation of technological change within the organisations that could possibly create technological unemployment. Of the 23 firms, 16 were currently implementing technology, 11 of the interviewees confirmed that technological unemployment may happen and nine of the interviewees anticipated no job losses at all.

Concern regarding job losses was preventing six of the firms from implementing certain technologies, that would result in job losses, as they had no suitable alternative plans with regards to their affected workforce. These firms seemed to be in limbo, with concerns about retrenching employees and the social impact, yet knowing that not making the change could result in them not being sustainable or competitive.

This situation is not positive for the economy as it could become a trend, leading to more stagnation. It does reveal the priority for firms to start planning mitigation activities in advance to avoid this kind of situation. There is also a partnership opportunity here with government to deal or resolve the situation to be able to move forward. Technological anxiety as described by Mokyr et al. (2015) was evident with 35% of the interviewees with concerns about job losses in the future and the overall impact of technological change and this could also be allayed through proactive management of this issue.

A slowdown in recruitment was being experienced by 12 of the firms because of tech. However, different skill sets were being recruited or sourced by 18 of the firms when employing new people. This could reinforce the WEF “Future of jobs” (2017) report that 39% of core skills across occupations in South Africa will be completely different by 2020. Firms were actively seeking IT skills developers, coders and analysts and one interviewee referred to a strong need for meta skills, not necessarily having all the technical knowledge, but being able to find or learn the information if needed (Interviewee 12). The above also aligned with 78% of the organisations’ having strategic intent to implement technological changes.

One mining company confirmed that they were taking the wait-and-see approach, and this was only because of financial concerns. If this firm is representative of the mining industry, by even 5%, with mining being one of South Africa’s major industries and considering Frank et al.’s (2017) belief that any organisation playing the wait-and-see approach may not survive, this could have serious implications for this industry and the

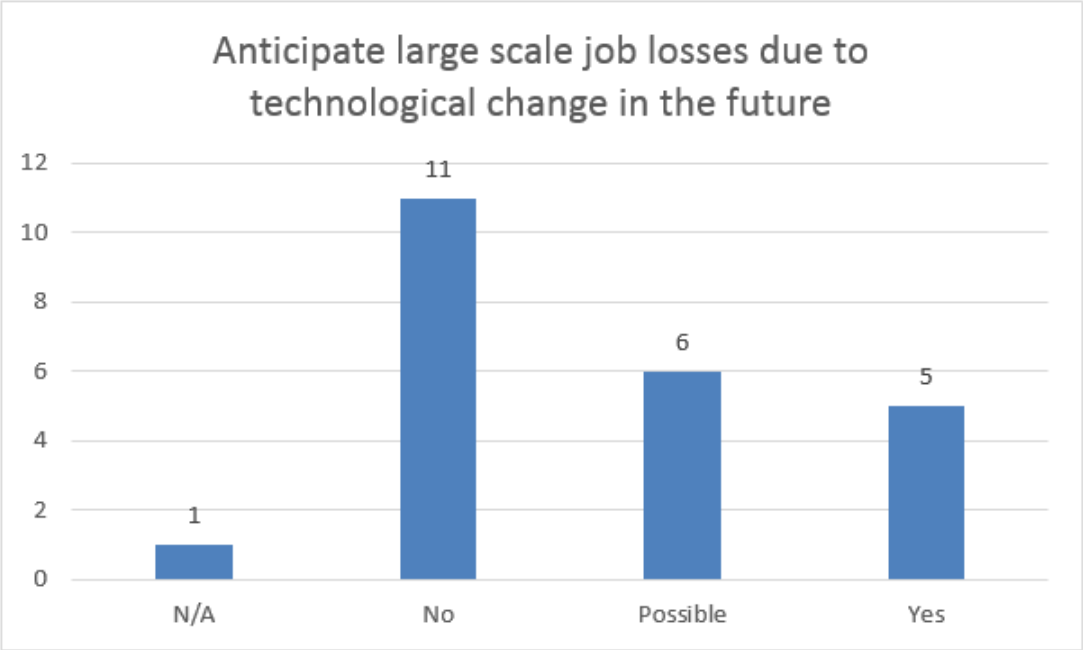
economy, so alternative solutions should be prioritised on the government's long to do list.

Most importantly, five (22%) of the firms had seen an increase, or were anticipating an increase in jobs because of technology, which confirms Phillips et al.'s (2018) belief that technology could be a growth multiplier, if planned for correctly. One interviewee expressed the view that if technology could be used to make firms more successful and thereby grow the economy, prosperity and subsequent employment opportunities could only follow (Interviewee 2).

One reason for the increase in headcount was the volume of new technology being implemented in the company and the additional need for skills as a result. Secondly, in two firms, the implemented tech had resulted in increased demand and additional headcount being needed to cope with the demand, which is another example of growth multiplication of technology (Phillips et al., 2018) and the digital abundance as described by Brynjolfsson and McAfee (2014).

As per Figure 5, when asked directly if they anticipated any large-scale job losses in the future due to technological change, only five participants responded positively, six thought it was possible and 11 believed that it would not happen. This seemed to contradict the predictions by Le Roux (2018) and Phillips (2018), as well as news articles by Brown (2018) and Moyo (2018) and with what was already happening within the sample firms. Although tech unemployment was not evident on a large scale, it did appear to be happening in pockets, over a period of time at several of the companies. (This is discussed further under RQ2). As such, these responses by the leaders could either be denial, optimism, or plans to actively prevent these job losses in the future.

Figure 5 Anticipation of Large Scale Job Losses



Overall, the level of awareness was high and strategic discussions were being held about the issue in most of the firms. However, actual planning and proactive management of the issue was limited as can be seen in the results of RQ2.

6.1.2 Overview of Technological Change

Uhl-Bien and Arena's (2017) definition of complexity regarding interconnectivity and changing in irreversible ways very aptly described the perceived situation of the firms interviewed with regards to technology. Complexity is happening on multiple fronts and contexts and change is being driven. The results of the research sought to explore the attributes of the tech change happening within the companies, how the change was interpreted by the leaders interviewed, as well as the types of changes happening and the timing thereof. It also sought to provide an overview of any technological unemployment happening within the firms.

The benefits of technological change and its role as growth multiplier (Phillips et al., 2018) were confirmed by the interviewees with more than half believing that it was beneficial for the firms, the economy and quality of life overall. The focus on these benefits is also motivated by Raphulu (2018). The firms that were adopting technology quicker, were seeing immediate positive results in terms of efficiencies, productivity and bottom line improvements. Evidence of adaptivity, agility and enablement from the CLT models was identified within these firms.

However, several of the interviewees believe that the change is happening incrementally and has been happening for a while, in such a way that the effects of the change are not really being noticed. Some of the firms displayed signs of reverting to the order response (Uhl-Bien and Arena, 2017) to try and control the changes happening, by putting changes on hold. Unfortunately, they could end up falling behind competitors. As per Schneider and Somers (2006) the chaos is critical to evolution.

Amongst the sample interviewed, financial services were ahead of even the technological firms with the volume and range of tech being implemented. This corroborates the WEF "Global competitiveness" (2017) report regarding South Africa matching global standards in the financial sector. Healthcare, legal and mining were the furthest behind in the sample. Possible reasons could be union activity protecting workers, employment legislation and shortage of resources or funds.

6.1.2.1 Types of Technological Change

As established in the results for RQ1, actual tech change across all 23 firms ranged from zero tech change to robots with employee numbers. Only four of the firms were experiencing no technological change. Tech being implemented was following global standards of AI, IOT, robotics etc. As such, the risk of job losses cannot be ignored, and firms are already actively thinking about the issue and acting.

6.1.2.2 Timing of Technological Change

In terms of the timing of the technological change, in most of the firms, it was happening already. When asked by when it would create unemployment, responses ranged from happening already, to only in 15 to 20 years' time. The firms that were implementing tech saw it as happening already or being imminent and others felt it was industry specific. The interviewees who saw a longer time frame justified it by referring to lagging South African innovation (Interviewee 8) and the protection of employee legislation (Interviewee 19).

6.1.2.3 Visibility of Technological Unemployment

The worker's nightmare as referred to by Frank et al. (2017) was confirmed as several firms had already experienced or were experiencing job losses. Interviewees confirmed that the following roles were being, could or would be lost within the sample firms; call centre agents; sales people; quality and assurance staff, classroom teachers, data

capturers, transactional managers, HR administrators, recruiters, dealership staff, accountants and finance clerks, office and admin staff and auditors. The roles mentioned agree with most of the literature (Autor, 2015; Brynjolfsson & McAfee, 2015; Brynjolfsson & Mitchell, 2017; Clemons et al., 2017; Cortes et al., 2017; Frey & Osborne, 2013; Katz & Krueger, 2017; Silva & Lima, 2017) and further confirms Cortes' (2016) views with regards jobs that have elements of routine-biased technical change (RBTC) being susceptible to automation.

Interviewees also discussed natural attrition and the slowing down of recruitment. Where people were resigning, they were not being replaced, if the technology implemented was able to replace the role. Where technology was able to improve productivity, additional headcount was not needed, as more could be done with less people and more efficiently.

Generational issues were explored with regards to the level of adaptability of older employees to tech change. In three of the firms, older executives exhibited a reluctance to adopt any type of new technology (Interviewees 5, 9 and 17) and were experiencing push back from younger team members because of this. In some firms, early retirement packages were being offered to resolve this issue. The challenge of unlearning old behaviours as described by Rautenbach et al. (2015) could explain this issue. However, it was evident from the sample results that an obstacle existed for older employees to remain up to date in terms of tech skills, because younger generation employees are learning and adapting at a much faster rate. This was even discussed as being a requirement by some of the interviewees themselves, in their leadership capacity.

Industry shrinkage and an oversupply of skills was mentioned in the mining industry and in the case of some IT development roles where certain skills were no longer required. This concurs with the work by Frank et al. (2017), once again referring to the worker's nightmare. The issue with this is that South Africa needs to compete on the global stage to grow its economy and cannot afford to exclude itself technologically, as confirmed by Phillips et al. (2018).

No evidence was seen of technological unemployment in the South African healthcare or legal professions based on the interviews conducted, which disagrees with the work done by Brynjolfsson & McAfee (2014) and Frank et al. (2017). However, this could just be because the industries are lagging behind their global counterparts in terms of

tech or the firms interviewed were not being representative enough. The WEF "Global competitive" (2017) rates South Africa's health sector as being globally competitive, so this needs to be explored further in future research.

6.1.3 Conclusion RQ1

The results for RQ1, are that the level of awareness amongst the leaders in the sample interviewed was relatively high. This was evident in that 78% of the firms are including technological change in their firm strategies and 70% are in the process of implementing technology or have already completed the implementation, with financial services leading with the volume of tech change and the tech industry being second.

In preparation and in response, 78% of firms were already employing different skillsets and 52% were already experiencing a slow-down in recruitment because of technology. Tech unemployment was already happening in 48% of the sample firms, but incrementally, in smaller pockets, and not on a large scale. The types of technological change and roles being affected agreed with what is happening globally. One positive is that some firms are experiencing an increase in headcount because of technology.

However, 39% of the sample anticipated no job losses within their firms and only 20% displayed any level of technological anxiety. Just under half of the sample (48%) though that large-scale job losses due to technological change would not happen at all in South Africa. Only 22% believed that large scale job losses would happen in the country in the future, and 26% though it may be a possibility. These low percentages did not bode well for job loss mitigation activities in the firms.

6.2 Discussion of Research Question 2 (RQ2):

What mechanisms are being utilised by the senior executives to mitigate job loss and which factors support this action within the organisations?

There was evidence of mitigation activities happening, with the most prolific being redeployment (16 firms), new skill mapping and the realignment of skills with new job requirements (15 firms) and reskilling (10 firms) and. As a representative sample for reskilling, this may be too low if the WEF figures of 39% of core skills changing by 2020 are accurate (WEF "Future of jobs", 2017).

6.2.1 Reskilling

In-house bespoke training was the most common form of reskilling being used. The firms with the most amount of tech change happening were specifically preparing employees via special in-house programs, directed at certain skill development or multi-skilling. Challenges being experienced by the firms included employee openness to being reskilled and the learning and unlearning of new and old behaviours, as described by Rautenbach et al. (2015) who discuss removing learning frameworks that are no longer needed to allow space for new suitable learnings. Creating a continuous culture of learning was the aim of a few of the firms to drive the ability to adapt to the changing environment. One interviewee remarked that there was not enough time to reskill and that they may have left it too late (Interviewee 6). This example corroborates Day and Schoemaker (2016) talking about organisational inertness being a significant obstacle to timely adaption, like trying to upskill a crew on a tanker at sea, in the middle of storm.

A shortage of IT or the correct technical skills was concerning for some of the interviewees who are now actively seeking technological skills to drive their strategies. This confirms the work by Phillips et al. (2018) that this is an urgent requirement and that principal intervention is needed to speed up acquiring the relevant and essential skills needed to maximise human-machine collaboration in South Africa. Learnerships and bursary schemes were being used by 30% of the firms as recruitment pipeline for their workforce, to provide the new skills they needed and to enable the graduates in the marketplace. This was also being used as a tool for staff retention.

6.2.2 Redeployment

Nearly 70% of the firms interviewed were actively redeploying staff or thinking about doing so. Challenges included incorrect skills sets, employees not wanting to be redeployed, or not enough jobs being available to deploy staff to. Shrinking industries like the mining sector are also a challenge for redeployment as there are more qualified people available than jobs. As such this mitigation activity may not be sustainable long term. Where employees have not kept their skills up to date, they are not able to be utilised elsewhere and this was evident with some IT staff who had not learnt new coding programmes, while working on old technology. Here, the importance of individual responsibility will come into play.

6.2.3 Other Job Retention Activities

Other job retention activities included proactively skill mapping to new roles, workforce

planning, retention projects, new job or role creation, rehiring of staff, creating learning paths instead of career paths, offshoring or outsourcing and lastly, the creation of dedicated innovation teams and using existing staff for in house development. Unfortunately, no clear evidence was seen of work planning as opposed to workforce planning, as recommended by Dr Phillips (2018). However, research and discussions on work planning are taking place at two of the firms (Interview 15 and 16). These firms are also investigating global models to see if any employee practices and principals could successfully be applied locally.

Two of the interviewees believed that no mitigation activity is required, and that the implementation of technology must run its course with the required fall out, so that new opportunities can arise from that. This would be similar to what happened in the previous industrial revolutions. This belief agrees with Osborn and Hunt (2007) when describing a complex adaptive system (CAS) which will self-organize and evolve to perform better in the new environment.

Ten of the firms are already moving towards a project employment or outsourcing model to avoid employing additional permanent staff and then having to retrench people once work is completed confirming the article by Goos et al. (2014) regarding technological change being biased towards replacing routine tasks resulting in offshoring. The labour broker model employed by a few firms in the past is now being deterred by labour legislation, so firms are seeking alternative solutions.

6.2.4 Conclusion RQ2

The results for RQ2 indicate that despite there being a high level of awareness of technological change and the possibility of job losses, mitigation activity is not where it should be with only just over half of the firms actively partaking in mitigation activities. These include reskilling, redeployment or realigning skills and a range of other minor activities, including retention projects, the creation of innovation teams and new roles. The firms that were implementing extensive tech changes were the most active with regards to job loss mitigation, and actively doing workforce planning and implementing extensive reskilling programmes.

Discussions are being held and plans are being made, but long terms strategic mitigation activity was low, so more could be done, as a sense of urgency is not evident. The awareness of possible job losses as shown by the results of RQ1, is not

necessarily transferring into action to mitigate. However, firms are seeking cost reduction solutions and improved efficiencies, which may still, or is resulting in reduced head count and as per Le Roux (2018) this confirms that South African firms may be driven to do this to stay competitive in global markets. The mitigation activity therefore needs to be escalated.

6.3 Discussion of Research Question 3 (RQ3):

Where does the level of responsibility lie for the mitigation of technological unemployment between business, government and civil society?

The moral obligation to behave correctly towards employees was a clear concern for the leaders interviewed. Unfortunately, multiple challenges exist and were raised as concerns in discussions about South Africa for job loss mitigation. Although many of the issues are not unique to South Africa, for the firms operating in this complex environment, they were significant, confirming the research need and that using complexity leadership theory was an appropriate lens.

6.3.1 South African Challenges and Shared Responsibility

In all the discussions with the interviewees on responsibility, concerns were raised about the state of the economy, standard of education, lack of economic growth and corruption issues, which agrees with some of the points raised by Olarere (2015) on problems facing African leaders. This was an inhibitor to growth for businesses, with a severe shortage of adequate skills to drive a technologically advanced or knowledge economy. The immigration of knowledge workers was also a concern for 30% of the sample. Comparisons were drawn between South Africa and global counterparts with regards to problems with infrastructure and connectivity. Interviewees believed that the state was not creating an enabling environment for technology and business to flourish with legislation and bureaucracy discouraging investment in South Africa. This is also contrary to the NDP (2030) goals.

Although many thought that government carried a higher level of responsibility to mitigate job losses, the capacity of government or ability to do so, was questioned. Overall more than 70% believed that it was a shared responsibility between firms and government to mitigate job losses. However, the sustainability of this for firms may be limited, if the economy does not grow and remains in recession.

Strong leadership in government and an awareness of future issues with regards to technology were also raised as a focus area needed for the future. This is where the partnership between government and firm leadership will be critical to ensure that where possible, firms are able to influence government on the challenges raised. Positive steps have been made in this regard in October 2018 with the job summit held in Johannesburg with a mandate to create 100,000 jobs, enabling consultation between government, private sector, unions and community organisations where skills development, SMME support, regulatory reforms, inclusive growth and transformation were discussed (Jobs summit, 2018). Future job summits and collaborative platforms will be essential for this. Concerns were raised by Interviewee 5 that government were not looking at growing technology opportunities and skillsets and these concerns could be addressed in these forums.

The two mining leaders specifically spoke about being dependent on the government to soften some of the employee legislation and act on the mining charter to ensure stability in the sector and create opportunities once again. Both interviewees spoke of a sense of limbo in the mining industry and inability to grow or compete globally as a result.

Individual responsibility to remain relevant, employable and up to date with regards to individual skillsets was discussed by 47% of the interviewees. Higher skillsets are being sought (Le Roux, 2018), and interviewees confirmed that the demand for IT skills is high, but supply is limited. It also poses a challenge for individuals who need to upskill themselves, especially in the types of skills that may be needed in the future. Interviewees mentioned multi-skilling and the use of meta skills as being an important requirement for the future and this must also be taken into consideration by individuals when choosing their learning paths.

Only 22% of the interviewees believed that civil society played a role in the mitigation of job losses due to technological change, mostly in partnership with firms. However, civil society also has an important supportive role in bridging the gaps between individual responsibility and firm responsibility. Interviewee 4 raised the point of there being a disconnect between young graduates and firm job opportunities. Civil society could assist in connecting the two, to try and mitigate both the skills shortage and the unemployment problem. Civil society could also contribute to individual responsibility in terms of reskilling. Although interviewee 22 expressed a concern that there was charity fatigue, interviewee 23 was correct in stating that all have a role to play in

contributing and no one can live in isolation from the communities around them.

6.3.2 Conclusion RQ3

The results for RQ3 indicate that the sample interviewed believe that responsibility for job loss mitigation due to technological change lies mostly with the government (92%) and firms (83%) and is mostly a shared responsibility. Individual responsibility became relevant as the third most important responsibility and civil society was seen to play a supporting role between all three. However, based on some of the challenges presented, a lot of work is needed, especially to improve the economy and create an enabling environment for firms to operate in technologically. Steps also need to be taken to improve infrastructure and to stop the immigration of key talent that is leaving South Africa's knowledge economy bereft.

The October 2018 job summit was a positive step in building the partnerships recommended by the research results. However, urgent action and implementation is needed more than rhetoric. One of the challenges of the NDP (2030), although a commendable blueprint, was the lack of implementation. As South African spirals into recession and unemployment numbers increase, the time for discussion is over and immediate action is required. As confirmed by Brynjolfsson and McAfee (2014) economies that get left behind may never recover.

6.4 Discussion of Research Question 4 (RQ4):

Can complexity leadership theory provide a framework to assist senior executives to better prepare for the mitigation of job losses due to technological change?

This question sought to explore what skills are needed by leaders to navigate the challenges of technological change and the mitigation of possible technological unemployment. Leaders were asked what skills where needed and where possible attributes of CLT and LOAT were identified. Although most of the framework could possibly be used by leadership, there were additional components that needed to be taken into consideration.

6.4.1 Leadership Skills Required

"This raises the problem of how leadership complexity might be studied in an organizational setting. Positivist methods limit their scrutiny to what can be (most

easily) measured, rather than what is most important" (Tourish, 2018). This quote by Tourish proved to be very apt based on the results.

The leadership skills most frequently discussed as being required by leaders in a time of technological change, and evident in the activities of the interviewees, named from highest to lowest in order of frequency, included; transparency and open communication; adaptive or creating adaptive capacity; enabling, engaging and ambidexterity; authentic and empathetic; agility; leading by example; ethical leadership; an understanding of technology; entrepreneurial leadership; operational and administrative; flexibility and fluidity and culturally and diversity inclusive.

Agility, flexibility and fluidity are named as part of enablement and entrepreneurial parts of the LOAT model respectively and not mentioned separately.

Of all these skills, the following are not specifically named in the CLT and LOAT models; transparency and open communication, authentic and empathetic, engaging and ambidexterity, leading by example, ethical leadership and cultural and diversity inclusive. This is discussed by Uhl-Bien and Arena (2017) in the brokerage model, confirming that diversity is needed for innovation to succeed. Some of these mentioned are different leadership models, with different theory and range of literature (Dinh, Lord, Gardner, Meuser, Liden, & Hu, 2014). As such, what may be needed is a combination of models or an adapted CLT and LOAT model with additional components.

In addition, only seven (30%) of the interviewees agreed with Uhl-Bien et al. (2007) regarding top-down leadership no longer being appropriate in a more knowledge-oriented economy. In a flatter less, hierarchical structure, more accountability is spread amongst team members and therefore there is no real requirement for an autocratic leader telling people what to do.

Most importantly, having a strong culture was spoken about by most of the recipients as being the most effective tool to traverse the technological change challenges. The firms who were implementing a large amount of technological change, with leaders who spoke about having a strong internal culture, seemed to be successfully mitigating or planning to mitigate any technological unemployment. This was mostly evident and expressed by interviewees one, two, three, four, 12, 13, 15, 16, 21 and 23. Trust was also mentioned as being important during the technological transition.

6.4.2 The Future - Work, Employees and Consumers

Points raised by the interviewees regarding the future of work, future employees and consumers included; decentralised business models; the gig economy and project work or job sharing; human machine collaboration and the need for the human element; flexible working hours and working conditions or remote working; employee engagement and rewards; employee engagement, value propositions and spiritual wellbeing or empowerment and lastly, customer led innovation and changing consumer behaviours.

Overall, firms were feeling a push and pull effect from changing consumer buying habits and younger employees looking for different employment experiences which required a change in leadership style. Research by Anderson, Baur, Griffith, and Buckley (2017) provides further confirmation of this "On the whole, these findings demonstrate that millennials are, in fact, different from their predecessors. Furthermore, these results suggest that these generational differences may call for adaptations to our current theories of leadership" (p. 246).

As per the results in chapter 5, the change in leadership to manage millennials was raised by a few of the interviewees, because of their influence in the workplace. Interviewee 4 used terms like "reshaping" and "fundamentally challenging". Here adaptive and enabling leadership skills will be a critical requirement. Anderson et al. (2017) say that there are gaps in leadership theory of today because of changes in values and attitudes of today's workers. However, it is likely that leaders may need to provide more structure in both jobs and career paths for employees to reduce turnover (Anderson et al., 2017). How this plays out in the gig economy remains to be seen.

What the research indicates is that there may not necessarily be gaps in the leadership theory as much as bridges that need to be built between the different models and the roles of culture, trust and transparency might form the foundation blocks for this bridge.

The need to maintain a human element in the time of technology discussed by several of the interviewees may reflect the technological anxiety previously mentioned. However, one interviewee made a good point in mentioning the possibility of different pricing for human vs machine interaction as a choice for future consumers.

> Interviewee 2: ‘’We service you with technology and that comes at a certain price, with a certain level of service, and we can service you with a real human being that you can meet face-to-face, that comes at a different price point, and you can choose. So, consumer choice kind of gets into it. I don't want to be fooled into thinking I still have a private banker that's a person. I might accept that I now have a private banker that's a robot. I'd be happy with that. I’d expect a lower price but if I wanted the human, I want to know I've got the choice to say, I want a real human and I'm prepared to pay extra for a real human.”

Human machine collaboration, as discussed by Frank et al. (2017) and Brynjolfsson and McAfee (2014) was raised by eight of the interviewees. Some had actively redeployed staff in new roles or were talking about the future of how these employees would work. Data interpretation and outputs were new roles described by some of the interviewees and this could be grown more. Interviewees spoke of data cholesterol and firms not knowing what to do with all their data, so data analysis will become more and more important as firms increase data about their clients via the multiple digital channels.

The future of online buying and reduced requirement for “brick and mortar” facilities were a concern for a few of the interviewees and could be one of the leading reasons for technological unemployment. This was already an existing issue for five of the firms interviewed, mostly financial services. This once again reiterates that redeployment will not be a sustainable mitigation activity as there may not be jobs or office to redeploy people too.

Flatter structures and less hierarchy was also an example of how business models were having to change to meet the needs of the business and customers. Some leaders talked about a high level of autonomy and accountability being required from their teams. In three of the firms, this aligned with a strong culture.

6.4.3 The Role of HR

Ten of the interviewees believed there is an opportunity for HR to enhance its reputation by becoming more technologically savvy and being more involved in the decisions that are happening with regards to tech change. They also believed that it was important for HR to be at the executive table in the discussion regarding technological change and to be involved from the beginning to be able to proactively

manage any changes, instead of only being pulled in at the end to deal with retrenchments. If HR are involved from the start, they can plan redeployment, reskilling and workforce and work planning in advance, to mitigate job losses, where possible.

All the mitigation activities mentioned in RQ2, reskilling, redeployment and other mitigation activities, require active participation by the HR community, especially in the learning and development and talent acquisition space. Existing models must be revisited and adapted to align with their changing business needs.

Interviewee 15 spoke about the firm actively researching what is being done globally by some of the larger tech firms, to implement similar successful employee programmes locally. Interviewee 15, 16 and 22 discussed learning paths vs career paths and how employee benefits are changing overall to adapt to the future of work. The scope of these changes requires different behaviours and activities from HR in the future to create an enabling and adaptive space for the technological change and its possible fallout.

6.4.4 Complexity Leadership Theory and Leadership Skills Needed

The firms that were more advanced in terms of implementing tech displayed strong levels of adaptability and agility, moving quickly to meet the needs of customers and stay ahead of the curve (Frank et al., 2017) and in the overview of technological change, were seeing the benefits thereof.

The one firm that had already completed retrenchments took three years to make the change and did not communicate or make any alternative arrangements for employees until it was too late. The interviewee also mentioned that the firm culture was not strong, and besides the lack of bias for action and agility, was very siloed operationally. These are the type of situations that can be avoided using the correct leadership skills and behaviours and the justification for the research.

Flatter structures (less hierarchy), smaller autonomous project work teams, informal work spaces and the implementation of digital kaizen (Frank et al., 2017) was more evident in those firms who were succeeding in the technological space, allowing for more agility and quicker adaptability to customer needs. They were therefore seen to be building adaptive capacity into routines as per Aggerwal et al. (2017) and strengthening capacity for change or like Schneider and Somers (2006) talking about

the development of strong culture through overcoming adversity. The leaders are creating conditions for innovation to emerge (Uhl-Bien & Arena, 2017), both adapting and enabling. These leaders are also showing a bias for action, which is part of entrepreneurial leadership (Uhl-Bien & Arena, 2017) of LOAT.

Appendix 14 summarizes the CLT and LOAT models and compares the results obtained from the research in terms of attributes discussed and evidence of the various attributes. As confirmed by Diesel (2017) the CLT model can only provide guidelines, it is not an all-encompassing model to resolve all leadership challenges. However, it does create a climate of innovation which is critical in a tech environment (Diesel, 2017).

Figure 6 below displays the leadership skills or behaviours named by the interviewees as being the key requirements for leadership in order of priority, from highest to lowest. Figure 6 differentiates between attributes of the CLA and LOAT models and attributes from other leadership models (Dinh et al., 2014). It also highlights the additional attributes required. Of these, culture (70%) and open communication (65%) were without a doubt, the highest mentioned of all, followed closely by the CLT and LOAT attributes (61% and 48%). Authenticity and empathy (48%) were rated highly but positivity was grouped here too, as the researcher believed they went hand in hand. The interviewees also believed that leaders needed technological skills. As per Kane, Palmer, Nguyen Phillips, Kiron & Buckley (2015) leaders do not need to be wizards at technology, but they must be able to link business and technology and lead the way in terms of what can be conceptualised or accomplished and how the business can be transformed by technology.

Figure 6 Leadership Skills/Behaviours Needed

As such, the complexity leadership theory can be built on and as per Anderson et al. (2017) there are gaps in our leadership theories that can be filled or possibly combined. It is apparent that culture may be a cohesive force for organisations, when everything around them is changing at an exponential rate. This agrees with the work by Uhl-Bien and Arena (2017) which describes a cohesive group within the adaptive space needing high levels of trust and culture to scale. The importance of communication and open conversations within organisations and with employees will encourage the development of trust and ensure that employee and companies meet each other half way to ensure successful sustainability of jobs and the businesses themselves.

6.4.5 Conclusion RQ4

The results for RQ4 indicate that the sample interviewed believe the CLT and LOAT frameworks can be used as a toolkit to lead during this time of technological change.

However, the models must be used in conjunction with other leadership models, including authentic, empathetic, ethical leadership and ambidexterity However, clear feedback from this research is the need for agility, the ability to adapt and enable teams to operate in the changing environment. In addition, open communication to establish trust and the development of a strong culture are important additional tools needed in this complex environment and the creation of an inclusive environment. Interviewees also believed that leaders needed technology skills or an improved knowledge of technology.

The scope of the technological future is unknown, and the possibilities are endless. The question by interviewee 5 asking “if we are blind and we are leading people, where are we going to lead them to?” was very indicative of how a few of the leaders who were interviewed felt, because this unchartered territory is very difficult to plan for. This research has sought to offer some possible skills and behaviours that leaders can use to help allay some of their fears.

6.5 Conclusion

This chapter will highlight main findings of the research as per the results in chapter five and the discussions in chapter six and will provide some recommendations for leaders based on the findings. Limitations of the research will be identified, as well as possible suggestions for future research.

The purpose of the study was to assess the readiness of South African organisations for the mitigation of anticipated job losses due to technological change. To achieve this the existing status of technological change within companies was assessed to establish what level of awareness exists. Secondly, the existence of job loss mitigation activities within the companies were identified. Thirdly, because of possible dire consequences for the economy, the level of responsibility for mitigation of jobs losses had to be identified, between firms, government and civil society. Lastly, the research sought to establish whether the use of the complexity leadership theory model could be used as a framework by leaders to assist them in the mitigation of job losses within this complex, changing environment.

CHAPTER 7: CONCLUSION

7.1 Principle Findings

The principle findings are summarised per research question topic.

7.1.1 Level of Awareness

The research confirmed that knowledge worker jobs are at risk in South Africa due to technological change, following the global trends and literature as discussed in chapter one (Autor, 2015; Clemons et al., 2017; Cortes et al. 2017; Frey & Osborne, 2013; Katz & Krueger, 2017; Silva & Lima, 2017). The types of technological changes happening at the firms interviewed are also following global trends as described by Schwab (2016) and WEF reports ("Future of jobs" 2017; "Eight Futures", 2018) and include digitalisation; robotics; drones; IOT, digitisation; AI; cloud and chatbots. Firms confirmed a push and pull effect from their global counterparts and their customers. They are therefore experiencing pressure to stay ahead of the game and prevail competitively.

This research paper sought to contribute to research regarding the scope of job changes, the type of transformation required as well as the status of any new work opportunities, which was said to be lacking by Brynjolfsson and Mitchell (2017). Evidence of Autor's (2015) belief that different types of jobs may be created and complement any labour output amongst knowledge workers was described by interviewees, but not largely in practice. Of the firms, 78% were already recruiting and looking for different types of skills. Firms that were increasing headcount (21%) were mostly adding jobs in the IT departments. This concurs with Le Roux's (2018) research that more IT employees staff will be needed (computer assistants, IT managers, system designers, analysts etc). Others (52%) were trying to do more with less staff, due to improved efficiencies because of new tech and were therefore slowing down recruitment. Human-machine collaboration related more to interpretive, analytical and judgement activities. New work opportunities discussed with interviewees related mostly to IT work and reporting and analysis roles. The type of transformation spoken about by the interviewees related more to multiskilling, meta-skills and continuous learning being required from their knowledge workers.

Only one of the firms was using technology to drive a societal improvement agenda as discussed by Frank et al (2017). The balance of the firms were using it to improve

customer service, internal efficiencies, productivity and reduce costs where possible. These firms were seeing these benefits internally and financially. However, leaders agreed that the economy could benefit from technology and that additional growth opportunities could be created to have a positive social impact.

There were 16 out of 23 firms (70%) that were implementing technological change and 10 (43%) confirmed that this change could result in unemployment. Only eight (35%) of the interviewees displayed signs of technological anxiety about job losses as described by Mokyr et al. (2015). As such, although awareness was evident, there did not seem to be a sense of urgency or concern amongst many of the firms, except for those going through extensive technological change, which were mostly the financial services companies. These were also the firms with the most knowledge workers at risk.

Offshoring and outsourcing is being actively implemented by a few of the firms as referred to by Brits (2017) and White (2018). One firm had discarded 14 jobs and outsourced work offshore already to stay ahead of their competitors, confirming that technology has no geographical borders.

The researcher found that there was a high level of interest from the interviewees regarding the results of the research and awareness ranged from interviewees thinking about the subject a lot, to not considering the subject at all prior to the interview. Most admitted after the interviews that it would be something they would be considering going forward. This achieved one of the aims of the research which was to create awareness and urgency around this issue, albeit only amongst the sample.

In conclusion, a relatively high level of awareness existed, and technological change was being implemented at more than half of the firms interviewed. However, based on the urgency of the issue and the potential of what the problem could become the awareness is below what it should be. Based on the literature, at this stage, most firms should be strategically planning for technological change and actively planning and implementing job loss mitigation activities for the firms to stay competitive globally and for the country to remain relevant in the global economy, without experiencing any more impact on the existing high unemployment statistics. Following this is the principle findings on the status of job loss mitigation activities.

7.1.2 Job Loss Mitigation Activities

The importance of this activity cannot be underestimated as confirmed by the unemployment stats of 27.5% (Statistics SA, 2018) and Phillips et al.'s (2018) report on the future of the South African workforce, stating that one-in-three jobs will be replaced by digital technology. South Africa's recession status and the recent job summit held in October 2018 reiterate how important it is to manage this issue. As mentioned previously, South Africa cannot exclude itself from this event and remain relevant and competitive globally.

Although more than half of the firms had strategic plans for technological change, less than half were actively implementing job loss mitigation activities or proactively investigating how to mitigate job losses. At the firms that were experiencing extensive technological change, this mitigation activity was far higher. Where change was happening in pockets, firms were dealing with unemployment issues as they arose, rather than setting up strategic long terms plans with regards to job loss mitigation. As such, although only one firm confirmed a "wait-and-see" approach, the other firms are almost behaving retroactively, in that they are dealing with the issue when it arises.

Reskilling, realignment of skills and redeployment are the most avidly followed mitigation activities. Reskilling mostly took the form of in-house bespoke training programmes (many of them online) and bursary and learnerships. Minimal reskilling was being done externally, and where it was being done, it was mostly to supplement internal reskilling programmes.

The financial services industry is one of South Africa's most highly ranked competitive industries by the WEF "Global competitiveness" (2017) and innovation within this industry is resulting in the most technological change, as was visible in the research. These were also the firms engaged in the most prolific of the job loss mitigation activities, as they are most at risk in terms of job losses amongst knowledge workers.

Responses from the financial services firms ranged from no job losses will occur to extensive job losses are anticipated and will happen. However, one of these firms were increasing head count after engaging in extensive technological change and increasing market demand. This firm has been implementing technology for the last ten years and may now only be bearing the fruit of those changes, or they may be the exception to the rule. However, the reality of anticipated jobs losses may be somewhere in between the first mentioned, confirming that job losses will occur,

regardless of mitigation activities. The one firm that confirmed they would not let any job losses occur now, could not confirm that this would be the case indefinitely and this was confirmed by another leader from the same firm who said that job losses would occur soon and that some jobs were already redundant.

Unfortunately, the fact that change is happening in pockets, means that larger organisations, who might be operating in a siloed environment and not communicating effectively across divisions or operations, may not necessarily be aware of changes happening elsewhere in the eco-system that could affect head count. This also indicates that HR is not actually involved in any of these projects which would help mitigate the problem.

In conclusion job loss mitigation activities for technological change did not feature in the strategic plans of most of the firms interviewed and was happening more retroactively than proactively. This is cause for concern for an issue that could have serious consequences for the South African economy. This leads into the next principle finding of who is responsible for the mitigation of job losses.

7.1.3 Level of Responsibility

The purpose of the research was also to establish who is responsible for the mitigation of job losses because, as described in chapter one, there is a grey line between mitigating activity by government, firms and civil society with regards to this responsibility. In many cases, firms and civil society have had to step in where government has not been able to step up.

Amongst the firms interviewed, most believed that it is a shared responsibility between firms and government (91%). However, government faces several challenges that need to be overcome, to play a key role in this activity, including creating an enabling environment for business to operate and thrive in, through amendments to policy, employee legislation and improvements to infrastructure. Several of the leaders believed that government must re-establish and build trust with firms, after the South African state capture scandal and numerous corruptions cases that have become regular news.

One of the biggest concerns was the standard of education that needs to be improved upon and aligned with market requirements, especially in terms of the new science,

technology, engineering and mathematics (STEM) skills that firms are needing. The increase in learnership and bursary skills being offered by firms can be used as a partnership activity with government and civil society. Few of the firms believed that civil society had a key role to play, other than supporting and participation in activities when invited

Strong leadership in government as well as awareness, was also seen as a key challenge. However, firms have a role to play here in terms of influencing key government players and assisting with consulting and the implementation of technologies that can assist government to overcome these challenges. Recent initiatives by government to improve foreign investment may also assist in this regard.

An important theme that did emerge was every individual's responsibility to remain employable and relevant in the work environment. As organisations evolve and work changes, it will be up to individuals to manage their own destiny and careers. This was discussed by Drucker (1999) who stated that knowledge workers had to take responsibility for their own productivity, have autonomy, as well as engage in continuous learning. Continuous learning was also a key theme that emerged amongst the interviewees as a requirement for work in the future.

In conclusion, the research confirmed that responsibility for job loss mitigation will have to be a partnership between government and firms, with a participatory role by civil society. However, individuals themselves will have to play an active role in ensuring that they upskill themselves and develop their own learning and growth paths.

7.1.4 Use of the Complexity Leadership Model framework

The theoretical need for the research was to explore and identify if the frameworks of CLT (Uhl-Bien et al., 2007; Uhl-Bien & Marion, 2009; Uhl-Bien & Arena, 2017) and LOAT (Uhl-Bien & Arena, 2018) could be succesfully applied by leaders within the sample organisations, to enable and adapt to the changing technological environment. Uhl-Bien and Arena (2018), believe that this is one of the greatest challenges facing leaders which was corroborated by the leaders in the sample. The researcher sought to identify leadership traits and behaviours which the leaders could use from the frameworks to assist them in this time.

Responses from the interviewees about what leadership skills and behaviours were needed mostly agreed with Uhl-Bien and Arena's (2017; 2018) CLT and LOAT frameworks and behaviours. However, there were key behaviours missing, some that were new and some that belonged to other leadership models. As described and explained in chapters five and six, these include transparency and open communication, knowledge of technology and active inclusion practices with regards to cultural diversity.

The inclusivity requirement confirms the defining characteristics of CAS frameworks that leadership should be encouraged to create an organizational identity that reflects variation and similarities, thereby inhibiting any possible negative outcomes (Schneider & Somers, 2006). Uhl-Bien and Arena (2017) also verify that this diversity is needed for innovation to flourish. Behaviours mentioned from other leadership models included empathy, authenticity, ethical leadership, ambidexterity and positivity. Ethical leadership, although not discussed by many of the interviewees, could become more important especially with regards to the management of job losses in the future and ethical tech choices.

The most common requirement was the development of a strong culture within the organisation. The firms that were successfully implementing a lot of technology, showed evidence of having a strong, inclusive culture, with limited siloed behaviour. This verifies Jackson and Phillip (2010) who believe that technological determinism and cultural determinism alone will not be successful in the management of technological change. Attention to organisational culture is needed to create an environment that is conducive to technological change, for it to be successful. Uhl-Bien and Arena (2017) also confirm the requirement for high levels of trust in the adaptive space to enhance the cohesive group which the research corroborated.

Open communication and transparency was regarded as important, even if job losses were going to happen, to give employees opportunities to prepare and reskill themselves or make other arrangements, if required. Interviewees referred to open reciprocal conversations rather than one-way communications. Keeping employees informed of what was happening within the organisation and its eco-system also seemed to build a stronger culture amongst those firms in the sample who were practising it. This confirmed the work by Schneider and Somers (2006) regarding leaders embracing CAS, to develop stronger teams who can then generally overcome

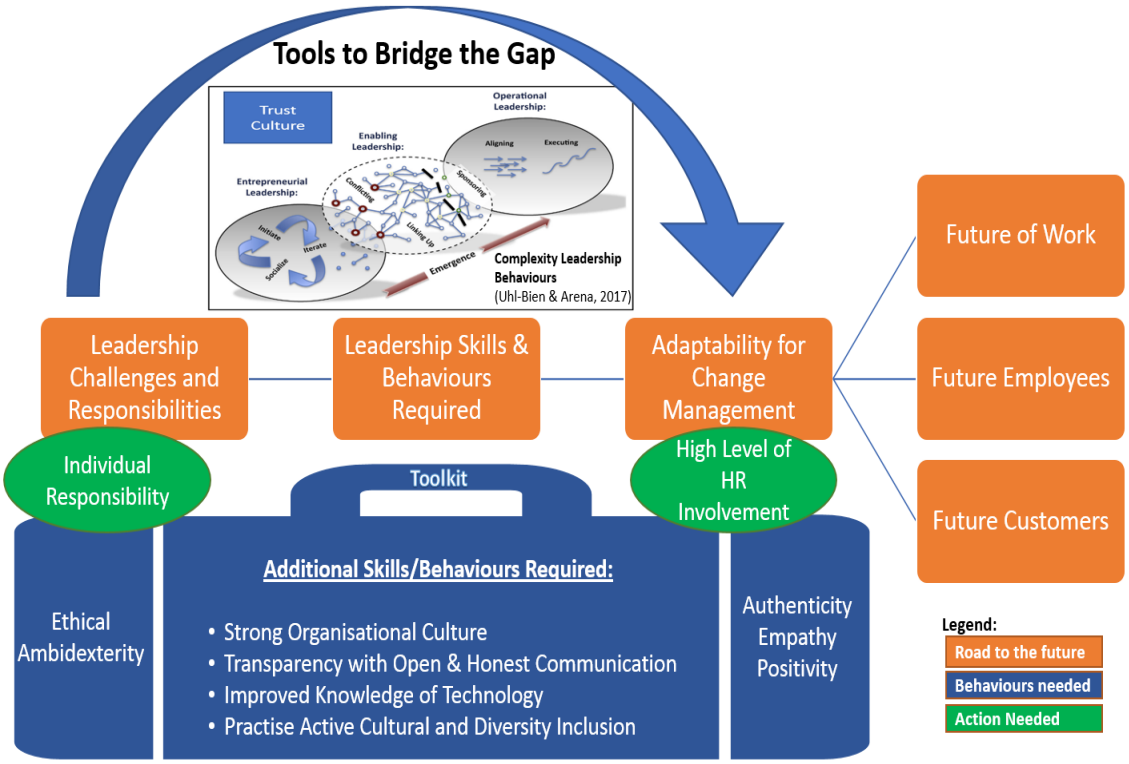
adversity and any unexpected threats posed by technological change, to avert job losses and rather collaborate with technology.

Based on the research responses, the importance of the role of HR within the technologically changing environment cannot be underplayed. Several interviewees saw this as an opportunity for HR to take a more active and significant leadership role, especially in proactively managing the mitigating activities. However, the need for HR to become more knowledgeable about technology was also seen as a requirement, so that they could make positive contribution to the technology discussions.

Individual responsibility is also included in the toolkit as leadership, especially HR leaders, can work together with employees to give them more autonomy over their individual careers, especially with regards to work planning and workforce planning (Philips et al. 2018).

Based on the above, Figure 7 provides a representation of the road to the future, with required actions and a behavioural toolkit that leaders can use to bridge the gap to the changing environment.

Figure 7 Behavioural Toolkit



In conclusion, the CLT and LOAT models do not need to be changed, as much as added to or combined with different leadership models (Anderson et al., 2017). In the same way that lines blur and change within complex adaptive systems, so are leadership models changing. As CAS will also naturally self-organise to perform better in an unknown environment (Uhl-Bien & Arena, 2018), so must the leadership models.

7.2 Implications for Management

Harari (2014) said “We have advanced from canoes to galleys to steamships to space shuttles – but nobody knows where we’re going. We are more powerful than ever before but have very little idea what to do with all that power” (p. 466). This quote was indicative of some of the fears expressed by the leaders interviewed for the research. As much as the leaders were excited by the possibilities of what technology was making possible, and wanted to be prepared, they seemed to be finding it very difficult to plan for the unknown.

Another quote by Tourash (2018) elaborated more on this point when criticising complexity leadership theory “Beyond this, researchers also need to abandon any suggestion that leaders are fully formed individuals whose goals are unproblematic, who have access to an astonishing range of toolkits that they deftly use to effect change, and who can manage complexity while in some unexplained way remaining more or less immune to it themselves. This also means foregrounding issues of power, control, dissent and resistance.” (p.15)

Besides the assessment of readiness of organisations for job loss mitigation, the purpose of the research was to provide leadership with a set of tools that can be used to mitigate job losses and to create awareness of the risks and responsibilities. Recommendations for leaders have been kept simple to avoid complicating matters further in an already complex environment.

The first recommendation is that strategic planning regarding technology must include HR from the beginning and the discussion must not only be about the technology, but the people and the technology. Work planning, workforce planning and reskilling must be part of the discussion from technological project concept stage to implementation and beyond. Any employee stakeholders must be communicated with from the beginning, with leadership keeping employees up to date on changes and employees letting leadership know what they need, to grow within the organisation, therefore

complete transparency from both sides.

The second recommendation is for leadership to focus on creating a strong culture of continuous learning within the organisation from employees to leadership. Any learning should contain an element of technology, to improve this knowledge across the organisation. This also corroborates the theme of individual responsibility to continually upskill. To develop the culture further, there should be a focus on innovation and accountability with a bias for action. These are key tenets of the CLT and LOAT models in enabling and entrepreneurial leadership (Uhl-Bien & Arena, 2017). This research sample has shown that the development of a strong organisational culture will assist in overcoming many of the challenges that technology could present.

The third recommendation is the implementation of technology using digital kaizen, as recommended by Frank et al. (2017). Small incremental changes allow for more attainable adaptions within an organisation and easier planning and management of the various stakeholders. Reskilling and redeployment can also then be organised more easily and timeously, if required. Transparency and open communication, with no siloed behaviour is a key requirement here, to ensure cohesiveness and culture building. It will also further enable a culture of trust.

A fourth recommendation is to build more agility, is flatter org structures and smaller work teams with high accountability, who are focused on projects of work. These project teams can achieve set outcomes, as opposed to ongoing repetitive work, which can easily be automated. This will also drive the individual responsibility agenda as employees will be forced to stay up to date on required skills to be included in these high performing teams.

The last recommendation is to make use of the other leadership models as presented in the leadership tool kit which are empathy, authenticity, ambidexterity and ethical leadership. Used in conjunction with the complexity leadership framework, and the additional components there should be very few technologically challenging situations that arise, that can't be dealt with.

7.3 Limitations of Research

This research sample mostly included financial services and technology firms and as such, other industries were not well represented. It therefore does not provide a

balanced representation of this issue in the South African economy.

The researcher was relatively inexperienced at interviewing, and even though all attempts were made not to lead interviewees on, this may still have happened unconsciously.

Opinions expressed are those of the interviewees in specific roles. Besides possible bias, the opinions may not be an accurate overall representation of what is happening in the firms, regardless of the seniority of the role.

The technological terminology and jargon could be used in different contexts or mean different things to different people, as could be seen by the mixed use of digitisation and digitalisation during the interview and transcribing process.

A few of the interviewees were not native English speakers and as such, there may be grammatical issues in the transcriptions, that could have been interpreted incorrectly during the coding process, despite all efforts being made to avoid this.

The volume of research results and information received had to be summarized for the research paper and unfortunately, key points or information may have been excluded, due to researcher bias, or limitations of the scope of the research and research paper guidelines.

The limited time line for the research may have resulted in key points being missed or the generalisation of certain points that could have been explored further.

7.4 Suggestions for Future Areas of Research

There is currently a plethora of articles and information relating to the issue of job losses due to technological change, mostly in the popular media, but an increase has also been noted in academic journals and during the research process within the last year. However, within the South African environment, even more research can be done because of the importance of the issue for the South African economy and the social impact.

For the benefit of the South African economy, it may be worthwhile to further explore the models and methods being used by companies to reskill employees for the new

technological environment and human machine collaboration. This was only briefly touched on in the research, but some companies were using a combination of different training methods for internal training that are working relatively well and could be replicated elsewhere for successful job loss mitigation.

This study focused on South African government issues and only made limited recommendations for mechanisms for government to enable and incentivise technological change within organisations, or to create an enabling environment for companies to operate successfully in a technological environment. More extensive research is needed in this regard.

The concept of the parallel state in South Africa needs to be investigated further, to explore options for government to reclaim the status as the main service provider successfully.

Of all the industries in the research sample, three appeared to be lagging behind global counterparts. As such, industry specific opportunities for technological change in the mining, healthcare and legal industries, which could benefit employees, as well as increase efficiencies and productivity, with positive social impact, needs to be explored further.

Important and urgent additional research is needed on companies who are creating jobs through technological change, to determine what they are doing successfully, what the similarities are and how these models could be replicated. Unfortunately, due to limited time and scope, this subject was only touched on in the research.

As identified in the research, HR need to play an active role in the technologically changing environment. Further study is needed of evolving HR models and activities, or areas of responsibility and how these models could successfully overcome technological change challenges within the workplace and the future of work.

This research was limited to South Africa and therefore it's global application is limited. However, there is an opportunity to research and compare a few emerging economies, especially on the African continent, to explore how they are being affected by technological unemployment and to investigate if any other countries are finding ways to avert the issue.

7.5 Conclusion

This research will contribute to the growing database of information that is becoming available on this topic daily. Its contribution is that it looks at the South African environment specifically and provides insight into what is happening within a range of South African organisations and industries in the technological environment and with regards to technological unemployment.

The business need for this research was to create awareness for South African organisations of the risks and responsibilities associated with technological change and job loss mitigation. However, even though firms may be aware of these risks and responsibilities, choices will still have to be made about how they choose to proceed into an unknown future. A tool kit has been provided to enable leadership to adapt and enable knowledge worker skillsets to meet the requirements of the future.

Challenges within the South African economy can become opportunities, if partnerships are formed between government and firms to enable technology further and build prosperity and connectivity. The urgency of this action cannot be underestimated, for the benefit of the South African economy, those who are currently unemployed and for those who could potentially become unemployed because of tech in the future.

As per the WEF “Future of jobs”’ report (2016) “The current technological revolution need not become a race between humans and machines but rather an opportunity for work to truly become a channel through which people recognize full potential. To ensure that we achieve this vision, we must become more specific and much faster in understanding the changes underway and cognizant of our collective responsibility to lead our businesses and communities through this transformative moment.” (p. 8)

APPENDIX 1: Consistency Matrix

Title: Assessment of preparedness for the mitigation of technological unemployment

RESEARCH QUESTIONS	SECTIONS IN LITERATURE REVIEW	DATA COLLECTION TOOLS	ANALYSIS TECHNIQUE
1. What level of awareness exists amongst senior executives in terms of job loss mitigation due to technological change within their organisations?	2.1 Introduction 2.2 South Africa's technological change environment 2.3 Roles that will be affected	4. Identify any anticipated or existing technological change happening within the company. 5. Describe and explore any effect of the change for the business and possible workforce impact.	Semi structured interviews and coding
2. What mechanisms are being utilised by the senior executives to mitigate job loss and which factors support this action within the organisations?	2.5 What leadership action is required	7. Discuss the plans for the workforce, if any. Identify any gaps or shortfall in the skill requirement. 8. Has any action already been taken or planned to mitigate job loss or offset the job loss, if applicable? 9. Discuss any issues or positive effects of the change, if applicable.	
3. Where does the level of responsibility lie for the mitigation of technological unemployment between business, government and civil society?	2.4 Responsibility for job loss mitigation	6. Discuss what response is required by leadership and who they believe is responsible?	
4. Can complexity leadership theory provide a framework to assist senior executives to better prepare for the mitigation of job losses due to technological change?	2.5 What leadership action is required 2.6 – 2.8 All theory on CLT and LOAT	Questions 5,7,8, 9 See above	

APPENDIX 2: Ethical Clearance Form

Gordon Institute of Business Science
University of Pretoria

01 June 2018

Valerie Wiggett

Dear Valerie

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

Please note that approval is granted based on the methodology and research instruments provided in the application. If there is any deviation change or addition to the research method or tools, a supplementary application for approval must be obtained

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

Gordon Institute of Business Science
Reg. No. 93/19816/08

26 Melville Road, Illovo, Johannesburg
PO Box 787602, Sandton, 2146, South Africa

telephone (+27) 11 771 4000
fax (+27) 11 771 4177

website **gibs.co.za**
University of Pretoria

APPENDIX 3: Consent Form

Gordon Institute of Business Science
University of Pretoria

30th July 2018

Dear Sir/Madam

INFORMED CONSENT LETTER

I am conducting research to assess the readiness of organisations in South Africa for the mitigation of job losses amongst knowledge workers, due to technological change. My aim is to assess the type of leadership style or traits/behaviours that are being applied by leaders with regards to the impact of technological change on their organisations and the actions that are being taken to mitigate job losses.

Our interview is expected to last about an hour, and will help us assess the status of your organisation with regards to the impact of technological change.

Your participation is voluntary and you can withdraw at any time without penalty.

All data will be reported without identifiers, thus your anonymity will be maintained. If you have any concerns, please contact my supervisor or me. Our details are provided below.

Yours faithfully

	Researcher:	Supervisor:
Name:	VALERIE WIGGETT	NAVLIKA RANTANGEE
Email	17393541@mygibs.co.za	nratangee@icas.co.za
Telephone	0793101203	0823141793

Signature of participant:	
Date:	
Signature of researcher:	
Date:	

APPENDIX 4: Email Brief

(Sent together with consent form)

Dear Sir/Madam

I am an MBA student at GIBS, which is the business school of the University of Pretoria. I am in the process of completing my research project as a compulsory component of my degree.

I am conducting research to assess the readiness of South African organisations for the mitigation of job losses, amongst knowledge workers, due to technological change. As part of the research methodology, I am interviewing senior HR and Business leaders in different organisations and industries.

My aim is to assess the type of leadership style or traits/behaviours that are being applied by leaders with regards to the impact of technological change on their organisations and the actions that are being taken to mitigate job losses.

I would like to request an interview with you to discuss the above topic and would be very grateful if you could afford me the time. The interview should not take longer than an hour.

I would appreciate your consideration of my request.

I have attached a copy of the informed consent letter for your perusal.

Yours faithfully

Valerie Wiggett

Contact details:
Mobile: 0793101203
Email: 17393541@mygibs.co.za

APPENDIX 5: Interview Dates and Times

Interview Number	Date	Length	Transcription tool
Pilot	25/06/2018	01:03:06:00	Not Included
1	25/07/2018	20:36:00	Speechnotes
2	26/07/2018	33:43:00	Speechnotes
3	30/07/2018	32:54:00	Speechnotes
4	01/08/2018	57:07:00	Speechnotes
5	03/08/2018	46:29:00	Speechnotes
6	07/08/2018	34:03:00	Speechnotes
7	14/08/2018	17:20:00	Speechnotes
8	15/08/2018	23:08:00	Speechnotes
9	16/08/2018	53:46:00	Speechnotes
10	16/08/2018	25:20:00	Sonix
11	17/08/2018	17:45:00	Sonix
12	18/08/2018	39:54:00	Sonix
13	18/08/2018	52:00:00	Sonix
14	19/08/2018	22:20:00	Sonix
15	21/08/2018	26:30:00	Sonix
16	22/08/2018	54:22:00	Sonix
17	23/08/2018	46:05:00	Sonix
18	24/08/2018	35:09:00	Sonix
19	24/08/2018	31:25:00	Sonix
20	27/08/2018	33:42:00	Sonix
21	28/08/2018	53:42:00	Sonix
22	06/09/2018	32:23:00	Sonix
23	14/09/2018	53:03:00	Sonix

APPENDIX 6: Interview Schedule

1. Executive's position and length of tenure.

2. Industry, type of business and age of company.

3. Overview of existing staff complement, number of knowledge workers and types of jobs done.

4. Identify any anticipated or existing technological change happening within the company.
    - What, how and when?

5. Describe and explore any effect of the change for the business and possible workforce impact.
    - *Identify CLT/LOAT attributes if applicable*.
    - *This is to establish the level of awareness and current stage of the issue within the organisation. Is this a current issue or challenge for the organisation? Does it feature in the strategic planning?*

6. Discuss what response is required by leadership and who they believe is responsible?
    - *Identify CLT/LOAT attributes if applicable*.
    - *This is to establish where the responsibility lies for job loss mitigation? Are firms entirely responsible? Should government share some of the responsibility or have it included in schooling curricula? Should employees be upskilling themselves?*

7. Discuss the plans for the workforce, if any. Identify any gaps or shortfall in the skill requirement.
    - *Identify CLT/LOAT attributes if applicable*.

8. Has any action already been taken or planned to mitigate job loss or offset the job loss, if applicable?
    - *Identify CLT/LOAT attributes if applicable*.

- *This is to determine what companies are actually doing in this regard. Are employees being reskilled or redeployed? Are there any potential retrenchments?*

9. Discuss any issues or positive effects of the change, if applicable.
    - *What role does complexity leadership theory play in the mitigation of job losses? What CLT/LOAT attributes are being displayed by the leaders? How are they leading? Can the CLT or LOAT frameworks be built on?*

APPENDIX 7: List of Code Groups and Codes

Code Groups – Codes (125)	
RQ1 Level of Awareness	**RQ1.1 Awareness of Technological Change** – Awareness - Leadership or Staff or Customers – Strategic Planning or Intent and business strategy alignment – Confirmation of Tech Change with possibility of technological unemployment – Technological Anxiety – Tech available or purchased or being discussed but not implemented - no plans for workforce – Funding and priorities of spend – Complacency Wait and see approach or too busy **RQ1.2. Technological Change Attributes** – Benefits of tech and growth multiplier – Competitive Edge – Rate and volume of Change and push vs pull – Resistance and Denial or Push back – Tech Change across different industries – Change in pockets and pieces of work – Increase in headcount due to tech **RQ1.2.1 Types of Technological Change** – Digitization, Digitalization Automation Digital process or system and Cloud – Alignment or Integration of Systems & BP improvement – In House system development/Upgrading – Use of Data or Data Analytics and data cholesterol – Impact farming and IOT/API & social impact – Use of Drones/Driverless vehicles/Robotics/Virtual Reality/3D Printing – No Tech Change – Tech Change - Choice – How it will be implemented – Chatbot/Video interviews – Blockchain/Suitcase banking – Artificial Intelligence/Machine learning – Biometric/T&A/Voice analytics **RQ1.2.2 Timing of Technological Change and potential job losses** – Tech Change - Timing Firm – Tech Change - Timing before tech impacts jobs **RQ1.2.3 Technological Unemployment** – Recruitment slow down and natural attrition or early retirement – Affected Roles – Technological unemployment – Tech Change - No job loss – Generational issue – Industry shrinkage and redundant jobs
Activities RQ2 Job Retention	**RQ2.1 Reskilling** – Reskilling and attributes – Continuous learning & Openness to learning – Multi-skilling – Learning/Unlearning a behaviour **RQ2.1.1 Options for Reskilling or Training** – In-House or Bespoke Training – Graduate, Learnerships & Bursary Schemes

	– External Reskilling **RQ2.2 Redeployment** – Redeployment **RQ2.3 Other Job Retention Activities** – New Skill mapping and Skill realignment – Offshoring, Outsourcing or Labour Broker arrangement – Retention or mitigation activities and projects – Job creation/Rehiring/New Role creation & example – Mitigation proactivity and workforce planning – Dedicated Innovation team & use of own dev resources – Learning paths vs Career paths & fail fast – No mitigation activity required
RQ3 Level of Responsibility	**RQ3.1 South Africa - Challenges and Opportunities** – International comparison or Unique to SA – Economic challenges and parallel state – High unemployment rate and role of unions – Opportunity Creation or Availability & immigration of knowledge workers – Emerging Economy vs Knowledge economy and standard of education **RQ3.1.1 Firm Responsibility** – Firm responsibility – Commitment to CSR - Bridging the gap and charity fatigue – Balancing Shareholder interests & profit focus – Corporate greed and layers of waste **RQ3.1.2 Government Responsibility & the Role of the State** – Government Action - Education & Policy – Government - Responsibility – Government Action - Leadership needed - Awareness and Ability to deliver – Government Action - Bureaucracy and Enablement – Government Action - Improve Infrastructure (Funding and tax payer burden) – Government - Corruption and Lack of Trust **RQ3.1.3 Civil Society Responsibility** – Civil Society responsibility **RQ3.1.4 Individual Responsibility** – Individual responsibility - Motivation and attitude – Performance management & Accountability **RQ3.4 Shared Responsibility** – Shared responsibility Firm and Government – Shared responsibility Government Civil Society and Firms – Shared responsibility Firm and Individual
RQ4 CLT & LOAT Framework Usable?	**RQ4.1 Leadership Challenges & Responsibilities** – Leadership Challenges and Responsibilities – Visionary and Inspirational and community needed – Legacy and Sustainability **RQ4.2 Leadership Skills Required** – Transparency and open communication or conversations – Adaptive or Adaptive Capacity or creating capacity – Enabling and Engaging and ambidexterity – Authentic and Empathetic and optimism and positivity – Agility and digital kaizen – Top-down or Control vs Servant and leading by example – Ethical leadership

	– Skills needed or capability and understanding of tech – Entrepreneurial Leadership – Flexibility & Fluidity required – Operational, Administrative, sponsorship and problem solving – Progressive cultural and diversity ability and inclusivity **RQ4.2.1 Change Management** – Change Culture or fitness and constant flux and fatigue – Change Management – Unknown direction and focus on the now and future proofing **RQ4.3.1 Future of Work** – Flexible hours and working online - collaboration and communication – Human-machine collaboration and the Human Element – Millennials and informality – Changing or Decentralised Business model – gig economy and project work or job sharing and smaller work teams **RQ4.3.2 Future Employees** – Employee value proposition - Growth or ikigai or spiritual wellbeing and empowerment – Employee engagement & rewards **RQ4.3.3 Future Customers** – Change in Consumer buying behaviours or online purchasing – Customer led innovation and Customer obsession **RQ4.4 Action Needed - Role of HR** – HR Thought Leadership and preparation – Role of Employment legislation – HR Challenges and Credibility – Recruitment and Job Evaluations **RQ4.5 Tools Needed - Culture & Trust** – Culture – Trust
Background	
	0.1 Interviewee Info – Roles – Length of tenure – Length of tenure in organisation – Portfolio – Profession and professional competency – Founding member **0.2 Company Info** – Staff Description and Demographics – Products and services incl. Business activity and Value proposition – Types of Businesses and Industries – Firm structure incl. Department description and Service challenges – Firm size – Countries of Operation – Age of Business – Competitor Comparison - Industry Tech or Service – Cost Cutting or Cost Consciousness or Business rescue – Firm sizes changed or changing – Global Market or Global business partners and MNCs – Industry Leader or trailblazer – Vision Mission and values

APPENDIX 8: Level of Awareness (By Interview)

#	Confirmation of strategic intent in the firm	Tech change in progress in the firm	If not, how far away	Confirmed that tech change could create job losses in the firm	No Firm Job losses anticipated	Increase in jobs due to tech change	Evidence of Tech Anxiety	Tech is Being discussed / available / purchase/ but not implemented - no plan for workforce	Concerns about funding for tech and priorities of spend or cost cutting	Slowdown in recruitment	Employing different skills	Wait and See	Anticipate large scale job losses due to tech change in the future in South Africa
1	X	Yes	In progress	X							X		Possible
2	X	No	1-2 years		X	Yes							No
3	X	Yes	In progress								X		No
4	X	Yes	In progress	X			X				X		No
5	X	Yes	In progress	X			X		X		X		Yes
6	X	Yes	In progress	X			X	X	X	X	X		Yes
7	X	Yes	In progress	X			X		X		X		Yes
8	X	No	N/A										No
9	X	No	N/A				X			X	X		No
10	X	Yes	In progress	X	X			X	X	X	X		Possible
11	X	Yes	In progress			Yes				X	X		No
12	X	Yes	In progress	X		Yes	X				X		Possible
13	X	Yes	In progress	X	X		X			X	X		Possible
14		Yes	Complete	X						N/A			Yes
15	X	Yes	In progress		X	Yes				X	X		No
16	X	Yes	In progress	X			X			X	X		Yes
17		On hold	On Hold		X			X		X	X		No
18	X	No	On Hold					X		X	X	X	Possible
19		Limited evidence	N/A		X			X		Limited	X		N/A
20		No	N/A		X								No

#	Confirmation of strategic intent in the firm	Tech change in progress in the firm	If not, how far away	Confirmed that tech change could create job losses in the firm	No Firm Job losses anticipated	Increase in jobs due to tech change	Evidence of Tech Anxiety	Tech is Being discussed / available / purchase/ but not implemented - no plan for workforce	Concerns about funding for tech and priorities of spend or cost cutting	Slowdown in recruitment	Employing different skills	Wait and See	Anticipate large scale job losses due to tech change in the future in South Africa
21	X	Yes	In progress		X			X		X			No
22	X	Yes	In progress		X					X	X		Possible
23	X	Yes	In progress	X		Yes			X	X	X		No
Total	**18**			**11**	**9**	**5**	**8**	**6**	**5**	**12**	**18**	**1**	

APPENDIX 9: Types of Tech Change (By Interview)

Number	Digitization/ Digitalization/ Automation/ Cloud	Inhouse system development or upgrades	Alignment or integration of systems and business processes	Chatbot and Video interviews	Peer to peer / IOT	Use of Data and Data analytics	Blockchain or suitcase banking	Use of drones / driverless vehicles / virtual reality / 3D printing	AI/Machine Learning	Biometrics and Voice analytics	Total
1						X			X		**2**
2	X			X		X		X			**4**
3	X										**1**
4	X	X	X			X	X				**5**
5	X		X		X			X			**4**
6	X										**1**
7	X				X						**2**
8	X	X									**2**
9			X	X							**2**
10	X	X	X			X					**4**
11	X	X									**2**
12	X		X	X			X				**4**
13		X		X		X				X	**4**
14	X	X									**2**
15	X	X									**2**
16	X	X	X		X			X			**5**
17			X								**1**
18											**0**
19	X										**1**
20	X								X		**2**
21	X	X	X							X	**4**

Number	Digitization/ Digitalization/ Automation/ Cloud	Inhouse system development or upgrades	Alignment or integration of systems and business processes	Chatbot and Video interviews	Peer to peer / IOT	Use of Data and Data analytics	Blockchain or suitcase banking	Use of drones / driverless vehicles / virtual reality / 3D printing	AI/Machine Learning	Biometrics and Voice analytics	Total
22	X	X	X								**3**
23		X			X		X		X		**4**
Total	**17**	**11**	**9**	**4**	**4**	**5**	**3**	**3**	**3**	**2**	

APPENDIX 10: Industry Specific Quotes Relating to Tech Change

Code	Industry	Quotation Content
Tech Change across Different industries	Financial Services and Public Sector	Interviewee XX: So, what we find is in financial services,those guys are way ahead of the curve in terms of what we have discussed. That is just on the one side of the spectrum. On the other end you get the public-sector clients and within that there is a level of differentiation. I have been working with the metros for the last three years, so there has been some uptake of some of those ideas and some of the pull factors where the client says: Guys come and talk to us about how we can leverage digital, to provide a good customer experience. Come and tell us how we can leverage SAP analytics for us to be able to have a one view of our customer,so that we understand what are the various touch points and how we serve them across all of those, touch points. So, there are those pull dynamics from the clients as much as if you look at a Public Sector it's still a push dynamic. But as I said on the other side of the continuum with Financial Services particularly its largely a pull dynamic.
Tech Change - Different industries	Healthcare	Interviewee XX: For example a urology hospital in Pretoria. I don't know if ... They've actually, I haven't seen it, It's a device, it's a dispensing robot and that took over the positions of 3 or 4 pharmacists.
Tech Change - Different industries	Healthcare - Global	Interviewee XX: So, when you look at it for the medical industry what will happen is... one of the providers or producers of kit in technology has made a probe that fits on your finger. You don't need to go to the doctor. You can be in a rural village, the doctor can be 10 000 miles away and he can actually take your blood pressure, your heart beat, your heart rate all of those statistics from that technology.
Tech Change - Different industries	Legal	Interviewee XX: I think it would be something so simple to implement and in fact it's it defies logic that it hasn't in this day and age been implemented as yet, within our judicial system, is the concept of electronic filing...You are still required, unless the other side consents to service by email, which most firms do, but unless there's that consent you still need to, with the document that you intend to file in court, drive to the opposing attorneys firm, serve that, a copy of that document on them and then drive from their firm to the courthouse, and actually stand in the queue sometimes of about half an hour to two hours long. ... if you're filing in the high court, and hopefully you file it, hopefully they do manage to file, find your court file that you need to file it into, first and foremost. That's the one major challenge. Then you still need to drive back to the office. Now that is for me just illogical. How the courts themselves, how the Department of Justice and Constitutional Development haven't implemented an electronic filing system.
Tech Change - Different industries	Legal - Global	Interviewee XX: they say lawyers will get replaced with AI. Yes, but I don't know, I mean technically, probably already software can make better legal technical recommendations ... than a person. But I don't know people like to talk to a lawyer for other reasons. They want, they want a sympathetic ear, they want somebody fighting in their corner, maybe they won't trust technology, but AI can do some pretty scary things in terms of finding patterns in data, that would apply to legal precedents as well. a clerk in a law firm gets told to do research on a particular case and will go and read,...10 20 years 50, whatever... 100 legal cases. The AI bot will read all million in the entire world that ever related to that topic and find the most common factors out of it, so I don't think any human can compete with that level of data analytics.
Tech Change - Different industries	Mining	Interviewee XX: Because of the need for production, the revenue and the chasing of making sure that, the demand, basically. If, if a mine strikes for one day, you lose millions. So typically, what happens is, you'll have 3 shifts. Eight hours, eight hours eight hours, like the morning, afternoon and night shift. A lot of companies are doing a twelve-hour shift, where you only have two crews. But there's constant production and then there's a day of rest normally, say Saturday every second Saturday or Sundays. But if you look at a plant for example, where once the mining, the ore is taken out, it goes through the whole smelter process and concentrator, that never shuts down. Not even over Christmas. So, it is a continuous process, to ensure that you have continuous production, that you can send into the market. ...I think it was in China that influence Australia a lot...they, the price I think it was Iron, was that iron ore I think. That the whole market crashed because they got extra, like piles. They used spare that they had put away and they flushed the market basically. And it had a whole ripple effect. So, I don't think the shift system will every change, unless you actually bring in the technology and the robots, and the I don't know, the machines who can work continuously. where you don't have to stop, and you don't care, but it's a while...

APPENDIX 11: Timing of Tech Change and Unemployment (By Interview)

#	Quote relating to Tech change timing in the business	Stage of tech change in firm / division	Timing for potential tech unemployment in firm	Quote relating to Tech change timing in South Africa	Timing for potential tech unemployment in South Africa
1	Well, we are only starting now, but I think in the next 2-3 years.	In progress	2 - 3 years	Not discussed	Not discussed
2	…We should have done it already. It's the case of being too busy to actually give attention to it and it would only affect one person.	Planned in 1-2 years	No job loss anticipated.	I think people don't think that the impact is there but I think that actually, if we looked at it, the impact is already happening and maybe not as obviously and not in big batches, but I can't prove it, but I would imagine that the composition of people in the workforce is evolving all the time because of the effect of technology, taking out steps in the process, automating tasks, making people's lives easier. On the other hand, it also complicates things.	Now
3	it wasn't all at once. It was a process… it was gradually implemented within the company	In progress	Redeployment and reskilling process in place	If you look its coming at a rapid rate and I can't put a number of years to it ...That's even if it is 2 years it could be a few months depending on what organisation, what industry and what product you are selling and who's your customers. But for companies today they have to change their mindsets on, it's not a thing of the technology is coming, and we haven't seen it, it will be here in 10 years. The technology is there. There is a large part of technology that we don't know exists and it does, and it is in proto type stage	2 - 10 Years
4	Which I think is 5 years from now. It's a 5-year plan.	In progress	No job loss anticipated.	The reality is that the 5% is going to relevant in18 months they are going to be wiped out...So, we try to have those conversations but yes, the concerns are there. So, what we then find is that in spite of our recommendations of what mitigations and all of that, you find that there is no uptake for any service that in the minds of those clients leads to… job losses, they tend to resist it.	Now

#	Quote relating to Tech change timing in the business	Stage of tech change in firm / division	Timing for potential tech unemployment in firm	Quote relating to Tech change timing in South Africa	Timing for potential tech unemployment in South Africa
5	On the knowledge workers side, the work that we've done so far in the automation of tasks, are pretty much like in the HR space, we have automated a lot of your transactional tasks. So, we are looking at automating all of the admin related tasks all of your document storage, your recruitment etcetera.... On the finance side we haven't really automated any of the financial elements yet from the white-collar workers.	In progress	In progress	So, they have seen the bigger picture in terms of where it is going. So, they are trying and testing a lot of the automation and staff in the European market and it will become a matter of sort of time where it will be pushed down here, but they don't understand the legislative compliance regulatory from a labour perspective in a South Africa market.	Now
6	Shoo because the exercise hasn't been done it would be difficult. However, the skill that exists already for quite a large number of people and that's 40% of the work… let's say 30 % let's be conservative 30 % of the workforce	In progress	In progress	knowing that this could happen how do you ensure that given the difficult operating… the difficult economic conditions in which your business operates. Are you able to maintain jobs? And have a workforce that can deal with these changes and it's difficult. ...So, really, I think anybody as an employer regardless if you are government or enterprise or small business you have an obligation to your workforce to create jobs and retain jobs.	Now
7	As we speak it's in progress full stop ...That is happening. It's not happening to, for the point to retrench people but it will, that's going to probably happen... I think 2 years. .	In progress	2 years	Not discussed	Not discussed
8	...we don't actually have any physical offices, so we are a distributed team around the world. It's easier to start like this from the beginning. So, where I am working it was started from the beginning. We didn't have to change to be where we are, and I think that is the biggest risk that companies like this where a corporate in a big office have a challenge.	N/A	N/A	I think it's far away... I don't think that job loss is something that I would be concerned about in the short term. I think even if they did. There is still a human element that is needed to analyse the information that is coming through. I think jobs will change but I don't think jobs will be lost necessarily as a result quickly and at scale. …So, until such time that the Infrastructure can handle the systems and our connectivity is really world class giving you fast enough service, reliable enough service, that infrastructure is still a limiting factor of something happening really quickly...No, it's not 18 months away in 5 years from now and I think there is a missing management ...training element..	18 months - 5 years

#	Quote relating to Tech change timing in the business	Stage of tech change in firm / division	Timing for potential tech unemployment in firm	Quote relating to Tech change timing in South Africa	Timing for potential tech unemployment in South Africa
9	The things that we have done here were not so much an introduction of a new technology. It was more on the re-engineering of the business processes for the better.	N/A	N/A	Question not answered directly	Now
10	from knowing how we operate ourselves and within our organization, we are only just moving a lot more system automated now. But just that's just to take off pressures for manual administration of that. So, in terms of our own organization, we slow to move on to technological changes but it's starting now. We've got exco coming up in two weeks' time. But we have to see what the decision was taken in that…	In progress	1 year	I think it's still going to go on for some time before we start seeing those kinds of things coming in... Hmm. The question is how ready is South Africa for that?	Unknown
11	We actually do we automating quite a bit... A lot ...So, for now it's just the mundane administration of things to free up people's time not to actually replace them.	In progress	No job loss anticipated.	I think is still very far away…I don't know... It depends how quickly they develop the stuff but I think we always a little bit behind in other countries but if you look at places like, I think it was Lego we were discussing, there are hardly any people working there anymore it's all done with machines, their factory workers and that, they've all been replaced. I don't know if we would ever get to that level here. Probably in the next 2 - 3 years people will start really looking at it.	2 - 3 years
12	...We are testing it, so it was actually pushed up from Nam which is our American business. So, we've only just started trialling out bots in MEIA I think we started at the beginning of the year. And I think to get further along and to get more approvals on it I think it's going to take probably another year.	In progress	1 year	Not discussed	Not discussed

#	Quote relating to Tech change timing in the business	Stage of tech change in firm / division	Timing for potential tech unemployment in firm	Quote relating to Tech change timing in South Africa	Timing for potential tech unemployment in South Africa
13	I think again I'm going to say I think XXX is a little bit behind the game. It was definitely happening more in XXX when I was there. But it's happening and. It's happening fast, but slow enough that I don't think people are really noticing. I think I think voice analytics will be the first one where I am predicting we may actually see... Researcher: How far away do you think that is? 12 months. And Ja. I don't think we're that far away from it so as far as facilitation Ja. I think the industry is... Researcher: In flux? Well in threat.	In progress	1 year	it's outlook predicting who you actually want to e-mail. it's Google predicting what you're actually looking... When you're feeling it, it's really helpful it's not getting in the way. So, I think we're further down the line than we think. And we're primed to accept it so … it's the machines are they're going to do it a lot better. But I think a lot of people have been feeling very calm about knowledge work and it's coming just around the corner.	Now
14	Ok well it probably started 3 years ago when we started looking at just to be more almost competitive in the market …South Africa, because XXX is so regulated, and then that deal probably finished in May this year when we then retrenched staff and moved to new software that obviously uses the XXX that's based in the UK.	Completed	Now	Not discussed	Not discussed
15	there is some implementation at the moment. But at the moment where we do then find capacity from a resource perspective we are able to utilize it elsewhere. Will it have a bigger impact in five years' time, possibly?	In progress	5 years	Not discussed	Not discussed
16	so we started having the discussion from a point of view where we had I think it was towards the beginning of the year where we were...So, the impact hasn't been all that great, but I think 2019. Project X goes live in 2019. It's all of these things start happening...But in terms of innovation in everything that we do know I think that it's the last 3 years.	In progress	1 year	All I know it's going to happen. It's going to have a really huge impact on our in employees. It is going to have impact on our South African workforce. It's having an impact worldwide.	Now

#	Quote relating to Tech change timing in the business	Stage of tech change in firm / division	Timing for potential tech unemployment in firm	Quote relating to Tech change timing in South Africa	Timing for potential tech unemployment in South Africa
17	We did. It's been put on hold. From a customer interaction perspective and they have these big plans, but nothing is kind of happening very quickly	On Hold	N/A	the people impact is going to take longer because we are... we do have quite stringent employment legislation and equity even equal pay for equal work and that type of thing. We do have those, not restraints or constraints but it needs to be taken into consideration. So, we can't just put in machines and get rid of people.... I think your more mature industries have got a bit of leeway I suppose because they don't have to deal with that as, as the impact is not as great. I would say that those sorts of industries are probably 5-10 years. But I think that where the knowledge workers would be impacted is probably 3-5.	3 - 5 years
18	In the company. No, but in the industry. Yes. And this is part of I think the challenge that we have.	On Hold	N/A	it's a national issue. with the situation in our country from a government point of view, it has to start there. Our biggest... there's no investment, or like I said, investor comfort. They, it's important to keep the market competitive.	Now
19	there was a lot of it when computers first became mainstream. there was a lot more of it and when companies started to migrate onto systems and using systems, that was sort of 80s 90s, I would say but I'm not personally seeing a lot of it at the moment.	N/A	N/A	Well, in the South African context there's always a lot of pressure to maintain the labour, the junior jobs. So, for example in Australia they've got robots doing certain mining jobs. And it saves a lot of jobs but that not ever happened here because there's too much pressure to employ a lot of people in that sector, to keep the economy going and all of that. So as much as, a robot sounds like it's a wonderful idea, if you have a bunch of robots, who is going to buy your products? So, I think in the South African context, well I would like to see it operating effectively in other countries. And then we're at least 15 20 years behind, in countries like Europe and U.S. So, I don't think, are we seeing that in other countries, where the context is the same? I'm saying in Australia maybe you seeing it in the mining sector, but would it happen here, due to all the pressure from unions and government. Would it happen? Probably not easily? So, I would say far off.	15 - 20 years

#	Quote relating to Tech change timing in the business	Stage of tech change in firm / division	Timing for potential tech unemployment in firm	Quote relating to Tech change timing in South Africa	Timing for potential tech unemployment in South Africa
20	I think there is scope in due course perhaps for technology to have a greater impact on the legal industry.	N/A	No job loss anticipated.	Will not be replaced by machines any time soon. Yes, you can get, we do have messengers, which do that by far and large, but sometimes, there are certain documents which need a particular touch, or someone with the.... No, I don't, Not in this day and age. it's something as basic as that, that we can't get right. It's...But the way things are being done now, I don't, I don't see any major job losses on the cards and ja it's as much as I would like the industry to adapt and become more technologically savvy,. I don't see it happening any time soon. I think it could have been done already simple something of electronic filing at court.	Unknown
21	Yes, across the group, across the group in HR at this stage.	In progress	No job loss anticipated.	I think we quite far away. I think we've got a lot of challenges, within our environment, just in South Africa already.	Unknown
22	So, we are now as a company introducing that within our business so that we, know how to use it, have got stories to go and share with our clients. So, there's been a big move, I know in my area in particular, we are digitizing the recruitment process and the onboarding process.	In progress	No job loss anticipated.	I think it's happening at the moment. I think that it's going to be a work in progress. no one has a crystal ball, so it's difficult to tell. I can already see knowledge workers, if you not upskilling, if you're not adapting, you're being left behind. It's, it's already in process... But I don't, I don't foresee a massive change that no one is going to be able to keep up with	Now
23	and then really went on a journey probably I can check dates, 13 years ago	In progress	No job loss anticipated.	Look we are in very interesting times at the moment. South Africans are very robust. They just are. And so, we need to work out how we how we repurpose those people. In our own organisation because if organisations don't do it, it's not governments problem. I mean if government employs more. Or some other inefficient organisation employs more. My tax has to go up and I have to be inefficient. So, if I can't solve it here and now.	Now

APPENDIX 12: Levels of Responsibility (By Interview)

Interviewee	Firm	Government	Civil Society	Individual	Total
1	X	X		X	3
2	X	X		X	3
3	X	X	X		3
4	X	X	X		3
5	X	X	X		3
6	X	X			2
7		X			1
8	X	X			2
9	X	X	X	X	4
10	X				1
11	X	X		X	3
12		X		X	2
13	X	X		X	3
14	X				1
15	X	X			2
16	X	X		X	3
17	X	X		X	3
18	X	X		X	3
19		X			1
20	X	X			2
21	X	X		X	3
22		X		X	2
23	X	X	X		3
Total	**19**	**21**	**5**	**11**	**56**

	Responsibility shared between Firm and Individual (3)
	Responsibility shared between Firm and Government (6)
	Responsibility shared between Firm, Government and Civil Society (4)

APPENDIX 13: Job Mitigation Activities (By Interview)

Interviewee	Redeployment	New Skill Mapping & Skill Realignment	Reskilling	Offshoring, Outsourcing / Labour Broker Arrangement	Job Creation, New Role Creation & Rehiring	Mitigation Proactivity & Workforce Planning	Retention Or Mitigation Activities & Projects	Dedicated Innovation Team / Use of Own Development Resources	Learning Paths vs Career Paths & Fail Fast Thinking	No Mitigation Activity Required
1	X		X			X		X		
2	X	X	X	X	X	X	X			
3	X	X	X				X			
4		X		X		X	X			
5	X	X	X		X	X	X			
6		X			X		X			
7	X		X							
8										
9	X	X			X		X	X	X	
10	X		X	X	X					
11		X		X						
12	X	X		X	X				X	
13	X		X		X	X				
14	X				X		X			
15	X	X		X		X	X		X	
16	X	X	X			X	X	X		X
17	X		X	X						
18		X		X		X				
19	X	X		X						
20										X
21	X	X	X	X	X	X				
22	X	X						X		
23		X								
	16	**15**	**10**	**10**	**9**	**9**	**9**	**4**	**3**	**2**

APPENDIX 14: Comparison of CLT and LOAT Models and Results

CLT	Summarized definition (Uhl-Bien et al., 2007; Uhl-Bien & Marion, 2009; Arena & Uhl-Bien, 2016.)	LOAT	Summarized definition Uhl-Bien and Arena (2017, 2018)	Spoken About during Research Interviews	Evidence within firm relating to technological change based on activity and discussions
Administrative	Managerial and formal activities of an organisation, such as coordinating and planning tasks. Top-down function embedded in authority and status Ideal for implementation	**Operational leadership**	Official design and alignment of systems and processes to efficiently execute ideas and convert them into productive outcomes. Most important role is converting innovation into reality and sustaining the results. Must not stifle innovation or entrepreneurship in bureaucracy but work more towards enabling and accommodating innovation and adaptability which are vital to the survival of organizations and achieving results. Sponsoring (supporting ideas), aligning (positioning and getting buy in/support from other stakeholders) and executing	5 Interviewees	Evidence of strategic intent at 18 firms

CLT	Summarized definition (Uhl-Bien et al., 2007; Uhl-Bien & Marion, 2009; Arena & Uhl-Bien, 2016.)	LOAT	Summarized definition Uhl-Bien and Arena (2017, 2018)	Spoken About during Research Interviews	Evidence within firm relating to technological change based on activity and discussions
Adaptive	Informal, emergent, complex and dynamic Conflict of ideas or preferences and adaptive, creative and learning actions emerge from the interactions within the CAS and strive to adjust to the tension Central source of change in an organization. Adaptive space. Adaptive space occurs in the interface between the operational and entrepreneurial system by embracing, rather than stifling, the dynamic tension between the two systems" Adaptability, which enhances performance and innovation, occurs in the everyday interactions of individuals acting in response to pressures and opportunities in their local contexts Allowing for innovation and creativity to emerge from any changes, as well as any positive results of technological change and reskilling opportunities.	**Entrepreneurial leadership**	Exploration and origin of new ideas, innovation, learning and growth within the organization and the birth place of innovative solutions, new products and services, which create and capitalise on additional opportunities and assist the organisation in adapting to complexity pressures (often a motivating factor) which challenge the individuals and teams to create new ways of working or products/services Creativity is a collective, cohesive process of trust. This type of leadership is often biased for action and works quickly to get ideas implemented, with limited resources and tight deadlines Flexible, tenacious, patient and persistent and understand the importance of timing to get new ideas to market	Adaptive - 14 Interviewees Entrepreneurial - 5 Interviewees Flexibility/Fluidity - 3 interviewees	10 firms are implementing 3 or more technologies that will fundamentally change how they operate and create new opportunities

CLT	Summarized definition (Uhl-Bien et al., 2007; Uhl-Bien & Marion, 2009; Arena & Uhl-Bien, 2016.)	LOAT	Summarized definition Uhl-Bien and Arena (2017, 2018)	Spoken About during Research Interviews	Evidence within firm relating to technological change based on activity and discussions
Enabling	Acts between administrative and adaptive leadership To create the conditions for complex interactive dynamics of adaptive leadership to emerge and to manage and integrate the administrative-adaptive interface Will provide an environment for any technological changes to happen successfully with minimum negative impact	**Enabling leadership**	Enabling of conditions that effectively support and sustain adaptive space. Enabling leadership is the unique complexity leadership attribute Combined and engaged with operational and entrepreneurial leadership, this attribute allows organizations to be agile and operate as complex adaptive systems. New, emerging response to complexity. Remains unrecognised, as no terminology has existed to describe it before and therefore it is often misunderstood or misconstrued. Link between operational and entrepreneurial systems within organizations and nurtures/enables adaptive space and the emergence of adaptive responses in a system. It initiates and amplifies support for novelty, innovation and change.	Enabling - 11 interviewees Agile (and digital kaizen) - 9 interviewees	<u>Mitigation activities:</u> Redeployment - 16 New skill mapping - 15 Reskilling - 10 Job creation - 9 Workforce planning - 9 Retention projects - 9 Dedicated innovation team - 4 Learning paths vs career paths - 3
Entanglement.	The dynamic relationship between the formal top-down, administrative forces (i.e., bureaucracy) and the informal CAS of social systems i.e. adaptive and enabling leadership. Co-ordination of the various leadership styles to ensure success			7 Interviewees	<u>Additional leadership styles/skills that interviewees believe are important or needed</u> Transparency and Open communication - 15 interviewees Ambidexterity - 1 interviewee Authentic/Empathetic/Positivism - 11 interviewees

CLT	Summarized definition (Uhl-Bien et al., 2007; Uhl-Bien & Marion, 2009; Arena & Uhl-Bien, 2016.)	LOAT	Summarized definition Uhl-Bien and Arena (2017, 2018)	Spoken About during Research Interviews	Evidence within firm relating to technological change based on activity and discussions
	of any changes.				Ethical - 5 interviewees Knowledge of Tech - 5 interviewees Cultural and diversity inclusion - 4 interviewees Culture - 16 interviewees Trust - 4 interviewees

REFERENCES

African Union (2016). *Continental education strategy for Africa 2016 - 2025*. Retrieved from https://au.int/sites/default/files/documents/29958-doc-cesa_-_english-v9.pdf

Aggarwal, V. A., Posen, H. E., & Workiewicz, M. (2017). Adaptive capacity to technological change: A microfoundational approach. *Strategic Management Journal*. doi.org/10.1002/smj.2584

Anderson, H. J., Baur, J. E., Griffith, J. A., & Buckley, M. R. (2017). What works for you may not work for (Gen)Me: Limitations of present leadership theories for the new generation. *The Leadership Quarterly*, *28*, 245–260. doi.org/10.1016/j.leaqua.2016.08.001

Arena, M. J., & Uhl-Bien, M. (2016). Complexity Leadership Theory: Shifting from Human Capital to Social Capital. *People and Strategy*, *39*(2), 22–27. Retrieved from https://search-proquest-com.uplib.idm.oclc.org/docview/1782244569/fulltextPDF/CDB8C87F375E42FBPQ/1?accountid=14717

Arntz, M., Gregory, T., & Zierahn, U. (2016). *The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis. OECD Social, Employment and Migration Working Papers, 189* (2). OECD Publishing, Paris. Retrieved from doi.org/10.1787/5jlz9h56dvq7-en

Autor, D. H. (2015). Why Are There Still So Many Jobs? The History and Future of Workplace Automation. *Journal of Economic Perspectives*, *29*(3), 3–30. doi.org/10.1257/jep.29.3.3

Autor, D. H., Katz, L. F., & Kearney, M. S. (2006). The Polarization of the U.S. Labor Market. *American Economic Review, 96*(2), 189–194. Retrieved from https://economics.mit.edu/files/11579

Autor, D. H., Levy, F., & Murnane, R. J. (2003). The Skill Content of Recent Technological Change: An Empirical Exploration. *Quarterly Journal of Economics, 118*(4), 1279. Retrieved from http://search.ebscohost.com.uplib.idm.oclc.org/login.aspx?direct=true&db=eoah&AN=23137821&site=pfi-live

Bakhshi, H., & Windsor, G. (2015). *The Creative Economy and the future of employment*. Retrieved from https://www.nesta.org.uk/publications/creative-economy-and-future-employment

Baxter, R. (2016). *The Future of the South African Mining Industry.* [PowerPoint Slides]. Retrieved from http://www.chamberofmines.org.za/industry-news/publications/presentations/send/7-2015/242-the-future-of-the-south-african-mining-industry

Bezuidenhout, C. (2018). *The impact of technological change on jobs and workforce structures*. (MBA Mini-dissertation). Gordon Institute of Business Science, University of Pretoria. Retrieved from https://repository.up.ac.za/handle/2263/64525

Bianco, A. (2018). *Active Labour Market Policies for Digital Economy: Skills Development and Workforce Preparation*. *Working Papers*. ASTRIL - Associazione Studi e Ricerche Interdisciplinari sul Lavoro. Retrieved from https://ideas.repec.org/p/ast/wpaper/0030.html

Birkinshaw, J., Zimmermann, A., & Raisch, S. (2016). How Do Firms Adapt to Discontinuous Change? Bridging the Dynamic Capabilities and Ambidexterity Perspectives. *California Management Review*. doi.org/10.1525/cmr.2016.58.4.36

Brits, A. (2017, November 8). *The business of outsourcing - what you need to know.* The South African. Retrieved from https://www.thesouthafrican.com/the-business-of-outsourcing-what-you-need-to-know/

Brown, J. (2018, March 3). Robots could cut 3 000 jobs at Nedbank. *Fin24*. Retrieved from https://m.fin24.com/Companies/Financial-Services/robots-to-cut-3-000-jobs-at-nedbank-20180304

Brynjolfsson, E. & McAfee, A. (2014). The second machine age: Work, progress, and prosperity in a time of brilliant technologies (1st ed.). New York: W.W. Norton & Company.

Brynjolfsson, E. & McAfee, A. (2015, September 13). Brynjolfsson and McAfee: The jobs that AI can't replace. *BBC News*. Retrieved from http://www.bbc.com/news/technology-34175290

Brynjolfsson, E. & Mitchell, T. (2017, April). Track how technology is transforming work. *Nature, 544*. 290-292. Retrieved from https://www.nature.com/news/track-how-technology-is-transforming-work-1.21837

BusinessTech. (2018, January 22). *IMF cuts South Africa's growth forecast for 2018 and 2019.* Retrieved from https://businesstech.co.za/news/finance/220451/imf-cuts-south-africas-growth-forecast-for-2018-and-2019/

Cohen, J. (2011, October 5). Companies must treat knowledge workers as assets. *Financial Times*. Retrieved from https://www.ft.com/content/5731c4e0-edcf-11e0-acc7-00144feab49a

Colbert, B. A. (2004). The complex resource-based view: Implications for theory and practice in strategic human resource management. *Academy of Management Review*, *29*(3), 341–358. doi.org/10.2307/20159047

Cortes, G. M. (2016). Where Have the Middle-Wage Workers Gone? A Study of Polarization Using Panel Data. *Journal of Labor Economics*, *34*(1), 63–105. doi.org/10.1086/682289

Cortes, G. M., Jaimovich, N., & Siu, H. E. (2017). Disappearing routine jobs: Who, how, and why? *Journal of Monetary Economics*, *91*, 69–87. doi.org/10.1016/j.jmoneco.2017.09.006

Clemons, E. K., Dewan, R. M., Kauffman, R. J., & Weber, T. A. (2017). Understanding the Information-Based Transformation of Strategy and Society. *Journal of Management Information Systems*. doi.org/10.1080/07421222.2017.1334474

Cummings, T. G., & Worley, C. G. (2015). *Chapter 19: Continuous change.* In T. G. Cummings & C. G.Worley, Organization Development & Change (10th ed.) (pp. 569-604). Stamford, CT: Cengage Learning.

David, B. (2017). Computer technology and probable job destructions in Japan: An evaluation. *Journal of the Japanese and International Economies*. doi.org/10.1016/j.jjie.2017.01.001

Day, G. S., & Schoemaker, P. J. H. (2016). Adapting to Fast-Changing Markets and Technologies. *California Management Review*. doi.org/10.1525/cmr.2016.58.4.59

Department of National Treasury, Republic of South Africa (2018). *2018 Budget Economic overview*. Retrieved from http://www.treasury.gov.za/documents/national budget/2018/review/Chapter 2.pdf

Diesel, R. (2017). *Organisational innovation climate as a mediator of the relationship between complexity leadership and contextual ambidexterity*. (MBA mini-dissertation). Gordon Institute of Business Science, University of Pretoria. Retrieved from https://repository.up.ac.za/handle/2263/64839

Dinh, J. E., Lord, R. G., Gardner, W. L., Meuser, J. D., Liden, R. C., & Hu, J. (2014). Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives. *The Leadership Quarterly*, *25*(1), 36–62. Retrieved from https://www-sciencedirect-com.uplib.idm.oclc.org/science/article/pii/S1048984313001203

Drucker, P. F. (1999). Knowledge-worker productivity. *California Management Review*, *41*(2). Retrieved from http://journals.sagepub.com/doi/pdf/10.2307/41165987

Engineering News. (2018, July 24) South African youthquake – businesses to prioritise skills for Ramaphosa's YES initiative. Retrieved from http://www.engineeringnews.co.za/article/south-african-youthquake-businesses-to-prioritise-skills-for-ramaphosas-yes-initiative-2018-07-24

Forman, C., King, J. L., & Lyytinen, K. (2014). Special Section Introduction—Information, Technology, and the Changing Nature of Work. *Information Systems Research*, *25*(4). doi.org/10.1287/isre.2014.0551

Frank, M., Roehrig, P. & Pring, B. (2017). What to do when machines do everything. [Adobe Digital Editions version]. John Wiley & Sons, Inc., Hoboken, New Jersey.

Frey, C. B., & Osborne, M. A. (2013). *The Future of Employment*. Oxford Martin School, University of Oxford. Retrieved from https://www.oxfordmartin.ox.ac.uk/downloads/academic/future-of-employment.pdf

Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*. *114*, 254-280. doi.org/10.1016/j.techfore.2016.08.019

GIBS Business School. (2018) *MBA 2017/18. Integrative business research report regulations - 2018.* Illovo, South Africa: Gordon Institute of Business Science. Retrieved from GIBS Blackboard https://gibs.blackboard.com

Godin, S. (2010). *Linchpin. Are you indispensible?* London: Piatkus

Goos, M., Manning, A., & Salomons, A. (2014). Explaining Job Polarization: Routine-Biased Technological Change and Offshoring. *American Economic Review*, *104*(8), 2509–2526. doi.org/10.1257/aer.104.8.2509

Gray, D. E. (2014). *Doing research in the real world*. 3rd Edition. London: SAGE.

Gustein, A. J., & Sviokla, J. (2018, July 17). *7 Skills that aren't about to be automated*. Retrieved from https://hbr.org/2018/07/7-skills-that-arent-about-to-be-automated

Harari, Y. N. (2014). *Sapiens: A Brief History of Human Kind.* London: Vintage Books

Jackson, S., & Philip, G. (2010). A techno-cultural emergence perspective on the management of techno-change. *International Journal of Information Management*, *30*(5), 445–456. doi.org/10.1016/j.ijinfomgt.2010.01.008

Jobs Summit. (2018, October). Retrieved from http://jobssummit.co.za/

Kane, G. C., Palmer, D., Nguyen Phillips, A., Kiron, D., & Buckley, N. (2015). Strategy, Not Technology, Drives Digital Transformation. *MIT Sloan Management Review & Deloitte*, (57181), 27. Retrieved from https://doi.org/http://www2.deloitte.com/content/dam/Deloitte/cn/Documents/technology-media-telecommunications/deloitte-cn-tmt-strategy-not-technology-drive-digital-transformation-en-150930.pdf

Katz, L. F., & Krueger, A. B. (2017). The role of unemployment in the rise in alternative Work arrangements. *The American Economic Review, 107*(5), 388-392. doi.org.uplib.idm.oclc.org/10.1257/aer.p20171092

Khoza, R. (2006) *Let Africa Lead: African Transformational Leadership for 21st Century Business*. Johannesburg: Vezubuntu.

Kline, W. B. (2008). Developing and submitting credible qualitative manuscripts. *Counselor Education and Supervision, 47*(4), 210–217. doi.org/10.1002/j.1556-6978.2008.tb00052.x

Knoess, C., Harbour, R. & Scemama, S. (2016, November 23). Prepare Your Workforce for the Automation Age. *Harvard Business Review*. Retrieved from https://hbr.org/2016/11/prepare-your-workforce-for-the-automation-age

Le Roux, D. B. (2018). Automation and employment: The case of South Africa. *African Journal of Science, Technology, Innovation and Development*, *1338*(4), 1–11. doi.org/10.1080/20421338.2018.1478482

Mendes, M., Gomes, C., Marques-Quinteiro, P., Lind, P. & Curral, L. (2016). Promoting learning and innovation in organizations through complexity leadership theory. *Team Performance Management: An International Journal*, *22*(5/6), 301–309. doi.org/10.1108/TPM-02-2016-0004

Metcalf, L., & Benn, S. (2013). Leadership for Sustainability: An Evolution of Leadership Ability. *Journal of Business Ethics*, *112*(3), 369–384. doi.org/10.1007/s10551-012-1278-6

Mhlanga, T. (2018, June 28). Government, business gather to unlock $100-billion investment for Ramaphosa new dawn. *Mail & Guardian*. Retrieved from https://mg.co.za/article/2018-06-28-shaping-an-inclusive-and-sustainable-future-for-south-africans

Mokyr, J., Vickers, C. & Ziebarth, N. L. (2015). The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different? *Journal of Economic Perspectives*, *29*(3), 31–50. doi.org/10.1257/jep.29.3.31

Moyo, A. (2018, October 1). Liquid Telecom braces for massive job cuts*. ITWeb Business Technology Media Company*. Retrieved from https://www.itweb.co.za/content/kLgB17eJO1kM59N4

Mzekandaba, S & Pazvakavambwa, R. (2018, January 25). Tech to contribute to job losses in SA. *ITWeb Business Technology Media Company.* Retrieved from https://www.itweb.co.za/content/o1Jr5qxEE5YvKdWL

Olalere, A. (2015). Complexity and leadership crisis in Africa. *International Journal of Public Leadership, 11*(3/4), 180–191 doi.org/10.1108/IJPL-08-2015-0021

Osborn, R. N., & Hunt, J. G. (2007). Leadership and the choice of order: Complexity and hierarchical perspectives near the edge of chaos. *Leadership Quarterly*, *18*(4), 319–340. doi.org/10.1016/j.leaqua.2007.04.003

Oxford Dictionary. (2018). *knowledge worker, n*. Retrieved from http://www.oed.com.uplib.idm.oclc.org/view/Entry/104170?redirectedFrom=knowledge+worker#eid40033264

Oxford Dictionary. (2018). *white-collar, n. and adj*. Retrieved from http://www.oed.com.uplib.idm.oclc.org/view/Entry/228587?rskey=LnPUdz&result=3#eid326282735

Oxford Dictionary. (2018). *responsibility, n.* Retrieved from http://www.oed.com.uplib.idm.oclc.org/view/Entry/163862?redirectedFrom=responsibility#eid

Phillips, R. (2018, April). Automation will create more jobs. *HR Future*. Retrieved from http://journals.co.za.uplib.idm.oclc.org/docserver/fulltext/om_hrf_apr_2018_a3.pdf?expires=1524933516&id=id&accname=57715&checksum=4DFA68FE3DFBA47DB67348A6C4D89B29

Phillips, R., Seedat, Y., & van der Westhuizen, S. (2018, February). *Creating South Africa's future workforce*. Accenture Consulting. Retrieved from https://www.accenture.com/t20180227T020625Z__w__/za-en/_acnmedia/PDF-70/Accenture-Creating-South-Africa-Future-Workforce.pdfla=en

Presley, S. P. (2014). *How leaders engage in complexity leadership: Do action-logics make a difference?* (Unpublished Doctoral Dissertation) Fielding Graduate University, California, USA. Retrieved from https://pqdtopen.proquest.com/pubnum/3611483.html

PWC. (2018). The Anxious Optimist in the Corner Office. *PwC*, 1–32. Retrieved from https://www.pwc.com/gx/en/ceo-agenda/ceosurvey/2018/gx.html

Raphulu, L. (2018). Upskill for automation. *HR Future*, (March), 34–35. Retrieved from http://journals.co.za.uplib.idm.oclc.org/docserver/fulltext/om_hrf_mar_2018_a15.pdf?expires=1525515991&id=id&accname=57715&checksum=9A30635B76863BB2F6AD01EDBFED9CC0

Rautenbach, R. Scheepers, C. & Sutherland, M. (2015). The process by which executives unlearn their attachments in order to facilitate change. *South African Journal of Labour Relations, 39*(2), 145-164. Published by University of South Africa (UNISA). Retrieved from https://repository.up.ac.za/handle/2263/50437

Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd Edition). London: Sage Publications Ltd.

Saunders, M., & Lewis, P. (2012). *Doing research in business and management: An essential guide to planning your project.* Harlow, Essex: Pearson Education Limited.

Saunders, M., Lewis, P., & Thornhill, A. (2009). Research Methods for Business Students, 5th Edition (5th ed.). Pearson Education limited: Edinburgh Gate.

Schneider, M., & Somers, M. (2006). Organizations as complex adaptive systems: Implications of Complexity Theory for leadership research. *The Leadership Quarterly*, *17*(4), 351–365. doi.org/10.1016/J.LEAQUA.2006.04.006

Schwab, K. (2016, January 14). The fourth industrial revolution: what it means, how to respond. *World Economic Forum*. Retrieved from https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

Shook, E. and Knickrehm, M. (2018). *Reworking the revolution*. *Accenture Report*. Retrieved from https://www.accenture.com/t20180125T024403Z__w__/us-en/_acnmedia/PDF-69/Accenture-Reworking-the-Revolution-Jan-2018.pdf#zoom=50

Silva, H. C., & Lima, F. (2017). Technology, employment and skills: A look into job duration. *Research Policy*, *46*, 1519–1530. doi.org/10.1016/j.respol.2017.07.007

Stanford University. (2016). *Artificial Intelligence and life in 2030*. Retrieved from https://ai100.stanford.edu/sites/default/files/ai_100_report_0831fnl.pdf

South African Government. (n.d.) *National Development Plan 2030*. Retrieved from https://www.gov.za/issues/national-development-plan-2030

Statistics South Africa. (2018). *Statistical Release P0211. Quarterly Labour Force Survey. Quarter 3: 2018*. Retrieved from http://www.statssa.gov.za/publications/P0211/P02113rdQuarter2018.pdf

Tourish, D. (2018). Is Complexity Leadership Theory Complex Enough? A critical appraisal, some modifications and suggestions for further research. *Organization Studies*. doi.org/10.1177/0170840618789207

Uhl-Bien, M., & Arena, M. (2017). Complexity leadership: Enabling people and organizations for adaptability. *Organizational Dynamics*, *46*(1), 9–20. doi.org/10.1016/j.orgdyn.2016.12.001

Uhl-Bien, M., & Arena, M. (2018). Leadership for organizational adaptability: A theoretical synthesis and integrative framework. *The Leadership Quarterly*, *29*(1), 89–104. doi.org/10.1016/j.leaqua.2017.12.009

Uhl-Bien, M., & Marion, R. (2009). Complexity leadership in bureaucratic forms of organizing: A meso model. *Leadership Quarterly*, *20*(4), 631–650. doi.org/10.1016/j.leaqua.2009.04.007

Uhl-Bien, M., Marion, R., & McKelvey , B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly, 18*(4), 298-318. Retrieved from https://www.sciencedirect.com/science/article/pii/S1048984307000689

Wajcman, J. (2017). Automation: is it really different this time? *British Journal of Sociology*, *68*(1), 119–127. doi.org/10.1111/1468-4446.12239

White, L. (2018, May 2). *Why small businesses are outsourcing to South Africa*. Retrieved from https://www.smh.com.au/business/small-business/why-small-businesses-are-outsourcing-to-south-africa-20180501-p4zcq1.html

World Economic Forum. (2016). *The future of jobs. Employment, skills and workforce strategy for the fourth industrial revolution.* Retrieved from http://reports.weforum.org/future-of-jobs-2016/

World Economic Forum. (2017). *The Future of Jobs and Skills in Africa.* Retrieved from http://www3.weforum.org/docs/WEF_EGW_FOJ_Africa.pdf

World Economic Forum. (2017). *The Global Competitiveness Report*. Retrieved from http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017–2018.pdf

World Economic Forum. (2018). *Eight Futures of Work Scenarios and their Implications*. Retrieved from https://www.weforum.org/whitepapers/eight-futures-of-work-scenarios-and-their-implications

World Economic Forum. (2018). *The Global Risks Report 2018 - 13th Edition*. Retrieved from http://www3.weforum.org/docs/WEF_GRR18_Report.pdf

World Economic Forum. (2018). *Towards a reskilling revolution - A future of jobs for all.* Retrieved from https://www.weforum.org/reports/towards-a-reskilling-revolution

Wright, O., Dudler, T., Scully, J., & McMillan, K. (2018). *Operate Like a Disruptor*. Retrieved from https://www.accenture.com/t20180313T072220Z__w__/ca-en/_acnmedia/PDF-72/Accenture-Strategy-Operate-Like-Disruptor-Executive-Summary.pdf