Perceptions for the Effectiveness of the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd

By

Luyanda Gwejana

210510810

A dissertation submitted in partial fulfilment of the requirements of the degree of Master of Business Administration

Graduate School of Business and Leadership

College of Law and Management Studies

Supervisor: Dr. Xoliswa Priscilla Majola

Year of submission

2023

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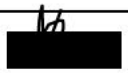
Supervisors Signature: 		
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NAME OF STUDENT: Luyanda Gwejana

STUDENT NUMBER: 210510810

DEGREE: Master of Business Administration

SCHOOL: Graduate School of Business and Leadership

NAME OF SUPERVISOR: Dr Xoliswa Priscilla Majola

TITLE OF THESIS/DISSERTATION: Perceptions for the Effectiveness of the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd.

DATE OF INTENTION TO SUBMIT: 18 November 2023

POSTAL ADDRESS: [redacted]

CELLPHONE: [redacted]

E-MAIL ADDRESS: 210510810@stu.ukzn.ac.za

STUDENT'S SIGNATURE: L.E GWEJANA DATE: 17 August 2023

***SUPERVISOR'S SIGNATURE:**……[redacted]……**DATE:…21/08/2023……..**

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Surname Gwejana	**Initials** LE	**Title** Miss	
Student number 210510810	**Study completed in Month & Year**	12	2024
E-mail address luyanda.gwejana@gmail.com			
Telephone number [redacted]	**Cell number** [redacted]		
College College of Law and Management Studies			
School Graduate School of Business	**Degree** MBA		
Discipline GSB & L	**Supervisor** Dr Xoliswa Priscilla Majola		
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ACKNOWLEDGEMENTS

I would like to express my sincere gratitude and appreciation to all who have assisted me throughout my MBA studies. Your support has provided me with the inspiration to persevere through the challenges of this journey. I would like to thank the following individuals for their support:

- To the Creator of all things, the Alpha and Omega, the source of wisdom and inspiration, I offer my heartfelt gratitude. Thank you, God! Through every obstacle and triumph, I have felt your presence, a constant reminder that I am never alone on this journey, thank you GOD for providing me with strength and perseverance to see this through, Philippians 1:6.

- I would like to express my heartfelt gratitude to my one and only sister, Thuledu Melodius Gwejana, for being my unwavering pillar of strength throughout the journey of this dissertation. Your unwavering support and encouragement have been instrumental in the completion of this dissertation. Your constant motivation and belief in my potential have fueled my determination to overcome challenges and persevere during the most challenging moments of this research. Beyond your unwavering support, you have been my confidante and sounding board, offering me guidance, advice, and a listening ear whenever I needed it. Your dedication to my success has never wavered, and for that, I am eternally grateful.

- To my mother, Nelisiwe Gwejana thank you, my love, for your support and encouragement. Aphile, Enhle and Khwezi Gwejana I have taken much of our quality time, but you never complained; instead, you were my source of renewed strength, my joy. You always brightened up my day. And without realizing you have provided me with all the support and love I could ever wish for. Thank you so much my babies.

- To my brother Vika and my cousin Sibongakonke (Khehla) a special thank you goes to you too. For your support,

- I would also like to extend my gratitude to my family and friends who have supported me throughout this journey. Your words of encouragement and belief in my abilities have been a constant source of inspiration. This accomplishment would not have been possible without your collective support.

- I would like to thank my supervisor, Dr Xoliswa Majola, for the assistance and guidance she has provided throughout my dissertation. Thank you for your professionalism and dedication to providing advice and feedback.

- My study group, thank you very much for your help and support throughout the study. I wouldn't have come this far if it wasn't for your support. Thank you, guys, for all the hard work, dedication, late nights and fantastic experiences we shared along this MBA journey.

- I would like to thank the participants of this study for taking the time out of their busy schedules to share their knowledge with me. Thank you for making the interviews thought provoking and rewarding. I appreciate your views and insight, without which this study would not be possible.

- I would like to say thank you to my friend Thulasizwe Myeni, your constant support throughout this entire journey has been remarkable, thank you so much, God bless you.

ABSTRACT

The emergence of the hybrid work model signifies a transformative shift in the way organisations approach work arrangements and employee engagement. Stemming from a confluence of technological advancements, instigated by the imperatives imposed by the COVID-19 pandemic, the shifting attitudes towards work-life balance, and the unforeseen global events that have shaped the current times, the hybrid work model represents a departure from traditional paradigms of office-based work. This dynamic model encapsulates the fusion of remote work and in-person collaboration, allowing employees to divide their work time between the convenience of their homes and the vitality of the physical workplace. The hybrid model acknowledges that different tasks, roles and individuals may require distinct environments for optimal productivity and creativity. Amid the emergence of hybrid work models, software development requires unique consideration due to the nature of its work. In light of the above, this study investigated how the hybrid model impacts LexisNexis South Africa's software developers' work patterns, considering both home and office-based collaboration. The research questions delved into the implementation of the hybrid model, perceptions of its effectiveness, and identification of collaboration tools suited for software developers. The research employed a constructivism philosophy, an inductive research approach using semi-structured interview techniques. Fifteen participants were purposefully sampled based on their leadership positions and their experience of the hybrid work model. Thematic analysis of the collected data revealed an in-depth understanding of the current application of the hybrid model at LNSA, its effectiveness, as well as the effectiveness of the collaboration tools used by the software developers. The key findings of this study highlighted that the effectiveness of the hybrid model is dependent on a range of factors such as individual preferences, specific project requirements, and the unique dynamics within different teams. This portrays the crucial need to tailor the model's implementation to align with these diverse needs and circumstances. Instead of a rigid, one-size-fits-all approach, the study recommended a more flexible and dynamic adoption of the hybrid model to optimise its potential benefits while addressing associated challenges. This approach recognises the elimination of a universally applicable solution and fosters adaptability in the workplace.

Keywords: Collaboration Tools, COVID-19 Pandemic, Hybrid Work Model, In-Person Collaboration, Remote Work, Software Developers

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LIST OF ABBREVIATIONS

CEO	-	Chief Executive Officer
CFO	-	Chief Financial Officer
COVID-19	-	Coronavirus Disease 2019
HR	-	Human Resource
ICT	-	Information and communications technologies
IDE	-	Integrated development environments
LNSA	-	LexisNexis South Africa
LOC	-	Lines of Code
NWFH	-	NOT working-from-home
UKZN	-	University of KwaZulu-Natal
UPS	-	Uninterruptible Power Supplies
UX	-	User Experience
WFH	-	Work from Home
WFX	-	Work-from-anywhere

CHAPTER ONE: OVERVIEW OF THE STUDY

1.1 Introduction

In an era marked by unprecedented technological advancements and a dynamic business landscape, organisations worldwide are continually seeking innovative ways to enhance operational efficiency and productivity (Smite, Tkalich, Moe, Papatheocharous, Klotins, and Buvik, 2022). The software development industry, at the forefront of this technological revolution, is undergoing a paradigm shift in its approach to work methodologies. The integration of remote work and in-office collaboration has given rise to the Hybrid Model, representing a synthesis of traditional and virtual work environments. This study, delves into the intricate dynamics of this novel work model within the context of one of the industry's leading organisations.

LexisNexis (Pty) Ltd, a prominent player in the information and technology sector, has adopted the Hybrid Model to harness the potential benefits of both in-person and remote work for its employees. As organisations globally grapple with optimising their workforce structures in the wake of the COVID-19 pandemic and changing workforce expectations, understanding the effectiveness of hybrid work models becomes paramount. This research study aims to explore the perceptions of software developers at LexisNexis (Pty) Ltd regarding the Hybrid Model's impact on their work, collaboration, and overall job satisfaction. By analysing the experiences and viewpoints of key stakeholders, this study seeks to contribute valuable insights into the factors influencing the effectiveness of the Hybrid Model in a software development context. Additionally, the study aims to provide actionable recommendations that can inform organisational strategies for optimising the integration of hybrid work models, ultimately fostering a workplace environment conducive to innovation and employee well-being.

This chapter begins with a brief background of the organisation under study, namely LexisNexis (Pty) Ltd. Thereafter, the focus of the study is presented, which delves deeper into what this study is about. The problem statement, the purpose of the study, as well as the research objectives and the questions guiding the study, are then outlined. Subsequently, the rational of the study is discussed in depth, following which, the delimitations, as well as the limitations pertaining to this study, are explained. The methodology underpinning the study is briefly explained and later expanded in the respective chapter.

1.2 Background of the study

Over the past decade, the number of people working from home has been steadily increasing (Mantesi, Chmutina, and Goodier, 2022). Before the COVID-19 outbreak, many companies started offering remote work as an option for their employees, this was due to the benefits that both employees and

companies could get as a result of working from home. A study conducted by Ford *et al.* (2021) revealed that remote work allows employees to connect with a team of experts from different backgrounds and locations, it also provides them with the opportunity to develop new perspectives. In 2020, governments around the world enacted restrictions that forced people to stay at home to fight COVID-19, non-essential workers were prevented from attending their habitual workplaces, this started the largest experiment of home working (Stickle and Felson, 2020). South Africans became slightly more acquainted with the COVID-19 virus and learnt to live with the virus, they also attempted to go back to the old way of living, while simultaneously embracing the new norm (Matli, 2020). This resulted in the emergence of the concept of 'Hybrid Working'.

The adoption of the hybrid workplace model, integrating remote and in-office work, has become ubiquitous in contemporary organizational settings, reflecting a paradigm shift in work culture (Jones and Thoma, 2019). This phenomenon, characterized by its pillars of flexibility and support, marks a departure from conventional employment arrangements and underscores a broader societal shift towards embracing technological advancements in work practices. While the hybrid model offers compelling benefits, including heightened productivity, reduced real estate expenses, decreased absenteeism, enhanced business continuity, and lower turnover rates (Stickle and Felson, 2020), its implementation is not absent of complexities and challenges. Employee experiences within the hybrid model vary, with some individuals reporting improved work-life balance and reduced transportation costs, while others may face potential career drawbacks due to limited in-person interactions (Matli, 2020). These nuanced impacts underscore the need for a comprehensive understanding of the hybrid model's implications on professional trajectories. Moreover, the hybrid model poses various downsides, such as decreased customer experience in digital service interactions, potential employee isolation disrupting traditional workplace dynamics, and heightened security risks, including cyberattacks and data loss (Matli, 2020).

The hybrid working model is ideal for both employees and businesses. It integrates the advantages of working from home with the utilisation of the companies' premises (Smite, Moe, Hildrum, Huerta, and Mendez, 2023b). Most organisations have opted for this type of working arrangement, which comprises 2-3 working days in the office and the remaining at home (Jones and Thoma, 2019). Stamford (2023) revealed that hybrid working is no longer just an employee perk but an employee expectation; consequently, this shift prompted many employees to partially return to the office in 2022. However, Stamford (2023) indicated that the hybrid workstyle will remain prominent in 2023 and beyond.

A study conducted by Nolan *et al.* (2021) revealed that the hybrid working arrangement for software developers involves the working-from-home (WFH) and not-working-from-home (NWFH) ratios. For many, this ratio will either be 100:0 or 0:100. It seems that the trend towards WFH that was already a

feature of the technology sector has received an abrupt acceleration, perhaps bordering on a sudden transformation. However, a 2020 Gartner Chief Financial Officer (CFO) survey report indicated that 74% of companies shifted some employees to permanent remote work after COVID-19. Post the pandemic, X (formerly twitter) announced to its staff that they can continue WFH permanently. However, in 2022, Elon Musk scrapped the WFH policy and ordered the staff back to the office, with the employees having to submit a request (through to management) which would only be approved by Elon Musk, for specific exceptions to remote working (Guardian, 2022). Major software companies such as *Microsoft, AirBnB* and *Facebook* informed their employees that they could WFH indefinitely or extend the WFH policies providing specific support, but they have since introduced Hybrid working. Therefore, there has been an increasingly positive attitude towards WFH, with COVID-19 restrictions accelerating the rise in flexible work arrangements and WFH (Hadden, 2020).

Although the Hybrid model is one that many organisations are currently implementing, there has not been sufficient scientific research that investigates its effectiveness, specifically among software developers, with numerous implementations having been done for the wider spectrum as a blanket approach (Jones and Thoma, 2019). Ford *et al.* (2021) indicated that, whilst other departments in organisations may require 2-3 days in the office to collaborate face to face, the frequency for software developers is significantly less than this. Although the need for collaboration among agile developers is acknowledged in many works, there has been limited research on the subject.

1.3 Problem statement

There has been a lot of confusion in the literature regarding the concept of the person-environment fit. The most common definition of the concept is that it refers to the compatibility between people and the environment they are in (Chilton, Hardgrave, and Armstrong, 2005). Understanding developer productivity in software development has seen great interest from research and industry, as improving developer productivity may lead to faster development speed, higher quality code, and also higher developer satisfaction (Ford *et al.,* 2021). At home, software developers can set up a quiet space with fewer distractions and focus on the code, whereas in the office, there are often distractions, even though minor, but are uncontrollable. Software developers are usually introverts who prefer working in a non-disruptive environment as the work requires a lot of their focus and attention (Ford *et al.*, 2021). However, it can also be argued that working from home presents various challenges. Distractions such as interruptions from family members, attention-seeking behavior from pets or children, and environmental noises are common. Additionally, the temptation to tackle household chores, access television, or engage in online shopping during work hours can be significant. Managing unstructured time without the routine of a traditional office poses difficulties. Technical issues with devices or internet connectivity may also arise. Personal health concerns or discomfort may further impact remote

work. Therefore, this study aims to address this gap by exploring software development leaders' perspectives on the effectiveness of the hybrid model for developers within the legal technology (legaltech) industry in South Africa.

1.4 Research objectives

There are three research objectives for this qualitative study. They are as follows:

- To understand how the hybrid model is currently being applied among software developers at LexisNexis South Africa
- To determine the software development leaders' perceptions of the effectiveness of LexisNexis South Africa's hybrid model.
- To assess the effectiveness of the collaboration tools used by software developers at LexisNexis South Africa

1.5 Aim of the study

The aim of the study was to determine the perception of software development leaders on the effectiveness of the Hybrid working model among software developers at LexisNexis South Africa and to make recommendations on improving the integration and optimization of the Hybrid working model based on their insights and experiences using the qualitative research approach.

1.6 Research questions

Based on the above research objectives, the following are the research questions for this qualitative study:

- How is the hybrid model currently being applied among software developers at LexisNexis?
- What are the software development leaders' perceptions on the effectiveness of the hybrid model at LexisNexis South Africa?
- How do software developers at LexisNexis South Africa perceive the effectiveness of the collaboration tools in use?

1.7 Significance of the study

The unexpected work-from-home mandate presented a chance to investigate what occurs when software developers are forced to work remotely with the rest of their colleagues. Software development work is similar to other types of knowledge work. However, developers ought to focus for longer periods and

work closely with other developers to produce current software. Working remotely may be challenging for many people, both logistically and psychologically, and infrequent connections among colleagues can hinder creativity and impair team cohesion. Whilst there may be developers who work best in isolation as they need a quiet space, uninterrupted face-to-face collaboration for them may not be a focal point, therefore, 2-3 working days in the office for collaboration may not be ideal for them. This study addresses the imperative for businesses to discern and tailor the implementation of hybrid work models specifically for software developers. As the field of software development relies heavily on collaboration and creative problem-solving, understanding how hybrid work arrangements impact productivity, innovation, and overall job satisfaction for software developers is crucial. The study aims to contribute valuable insights into optimising workflows, maintaining effective communication and collaboration in a distributed work environment, and promoting a positive work-life balance. By exploring the unique circumstances of software developers in the context of hybrid work, the research not only enhances our understanding of the dynamics in this field but also provides actionable strategies for businesses to attract, retain, and support top talent in the competitive technology industry, ultimately fostering a more adaptive and satisfied workforce.

Furthermore, as businesses worldwide embrace remote work, policies need to be nuanced and tailored to the unique needs of different professions. Focusing on software developers, this research contributes essential insights into crafting policies that optimise productivity, support collaboration, and enhance the overall well-being of these professionals in hybrid work settings. Policymakers can draw upon these findings to establish guidelines that strike a balance between flexibility and structure, ensuring that the WFH policy is not only inclusive but also conducive to the specific demands of software development.

1.8 Research methodology

The research methodology section of this study provides an overview of the chosen approach and procedures. The study adopted a qualitative research method, allowing for a deep exploration of perceptions regarding the effectiveness of the hybrid model for software developers in the legal technology industry. A purposive sampling technique was used to select the 15 participants who had knowledge of the research topic. Semi-structured interviews were conducted with software development leaders from specific departments at LexisNexis South Africa in Johannesburg, Durban, Cape Town and Port Elizabeth. In-depth interviews were conducted with the participants via the Zoom platform. The collected data was further analysed thematically to identify emerging themes regarding the hybrid model. The study emphasised validity and reliability by maintaining consistency in interview questions, recording interviews and ensuring trustworthy and transferable findings. Ethical considerations, including obtaining ethical clearance, protecting participant privacy, and obtaining informed consent, were strictly adhered to throughout the study.

1.9 Chapter outline

1.9.1 Chapter 1: Introduction to the study

This chapter introduces the study discussing the background, and motivation of the study. Then, the research problem and research questions are posed. Thereafter, the study's significance is discussed before outlining the research methodology utilised.

1.9.2 Chapter 2: Literature Review

This chapter provides a comprehensive exploration of existing literature related to the effectiveness of hybrid work models, with a specific focus on software developers within the context of LexisNexis (Pty) Ltd. This chapter synthesises and analyses a wide range of scholarly articles, research studies, and industry reports to establish a theoretical foundation and contextual understanding of the hybrid working model. It delves into key themes such as the impact of hybridity on software development practices, the role of technology acceptance, organisational strategies for hybrid work, and perceptions regarding the effectiveness of hybrid models among software developers. By reviewing and synthesising relevant literature, this chapter sets the stage for the empirical investigation, offering insights and perspectives that inform the research questions and objectives of the study.

1.9.3 Chapter 3: Research Methodology

This chapter describes the design of the study: the sampling, data collection and data analysis techniques employed in conducting the research, as well as how the trustworthiness and credibility of the findings were ensured. The research onion is used as a means to depict the various issues which are underlying the process of conducting this research. The chapter concludes with a thorough discussion of the ethical procedures followed by the researcher to ensure that the dignity, confidentiality and anonymity of the participants were upheld throughout the research process.

1.9.4 Chapter 4: Presentation of findings

This chapter presents the results obtained from the interviewees at LNSA. The findings of the study are presented according to the main themes and the associated sub-themes that emerged during the data analysis process. Thematic analysis was conducted on the interview transcripts to reveal these themes that emerged from the participant's views. The key themes were highlighted using direct quotations from the participants.

1.9.5 Chapter 5: Discussion of findings

This chapter presents the discussion of the findings of the study presented in Chapter Four, in relation to the literature reviewed, in order to contextualise the study. It examines the collective perspectives and experiences of LNSA software development professionals, it also contextualising these insights within the global landscape of emerging trends and established research. The discussion of findings centres on the collective experiences and perceptions of these industry leaders, shedding light on the specific challenges, opportunities, and future prospects inherent in hybrid working methodologies, particularly within the realm of software development, by juxtaposing the qualitative data gleaned from interviews with the established body of literature.

1.9.6 Chapter 6: Conclusions and recommendations

This chapter offers a comprehensive synthesis of the research's key findings aligned with the study's objectives. It includes recommendations derived from these key findings, specifically tailored for hybrid policy implementations, with a focus on LNSA software developers. The conclusion of the chapter involves proposing avenues for future research to further contribute to the evolving understanding of effective policies in this domain.

1.10 Chapter Summary

This introductory chapter provided an overview and background to the study. The organisation under examination was LexisNexis (Pty) Ltd, a major player in the information and technology sector, which adopted the Hybrid Model. A detailed motivation and focus for this study was provided, highlighting the global shift towards hybrid work post-COVID-19. This research explored software developers' perceptions within LexisNexis, aiming to understand the impact of the Hybrid Model on work dynamics, collaboration, and job satisfaction. The problem statement highlighted the challenges faced by software developers in the hybrid model. The aim of the study was clearly defined—to determine software development leaders' perception of the effectiveness of the Hybrid Model. Research objectives and corresponding research questions were established, addressing the application of the hybrid model, leaders' perceptions, and the effectiveness of collaboration tools for software developers. The significance of the study lies in its potential to offer insights for tailoring hybrid work models specifically for software developers, ultimately contributing to a more adaptive and satisfied workforce in the technology industry. Concluding the chapter, a discussion on research methodology precedes an outline of the dissertation structure. Subsequently, the next chapter scrutinises the literature on Hybrid Models, encompassing discussions on the theoretical and conceptual frameworks. Additionally, this chapter delineates existing gaps in the literature and explicates how the present study aims to contribute to their resolution.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter outlines and evaluates the existing literature related to the topic under investigation. Numerous studies have been conducted on remote work during and after the COVID-19 pandemic, including studies addressing the experiences of the emergence and application of the hybrid working model. However, this study focuses mainly on the application of the hybrid working model on LNSA software developers, examining whether this model is effective for software developers. The theoretical framework for this study thus places a focus on the different communication and collaboration theories that will help in establishing the theoretical underpinnings of this research. A review of relevant literature will examine the collaboration tools utilised by software developers and as a result of the tools, it will also determine whether the hybrid model should be applied in the same manner to departments that do not make use of these tools.

2.2 Theoretical Framework

A theoretical framework serves as a foundational structure derived from the theories articulated by experts in the relevant field. It functions as a theoretical coat hanger for data analysis and interpretation of results, offering a synthesized perspective from previously tested and published knowledge (Kivunja, 2018). Swanson (2013) emphasizes that the theoretical framework is not a summary of the researcher's personal thoughts but rather a synthesis of the insights of prominent figures in the field, providing a lens through which data is examined, analysed, and findings are interpreted. It acts as a guiding structure that encapsulates what experts in the field say about the research question and the identified problem, aiding in the development of an informed and specialized perspective. By situating research findings within this framework, academic rigor is maintained, ensuring a scholarly approach to data analysis and interpretation (Kivunja, 2018).

In contrast, a conceptual framework encompasses the holistic, logical orientation, and associations that underpin the thinking, structures, plans, and practices of the entire research project. It represents the researcher's thoughts on various elements, including the identification of the research topic, the problem under investigation, the questions to be addressed, literature to be reviewed, theories to be applied, methodology, methods, procedures, instruments, data analysis, interpretation of findings, and the subsequent recommendations and conclusions (Kivunja, 2018). Ravitch and Riggan (2017) stress that the conceptual framework serves as the logical conceptualization of the entire research project, functioning as a metacognitive, reflective, and operational element throughout the research process. In

essence, it offers a comprehensive and cohesive guide for the researcher, providing a structured approach to navigate the complexities of the research endeavor.

The theoretical framework underpinning this study serves as a robust foundation for delving into the complexities of the hybrid working model, particularly within the domain of software development. In navigating the evolving landscape of work, a synthesis of key theoretical perspectives has been meticulously crafted to provide a comprehensive understanding of how hybridity manifests in this professional realm. The theoretical framework draws upon various lenses, including Activity Theory, Social Exchange Theory, Technology Acceptance Model, Transaction Cost Economics, and Organisational Ambidexterity. Each theory contributes distinct insights, collectively offering a nuanced examination of how work activities, social interactions, technology adoption, economic considerations, and organisational strategies are shaped within the context of hybrid work arrangements. This section unfolds the rich tapestry of theories guiding our exploration, elucidating their relevance and application in unraveling the intricacies of the hybrid working model for software developers.

2.2.1 The Activity Theory

The Activity Theory, initially introduced by Soviet psychologist Lev Vygotsky in the early to mid-20th century, serves as a foundational framework for examining how work activities are distributed and coordinated within a hybrid setting. Vygotsky's work laid the groundwork for understanding the social and cultural aspects of human cognition and activity. The theory posits that human activities are not isolated but rather interconnected with the tools, rules, and community in which they operate (Bertelsen and Bødker, 2003).

In the hybrid work model at LexisNexis, where tasks are complex and often collaborative, the Activity Theory proves valuable in understanding the dynamics of software developers' activities. It highlights the relationships between the technological tools used, the organizational rules and policies governing work, and the virtual and physical interactions within the professional community. LexisNexis, as a provider of legal and information services, operates within a socio-technical ecosystem where effective coordination is crucial (Barab, Schatz and Scheckler, 2004).

The Activity Theory's emphasis on the social and cultural dimensions of work aligns well with the collaborative nature of the legal and information services field. As LexisNexis employees navigate their tasks in a hybrid work environment, the theory offers insights into how they engage with technological tools, adhere to organizational rules, and foster a sense of community within their professional context. This nuanced understanding is particularly relevant as organizations like LexisNexis adapt to evolving work paradigms, providing valuable insights for optimizing work processes, communication, and

collaboration within the organization. Therefore, the Activity Theory serves as a robust analytical framework for studying and enhancing the coordination of work activities at LexisNexis.

2.2.2 The Social Exchange Theory

The emergence of the Social Exchange Theory within sociology and social psychology, credited to influential figures such as George Homans, John Thibaut, Harold Kelly, and Peter Blau, has significantly influenced the understanding of social behavior (Cook, Cheshire, Rice and Nakagawa, 2013). This theoretical framework, grounded in principles of reciprocity and mutual benefit, offers a practical lens for examining the dynamics of social interactions among software development team members within hybrid work models (Cropanzano, Anthony, Daniels, and Hall, 2017). In the context of LexisNexis or similar environments, where collaborative efforts among software developers are crucial, the Social Exchange Theory becomes instrumental in unraveling how team members engage in reciprocal relationships, exchanging resources, support, and information.

The application of the Social Exchange Theory is particularly pertinent in exploring how collaboration, trust, and knowledge sharing unfold within the unique dynamics of hybrid work environments, considering both virtual and physical spaces. The theory sheds light on the nuanced social dynamics that contribute to effective collaboration, providing insights into how principles of reciprocity and mutual benefit shape interactions among software developers, whether they are co-located or working remotely (Chernyak-Hai and Rabenu, 2018).

This sociological perspective, as highlighted by Hartner-Tiefenthaler, Zedlacher, and Clarke (2023), enriches the study's exploration of hybrid work arrangements. By focusing on the relational dimensions of software development, the Social Exchange Theory contributes to a deeper understanding of the social fabric that underlies successful collaboration in the context of hybrid work. The insights gained from this application of the theory can inform practical strategies for fostering effective teamwork, building trust, and enhancing communication in diverse work settings, providing actionable guidance for optimizing software development practices within the evolving landscape of hybrid work (Karadagi, 2023).

2.2.3 The Theory of Transaction Cost of Economies (TCE)

The theory of Transaction Cost Economics (TCE), introduced by Nobel laureate Oliver E. Williamson in the 1970s, plays a crucial role in this study by offering a framework to scrutinise the economic implications of hybrid work models, particularly within the realm of software development. Williamson's TCE focuses on understanding the costs and benefits associated with different organisational arrangements, emphasising the role of transaction costs in shaping the choice between market and hierarchical governance structures (Williamson, 2007). Applied to the context of hybrid

work models for software development, TCE provides a lens through which one can evaluate the economic efficiency of coordinating and monitoring tasks in a distributed environment. Hybrid work models introduce new transaction costs related to communication, coordination, and control that need to be carefully considered. By leveraging TCE, the study aims to identify and assess these transaction costs, shedding light on how they influence the overall economic implications of adopting a hybrid approach (Gibbons, 2010). TCE's emphasis on aligning organisational structures with the characteristics of transactions is particularly relevant for software development, where tasks often involve complex collaboration and knowledge-intensive activities. Through TCE, the study seeks to uncover how the costs and benefits of coordinating software development tasks in a hybrid environment compare to alternative work arrangements, providing organisations with valuable insights into the economic efficiency of adopting hybrid models. This economic perspective contributes to a comprehensive understanding of the organisational considerations involved in implementing and managing hybrid work arrangements for software developers

2.3 Hybrid Model Application

Remote working, also known as telecommuting, has been a practice that predates the COVID-19 pandemic (Chen, Weziak-Bialowolska, Lee, Bialowolski, Cowden, McNeely, and VanderWeele, 2023). Silver (2023b) supports this notion, stating that although remote work has been in existence for a long time, it was not as prevalent or widely accepted as it is today (Smite, Moe, Hildrum, Gonzalez-Huerta, and Mendez, 2023a). Historical examples include the spatial separation of workplaces and residences, where employers provided housing for workers, small business owners lived above their shops, and women engaged in piecework while attending to family responsibilities. Additionally, family farms have long exemplified this concept (Silver, 2023b). However, Hille (2021) describes remote work in various ways, ranging from virtual work in virtual offices (Zhang, 2016), telework (Belzunegui-Eraso and Erro-Garcés, 2020), to work from home (Dean and Student, 2020). These descriptions are frequently linked to the nature of the job, job specification, work management style, and the existence of virtual offices, but they may vary across different countries. Telework is the oldest definition, developed in the 1970s (Nilles, 1975). Since then, telework has transformed significantly, incorporating not only telecommunication technology, but also evolved ICT (Information and communications technologies), such as broadband Internet, smartphones, desktop computers and others. According to Eurofound (2017), the most appropriate definition should include two elements: work conducted using new technologies (e.g., ICT) and from outside the employer's office (e.g., home).

In contemporary times, certain organisations have adopted flexible work arrangements that allow employees to work remotely from home on an ad-hoc or full-time basis (Chen *et al.*, 2023). However, prior to the COVID-19 pandemic, remote work was not as prevalent, and the majority of the workforce

had limited experience with working from home (Wigert, 2022). According to a study by Naidu (2020), only a minority of companies (37%) were partially prepared for the sudden transition to remote work during the lockdown, with a mere 5% of respondents having previously worked from home. Similarly, when LNSA implemented its flexible work from home policy in 2017, it initially applied to specific software development teams in the Cape Town branch, gradually extending to other regions such as Johannesburg (LexisNexis, 2022).

The limited popularity of remote work prior to the pandemic can be ascribed to multiple factors. One significant barrier was the inadequate technological infrastructure within numerous companies, hindering the widespread adoption of remote work (Marino and Capone, 2021). Concerns surrounding effective communication, collaboration, and potential decreases in productivity also contributed to the hesitancy towards remote work. The 2020 report of the Cisco Digital Readiness Index, which evaluates the digital preparedness of 146 countries across various dimensions, ranked South Africa in position 78 – suggesting that South African organisations faced challenges in fully integrating and leveraging digital technology, thereby impeding the streamlining of business processes through technological means (Naidu, 2020).

In recent years, there has been a growing emphasis on fostering a caring climate within the workplace, characterised by the treatment of employees with care, trust, fairness and respect (Chen *et al.*, 2023). A regenerative workplace has been proposed to enhance employee motivation and overall well-being, thereby potentially augmenting organisational outcomes (Chen *et al.,* 2023). Allowing employees to work from home represents one of the workplace resources that contribute to the creation of a caring organisational climate, prompting certain organisations to offer remote work as a benefit. Prior to the pandemic, remote work was primarily regarded as a perk provided by companies. Consequently, comprehending the impact of remote work on work outcomes in non-pandemic circumstances is of utmost importance (Chen *et al.,* 2023). A study conducted by Fessell and Lexa (2020) portrayed that during the COVID-19 pandemic, the researched organisations' model flexed to a relatively higher level of off-site working. However, post COVID-19, the organisation would expect a return to the familiar competitive business, thus, it would be imperative to re-establish the pre-COVID-19 on-site–off-site balance. Smite *et al.,* (2023) also supported this by stating that the pandemic left a permanent mark in the fundamental principles of the workplace, as many information workers expressed their preferences to continue working from home.

Working from home can have a significant impact on employees' work and personal lives (Niebuhr, Borle, Borner-Zobel, and Voelter-Mahlknecht, 2022). Enforced WFH has also had significant implications for employee well-being (Silver, 2023a). According to the Conservation of Resource

Theory and the Job Demands-Resources Model, WFH offers employees the flexibility to manage their schedules and work in environments that suit them, which can improve productivity and job satisfaction while reducing work-life conflicts (Kifor, Săvescu, and Dănuț, 2022). A large survey of over 30 000 American workers identified five reasons for the large shift in favour of WFH (Barrero, Bloom, and Davis, 2021), including better-than-expected WFH experiences, new investments in physical and human capital that enable WFH, the change in attitude and stigmatisation of remote workers, lingering concerns about crowds and contagion risks, and a pandemic-driven surge in technological innovations that support WFH. Similarly, an overview of the pandemic productivity of software engineers summarised by Smite *et al.* (2023c) illustrates the positive experiences with remote working. Additionally, WFH can eliminate the negative effects of commuting, such as poor mental health, back pain and cardiovascular disease (Lopez-Leon *et al.*, 2020). Furthermore, remote work can reduce expenses associated with transportation, work clothes, and meals, leading to financial savings for employees. For some employees, a quiet home environment can increase their focus on work and reduce distractions (Khanna, Murnane, Kumar, Rolfe, Dimitrieski, McKeown, Ejareh Dar, Gavson, and Gandhi, 2020). Enforced WFH has also had broader societal impacts, including reductions in traffic congestion, greenhouse gas emissions, and air pollution due to fewer people commuting to work (Suryanto, Fitriati, Natalia, Oktariani, Munawaroh, Nurdin, and Ahn, 2022).

However, Smite, Moe, Klotins, and Gonzalez-Huerta (2023c) argued that WFH can also have unintended consequences for some employees. For instance, some may experience a sense of isolation, distractions from family obligations, longer work hours, work intensification, and reduced supervisor support and mentoring, which can impact work quality and accountability. Additionally, Pruthi and Hernanz-Schulman (2022) stated that balancing work and personal life can become more challenging when working from home, leading to increased stress and burnout. Collaboration and communication between team members can also become more challenging in a remote work environment, resulting in delays, misunderstandings, and reduced productivity (Jacobs, 2022). Therefore, enforced WFH has highlighted the importance of reliable technology and infrastructure for remote work, as well as effective communication and collaboration tools. On the other hand, WFH has also highlighted existing social inequalities, as not everyone has access to the necessary technology or a suitable work environment to work from home (Silver, 2023a).

Before the pandemic, remote working was not as widespread or commonly practiced as it is today. However, it was still recognised as a valuable perk by both employees and companies. The sudden onset of the pandemic compelled a rapid shift to remote work to maintain operations while adhering to social distancing guidelines and lockdown measures. In addition, (Smite *et al.*, 2023c) posited that one of the most notable impacts of enforced WFH has been the rapid acceleration and widespread adoption of remote work. Many companies and employees were initially hesitant or resistant to remote work, but

the pandemic forced them to adapt quickly. As a result, remote work underwent a significant transformation, gaining increased prominence and acceptance among employers and employees alike. It evolved from being a mere benefit to becoming an essential and necessary practice during the pandemic (Stiles and Smart, 2021).

In the post-pandemic period, remote work reverted to being a valuable benefit, yet one that holds immense importance and appeal to employees. It offered them greater flexibility and the opportunity to achieve a better work-life balance. Simultaneously, it also allowed companies to reduce costs associated with physical office spaces and other related expenses (Santos, Amaral, and Simões, 2021). According to Stiles and Smart (2021), the pandemic has propelled remote work from a less common benefit to a vital and obligatory arrangement, as it retains its status as a highly valued benefit, providing employees with enhanced flexibility and work-life balance, while affording companies the advantages of cost reduction. A study conducted by Smite *et al.* (2023a) revealed that a solution to the above was formulating new work policies that set the expectation for employees regarding office presence and behaviours in a new hybrid work situation.

2.4 Effectiveness of Hybrid Working Model

During the pandemic, many companies and service industries were forced to shut down (Innstrand, Christensen, Grodal, and Banks, 2022), resulting in unused office spaces and unnecessary rental expenses. As lockdown restrictions eased, organisations began re-evaluating their work strategies. Consequently, many decided to sell or provide furniture to their employees for home office setups. According to a study conducted by Smite *et al.* (2023c), numerous companies aided with home office equipment that went beyond the essential IT requirements. This support was exemplified through reimbursement programmes aimed at providing employees with home office equipment. Additionally, companies covered expenses such as internet fees and electricity costs, and some even offered subsidised lunches for their staff members. However, this shift to remote work introduced new challenges, such as high data costs for businesses. Initially, employees managed to deliver the required outputs effectively, but over time, work-life balance issues and other factors affected performance (Massar *et al.*, 2022). To address these issues, businesses started adopting performance monitoring tools to encourage productivity and assist managers in effectively overseeing remote employees. Call centers also had to invest in tools to improve call quality, which added to the overall costs. As a cost-saving measure, downsizing became a popular option for organisations, with many opting for short-term contracts with service providers (Matli, 2020). Additionally, organisations sold or provided office equipment to their employees, enabling them to set up home offices for remote work (Delanoeije and Verbruggen, 2019).

A study conducted by Granneman (2021), revealed that employees increasingly relied on technology and interconnectivity as integral components of their workflow. This therefore, heightened dependence which rendered them susceptible targets for cybercriminal activities. As employees operate in isolation from traditional office settings, the avenues for communication among staff members regarding critical business processes are diminished. Consequently, this reduction in communication channels potentially exposes vulnerabilities within organizational frameworks, thereby amplifying the risk of fraudulent activities. As employees transitioned to home offices, the increased usage of VPNs, remote desktop technologies, and the rush to address capacity issues created opportunities for cybercriminals. Password-spraying attacks surged, particularly on remote desktop technologies like Citrix, Microsoft RDP, and VMware VDI. These attacks, often motivated by ransomware, are challenging to detect as they involve valid user credentials, potentially resulting in devastating business impacts.

In response to these evolving threats, recommendations for organizations like LexisNexis encompass providing company-owned equipment, implementing robust mobile device management controls, deploying corporate VPN solutions, enforcing multi-factor authentication, and conducting frequent training on social engineering. These measures form a pivotal framework for safeguarding organizations and their employees against cyber threats. However, the chapter underscores the critical importance of ongoing monitoring, proactive responses to evolving attack vectors, and the extension of stringent security controls from the enterprise network to the home network. Such comprehensive measures are essential for effectively mitigating the inherent risks associated with remote work environments (Granneman, 2021).

Elon Musk had indicated that their employees would work from home permanently, however, the organisations Chief Executive Officer (CEO) later changed to the adoption of a hybrid working model rather (Guardian, 2022). According to the PWC (2021), knowledge workers have become accustomed to working remotely, and splitting time between the office and home is expected to become the new normal. Evidently, an increasing demand for flexibility from the new hires during job interviews calls for new corporate policies regarding working from home. In fact, the degree of flexibility might now become the make-or-break point in many employment decisions (Smite *et al.*, 2023a). A survey of 127 companies on the Gartner (2020) report, revealed that 82% of respondents intended to permit remote working some of the time, as employees returned to the workplace. One key approach that managers are using to tackle these problems is formulating new work policies that set the expectation for employees regarding office presence and behaviours in a new hybrid work situation. It is important to note that the existence of such policies is nothing new (Smite *et al.*, 2023c).

As organisations strive to accommodate a workforce that blends both on-site and remote employees, they face the challenge of embracing a new and intricate hybrid work environment. This entails evolving the way individuals collaborate and cooperate to successfully accomplish their tasks. A survey covering

the period from July 2020 to March 2021 (Barrero *et al.* (2021) found that post the pandemic, Americans estimate to spend on average 20 percent of full workdays working from home and that both the employee preferences to work from home and the employers' plans for the employees to work from home are increasing. Other studies that outlined corporate policies for remote work include studies of working from anywhere, hybrid work arrangements and remote first companies (Choudhury, 2020; Santos and Ralph, 2022). A cross-national study of working from home policies by Timsal and Awais (2016) suggests that culture significantly impacts flexible work arrangement policies, with control-oriented cultures implying more challenges with WFH. A global survey of 80 companies by Colliers International, a leading real estate professional services and investment management company, showed that 86% of managers and leaders noted that they typically expect employees to work between one and four days at home from 2023 (Writer, 2021). However, during the pandemic, the adoption and variation of such policies grew fast with multiple new perspectives emerging (Choudhury, 2020). Quite a few companies today implement WFH as an element of flexibility, leading to a regular but partial practice (a few days a week) and some even as a general company practice (Smite *et al.*, 2023c).

Smite *et al.* (2023a) conducted 22 surveys on over 11,000 individuals from 20 corporate entities. The results depicted the respondents' voice and varied by company, with the median being 65%. The response rates varied by company, ranging from 15% to 100%. The researchers used a scale of frequency to describe the various response options. Some of these included "Never," "Occasionally," "Less than half a week," "Half the time," "More than half a week," and "Always." These answers were categorised into five categories: "Never," "Occasionally," "Less than once a week," "Half the time," and "More than half a week." The value of employees who took the "Never at home" and "Occasionally from home" options is only 10%. In contrast, those who took the "Always at home" option had a median value of 10%, which is in line with the 10% of office workers. Most of the survey respondents indicated that they prefer working from home or hybrid arrangements (Gratton, 2021). The main reason for this trend is that it provides them with better conditions for their concentration and work-life balance. In addition, according to colleagues, collaborative work is more beneficial than traditional office setups (Smite *et al.*, 2023a). Some exceptions to this trend can be found. According to a study conducted by the Gensler Institute in 2021, employees who live in homes that are not ideal for their concentration work tend to be less productive when they work from home. They also prefer to use the office when they need to complete their work.

Managers often pose the question of whether the concept of "working from home" could potentially result in a phenomenon known as "shirking from home"(Bloom *et al.*, 2015). Managers who adhere to a "Theory X" management style (McGregor, 1960) which reflects a low perception of self-efficacy and a lack of trust in employees' ability to handle remote infrastructure, work independently, manage time effectively, or operate without constant supervision, tend to hold a skeptical view towards telework

(Silver, 2023b). Similarly, teleworkers themselves often sense this lack of trust, as they perceive their supervisors reluctantly accepting their preference for working from home (Pratt, 1984). Within the same work environment, some coworkers exhibit skepticism towards teleworkers, suspecting that those working off-premises are not putting in full-time effort, while others show acceptance, admiration, envy, jealousy, or even resentment (Pratt, 1984). However, it is important to note that the current work-from-home situation differs from previous studies on distributed development and telework, as it is no longer a selective and voluntary practice for a limited few, but rather a widespread and mandatory practice for everyone.

While some organisations have provided their employees with tools such as laptops, data, and office equipment to facilitate working from home, the state of South African infrastructure remains a hindrance to achieving a productive work-from-home schedule. Load shedding, which has become a regular occurrence in the lives of all South Africans, was temporarily halted during the pandemic (Agency, 2020). However, as restrictions were eased, load shedding resurfaced and has been more severe than in previous years. According to an article published by Writer (2023a), South Africa has experienced load shedding for all but one day of the first four months of 2023, totaling 106 days. The South African Reserve Bank estimated a total of 250 days of load shedding, slightly higher than the 207 days experienced in 2022. In terms of hours, load shedding has been in effect for 2,442 hours so far this year, closing in on the 3,776 hours recorded in 2022, as reported by EskomSePush.

Despite load-shedding mitigation measures such as electricity self-generation and UPS systems, as mentioned by Writer (2023a), it can be argued that network issues accompanying blackouts still remain unaddressed, potentially impacting the productivity of remote workers. Based on research by Weerarathna *et al.* (2022) in India, employees faced hardships due to poor network connections and a lack of physical infrastructure, which led to problems in accessing organisation networks. Overall, the challenges faced are interlinked, as well as the negative outcomes. According to the Global Innovation Index (GII), an annual report published by the World Intellectual Property Organisation (WIPO), South Africa was ranked 61 out of 132 economies assessed in the 2022 edition. This indicates a slight improvement compared to previous years. The GII takes various factors into account, including research and development investment, technological infrastructure, human capital, business innovation, and creative outputs (Huarng and Yu, 2022). Although some employers have offered accessibility and autonomy to employees, productivity may decrease due to a lack of experience handling networks without supervision (Weerarathna *et al.*, 2022). Conversely, in the 2019 Global Competitiveness Index Report, South Africa was classified as the second-most competitive economy in Sub-Saharan Africa, following Mauritius. However, the overall ranking dropped from 67 out of 140 countries in 2018 to 60 out of 141 countries in 2019. This decline was primarily attributed to a decrease in the nation's ability to innovate, adopt information and communications technology (ICT), and maintain good health. The

report highlighted South Africa's weak performance in terms of innovation capability, ranking 46 out of 141 countries, with a score of 45 out of 100 (Schwab, 2019).

In summary, despite some efforts to mitigate load shedding's impact on industries, network issues and infrastructure challenges remain, potentially affecting the productivity of remote employees. South Africa's rankings in global innovation and competitiveness reports indicate room for improvement in areas such as innovation capability and ICT adoption also arguably the reasons for the impact in South African employees being unable to work from home permanently (Schwab, 2019). Therefore, after the pandemic, for employees who were not significantly affected by infrastructure challenges, and whose roles did not require strict adherence to set business hours due to customer interactions, etc., and who had the necessary collaboration tools in place, it could be argued that while the hybrid model may work to some extent, working from home is primarily a preference. Many organisations consider it a benefit, but it can also be viewed as a cost-saving measure due to reduced expenditure.

2.5 Hybrid model for software developers

Working from home and regular remote work are not a new phenomenon within software development. Some companies have implemented various working from home approaches with existing policies before the COVID-19 pandemic (Nolan, White, Soomro, Dopamu, Yilmaz, Solan, and Clarke, 2021), and further studies have explored regular remote work post the COVID-19 pandemic (Ralph, Baltes, Adisaputri, Torkar, Kovalenko, Kalinowski, Novielli, Yoo, Devroey, and Tan, 2020). However, it is important to note that working from home and regular remote work are distinct from the sudden shift to remote work during the COVID-19 pandemic. In this unique situation, software developers accustomed to primarily working in person were abruptly forced to transition to remote work (Miller, Rodeghero, Storey, Ford, and Zimmermann, 2021). This rapid and involuntary change set working remotely during the pandemic apart from regular remote work.

Conboy, Moe, Stray, and Gundelsby (2023), discovered that WFH has experienced a significant increase. Initially, this was driven by the necessity and legal requirements imposed by the pandemic, but it has now become a matter of preference. It is evident that WFH is not a temporary trend and will continue in the long run. According to a recent survey conducted by Conboy *et al.* (2023) among 1,380 software developers, only 3% intend to return to the office on a full-time basis. Additionally, 25% plan to work fully remotely, while 56% prefer a hybrid approach, which involves regularly going to the office but not daily. As a result, companies like Facebook, Square, Shopify, and Slack have implemented policies that allow for long-term and even permanent WFH arrangements. Spotify introduced a work-from-anywhere (WFX) policy, granting employees the freedom to choose their preferred frequency of office attendance, work from home or relocation to a different country.

Consequently, many software development environments are currently characterised by, and have increasingly adopted, a "hybrid software development" model.

The current approaches to hybrid work typically revolve around a fixed calendar schedule, such as designating specific days for working from home or in the office. Wang, Chou, Fathi, Schimmer, Colligan, Redmiles, and Prikladnicki (2022) portrayed a hybrid schedule that organised recurring software development tasks, such as common scrum ceremonies, into on- and offsite schedules. For a typical five-day week during a sprint, this site practiced three aligned onsite days for scrum ceremonies of the basic scrum and less framework as well as the architecture and UX (User Experience) design sessions. These onsite days were primarily reserved for collaboration intense sessions in person and some optional and informal team-building events. The remaining two days were remote days for focused standalone work sessions in between; one was the “no-meeting Wednesday” to reduce interruptions. The rationale behind this formation was to fit scrum activities in a two-week timeframe, starting with planning in week 1 and ending with reviews and retrospectives in week 2. However, developers can utilise their onsite workplaces and assigned desks at any time they prefer.

This approach aligns with various human resource (HR) laws worldwide, which grant employees the right to remote work for a set number of hours or days per week. However, an alternative organisational approach is event-based, where teams and their activities are structured in response to specific trigger events, rather than predefined time slots. An event-based activity, like a planning session, serves as a reference point for coordinating tasks before and after the event (Wang *et al.,* 2022). Software development, being an event-driven profession, involves teams organising their work around events like system failures, customer requirement changes, or the addition of new team members. Instead of relying on fixed times and days, it may be more beneficial to encourage on-site presence for everyone during or immediately after certain events, while allowing remote work during and after other activities and events. Sporsem and Moe (2022) offered valuable insights into event-based hybrid work, emphasising the tailored use of communication technology to facilitate team collaboration during unscheduled and often urgent events.

According to a study conducted by Conboy *et al.* (2023), organisations should strive to understand the best practices for implementing hybrid work, such as determining the optimal number of work-from-home days, defining suitable processes, and selecting appropriate technologies. This is crucial because employees within an organisation have diverse responsibilities and preferences regarding flexibility. Hence, the approach to hybrid work needs to be tailored to individuals and their specific tasks (Conboy *et al.,* 2023). Smite *et al.* (2023a) argue that most hybrid methods, processes and tools are typically designed with a fixed hybrid profile in mind, which may not be as effective for certain combinations of office and work-from-home arrangements, as compared to others. In contrast to the commonly adopted

one-size-fits-all approach to hybrid work, Wang *et al.* (2022) propose that organisations should initially conduct experiments to develop their own unique hybrid work paradigm. They advocate for a bottom-up approach that encourages continuous improvement within the organisation's own work practices. This allows for a more customised and effective hybrid model, rather than blindly adopting a generic hybrid work framework embraced by other organisations in the market. Marcin Floryan, director of engineering at Spotify, also supports that "Hybrid work should be seen as an ongoing experiment with the potential to shape the future of software development" (Jackson *et al.,* 2022: 27). Many publications are suggesting new ways of working in a hybrid environment (Jackson *et al.,* 2022). A new set of recommendations for hybrid software development, as well as the current existing assumptions, are outlined in Table 2.1.

Table 2.1: A new set of recommendations for hybrid software development

A new set of recommendations for hybrid software development	
Existing assumptions	**New recommendations**
1. The careful organisation and synchronisation of calendars and development cycles are necessary for hybrid development to work.	1. Consider event-based hybrid organisation with or instead of calendar-based organisation.
2. There is one best way of doing hybrid development	2. Think about more than one way of doing hybrid development.
3. Hybrid is a fixed and binary concept.	3. Consider the fluidity of hybrid development.
4. Hybrid methods should be implemented as closely as possible to original guidelines.	4. Consider hybrid work as an ongoing experiment.

Source: Jackson *et al.,* (2022:28)

The table provided showcases four prevailing assumptions that currently exist in the realm of hybrid working. The first assumption, which is the most widespread, considers the hybrid working model as a combination of on-site office work for a specific number of days per week, with the remaining days spent working remotely. Additionally, the table presents a fresh set of recommendations specifically tailored for software developers, offering insights into adopting the hybrid model effectively. This framework can serve as a valuable resource for other organisations looking to establish their own unique approach to hybrid work, following a bottom-up methodology.

2.6 Collaboration Tools

Software development plays a crucial role in modern industries, meeting the increasing demand for technology-driven solutions. The reliance on software has become indispensable in various sectors, including office work, administration, banking, and many others (Munassar and Govardhan, 2010). The ever-growing importance of computers and software in industry underscores the need for highly skilled professionals in this field. Software developers often find themselves fully engaged in demanding tasks for extended periods (Tokdemir, 2022). As a result of software development being a critical and scarce skill, the phenomenon of distributed software development is not new in this industry. Many software teams have been formed with a team structure that spans multiple locations, time zones, and cultures. However, due to the ongoing global COVID-19 pandemic, more teams than ever are now operating in a remote operating model with team members based in different locations from one another (Hille, 2021). As a result of this shift to remote work, many teams are now trying to find new ways of working effectively. To do so, they heavily rely on tools as they can no longer depend solely on traditional in-person interactions to discuss, agree and shape their software solutions (Russo, Hanel, Altnickel, and Van Berkel, 2023).

According to Taft (2014), the ever-evolving world of continuous delivery and agile methodologies requires software developers to maintain constant communication and collaboration with others to stay updated on the progress of projects. In order to succeed in this dynamic environment, developers must possess a combination of qualities such as creativity, systematic thinking, persistence, and the ability to handle high levels of stress (Gajdzik and Wolniak, 2022). The pressure to meet tight deadlines poses significant challenges for software professionals, and effective communication and collaboration are essential for team-based software development (Teffo, Sigama, and Kanobe, 2023). When communication and collaboration falter, it can have detrimental effects on productivity in various aspects. It can lead to the need for rework, diminished trust among team members, and overall dissatisfaction. The COVID-19 pandemic and the subsequent shift to remote work have further highlighted the importance of collaboration tools in the software development process (Jackson, Van der Hoek, Prikladnicki, and Ebert, 2022). As teams adapt to remote work arrangements, these tools have become even more critical for facilitating effective communication, collaboration and coordination among team members who are physically dispersed.

The use of collaboration tools enables developers to bridge the gap created by remote work and maintain a high level of productivity (Jones and Thoma, 2019). These tools provide platforms for virtual meetings, real-time messaging, shared document collaboration, and version control, among other functionalities. By leveraging these tools, software development teams can maintain effective communication channels, ensure seamless collaboration, and foster a sense of camaraderie despite

physical distance (Mishra, Mishra, and Ostrovska, 2012). As the software development landscape continues to evolve, it is crucial for professionals to recognise the importance of effective communication and collaboration in achieving project success. This involves embracing the use of collaboration tools and adapting to remote work environments. By doing so, software development teams can overcome the challenges posed by tight deadlines, promote productivity, and deliver high-quality solutions in an ever-changing industry (Jackson *et al.*, 2022).

According to Maree (2022), while collaboration tools play a crucial role in software development, face-to-face meetings are essential for fostering in-depth discussions. Face-to-face interactions offer numerous advantages, including improved focus, reduced interruptions, sufficient time to complete work, more efficient meetings, and a more comfortable work environment. These factors contribute to more meaningful and productive discussions among team members. Traditionally, software teams have relied on a set of collaboration tools that encompass video conferencing, instant messaging/chat, task trackers, shared documents, wikis, and source code repositories (Jackson *et al.*, 2022). However, in recent years, there has been an increasing adoption of new online tools designed to enhance real-time collaboration among remote team members. Examples of these tools include digital whiteboards and diagramming tools, as highlighted by (Mishra *et al.*, 2012).

Despite the growing availability of these tools, there is a lack of research exploring how this expanded range of collaboration tools effectively supports remote software development teams. Therefore, further investigation is needed to understand how these tools can best facilitate collaboration and boost productivity in remote settings (Jackson *et al.*, 2022). It is crucial for software development teams to strike a balance between leveraging collaboration tools for efficient remote work and recognising the value of face-to-face meetings. By combining the benefits of both approaches, teams can create an environment that encourages in-depth discussions, fosters effective collaboration, and ultimately leads to successful software development outcomes.

A study conducted by Microsoft involving a substantial workforce of over 60,000 employees, found that the implementation of remote work across the organisation resulted in a more rigid collaboration network (De Kok, 2016). This shift led to a decline in the formation of new connections and increased segregation within formal business units. Moreover, the study highlighted a transition from synchronous to asynchronous communication as a consequence of remote work (Yang, Van Aalst, and Chan, 2021). The researchers also drew upon related studies suggesting that changes in collaboration and communication methods hinder the transfer of knowledge, impede the effective conveyance and processing of complex information, and diminish overall communication quality. Consequently, the authors anticipated that these network changes would adversely affect productivity and innovation (Yang *et al.*, 2021). Similar concerns have been raised by other researchers, who have expressed

apprehensions about the long-term consequences of eroding social ties, diminished attachment and team cohesion, and a decreased inclination for collaborative work in remote settings (Santos and Ralph, 2022; Smite *et al.,* 2022).

Contemporary software development methodologies, such as agile and flow-based development, were initially designed with the assumption of collocated on-site teams or controlled distributed development in office settings, rather than large-scale work-from-home (WFH) scenarios. However, the widespread adoption of remote and hybrid work challenges the underlying principles of pre-COVID methods like agile, which were tailored for teams physically together or distributed across offices equipped with communication technology. Additionally, teams used to select processes based on their effectiveness in solving customer problems, but now the processes must also address team-building, team strengthening, and adaptability to hybrid setups. Wang *et al.* (2022) suggest that experimenting with hybrid work models is crucial, and Jackson *et al.* (2022) emphasise the same approach when it comes to collaboration tools. Wang *et al.* (2022) propose that identifying new methods and tools should involve experimentation, trying out different processes and tools, and gathering empirical evidence on their effectiveness. It is essential for software developers to have tools that foster employee engagement within the hybrid work model and support the unique requirements of these new hybrid methodologies.

Jackson *et al.* (2022) suggest eight approaches that hybrid software teams use to preserve, structure, and promote creativity as part of their day-to-day work. In the discussion below, the tools are organised and reviewed into three categories.

2.6.1 Communication Tools to Stay Connected

In this category, the primary technologies include chat, videoconferencing, and social networking. Chat tools facilitate the exchange of messages among software developers, serving various purposes like seeking assistance or discussing features and bugs. Industry-standard tools like *Slack* and *Google Chat* have become widely used. Videoconferencing tools, such as *Zoom* and *WebEx,* enhance the chat tools by enabling teams to have visual meetings, which can be pre-scheduled or spontaneous. Social networking tools, although also offering communication capabilities, primarily focus on creating communities and providing organisational awareness by identifying individuals within the organisation.

2.6.2 Artifact Management Tools to Coordinate Storing, Sharing, and Editing Artifacts

Virtual whiteboard software, diagramming tools, and shared document editors are all designed to assist small groups of developers in creating collaborative content. These tools, such as *Mural* for creative design sketches, *Gliffy* for formal diagrams, and *Google Docs* for primarily textual documents, aim to facilitate shared work. Although all three tools support asynchronous collaboration, their main purpose

is to enable synchronous collaboration among a small group of engineers. In the past, integrated development environments (IDEs) primarily focused on individual developers coding on their desktops. However, recent advancements have introduced features that promote online collaborative work, such as pair programming or the ability to author test cases directly within the IDE. An example of this is the *Code With Me* extension for *IntelliJ*. Additionally, knowledge management tools like Confluence help teams manage a central resource that evolves continuously, allowing them to share various types of information that are important for the development project.

2.6.3 Task Management Tools to Organise Work and Gain Insights on Progress

Task management technologies encompass various tools and platforms designed to facilitate planning, project management, and tracking. Examples of these technologies include planning and project management tools like *Asana* and *Trello*, which enable the creation, organisation, and monitoring of tasks. Repositories, such as *GitHub* and *GitLab*, serve as centralised platforms for storing development artifacts, providing controlled access and version control. Additionally, status dashboards offer a comprehensive overview of the team's progress by presenting key development statistics. When creating dashboards, teams should consider which metrics are most relevant to their specific needs. For instance, teams adopting a *DevOps* approach often prioritise flow metrics. These metrics can be measured using commercial tools like Tasktop Viz or open-source frameworks like the *Google Cloud Four Keys* project.

When selecting collaboration tools, it is crucial to carefully consider various aspects that extend beyond individual convenience and avoid making impulsive choices. Additionally, the adoption of these tools can introduce new technical challenges, such as:

- Intellectual property rights (IPR) and governance concerns due to uncertain server locations.
- Cybersecurity measures to safeguard shared information from malicious attacks.
- Ensuring smooth transitions between online and offline work, including having adequate local machine backups.
- Adapting to fluctuating bandwidth and connectivity issues, aiming to minimise frequent and disruptive interruptions. Implementing simple solutions like real-time automatic checks on video and audio quality for all participants could be beneficial in addressing this challenge.

Lack of suitable tools to foster innovation within the hybrid working model can hinder the organisation's ability to compete effectively. Successful collaboration across various disciplines and functions is essential in this context. To achieve optimal lifecycle management, it is crucial to establish connections

between engineering and other relevant areas. Merely emphasising development alone is insufficient, as the landscape of software development is undergoing transformations with the emergence of low-code platforms and other paradigms. Therefore, a holistic approach that encompasses these evolving trends is necessary to drive innovation and stay competitive.

Table 2.2 provides an overview of current tools with underlying use cases and technologies for software development team collaboration.

Table 2.2 : Collaboration Technology

Technology	Primary Purpose	Use Case	Risks	Scale of Use	Examples	Selection Considerations
Communication: chat	Real-time chatting with remote colleagues	• Asking for help • Discussing features and bugs • Coordinating a team's tasks • Virtual water cooler conversations	• Long chat chains make it hard to retrieve relevant information later • Too many conversations to keep track of	One to one, small group, large team, everyone	• Slack • MS Teams • Google Chat	• Do you need to integrate with other tools? • Are you planning on one vendor and tool suite that provides many tools or going for a best-in-class approach?
Communication: videoconferencing	Real-time meetings with remote colleagues	• Scheduled or recurring meetings • Quickly hold unscheduled meeting with one or more colleagues • Prerecord video presentations for distribution and viewing asynchronously	• Overly high bandwidth needs • Insufficient flexibility, such as with WebEx • People can spend too long in meetings and feel unproductive • Domination by a small group of participants	Small group, large team, everyone	• Zoom • Google Meet • MS Teams • Cisco WebEx	• What bandwidth is necessary? • Does the tool easily adjust to changing bandwidth, such as when traveling? • What type of meetings do you hold, and is participant interactivity beyond seeing and talking with one another important?
Communication: social networking	Provides social networking features for the enterprise	• Building communities within a company • Connecting to colleagues • Awareness of organizational change • Finding others with relevant expertise	• Overlaps with other tools such as chat, video, and knowledge management • Scattered information which is not consolidated	Large companies	• Yammer • Workplace from Meta • Jive	• How do you build communities in your organization? • Do you need this tool, or will others suffice?
Artifact management: virtual whiteboard software	An online space for multiple participants to collaboratively create and edit content	• Brainstorming sessions involving many people • Creative design work • Create architecture and design documents in advance of sharing with colleagues	• Can be complex for newcomers to use	One to one, small group	• Miro • Mural • Google Jamboard	• What type of content do you collaborate on in meetings? • How is your team distributed? Are some colocated in an office and will use a virtual whiteboard? • How versed is the team in holding effective virtual creative practices?
Artifact management: diagramming	Produce and share diagrams online	• General diagramming collaboratively in real time • Sharing diagrams with colleagues • Interactively describing code and solution designs with teammates	• Not integrated; thus, diagrams are frequently exported and may become out of sync	One to one, small group	• Lucidchart • Gliffy • MS Visio	• What type of diagrams do you use and share? • Is integration important? • Do your graphics need semantics, such as UML modeling or schematics?

Source: (Jackson *et al.*, 2022: 9)

Technology	Primary Purpose	Use Case	Risks	Scale of Use	Examples	Selection Considerations
Artifact management: shared document editors	Create and edit documents	• Producing shared documents over typically a short period of time, with a small group responsible for the document • Shared note taking in meetings • Getting feedback from a larger group as comments on the shared document	• Losing consistency of voice and message (individuals producing individual parts) • Largely invisible edits	One to one, small group	• Google Docs • MS Word 365 • Dropbox • SharePoint	• Does the tool support your office suite? • Which vendor's suite best meets your needs across the different tools? • Is collaboration synchronous or asynchronous? • Are original applications available to edit documents, rather than insufficient browser mode, such as in SharePoint?
Artifact management: IDE, ALM, PLM	Predominantly for writing code but also support for remote pair programming/ code sharing	• Pair and mob programming with remote colleagues • Learning about the code from teammates	• Vendor lockin • IPR protection • Code-sharing technologies are nascent and so may have issues • Insufficient import/export functions • Steep learning curve for nondevelopers	One to one	• IntelliJ with Code With Me • MS Visual Studio Code with Live Share	• What IDE/ALM/PLM suite is necessary internally and externally? • What artifact types do you need, and are they supported by the tool? • Considering the complexity/ impossibility to switch, how do you avoid vendor lockin? • Does the tool support necessary traceability?
Artifact management: knowledge management	Readily enables the capture and sharing of knowledge with colleagues	• Sharing knowledge, such as architecture and design, requirements across a set of user-managed webpages • Capturing knowledge as a series of questions and answers • Readme files in source code repositories enable developers to share knowledge • Can rebuild static sites as part of CI/CD pipelines, which can help keep content updated	• Challenging for a team to keep documentation up to date • Cannot easily find information distributed across multiple pages • Scattered information which is not consolidated	Large team, everyone	• Confluence • Stack Overflow for Teams • GitHub • Static site generators, such as Gatsby	• Who are the primary user bases for creating and viewing knowledge, respectively? If the user base is developers, may want to consider the more developer-oriented options versus generic knowledge management solutions • What tools do you need to integrate with? • Is the knowledge accessible in structured format?
Artifact management: CI/CD	Automated pipelines to build code, run tests, perform quality checks, and deploy software	• Can define a pipeline that automates all of the steps required to take code from source control through to a live deployment. • Automate updates to documentation	• Can be costly to run if the software is run on premises as opposed to a software-as-a-service offering • Challenging to agree and configure the steps in a pipeline, especially if introducing conformity across an organization	Everyone	• Jenkins • CircleCI • TeamCity • GitLab	• Are you going to run locally or in the cloud? • What hosting platforms or other tools do you need to integrate with? • How mature are your CI/CD pipelines from code to deploy to monitor? • Does the tool support traceability for code and design decisions?

Source: (Jackson *et al.*, 2022: 10)

Technology	Primary Purpose	Use Case	Risks	Scale of Use	Examples	Selection Considerations
Artifact management: testing tools	Define, manage, and execute tests	• Easily store tests alongside source code • Collaborate with colleagues and stakeholders on authoring tests • Execute tests automatically as part of CI/CD • Tests are the documentation for the product	• Insufficient support for change management • No traceability to defect and configuration management tools • No support towards test coverage	Everyone	• JUnit • Cypress • Cucumber • Gatling	• What types of testing does your team perform? • How does your team collaborate on tests? • Does the tool support traceability for requirements to test, for example, for test-driven requirements engineering? • Does the tool connect to your change management?
Task management: planning and project management	Manage a team's work	• Plan and manage agile sprints • Capture tasks to be completed • Track/obtain reports on progress • Manage non-IT projects • Capture not tasks but information relevant to tasks	• Steep learning curve for newcomers	Small group, large team, everyone	• Jira • Trello • Asana • Basecamp	• Are integrations to other tools important? • Will teams other than software teams use the tool? • Are specific methods necessary, such as Kanban or agile Scrum support? • Do you want a single project management platform that provides many features and inbuilt tools?
Task management: code repositories	Manage source code	• Commit code • Approve pull requests • Task tracking • CI/CD pipelines • Finding developers with relevant expertise	• Complexities of branching and merging • Steep learning curve for nondevelopers	Small group, large team, everyone	• GitHub • GitLab • Bitbucket	• Will you host in the cloud or on premises? • Do you want a full or partial DevOps platform or code repository combined with other tools?
Task management: status dashboards	Share a project or team's progress	• Incorporate data from multiple developer tools to share progress and provide the latest status • Collaborate in real time on shared dashboards to drill into the data • Can also incorporate production data and statistics	• Time consuming to set-up and maintain the dashboards • Multiple dashboards in various operational tools which are not consolidated • Mere data cemeteries that remain unused	Large team, everyone	• Grafana • Tasktop Viz • Tableau • Google Data Studio	• Who will be maintaining the dashboards, and what is their level of technical proficiency? • What data sources will be feeding the visualizations? • What type of metrics are you interested in? • What other platforms are you using in your organization, such as Amazon Web Services or Google?

Source: (Jackson *et al.*, 2022: 11)

2.7 Research Gaps

The literature review demonstrates that the workplace has experienced significant changes over the past few decades, and according to Smite *et al.* (2023a), the COVID-19 pandemic has accelerated this transformation. It highlighted the differences between physical and virtual work environments, raising questions about the role of traditional offices (Conboy *et al.*, 2023). Whilst some scholars justify the concept of pre-pandemic WFH, using farms and farmhouses as an illustration, there has been minimal evidence in literature to support this connotation. Furthermore, the nature of work has become more flexible and virtual, with digital and business-oriented settings replacing traditional manufacturing-focused workplaces. Advances in information and communication technology have popularised new working arrangements like WFH and hybrid workplace models. However, trust and scepticism around remote work exists among some managers and co-workers, which has also been a key factor in the adoption and implementation decisions. According to Schwab (2019), South Africa's infrastructure was assessed, and it was found that challenges such as inadequate energy supply, including load shedding, were among the key factors affecting the country's overall competitiveness. These infrastructure challenges not only hindered productivity, but also had broader implications for South Africa's ability to attract investment and foster innovation (Schwab, 2019). Therefore, the implementation and application of these models varies across organisations and job roles, particularly software development roles. Jackson *et al.* (2022) stated that there is still a lot more to be understood in relation to hybrid development, and this will provide rigorous and relevant evidence-based guidance for practice. The future of software development is seen as an ongoing experiment with hybrid work shaping its direction. Studies show a significant increase in remote work, with many software developers preferring a hybrid approach. Companies like *Facebook*, *Square*, *Shopify*, and *Slack* implemented policies to support long-term remote work arrangements.

2.8 Chapter Summary

Collaboration tools that promote innovation and connect different disciplines are essential for effective software development in the hybrid working model. Whilst the current adopted hybrid working models may not necessarily be wrong, Jackson *et al.* (2022) argue that there is a need to at least challenge and refine them so that future developers and development managers can be more informed when thinking about organising and executing hybrid development. Therefore, this chapter analysed the hybrid working model, and how various organisations apply it. The chapter provided suggestions and also highlighted the importance of collaboration tools that need to be applied for software developers to effectively apply the hybrid working model. The following chapter presents the qualitative methodology underpinning this study, alongside the rationale.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter focused on the methodology employed when conducting the study. Firstly, the research design underpinning this study was discussed, and a justification of why a qualitative research method was chosen and deemed appropriate to allow the researcher to address the research objectives and questions guiding the study was provided. The study area, population, and the sampling technique and size were discussed. Thereafter, the study reviewed the research instruments that were utilised; it then examined the validity and reliability of the instruments that were used. Data collection and data analysis methods employed in this study were outlined. The last part of the section indicated how the researcher ensured that all ethical procedures were followed to guarantee the confidentiality and anonymity of all research participants. In reiteration, the aim of this study was to investigate the perspectives of software development leaders regarding the efficacy of the hybrid working model within the software developer community at LexisNexis South Africa. By doing so, it aimed to address the current approach taken by LNSA in adopting this model and evaluated its effectiveness.

3.2 Study setting

The study was undertaken at LexisNexis South Africa, a division within the RELX group. LexisNexis South Africa is the world's leading supplier of information-based solutions, as well as analytics which help customers to enhance productivity, decision-making and outcomes, whilst also advancing the rule of law around the world (LexisNexis, 2022). This organisation was chosen because it adopted the hybrid working model for all its employees, post the COVID-19 regulations in March 2022. The adoption was in line with the local trends in South Africa, however, the implementation of the model was carried out through a blanket approach. The study was conducted in South Africa and participants from LNSA at the Johannesburg, Durban, Cape Town and Port Elizabeth offices were interviewed via Zoom. Whilst LNSA has offices in 6 South African provinces, only 4 of the abovementioned locations was utilised as a study area, ~~this is~~ due to the fact that there are no software developers in the other two regions, consequently the hybrid model for software developers in these regions is not applicable.

3.3 Research paradigm

A research paradigm refers to a broad framework or perspective that guides the researcher's approach to conducting research. It encompasses a set of assumptions, beliefs, and values about the nature of knowledge, the way it is acquired, and the methods used to investigate and understand the research problem

(Jonker and Pennink, 2010). Or, as Lather (1986) explains, a research paradigm inherently reflects the researcher's beliefs about the world that he/she lives in and wants to live in. It constitutes the abstract beliefs and principles that shape how a researcher sees the world, and how he/she interprets and acts within that world. It defines the researcher's worldview, meaning that a paradigm constitutes the abstract beliefs and principles that shape how a researcher sees the world, and how he/she interprets and acts within that world. It is the conceptual lens through which the researcher examines the methodological aspects of a research project to determine the research methods that would be used and how the data will be analysed. Guba and Lincoln (1994) define a paradigm as a basic set of beliefs or worldview that guides research action or an investigation. Similarly, the gurus of qualitative research, Denzin and Lincoln (2008), define paradigms as human constructions, which deal with first principles or ultimates, indicating where the researcher is coming from, so as to construct meaning embedded in data. Paradigms are thus important because they provide beliefs and directives that influence what should be studied, how it should be studied, and how the results of the study should be interpreted for scholars in a particular discipline. The paradigm defines a researcher's philosophical orientation and this has significant implications for every decision made in the research process, including choice of methodology and methods (Kivunja and Kuyini, 2017). Therefore, a paradigm offers insights into how data will be interpreted and the manner in which significance will be derived from the gathered data, considering individual backgrounds and experiences (Leavy, 2022).

The ontological and epistemological belief systems have been joined to form a paradigm (Leavy, 2022). According to Rehman and Alharthi (2016), ontology deals with the nature of reality and existence. It involves the researcher's beliefs about the fundamental nature of the social world, including the existence of objective reality, the role of social structures, and the nature of human agency. Epistemology refers to the researcher's beliefs about the nature of knowledge and how it can be acquired (Rehman and Alharthi, 2016). It explores questions such as what counts as evidence, how knowledge is verified, and the relationship between the knower and the known (Rehman and Alharthi, 2016). Adhering to an ontological belief system (explicitly or implicitly) guides one to certain epistemological assumptions. Therefore, if a singular verifiable truth is assumed, "then the posture of the knower must be one of objective detachment or value freedom in order to be able to discover 'how things really are' and 'how things really work'" (Guba and Lincoln, 1994:105). Objectivism encompasses the assumptions of natural sciences, positing that the social reality under investigation exists independently of ourselves and others (Saunders, Lewis, and Thornhill, 2009). On the other hand, subjectivism embodies the assumptions of the arts and humanities, highlighting that the social reality is constructed through the actions and perceptions of individuals (Saunders *et al.*, 2009).

In this study, the researcher embraced epistemology by engaging with the study participants, allowing for the exchange of perspectives and the co-construction of reality. Subjectivism was employed with the purpose of the researcher comprehending the participants' realities, making sense of them, and gaining meaningful understanding of their perceptions, actions, motives, and intentions (Saunders *et al.,* 2019). The development of research methodology was approached by employing the theoretical framework known as the "research onion" as depicted in Figure 3.1.

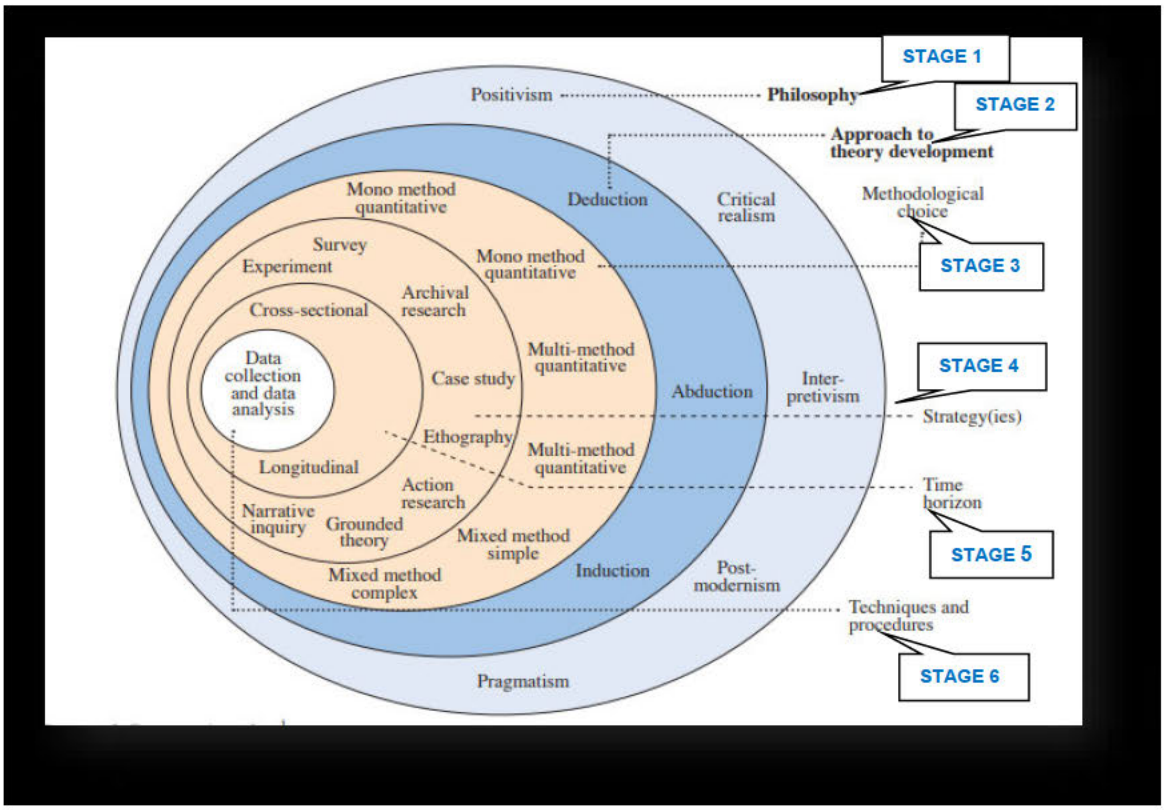

Figure 3.2: The research onion (Melnikovas, 2018)

The research onion, developed by Saunders *et al.* (2019), is a conceptual framework that helps researchers understand and structure the various stages and elements involved in conducting research. It provides a systematic approach to research design and guides researchers through different levels of decision-making in the research process. The research onion represented in Figure 3.1 consists of six stages, each representing a different aspect of the research design. These will be discussed in detail in the sub-sections.

3.4 Research Design

This section described the decisions made in designing the research to answer the objectives of the study. The rationale for these design choices were grounded in the specific research questions and objectives of this study, as outlined by (Saunders, Lewis, and Thornhill, 2023). The subsequent subsections offered an

insight into the research methodology, utilising the theoretical framework known as the "research onion," illustrated in Figure 3.1. This approach provided a structured and layered perspective, guiding the methodological choices in a coherent manner and aligning them with the overarching goals of the research.

3.5 Research Philosophy

Research philosophy is the first stage of the research onion and it refers to the set of assumptions, beliefs, and values that underpin an individual researcher's worldview and approach to knowledge creation (Saunders *et al.,* 2019). It is more specific to the researcher's personal stance and orientation toward conducting research. Research philosophy is influenced by various factors, including the researcher's educational background, personal experiences, and theoretical perspectives. Research philosophies include the following:

3.5.1 Positivism

Positivism is a philosophical and sociological approach that emphasises the importance of empirical evidence and scientific methods in understanding the world (Rehman and Alharthi, 2016). Positivists believe that knowledge should be based on observable facts and verifiable data, rejecting speculative or metaphysical explanations. They advocate for the use of the scientific method to study and explain phenomena (Saunders *et al.,* 2019). Positivism assumes that the social world operates according to regular patterns and can be understood through systematic observation and experimentation.

3.5.2 Postpositivism

Postpositivism is a philosophical position that emerged as a response and critique to positivism (Hammersley, 2019). According to Creswell and Creswell (2017), postpositivism represents a more nuanced and critical approach to scientific inquiry. It acknowledges the limitations of objectivity, emphasises the role of theory and interpretation, and recognises the complex and multi-faceted nature of social phenomena (Leavy, 2022). Postpositivism researchers are determined and focus on reductionism, empirical observation, instrument and theory verification (Creswell and Creswell, 2017).

3.5.3 Critical realism

Critical realism acknowledges the existence of an external reality independent of our perceptions and observations. It argues that while our knowledge is imperfect and mediated through our subjective experiences, there are underlying structures and mechanisms that shape the social world and produce observable phenomena (Mukumbang, 2023).

3.5.4 Postmodernism

According to Saunders *et al.* (2019), postmodernism represents a complex and diverse intellectual movement that challenges established ways of thinking and seeks to deconstruct and reimagine social, cultural, and artistic conventions.

3.5.5 Pragmatism

Pragmatism is a philosophical tradition that advocates for a practical and problem-solving approach, it emphasising the practical consequences of beliefs and actions and valuing experiential learning and adaptation in response to changing circumstances (Kaushik and Walsh, 2019). Pragmatist researchers aim to address real-world problems and use methods and approaches that are most effective in achieving desired outcomes (Creswell and Creswell, 2017). Pragmatism encourages flexibility, adaptation, and the integration of diverse perspectives to find practical solutions to research questions or problems. It emphasises the importance of taking action and making a positive impact based on the findings and recommendations of the research (Leavy, 2022).

3.5.6 Constructivist or Interpretivism

This philosophy highlights the distinction between humans and physical phenomena by emphasising their capacity to create meanings (Saunders *et al.,* 2019). It is also known as the social construction of reality, as researchers actively participate in constructing and reconstructing meanings through their daily interactions (Leavy, 2022). Constructivists primarily examine people's perspectives and perceptions of phenomena, studying social interactions and the contextual factors that contribute to the construction of particular knowledge (Rees, Crampton and Monrouxe, 2020). Consequently, they challenge the notion of discovering an "objective truth," instead recognising that social realities emerge within specific contexts over time (Klassen, 2018). Constructivism encompasses principles such as understanding, the consideration of multiple participant meanings, social and historical construction, and theory generation (Creswell and Creswell, 2017). It directs attention to the details of a situation, aiming to uncover the underlying reality (Wahyuni, 2012). Researchers adopting an interpretivist stance assume that knowledge and meanings are based on individual interpretations (Swanson and Holton, 2005).

The paradigm that was chosen for this study was constructivism. Constructivists aim to understand the rules used by people in making sense of the world (Sekaran and Bougie, 2016), and to examine social knowledge and how that knowledge affects others (Burr and Dick, 2017). The aim of this study was to examine in detail, the perceptions relating to the hybrid model adoption, particularly in the software development field;

thus, constructivist philosophy was found to be relevant for this study. This is because the constructivist philosophical stance is always qualitative in nature and mainly focuses on interviews which are semi-structured in order to collect rich data that allow for deep understanding of a specific case study (Taylor, 2021). The constructivist paradigm was therefore deemed appropriate for this study as it allowed the researcher to explore the issue under investigation.

3.6 Research Approach

The process of theory development can be influenced by the research philosophy adopted at the previous level (Melnikovas, 2018). This is the second stage of the research onion and comprises three main approaches: deduction, induction and abduction (Saunders *et al.,* 2019).

Deduction encompasses significant attributes. Primarily, it involves the pursuit of elucidating cause-and-effect connections among concepts and variables (Azungah, 2018). According to Melnikovas (2018), data is then gathered to validate or disprove the hypothesis. This approach is frequently employed to assess pre-existing theories. As a scientific method that emphasises structure, quantification, generalisability, and verifiable hypotheses, the deductive approach is commonly rooted in the positivist research philosophy. Consequently, opting for deduction often corresponds to utilising a quantitative methodology (Saunders *et al.*, 2019).

On the contrary, inductive approach commences with the act of observing and collecting data (Saunders *et al.*, 2019). Its objective is to gain a comprehensive understanding of the problem's essence by obtaining an initial sense of the situation. Subsequently, the researcher engages in the depiction and analysis of the gathered data to establish a theory (Saunders *et al.*, 2019). This methodology is commonly employed in scenarios where there is a scarcity of prior research on the subject, or when there is a need to develop novel theories (Azungah, 2018).

According to Saunders *et al.* (2019), abduction is an approach that begins with the observation of an empirical phenomenon. The researcher then generates a best guess or conclusion, based on the available evidence. This approach involves a combination of induction and deduction, as the researcher moves back and forth to find the most plausible explanation (Melnikovas, 2018).

This qualitative study employed an inductive approach to gather insights from the participants of the study. The objective was to gain an understanding of whether there were alternative ways to implement the hybrid model specifically for software developers.

3.7 Research method choice

Saunders *et al.* (2019) propose that the third stage of the research onion pertains to the selection of a research method. This crucial decision involves opting for qualitative, quantitative, or mixed methods research approaches in order to address the research questions at hand.

3.7.1 Quantitative Research Method

Cohen, Manion and Morrison (2002), defines quantitative research as a form of social research that utilises empirical methods and empirical statements. According to Cohen *et al.* (2002), empirical statements describe what is observed in the real world, rather than expressing normative or prescriptive claims. These statements are typically expressed numerically. Another characteristic of quantitative research is the use of empirical evaluations, which assess the extent to which a specific program or policy meets a particular standard or norm based on empirical evidence. Additionally, Creswell and Creswell (2017) provide a succinct definition of the quantitative research approach as one that aims to explain phenomena by collecting numerical data and analysing them using mathematically based methods, particularly statistics. According to Saunders *et al.* (2019), quantitative research method is a systematic and structured approach used to gather and analyse numerical data to answer research questions or test hypotheses. It involves the collection of data through standardised instruments such as surveys, experiments, or existing datasets. The data collected is typically in the form of numbers or quantifiable measurements, allowing for statistical analysis and objective interpretation (Sukamolson, 2007).

3.7.2 Qualitative Research Method

Qualitative research is a methodological approach that focuses on understanding and interpreting the subjective experiences, behaviours and social phenomena of individuals or groups (Creswell and Creswell, 2017). It aims to explore and gain in-depth insights into the complexities and meanings associated with a particular research topic (McCusker and Gunaydin, 2015). Qualitative research employs a variety of data collection techniques, including interviews, observations, focus groups and analysis of documents or artifacts. The researcher seeks to gather rich, detailed, and contextually embedded data to gain a comprehensive understanding of the research subject (Sekaran and Bougie, 2016). The analysis of qualitative data involves several approaches including thematic analysis, content analysis, or grounded theory. These methods aim to identify patterns, themes, and concepts within the data and derive meaningful interpretations (Saunders *et al.,* 2019).

3.7.3 Mixed Methods

The mixed research method involves utilising both quantitative and qualitative research approaches in studies (Saunders *et al.*, 2019). The choice to use mixed methods depends on the research objectives, the nature of the research questions, and the specific needs of the study (Sekaran and Bougie, 2016). It is essential to recognise and comprehend the objective, subjective, and inter-subjective realities that exist in the world during any research. Additionally, it is crucial for researchers to understand different perspectives and meanings without introducing bias into their study (Harrison, Birks, Franklin and Mills, 2017). The research questions in a study determine the direction of the investigation. Hence, in a mixed methods study, these research questions can be presented concurrently or sequentially (Brannen, 2017). Moreover, Alavi and Hąbek (2016) propose that using a mixed method of research is an optimal strategy for obtaining comprehensive insights into a specific topic. This is because mixed methods research proves especially valuable when studying complex phenomena. It is also beneficial when exploring multiple dimensions of a research problem. Additionally, it is useful when a single method cannot fully capture the intricacies of the research questions. It allows researchers to leverage the strengths of qualitative and quantitative approaches to provide a more comprehensive and robust understanding of the research topic. They believe that relying solely on a single method is limiting and may result in incomplete exploration of various research problems within that topic. Therefore, by combining qualitative and quantitative data, researchers can gain a deeper understanding of the research topic, validate findings across different data sources, and provide a more robust basis for conclusions and recommendations.

The qualitative research approach was used for this study. Through the approach, the researcher managed to collect various data points and interpretive practices related to perceptions of software developer leaders on the effectiveness of the hybrid model for software developers in the legal technology industry. This method allowed the researcher to gather multiple sources of information. Some of the sources that the researcher used includes published data by other researchers, textbooks and organisation reports. Semi-structured interviews were scheduled and conducted over Zoom as it allowed the researcher to ask the participants questions in a variety of ways, and they were also ~~be~~ able to respond to them freely. Information was collected from a sample drawn from software development leaders in a South African organisation in order to describe, explain and compare their attitudes and perspectives, towards the Hybrid model.

3.8 Research strategies

Saunders *et al.* (2019) identify the fourth layer of the research onion as research strategies. According to Sekaran and Bougie (2016), the research strategy serves as a link between the philosophical underpinnings

and the chosen methods for data collection and analysis. The research strategy refers to the researcher's plan for addressing the research questions posed (Saunders *et al.*, 2019). Sekaran and Bougie (2016) propose various strategies for research, including experiments, surveys, archival research, case studies, ethnography, action research, grounded theory, and narrative inquiry. Of the strategies indicated in Figure 3.1, this study employed the phenomenological enquiry, as it aligns with the research objective of furnishing an intricate and comprehensive elucidation of the perspectives held by software development leaders concerning the efficacy of the Hybrid working model within the context of software development.

3.8.1 Ethnographic perspective

Ethnography, originating from anthropology (Sekaran and Bougie, 2016), is a research strategy that facilitates a comprehensive examination of cultural phenomena, offering unique insights that may be challenging to obtain through alternative research methods. According to Sullivan and De Bruin (2023), ethnographers achieve this by immersing themselves in the everyday experiences of the studied group, aiming to adopt an emic (insider's) perspective and can contribute to ~~our~~ understanding of diverse cultures, communities and social practices. The primary data collection method in ethnography is participant observation, wherein researchers actively engage with the subjects. Additionally, ethnographers may employ supplementary techniques such as interviews and questionnaires to gather data within the ethnographic research framework (Sekaran and Bougie, 2016).

3.8.2 Narrative perspective

The narrative perspective is a research approach that focuses on understanding and interpreting individual or collective experiences through storytelling (Saunders *et al.*, 2019). The narrative perspective offers a humanistic and holistic approach to research, emphasising the richness and complexity of individual stories. It allows researchers to explore diverse perspectives, challenge dominant narratives, and highlight the diverse range of human experiences (Sonday, Ramugondo and Kathard, 2020). By analysing narratives, researchers gain insights into how individuals construct meaning, navigate challenges, and negotiate their identities within social and cultural contexts (Sekaran and Bougie, 2016).

3.8.3 Phenomenological perspective

According to Saunders *et al.* (2019), the phenomenological perspective is a research approach that aims to understand and interpret the subjective experiences and meanings individuals attribute to particular phenomena. Sekaran and Bougie (2016) noted that this perspective offers a unique lens to explore the lived

experiences of individuals and to gain insights into how they make sense of their world. By focusing on subjective experiences, phenomenological research contributes to the understanding of human consciousness, meaning-making, and the complex interplay between individuals and their environment (Sekaran and Bougie, 2016).

3.8.4 Grounded theory

Grounded theory, as described by Corbin and Strauss (1990), is a systematic approach that aims to develop theory based on inductive reasoning from data. It involves several key tools, including theoretical sampling, coding, and constant comparison. The primary objective of grounded theory is to generate theories or explanations that emerge from the data itself, rather than imposing preconceived theories or hypotheses on the research process (Dunne, 2011). It involves systematically collecting and analysing data to uncover patterns, categories, and relationships that lead to the development of theoretical constructs.

3.8.5 Case study

A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context (Yin, 2003). Case studies allow a researcher to undertake a detailed study of a specific subject, for example a place, event or organisation, and data can be collected using a variety of sources and methods (Stake, 2008). In this way, case study research focuses on gaining a holistic understanding of the case. Flyvbjerg (2011) argues that case studies allow the researcher to gather more detail, to provide rich, complete accounts of the case or site selected and the choice of this type of research thus promotes deep understanding of the topic under investigation. The collection of data can be through interviews, observation or through appropriate documentation.

3.9 Time Horizon

The fifth layer of the research onion is the time horizon (Melnikovas, 2018). There are two types of time horizons described by Saunders *et al.* (2023), and these are cross sectional studies and longitudinal studies. Longitudinal studies involve studying people or phenomena at multiple time points. This approach entails gathering data on two or more occasions over an extended period (Saunders *et al.*, 2023). However, it is important to note that longitudinal studies require a greater investment of time, effort and financial resources compared to cross-sectional studies (Sekaran and Bougie, 2016). Cross-sectional studies involve gathering data on a single occasion, typically spanning days, weeks, or months, to address a specific

research question (Sekaran and Bougie, 2016). These studies provide a snapshot of the research variables or phenomena of interest at a particular moment, without follow-up data collection (Saunders *et al.,* 2023).

In the context of this study, the primary data collection method employed a cross-sectional approach, focusing on semi-structured interviews. The cross-sectional nature of the study was evident in the decision to gather data in a single instance, utilising Zoom sessions due to time constraints. Each interview, lasted approximately forty-five minutes, and it aimed to capture a snapshot of the participants' perspectives and experiences at that specific point in time. The adoption of the cross-sectional approach aligns with the practical need to efficiently collect data within a limited timeframe. Additionally, to ensure accuracy and provide an opportunity for further analysis, participants' consent was obtained to record the interviews using Zoom, creating a comprehensive record that can be revisited and scrutinised after the data collection phase. The cross-sectional design, in this case, allowed for a snapshot understanding of the participants' insights without requiring an extended study duration.

3.10 Research techniques and procedures

The sixth and final stage of the research onion is research techniques and procedures (Melnikovas, 2018). This stage involves selecting and implementing specific methods, tools, and procedures to collect, analyse, and interpret data in line with the research objectives and questions.

3.10.1 Target population and sample

A target population refers to all people, sampling units, or elements with which a particular research problem is concerned (Strydom, 2011). In this study, a purposeful sampling approach was employed, focusing on software development leaders in the legal technology industry in South Africa, as the target population. However, due to practical constraints or a desire for organizational specificity, the sample was further restricted to software development leaders exclusively within LexisNexis South Africa (LNSA). This combination of purposeful sampling and restricted or narrow sampling ensured a deliberate selection of participants possessing specific characteristics relevant to the research problem, while also concentrating the study within the organizational boundaries of LNSA. This targeted approach aimed to provide a nuanced understanding of the leadership dynamics within software development in the legal technology industry, as exemplified by the chosen organization in the South African context.

According to Sekaran and Bougie (2016), there are two types of sampling designs and these are probability and non-probability sampling. The sampling procedure employed in this study was non-probability,

whereby the purposive sampling technique was employed. Sekaran and Bougie (2016) state that in non-probability sampling, the selected sample represents the population, but the elements in the population do not have an equal chance of being chosen. Thus, it cannot be said that the sample is representative of the entire population in any statistical sense. Saunders *et al.* (2023) further state that when using the purposive sampling technique, also known as judgemental sampling, the researcher makes a judgement on who to select and include in the study, as each selected participant has knowledge of the research topic and can therefore make a certain contribution to the study. In light of this, the participants selected for this study were drawn from the following departments: LexisConvey, Rates Clearance, Lexis Deceased Estates, Gateway, Data Services, Know Your Company and the Global Technology Operations.

All of the 15 participants were interviewed using a semi-structured interview schedule. The group of participants was derived from the list of managers with employees who report into them, whom are in the software development department at LexisNexis South Africa. They were all asked the same questions that had been developed by the researcher to explore the key issues outlined in the research objectives. As indicated in Table 3.1, two software development managers, ten software engineering leads, one software quality assurance manager and two quality engineering leads, participated in the study.

Table 3.1: Categories and number of study participants

Designation	Number of participants
Software Development Manager	2
Software Engineering Lead	10
Software Quality Assurance Manager	1
Quality Engineering Lead	2

Participants were initially contacted through phone calls to introduce the research's purpose and nature. This approach helped to create a sense of comfort and willingness among the participants to participate in the study. Subsequently, the interview date and time were mutually agreed upon, and the required documents, such as the gatekeepers' letter and informed consent form, were shared with the participants via email, for their completion and return.

3.11 Data Collection Methods

There are several methods available for collecting data in a research study; however, for this research study the primary data collection involved conducting semi-structured interviews.

An interview is a guided, purposeful conversation between two or more people (Sekaran and Bougie, 2016). Interviews are a research method that allows for in-depth exploration of participants' perspectives, experiences, and opinions. They provide an opportunity for researchers to ask questions and delve into specific areas of interest to gather information from the interviewee(s). There are various types of interviews, namely individual or group interviews which can be structured, semi-structured or unstructured (Sekaran & Bougie, 2016). The different types of interviews are discussed briefly below:

Unstructured interviews are conducted without a predetermined set of questions or a rigid format. Instead, they allow for a more open and flexible conversation where the interviewer can explore various topics and delve deeper into the participants' responses (Sekaran and Bougie, 2016). The content and direction of the interview are not predetermined, allowing for spontaneity and a more organic flow of discussion. Unstructured interviews are commonly employed in preliminary research to identify specific factors that warrant further exploration in the subject under investigation. These interviews help researchers gain insights and pinpoint areas that necessitate in-depth investigation (Castillo-Montoya, 2016). On the other hand, structured interviews are carefully organised with predetermined sets of questions and a structured content. Prior to the interview, an introduction is provided, along with a predefined list of topics and suggested probing questions to guide the conversation (Sekaran and Bougie, 2016).

Semi-structured interviews refer to a flexible and adaptable approach to gathering data, combining aspects of both structured and unstructured interviews (Sekarana and Bougie, 2016). In this method, researchers have a set of predetermined questions or topics to guide the interview, but they also allow for open-ended discussions and follow-up questions to explore deeper into the participants' responses. This approach enables a balance between standardised data collection and the flexibility to capture rich and diverse insights from the interviewees (Saunders *et al.,* 2023). Semi-structured interviews were conducted as the empirical part of the study to collect primary data. Due to time limitations, a cross-sectional approach was chosen, collecting data only once within the limited timeframe. According to Moser and Korstjens (2018), semi-structured interviews offer flexibility, allowing the interviewer to adapt and generate new questions based on the information shared during the interview. The purpose of using semi-structured interviews was to gain further clarification from participants, ensuring a comprehensive understanding of their perspectives on the research topic. The researcher aimed to create an environment where participants felt comfortable expressing their specific concerns and sharing their experiences related to the workplace context.

Initially, the participants were contacted through Microsoft Teams messages, followed by phone calls, and finally, emails. This approach was adopted to ensure effective communication with the participants, considering their busy schedules. The interviews were carefully scheduled at times convenient for each participant. However, due to the unpredictability of some participants' schedules, a few interviews had to be rescheduled to find a more suitable times for their participation. Before the aforementioned steps, it was essential to arrange a meeting with the Technology Director of LNSA to gain approval for scheduling interview dates that would not disrupt the participants' responsibilities. The participants were informed in advance that the interviews would be conducted using online platforms. As the participants regularly utilised online videoconference applications as part of their daily work routine, they had no difficulties accessing and utilising these applications through organisational resources.

Utilising Microsoft Teams messages, telephone calls, and email correspondence enabled the researcher to establish trust within a limited timeframe. The significance of participating in the study was thoroughly conveyed to all participants, allowing them sufficient time for thoughtful consideration and the freedom to decide whether or not to participate. It was made clear that participation in the study was entirely voluntary, ensuring that no coercion was involved.

At the beginning of the interview, participants were reacquainted with the information outlined in the informed consent form (Appendix C), emphasising the assurance of their anonymity and the request for recording the interview. Additionally, a concise introduction to the research was given, providing participants with an understanding of the research's aim and objectives. This context was crucial to emphasise the significance of the study to the participants. Once the participants felt at ease and ready to proceed, the interview officially commenced (Saunders *et al.*, 2023).

The researcher created a set of pre-planned questions (Appendix D) and administered them to the selected participants in the study. Any ambiguous questions were clarified for the participants, ensuring openness and uniformity during the interviews. Additionally, participants were encouraged to discuss other relevant factors of interest to the researcher, as advised by Clark and Vealé (2018), to ensure comprehensive coverage of significant aspects related to the research topic. The interview questions were in English, and the participants mostly responded in English. All interviews were precisely transcribed from the recorded sessions.

Moreover, utilising internet-based interview techniques like videoconferencing enabled the participants to engage in interviews from various geographical locations, within a comfortable and familiar environment

(Saunders *et al.*, 2023). The duration of the interview sessions varied between forty minutes and one hour, depending on the extent of the participants' expertise. In this study, the advantages of videoconferencing applications, including the ability to record interviews and generate automatic transcripts, were utilised (Salmons, 2012).

3.12 Primary and secondary data collection in this study

In order to conduct a comprehensive and scientifically grounded research study, it is essential to understand the distinction between primary and secondary data (Flick, 2017). Primary data involves the direct collection of information tailored to the specific objectives of the study, such as through surveys or interviews. On the other hand, secondary data refers to information that has already been collected by other researchers and is available from existing sources. These sources could include academic journals, textbooks, and organisational reports. This study employed both primary and secondary data sources. The primary data was gathered through semi-structured interviews, providing firsthand insights aligned with the research objectives. Secondary data, drawn from peer-reviewed academic journal articles, textbooks, and organisational reports, formed the basis for the literature review in Chapter Two and the discussion of research findings in Chapter Five. This approach ensures a well-rounded and informed exploration of the research topic.

3.13 Data Analysis

According to Schwandt (2014), data analysis is a process that helps to derive meaning from collected information. It enables researchers to examine the data, identify emerging patterns, and find answers to questions, thus giving coherence to the collected data (Whitehead and Whitehead, 2016). Clark and Vealé (2018) mention that there exists a range of methods for analysing data, including both quantitative and qualitative approaches. Quantitative data analysis involves numerical or statistical techniques, while qualitative data analysis focuses on using descriptive language (Sekaran and Bougie, 2016). The data analysis for this study was conducted using qualitative research methods, and the findings were presented in the form of written descriptions. The process of analysing the data involves carefully examining and condensing the collected information, with the goal of generating a manageable set of informed decisions that will enable the researcher to draw meaningful conclusions (Moser and Korstjens, 2018). The researcher utilised the gathered information to identify recurring themes that emerged from the interviews. Thematic analysis, as described by Saunders *et al.* (2023), is a method used to identify major themes in qualitative

data. The perspectives of each participant were categorised into common issues and organised into thematic groups.

According to Saunders *et al.* (2019), qualitative data obtains its significance from the words used and lacks standardisation. Consequently, qualitative data necessitates interpretation, categorisation, and conceptualisation of the participants' statements. Thematic analysis serves as the foundation for data analysis in qualitative research, as it seeks to identify and examine patterns within the qualitative data (Creswell and Creswell, 2018). Thematic analysis involves the researcher's exploration of patterns in the data, known as themes, which can be based on the research objectives. These themes are then categorised through a process called coding (Clark and Braun, 2013). ~~as described by Clarke and Braun (2013).~~ In an inductive approach, the themes emerge from the data itself, and the researcher does not analyse the data based on pre-existing theories. On the other hand, in a deductive approach, the themes are predetermined and linked to existing theories and research objectives, ~~as noted by~~ Saunders *et al.* (2023). In this study, thematic analysis of the transcripts was conducted to identify themes that aligned with the study objectives. ~~following Joffe (2011) approach.~~

To perform the thematic data analysis, the researcher read and revisited the content of the automatically generated transcripts multiple times, gaining familiarity with the material, deriving meaning, and searching for patterns (Clark and Braun, 2013). ~~, as outlined by Clarke and Braun (2013).~~ It was noted that automatically generated transcripts often contained inaccuracies, leading to potential changes in the context of the conversation. To address this issue, the interview recordings were used to carefully edit and clarify all the automatically generated transcripts, effectively eliminating these errors. Keywords and phrases frequently used by participants were examined to identify patterns in the data. Each extract was assigned a code that summarised its meaning, and extracts with similar meanings were grouped under the same code. As new meanings emerged, new codes were generated and assigned accordingly. Eventually, recurring and related codes were organised into themes and subthemes. Throughout this process, the literature review and theoretical framework presented in Chapter Two were employed to iteratively interpret and analyse the data. This iterative process led to the refinement of the codes, resulting in the identification of seven themes and thirty-six subthemes. The NVivo (QSR, 2020) data analysis software was utilised to assist in the analysis and management of the data.

3.14 Trustworthiness

According to Anney (2014), qualitative analysis relies heavily on perceptive pattern recognition right from the outset. The data quality in qualitative research is determined by fulfilling four essential requirements: credibility, transferability, dependability and confirmability.

3.14.1 Credibility

Credibility, as discussed by Patton (1999), is a crucial element in research quality, emphasising the reliability and trustworthiness of research findings. It pertains to the degree to which data and analysis accurately represent the phenomenon under investigation, playing a vital role in establishing the validity and reliability of the research (Patton, 1999). In this study, a comprehensive exploration was conducted to examine the perceptions of LexisNexis software developers regarding the effectiveness of the hybrid model. To ensure credibility and minimise researcher bias, participants' experiences were recorded in their own words through audio recordings and verbatim transcription. Feedback from the participants was sought to align the findings with their actual experiences. This process allowed participants to review and provide input on the transcribed data, ensuring the credibility and accuracy of the study. Thus, credibility aimed to ensure that the research resonated with the readers' understanding of their own environments (Stahl and King, 2020).

3.14.2 Dependability

According to Anney (2014), dependability refers to the consistency and reliability of research findings over time. To establish dependability, several strategies are employed, including an audit trail, a code-recode strategy, stepwise replication, and peer examination (Anney, 2014). In this study, the researcher played a crucial role in evaluating the findings, interpretations and recommendations, all of which were supported by the data collected from the participants. The researcher retained the audio recordings and interview notes as part of ensuring dependability. Furthermore, the researcher provided a comprehensive discussion of the study's process and steps, making it easy for another researcher to replicate the study. This emphasis on transparency and replicability aligns with the use of an audit trail as a strategy to enhance dependability.

3.14.3 Confirmability

Confirmability, as defined by Moser and Korstjens (2018), pertains to the extent to which the findings of an inquiry can be confirmed or corroborated by other researchers. It focuses on establishing that the data

and interpretations derived from the study are not mere products of the researcher's imagination but are clearly grounded in the collected data. Moser and Korstjens (2018) suggest that achieving confirmability in qualitative inquiry involves employing an audit trail, maintaining a reflexive journal, and utilising triangulation. In this study, several measures were taken to ensure confirmability. First, interviews were meticulously recorded and transcribed verbatim to accurately and comprehensively capture the participants' perspectives. Member checks were conducted to validate that the researcher's portrayal of the phenomenon aligned with the participants' viewpoints. Additionally, the researcher abstained from imposing personal interpretations during the data analysis phase. By employing direct quotes from the interviews, the study achieved confirmability by presenting evidence directly from the research context and the participants themselves, thereby minimising researcher bias and conveying their meanings and emotions as faithfully as possible.

3.14.4 Transferability

Transferability, as described by Anney (2014), refers to the extent to which the findings of qualitative research can be applied to different contexts or situations involving different participants. It can be seen as the qualitative equivalent of generalisability. In this particular study, the focus was on leaders at LexisNexis who were well-versed in the hybrid model implemented by the organisation, and they were considered experts in the software development domain with valuable insights on the subject. The transferability of the study lies in the in-depth understanding and rich account provided by these participants, which can be related to other studies' deep interpretations of their respective contexts (Stahl and King, 2020). Essentially, the knowledge gained from this research can have relevance and applicability beyond the immediate study setting, contributing to the broader understanding of the subject matter.

3.15 Ethical Considerations

The research followed a rigorous ethical framework to ensure the protection of participants and the organisation involved. Ethical clearance for the research was obtained from the University of KwaZulu-Natal (UKZN) ethics office, as outlined in Appendix B. The research adhered to the ethical guidelines provided by UKZN, which outline the best practices to be followed. Additionally, permission to conduct the research at LexisNexis South Africa and interview participants was granted by the Human Resources Director through a gatekeeper’s letter (Appendix A).

Informed consent was obtained from all the participants, as detailed in Appendix C. Participants were fully informed about the study’s intention and were made aware that their participation was voluntary. Interviews

were only conducted once ethical clearance, the gatekeeper's letter and informed consent forms were approved. Prior to each interview, participants were reminded of the contents of the informed consent form, including the recording and transcription of the interview. Participants were asked to sign the consent form, confirming their understanding of the study and their voluntary participation. At the beginning of each interview, participants received background information about the study and its aims, ensuring their understanding of the research's value to the organisation.

Anonymity and confidentiality were assured from the start of the study. Participants were informed that only the researcher and the researcher's supervisor would have access to the interview recordings and notes. Codes were used during the presentation of findings to maintain participant anonymity, and their names or identification details were not disclosed. All collected data was anonymised and securely stored on an online drive for five years, after which it will be permanently deleted. The supervisor will have access to the data. If required, all data collected during the study will be made available to UKZN upon request.

3.16 Chapter Summary

This chapter details the research methodology that was used to undertake this study. The aim of the study was outlined in order to contextualise the decisions taken in designing the research. The research paradigm has been discussed in this chapter. The research onion was used to guide the research process, and this was explained in this chapter. The research methodology has been explained in detail to show how qualitative research methods had been used to investigate the effectiveness of the hybrid model for software developers at LNSA, and to determine how the hybrid model can be implemented better and differently. Purposive sampling has been used with in-depth interviews. The technique used for data analysis was thematic analysis. The next chapter presents the results of this qualitative study.

CHAPTER FOUR: PRESENTATION OF FINDINGS

4.1 Introduction

The contemporary professional workplace has undergone substantial transformations in recent years, primarily in response to prevailing shifts in the global landscape. Of these shifts, perhaps the most paramount, particularly in light of the worldwide pandemic, pertains to the transformation of traditional office-based work paradigms into more adaptable and flexible hybrid structures. This chapter serves as an exposition of the outcomes derived from a series of semi-structured interviews conducted within the confines of LexisNexis (Pty) Ltd. These interviews were orchestrated to yield a comprehensive depiction of the experiences, perspectives, and challenges encountered by software development leaders in relation to the hybrid work model and the collaborative tools employed within the domain of software development. This chapter begins by providing an overview of the study participants. Then, the thematic framework containing the key themes and subthemes is tabled before discussing the findings in greater detail. The key themes that were identified are supported using direct quotations from the participants.

4.2 Study Participants

Among the cohort of participants chosen purposively for engagement in this study, a total of 15 participants were included. It is notable that within this group, two participants occupy esteemed senior leadership roles within their respective departments. Concomitantly, the remaining participants, constituting a group of 13, are positioned within the middle management stratum. In accordance with the precise scope delineated, the study was meticulously confined to leaders presiding over software development functions, where the parameters necessitated the presence of a direct reporting dynamic within the ambit of LexisNexis. To provide due diligence to the imperatives of confidentiality and anonymity paramount in ethical research practices, the particulars pertaining to each of the fifteen participants' identities and affiliations are meticulously delineated in Table 4.1. In this tabulated presentation, the emphasis rests on designations held by participants and the quantification of their direct reports, constituting a comprehensive encapsulation of their managerial responsibilities within the LexisNexis context.

Table 4.1: Details of the study participants

Participant Number	Job Title	Direct Reports
P1	Software Development Manager	37
P2	Software Development Manager	17
P3	Software Engineering Lead	7
P4	Software Engineering Lead	8
P5	Software Engineering Lead	3
P6	Software Engineering Lead	12
P7	Software Engineering Lead	8
P8	Software Engineering Lead	2
P9	Software Engineering Lead	1
P10	Software Engineering Lead	5
P11	Software Engineering Lead	7
P12	Software Engineering Lead	2
P13	Software Engineering Lead	3
P14	Software Quality Engineering Lead	5
P15	Software Quality Engineering Lead	7

4.3 Themes and sub-themes

The sub-sections to follow present the findings of the study according to the themes and sub-themes that emerged after the data collected during the interviews was coded and analysed. The resulting thematic framework, presented in Table 4.2, details the five themes and eleven sub-themes that were identified.

Table 4.2: Themes and sub-themes

Themes	Sub-themes
4.1 Software Development Productivity in Different Settings	4.1.1 Factors Influencing productivity in Different Settings
	4.1.2 Working from Home
	4.1.3 Working from the office
	4.1.4 Setting that produces optimal productivity
4.2 Hybrid Model Implementation	4.2.1 Flexibility and Adapting to Hybrid Model
	4.2.2 The Influence of Hybrid Work Policies on In-Person Attendance
	4.2.3 Hybrid Work Model's Effectiveness
4.3 Collaboration in Software Development	4.3.1 Hybrid Model and Team Collaboration
	4.3.2 The Essential Platform for Collaborative Work
	4.3.3 The Complexities Involved in Virtual Collaboration
	4.3.4 The Path Forward for Tools Designed for Teamwork
4.3 Technological Interaction replacing face - to - face interaction	

The following subsections discuss each of the themes and sub-themes in greater detail. In addition, relevant unedited extracts from the participant's transcripts are provided to support the theme.

Theme 4.1: Software Development Productivity in Different Settings

Software developer productivity is frequently assessed through the quantitative examination of software artifacts generated within prescribed temporal parameters, the same can be applied when evaluating software development productivity in different settings. These artifacts encompass a range of measurable criteria, including, but not limited to, the accumulation of submitted lines of code (LOC), the calculation of function points, the enumeration of completed tasks, and the quantification of the duration required for the realisation of specific requirements. These metrics serve as essential benchmarks for appraising the efficiency and efficacy of software development practices, affording valuable insights into the competence and progress of development teams (Bao *et al.*, 2022). With the shift and transformation of traditional office-based work paradigms into more adaptable and flexible hybrid structures, software development

leaders at LexisNexis are constantly faced with upkeeping and monitoring productivity of developers in the different work settings ~~that they work in~~.

The ensuing subsections delve into the perspectives and experiences of the study participants regarding their engagements within various work settings. These discussions encompass an exploration of the perceived impact of these diverse work environments on software development productivity. Additionally, the subsections seek to ascertain the participants' viewpoints regarding which work setting is deemed most conducive for eliciting optimal productivity from software developers.

Sub-theme 4.1.1: Factors Influencing productivity in Different Settings

Bao *et al.* (2022) advanced the field by advocating for the utilisation of multiple metrics in comparing developer productivity between remote work (WFH) and onsite work settings, leveraging datasets that encompass diverse aspects of software development, such as the quantification of build activities, code commits, and lines of code inserted and deleted. These multifaceted analyses and proposed methodologies contribute to the enriched understanding of software developer productivity in varying work environments, fostering a robust foundation for academic discourse and practical application. Participants shared various factors that impact productivity based on work environments:

"Software developer productivity in diverse work environments is contingent upon several interconnected factors. Effective communication tools, adaptable leadership, and access to appropriate technology infrastructure lay the foundation for productive work, regardless of the setting." (P11).

"Developers' autonomy and flexibility in managing their schedules, along with the presence of minimal distractions and interruptions, contribute to sustained focus and output. Team cohesion, a strong organisational culture, and the ability to strike a work-life balance are vital for motivation and collaboration." (P9).

Task complexity, the nature of the project, and the alignment of performance metrics with goals can influence productivity differentially across environments. Additionally, individual well-being, external factors like infrastructure and regulations, and the nuances of team dynamics further shape productivity outcomes. Therefore, a holistic approach that addresses these multifaceted factors is imperative for optimising software developer productivity across various work settings." (P12).
Some participants added that:

"A quiet and interruption-free workspace is often considered conducive to the productivity and concentration of software developers. Such an environment allows developers to delve into complex problem-solving, coding, and debugging tasks with minimal distractions." (P6).

"Uninterrupted focus can enhance code quality, reduce errors, and expedite development processes. To optimise productivity, developers may seek or create quiet spaces, whether at home or in the office, where they can immerse themselves in their work without disruptions, fostering a more efficient and effective software development workflow. Therefore, the location does not matter so long as its conducive." (P9).

Therefore, software developer productivity is a multifaceted and dynamic phenomenon influenced by a plethora of interrelated factors. By acknowledging and addressing these multifaceted factors, organisations can better harness the full potential of their software development teams, irrespective of the work environment, thereby promoting a more efficient and effective software development workflow.

Sub-theme 4.1.2: Full time working from home

South Africa grapples with a myriad of infrastructure challenges, with the ongoing issue of load shedding being one of the most prominent, and affordability when it comes to office equipment or space at home. Nevertheless, amidst these challenges, devices like Uninterruptible Power Supplies (UPS) and inverters have emerged as indispensable solutions for numerous software developers. These developers have increasingly embraced the option of working from home, perceiving it as a means to bolster team productivity. The reliability provided by UPS systems and inverters during power interruptions is seen as pivotal in ensuring uninterrupted workflow, enabling team members to maintain their work momentum. Consequently, such solutions are believed to contribute to enhanced output and efficiency among software development teams operating in the South African context. In light of this, the participants noted the following:

"The full on working from home is the best, it's nice to go to the office every now and then to meet the team. But like I said with regards to productivity when we need to do a major release, we try not to go into the office. With load shedding also in full force, so sometimes in the middle of the meetings you have to switch if you haven't set up your router. However, with loadshedding schedules, you are able to plan for this and the UPS for instance to or the inverter connects to it automatically, thereby causing zero negative impact to productivity." (P6).

Another participant emphasised that the comfort of one's own home fosters increased productivity:

"At home most of us did work more than eight to five. I mean, I remember having calls like at 11:00 o'clock with the entire team at 11:00 PM. That's not gonna happen in the office, right? I can say that this is a disadvantage, however I can't really think of it as a disadvantage as such, I felt like at home it was just easier, we were more collaborative at home because if we were in the office there would be much more distractions like a lot of the normal office interactions do not happen at home. Most of the conversations at the office is not about work. It's like how is the weekend? That sort of talk used to happen. A lot of time gets wasted in that and it doesn't happen at home. Everyone is always online, always available." (P11).

Another participant attested to the above statement:

"I really feel like a reliable and well-equipped home office is essential. High-speed internet, a powerful computer, ergonomic furniture, and a quiet workspace are crucial for developers to work efficiently from home. And when they downsized the offices, LNSA gave all employees office chairs, desks, two screens etc. This meant that we could set up the exact same office set ups in our homes, so from an ergonomics perspective, we are able to work at home in a set up environment which assists in achieving optimal productivity." (P12).

Another participant stated that he likes working from home due to the convenience of accessibility, he shared that when a team member has an issue, the entire team dial into one call and try to help the team member out. Thereby, collaborating via collaboration tools such as MS teams. Participant 13 further alluded to the fact that MS teams enables team members to both all work on a team members screen at the same time, however if all team members are physically present, they cannot all work on a team members screen at the same time. This is called driving in code.

"When driving in code, you have a driver, you both can't drive, so even if I'm telling you an idea and I want to sit with the keyboard? Like I need to type something, use your mouse and show you what to do. But what happens is often when in the office, so you doing all the driving and the passenger is not really paying full attention. They not learning, so what you would do then is you make him drive. But it takes longer. So, what I like about working from home is you both can drive, so you both can drive at the same time, and if he's typing something or in the wrong place like I'll just click the closer to where you type or he's looking for

something there, like every time. But by the time is a challenge right and this is so much time saving." (P13).

Hence, the full-time remote work arrangement at LNSA proves to be more productive for its developers due to several key factors. Firstly, it allows them to circumvent the challenges of daily traffic, resulting in more time available to focus on their tasks. Secondly, the comfort of working from their own homes translates into fewer interruptions, as compared to office environments. Lastly, while infrastructure issues may initially appear as potential distractions, the organisation's decision to downsize office spaces and divest office furniture has effectively mitigated these concerns, further contributing to a conducive work environment for productivity.

Sub-theme 4.1.3: Working from the office

The context of the workspace significantly influences the overall work experience. Research by Awada, Lucas, Becerik-Gerber and Roll (2021) highlights that worker satisfaction with their workspace, including factors such as privacy and the ability to personalise it, serves as a predictor of productivity. Traditional office environments typically offer well-maintained workspaces with a focus on indoor environmental quality (IEQ), encompassing elements such as lighting, temperature, ventilation, air quality, and noise control. These IEQ components play a pivotal role in creating a comfortable work experience, ultimately contributing to enhanced employee productivity. One participant said that:

"Working from the office yields higher productivity because, first and foremost, the physical office environment often provides access to specialised equipment, robust network infrastructure, and support services that can optimise the development process. Moreover, the office setting fosters immediate face-to-face collaboration, which can expedite issue resolution, idea sharing, and decision-making among team members. Additionally, the structured office environment helps delineate work hours and boundaries, supporting a healthier work-life balance. Finally, the social interaction and camaraderie found in the office can boost motivation and engender a sense of belonging among developers, further enhancing their overall productivity." (P1).

Another participant highlighted that working from the office results in higher productivity due to the convenience of accessibility:
"Sometimes you trying to find someone, whereas if you at the office its quicker. You can actually turn around and see if they're sitting there and you know what they're doing in the team, so that's great. And

they know what they're supposed to do. So, once you tell them, OK, this is what we're doing, it's much quicker." (P2).

The view was supported by another participant who said that:

"And then I mean, in terms when we were all fully in the office, in comparison to when we had to work from home. The biggest challenges were when you needed to explain something, so if you were at the office, you would quickly hop onto someone or get closer to someone by their desk and maybe two or three minutes, it's done. Work From Home you had to either schedule a meeting or leave the person a message on teams and then they will get back to you. Then you might have to follow it up with a call. The whole sharing of screens things took longer and I think that's also what led to the lots of meetings because everything in there to be explained properly because now you don't have that feature of the face to face with the older people or the people that had worked with, especially in the team it was easier because you knew you knew their process." (P8).

Participant 6 added that working from the office is always best for new starters who require training, as well as junior developers, alluding that the office setting offers immediate access to experienced mentors and colleagues who can provide guidance and support. It provides a structured learning environment with training programmes and resources, allowing newcomers to acquire essential skills systematically.

"In-office work facilitates seamless team collaboration, communication, and social integration, fostering faster skill development and networking opportunities. Additionally, it offers access to specialised tools and equipment, ensuring that junior developers have all the resources they need. Overall, the office environment is recognised for its ability to expedite the learning curve and facilitate a smoother onboarding process for new team members." (P6).

The consensus among some participants underscores the productivity benefits of working from the office in the realm of software development. The office environment provides a host of advantages, including access to specialised equipment and robust infrastructure that streamlines the development process. Face-to-face collaboration fosters quick issue resolution and effective idea sharing. Moreover, the structured nature of the office setting helps establish clear work boundaries and supports a healthier work-life balance. Social interaction and the camaraderie of the office environment serve as motivating factors that engender a sense of belonging among developers, ultimately enhancing their overall productivity.

Sub-theme 4.1.4: Setting that produces optimal productivity

Establishing an ideal work environment for software developers entails a thoughtful evaluation of both physical and cultural factors that empower them to achieve peak performance. Customising the work environment to align with developers' unique needs and preferences can notably amplify their productivity and job satisfaction. Interestingly, when participants compared various settings, the majority emphasised that working from home consistently delivers the most favourable results for them:

"From my perspective, software developers tend to be more productive while working from home. The focused environment allows them to concentrate on their work without the distractions that can arise in an office setting." (P13).

The view was supported by another participant who said that:

"In terms of optimal productivity, the experience of working from home has generally produced the best results for our team. The reduced distractions, personalised workspace, and flexibility have contributed to higher productivity levels. The Hybrid Model also offers its own advantages by combining the best of both worlds, providing opportunities for collaboration and face-to-face interactions that can enhance productivity in certain situations. Ultimately, the ideal approach may vary depending on individual preferences, project requirements, and team dynamics." (P9).

Another participant who has team members who work from different parts of the world stated that:

"We feel overall the work from home produces optimal performance AND also aligns with our time zones" (P15)

The insights shared by participants shed light on the work settings that foster optimal productivity for software developers. A clear consensus emerged, with the majority highlighting the advantages of working from home. This preference is attributed to the focused and distraction-free environment that remote work affords, enabling developers to concentrate on their tasks effectively. It was evident that reduced distractions, personalised workspaces, and enhanced flexibility contribute significantly to higher productivity levels.

Theme 4.2: Hybrid Work Model Implementation

In the aftermath of the pandemic, LNSA initiated an office downsizing endeavour, accompanied by the implementation of a hot desking model within an open-plan office configuration, LexisNexis also implemented a hybrid working model. In accordance with this model, which stipulates that LNSA employees are expected to physically attend the office 2-3 times weekly, participants expressed their views on the ~~on the~~ implementation of this model.

"The hybrid model is not new to LNSA, it leads back in time and the origins of the hybrid model may be traced back to a period of time that occurred before the COVID-19 epidemic. At LNSA, the model was more of a fluid, ever-changing concept than it was a predetermined response to an ongoing international issue. It was a reaction to the rising requirements of software engineers who want flexibility and alignment, particularly when working with multinational teams that were distributed across several time zones." (P2).

The adoption of the hybrid model by LNSA's software developers exposes both challenges and possibilities, varied in severity and type across teams and people. This is typical of transitions, and it is true for the majority of them as well. Therefore, the following subsections discuss the views of the participants pertaining to adapting to the hybrid model, the level of compliance and adherence followed by software developers in relation to this policy and lastly, if it has been effective.

Sub-theme 4.2.1: Flexibility and adapting to Hybrid Model

During interviews, participants expressed the importance of adaptability and flexibility for software developers navigating the hybrid work model, where remote and in-person work coexist. Embracing remote work tools, honing effective communication, and mastering time management skills, are essential. One participant said that:

"Developers must adapt seamlessly to different work environments, stay committed to continual learning in a fast-evolving tech landscape, and cultivate remote collaboration skills while prioritising cybersecurity. Maintaining a healthy work-life balance, adjusting to changing workloads, and actively seeking feedback for improvement are equally crucial. Networking and staying informed about company policies are essential in this dynamic work environment. Ultimately, in the hybrid model, adaptability becomes both a skillset and a mindset, enabling developers to thrive in an ever-changing professional landscape." (P3).

In addition to this, another participant commented that:

"It is now much easier to collaborate with teams located all over the world, particularly those located in countries with different time zones, such as India. The integration of productivity and adaptability appears as a primary point of emphasis, which suggests that the success of the model is dependent on its capacity to accommodate a wide variety of operational requirements." (P15).

On the other side, another participant offers a contrast, or a dichotomy stating that:

"Even though there are higher levels of productivity that may be reached when working remotely, however, there is an attractiveness of working in a more traditional office atmosphere. For many people, the traditional office setting is irreplaceable because it provides them with the benefits of an organised environment, organic relationships, and a tangible feeling of team spirit." (P1).

The complexities of the hybrid work model, as applied to LNSA, create a rich tapestry of experiences and points of view that are both challenging and educational.

"Implementation of the hybrid felt more like forced upon you, like you must come in on these days and I've seen a lot of kickback from many other developers in other companies. As so much so that they actually left the company because they couldn't understand why there was this forced the need for them to come in." (P10).

The hybrid work model, characterised by its intrinsic flexibility, has garnered favour among software developers. Nevertheless, the process of assimilating into this model, which mandates physical presence in the office for a designated 2–3-day period each week, has posed a substantive challenge. Developers contend that their productivity is not contingent upon a requisite presence in the office for the specified duration, emphasising that efficacy hinges upon multifaceted determinants. The ensuing subsection undertakes a comprehensive examination of the extent to which adherence to the stipulated office attendance timeframes is observed.

Sub-theme 4.2.2: The Influence of Hybrid Work Policies on In-Person Attendance

Participants shared that whilst the hybrid policy stipulates that LexisNexis employees need to come into the office 2-3 times a week, reports suggest that the majority of the software developers do not adhere to this policy. One participant shared that:

"The frequency with which our team members come into the office varies. Some team members come in once a week, while others, especially contractors in India, primarily work from home." (P15).

Another participant stated their team seldom comes into the office due to geographical dispersion and the office environment not being conducive to their productivity:

"On average, we visit the office about once a month. Our office visits are driven by job necessity rather than strict compliance with the Hybrid Policy. The necessity arises when we need in-person collaboration or intensive planning sessions. If we had to enforce office attendance solely for policy compliance, it could have led to resignations, as our team was initially hired during the COVID-19 period with the expectation of remote work." (P10).

This view is supported by another participant who highlights that:

"The team rarely visits the office due to their geographically dispersed nature, with each team member scattered across various locations. They only visit the office when there is a specific agreement or need, typically involving collaboration with someone else. Even so we collaborate utilising *the different online tools. The team's visits to the office are driven by job necessity rather than strict compliance with the Hybrid Policy." (P6).*

Overall, adherence to the Hybrid Policy appears to be driven more by job requirements than strict policy compliance.

Sub-theme 4.2.3: Hybrid Work Model's effectiveness

The several perspectives on the efficacy of the hybrid model have been expressed by the participants who provided a comprehensive point of view. The model, although revolutionary and loaded with benefits, needs careful implementation, ongoing review, and periodic recalibration in order to get optimal results. The secret to realising its full potential is to embrace its strengths and solve its challenges. Participant 9 specified that in office setup only works if team members are all in the same office at the same time. This is because the office provides the facilities needed to act as an office when there are more people there:

"If an event or meeting with other team leads has been scheduled, I sometimes go to the office just for that event, and then go back home afterwards, there is no point in going to the office just to sit and work by yourself in a noisy office where you still have to be on remote calls and possibly socialise with staff outside of your team." (P9).

Another participant stated that the Hybrid Model offers a balanced approach, combining the advantages of remote work flexibility with in-person collaboration opportunities to enhance communication and teamwork:

"It allows for a balance between the advantages of working from home and the benefits of in-person collaboration. Team members can enjoy the flexibility and focus of remote work while also having the opportunity for face-to-face interactions, team building, and brainstorming sessions during office days. The Hybrid Model enhances communication and collaboration while still maintaining the benefits of remote work." *(P14).*

Another participant supported this statement by adding that:

"The Hybrid Model also offers its own advantages by combining the best of both worlds, providing opportunities for collaboration and face-to-face interactions that can enhance productivity in certain situations. Ultimately, the ideal approach may vary depending on individual preferences, project requirements, and team dynamics." (P8).

Another participant commented that the blanket application of the hybrid model mandating 2-3 office days a week for all employees, without considering job-specific needs and different working styles, appears ineffective:

"The hybrid model whereby all employees are required to come into the office 2-3 times a week is not effective, perhaps it should not have been applied as a blanket approach, and perhaps could have been applied in accordance to the different job requirements. As developers we have a vast number of systems that we can use to collaborate, in comparison to the call center for example. The way in which we also work is also completely different." (P10).

The view is supported by another participant who said:

"Whilst the hybrid model can be deemed effective, however, there are many ways in which the hybrid model can be implemented, such as in terms of the number of days in the office need not be stipulated, this can be looked at by a case-by-case scenario. For example, for developers it would be great to only come into the office when there is a specific important event, such as planning or if there are retrospectives etc. However, the current model is great but not effective." (P6).

Another participant stated that:

"The function of the office is reimagined from that of a simple workplace to that of a collaborative centre in situations when teams are dispersed across a variety of places. Therefore, the significance of it lies not only in ensuring compliance but also in maximising the benefits of face-to-face contacts, brainstorming sessions, and activities that strengthen teams." (P1).

In discussing the effectiveness of the hybrid model, one participant acknowledged that while the hybrid model offers advantages, it also presents challenges:

"The hybrid model does not come without its challenges, despite the obvious benefits. The challenges that arise in terms of team chemistry, in particular when the onboarding process is carried out entirely remotely. The lack of face-to-face encounters may sometimes have the effect of watering down the sense of team spirit. The technical and operational challenges posed by the hybrid model are reflected in the length of time required for virtual meetings. In addition to this, a big worry over mental health as well as the seeming absence of emotional and sympathetic support in a work environment that is conducted remotely." (P3).

In essence, the effectiveness of the hybrid model is not a one-size-fits-all solution but requires a nuanced and dynamic approach that acknowledges both its benefits and challenges while tailoring it to the unique requirements of different teams and individuals.

Theme 4.3: Collaboration in Software Development

Collaboration in software development is integral to the process, involving cross-functional teams, clear communication channels, version control systems like Git, pair programming, and code reviews to ensure code quality and knowledge sharing. Agile methodologies emphasise iterative development and close collaboration with stakeholders, while documentation and automated testing facilitate the process. In an increasingly globalised industry, remote collaboration tools enable effective teamwork across geographic

locations. Conflict resolution and continuous improvement are essential for maintaining a healthy team dynamic, ultimately leading to the successful delivery of high-quality software products aligned with business goals and user needs.

The subsequent subsections delve into participants' perspectives on the hybrid model and its impact on team collaboration, investigating the equilibrium between remote work and in-person interactions. Furthermore, they analyse the essential platform for collaborative work, emphasising the significance of digital tools in fostering effective collaboration. The complexities involved in virtual collaboration are explored, shedding light on the challenges and nuances inherent in remote teamwork. Additionally, the path forward for tools designed for teamwork is discussed, presenting insights into potential enhancements and strategies aimed at elevating collaborative processes within the realm of software development.

Sub-theme 4.3.1: Hybrid Model and Team Collaboration

Team collaboration is crucial for software developers. It helps harness diverse skill sets and facilitates efficient problem-solving. It ensures quality assurance and enhances project efficiency. Collaboration fosters innovation and promotes effective communication. Additionally, it enables adaptability to changing requirements and facilitates feedback and continuous learning. Collaboration also encourages documentation and streamlines project management. Moreover, it mitigates risks and ultimately leads to customer satisfaction. In the dynamic world of software development, collaboration is essential. It improves the quality of the software and accelerates project completion. Collaboration ensures adaptability to changing demands and promotes innovation through the exchange of ideas and insights among team members.

Participants shared their views on the Hybrid Model significantly influencing team collaboration in various ways:

"It seeks to strike a balance between the advantages of remote work, such as flexibility and autonomy, and the benefits of in-person interactions. Team collaboration in a hybrid model hinge on effective communication and coordination, as team members may be physically distant from one another. Digital tools and technology play a crucial role in bridging this gap, enabling remote team members to collaborate seamlessly." (P9).

However, challenges in team collaboration may arise due to the hybrid model. Another participant stated that:

"Team dynamics can be affected as team members alternate between remote and in-person work, potentially impacting team cohesion and culture. Moreover, managing schedules and ensuring that everyone is on the same page can be more complex when some team members work remotely. Clear communication and structured processes are vital for overcoming these challenges." (P3).

Participant 4 stated that:
"Ultimately, the success of team collaboration in a hybrid model depends on how well organisations adapt to this new way of working. It necessitates a flexible and inclusive approach that accommodates the diverse needs and preferences of team members while leveraging technology to facilitate effective communication and collaboration regardless of physical location." (P4).

In summary, team collaboration is not just beneficial but essential within a hybrid working model for software developers. It empowers developers to leverage their collective skills, adapt to changing circumstances, innovate, and deliver high-quality software solutions that meet client needs and expectations, regardless of their physical work location.

Sub-theme 4.3.2: The Essential Platform for Collaborative Work

The essential platform for collaborative work among software developers encompasses a comprehensive suite of digital tools and technologies meticulously tailored to nurture effective teamwork, streamline development processes and enhance overall productivity.

"Collaboration toolkits for software developers encompasses of versatile version control systems, such as Git, for efficient code management, integrated development environments (IDEs) that facilitate code creation and testing, and code repository hosting services, such as GitHub and GitLab, which enable cloud-based code collaboration. Additionally, communication tools like Slack and Microsoft Teams facilitate real-time information exchange, while project management and issue tracking software, along with collaborative coding environments, empower efficient project organisation and code review. Cloud-based document sharing, continuous integration/deployment pipelines, knowledge sharing platforms, video conferencing, secure file transfer tools, and collaborative whiteboarding platforms complement this arsenal. Collectively, these resources create a cohesive environment that not only supports collaborative

software development but also ensures the security and quality of the end product, regardless of the team's geographical dispersion or remote work arrangements." (P2).

Another participant added to this by stating that:

"These platforms serve as the foundation for the everyday rituals that are part of agile development, including stand-ups, retrospectives, and planning meetings. The experience of working together is not without challenges, however, testament to the widespread effect that Microsoft Teams and Confluence have in the software development industry. The procedure is sometimes hampered by problems that range from language and accent difficulties to communication hiccups and differences in network configuration. The good news is that technical solutions such as screen-sharing functionality and translation tools provide a way out of this predicament." (P3).

Jira and DevOps for task management, Prodpad for product management, and even the time-honored whiteboard for creative thinking are just some of the tools that another participant, who offers a wider viewpoint, noted:

"Collaboration in the software development space involves working together as a team to plan, design, implement, and deliver software solutions. With the flexibility of working from home, collaboration has become easier through tools like video calls and screen sharing, enabling seamless communication and teamwork. My team utilises various communication tools such as Microsoft Teams, WhatsApp, email, Jira, DevOps, Prodpad, and whiteboards to communicate with other team members. These tools enable us to have both formal and informal discussions, share updates, track progress, and collaborate on different aspects of the software development lifecycle." (P5).

Another participant highlights their predominant use of MS Teams for chat, voice calls, and screen sharing when necessary. However, they express a limitation in real-time collaborative coding tools, citing complexities in their usability:

"Mostly the team communicates mostly via MS TEAMS via teams chat, or voice calls, and screen share when necessary. For code reviews, the team relies on Pull Requests in Azure DevOps for efficient code review and approval processes. The utilisation of confluence is a comprehensive knowledge repository, where accumulated knowledge is documented over time. Document sharing takes place through SharePoint and Teams channels, while the team uses video recordings to demonstrate software functionalities,

providing flexibility for viewing at any time. To facilitate seamless handovers, the team compiles handover articles in the wiki for the testing team and conducts calls to provide guidance and insights into their work processes." (P7).

Therefore, the essential platform for collaborative work empowers software development teams to communicate effectively, manage projects efficiently, collaborate on code seamlessly, and maintain high standards of code quality. It plays a crucial role in enabling software developers to work together successfully, regardless of their physical location or working arrangements.

Sub-theme 4.3.3: The Complexities Involved in Virtual Collaboration

Virtual collaboration has rapidly transitioned from a supplementary option to an imperative requirement in an era dominated by digital advancement. This sentiment is adeptly encapsulated by the participants. Although traditional face-to-face meetings, which hold nostalgic value, persist, they are being overshadowed by virtual interactions, notably within domains like software development. Numerous factors contribute to this shift. The inclination towards virtual collaboration is reinforced by factors such as geographical constraints, divergent time zones, and the constraints imposed by unforeseen events, including pandemics.

"Virtual collaboration introduces a multitude of complexities that demand thoughtful consideration. These complexities arise from the shift towards digital collaboration and remote work, which have become increasingly prevalent in today's interconnected world. Among the foremost challenges are communication hurdles, stemming from reliance on digital platforms and asynchronous interactions, potentially leading to misunderstandings and misalignment among team members." (P6).

Another participant added that time zone disparities pose logistical challenges, making synchronous collaboration and meeting coordination more intricate. He also alluded to the fact that the absence of face-to-face interactions tends to hinder team bonding, creativity and the exchange of non-verbal cues, thereby impacting the overall collaborative experience. Furthermore, technical issues, including connectivity problems and software glitches, can disrupt workflow and hinder productivity. Cultural and language differences within diverse virtual teams require proactive efforts to ensure effective communication and understanding among members. Moreover, maintaining project visibility, knowledge sharing, and collaborative coding practices, can be intricate in virtual settings. The participant said:

"Building trust, addressing data security concerns, and safeguarding team members' mental well-being are additional layers of complexity inherent to virtual collaboration. Navigating these challenges requires a holistic approach, encompassing clear communication norms, tailored collaboration tools, and strategic solutions to address issues as they arise, ultimately fostering successful virtual collaboration among software developers." (P15).

Participant 2 stated that:

"The success of virtual interactions is not simply attributable to the requirements of the situation. It is impossible to dispute the fact that they are characterised by a certain degree of efficacy and adaptability. Developers are able to participate in meetings from any location, eliminating the need for lengthy travels and allowing them to concentrate entirely on the subject at hand. In addition, the key to successful initiatives is a synergistic combination of individual capabilities and group motivation. The enhancement of project outputs is achieved by the combination of different people's perspectives and the ideas generated by the group as a whole." (P2).

Therefore, the dynamics of virtual collaboration have undergone a remarkable transformation in response to the accelerating digital landscape.

Sub-theme 4.3.4: The Path Forward for Tools Designed for Teamwork

The way forward for tools designed to facilitate teamwork is shaped by a multifaceted approach aimed at optimising collaborative work environments. As emphasised by participants, these tools have evolved into essential components across diverse domains, including software development. Participant 7 alluded to significant future directions for these teamwork tools. The key guidance that emerged revolves around ensuring seamless integration and compatibility to streamline workflows and minimise friction between applications. Central to these developments will be the enhancement of real-time collaboration features, particularly for pair programming and code reviews. This will be complemented by AI-driven automation to aid in tasks such as code analysis and bug detection. In addition, there will be a focus on robust data analytics and reporting capabilities, which will empower teams with actionable insights. Strengthening security measures and compliance standards will be of utmost importance to safeguard sensitive data and ensure data protection.

"Prioritising user experience and accessibility, scalability, customisation, and cross-platform compatibility will ensure tools cater to diverse team needs, all while continuous improvement driven by user feedback remains a central tenet. Ultimately, these directions pave the way for collaboration tools to play a pivotal role in enhancing team productivity and adaptability in the dynamic landscape of modern work." (P7).

Another participant added that:

"The present and look into the future, paint a clear picture of where collaborative tools may potentially be heading in the future. Virtual reality, which is often linked with gaming or other immersive experiences, is being discussed as a possible game-changer for cooperation on software development. Imagine a scenario in which developers from all over the world collaborate in real time by entering a virtual environment and engaging in ideation, coding, or bug testing. This not only adds a new facet to the concept of collaboration, but it also removes the geographical and logistical limitations that previously existed." (P11).

By drawing attention to a facet of virtual relationships that is sometimes ignored, another participant provides an additional layer of depth, stating that:

"In addition to the benefits brought about by advances in technology, there is also a societal upside. Online conversations, which are unaffected by prejudices related to a person's race, gender, the clothes they wear, or their physical appearance, provide the way for talks that are more egalitarian and focused on the topic at hand. Despite the fact that platforms such as MS Teams, Confluence, and JIRA have established themselves as essential components of the collaborative toolbox used by developers at LexisNexis South Africa, new technologies are always appearing on the horizon." (P1).

Therefore, the future is going to be filled with exciting new developments, from virtual reality to augmented reality, and even collaboration tools powered by artificial intelligence. But even in the middle of this technological renaissance, an essential element continues to hold true: striking a balance between the variety of tools and the clarity of communication.

Theme 4.4: Technological interaction replacing face - to - face interaction

In today's landscape, software developers are increasingly finding themselves collaborating within teams that span the globe, encompass multiple organisations, cultures and operate across various geographical locations. Consequently, these teams are encountering the growing challenge of adopting virtual

collaboration practices. Advancements in technology have paved the way for innovative modes of interaction, with electronic communication becoming a pivotal tool for enabling virtual collaboration. The traditional face-to-face collaboration model has evolved into a virtual dynamic facilitated by web-based platforms (Azadegan and Kolfschoten, 2014).
One participant stated that:

"Technological interaction has increasingly supplemented and, in some cases, replaced face-to-face interaction, especially in certain domains and circumstances. The rapid advancement of digital communication tools, ranging from video conferencing platforms to social media networks, has enabled people to connect and collaborate remotely, transcending geographical barriers. This shift has been particularly evident in professional settings, where remote work, virtual meetings, and digital project collaboration have become commonplace, driven further by events like the COVID-19 pandemic. However, it's essential to recognise that while technological interaction offers unparalleled convenience, efficiency, and accessibility, it doesn't entirely replace the value of face-to-face interactions. In personal relationships, creative endeavors, and certain nuanced conversations, the depth of human connection, non-verbal cues, and physical presence remain irreplaceable. Thus, technological interaction complements but does not fully replace face-to-face interaction, and the balance between the two depends on the context and individual preferences." (P10).

Another participant mentioned that virtual teams often grapple with obstacles related to the absence of physical presence and non-verbal cues, as well as issues pertaining to mutual respect and trust. He stated that trust holds a significant role in influencing individuals' readiness to engage in conversations with others, which is a prerequisite for sharing knowledge beneficial to the organisation. It serves as both an outcome and a process, as a certain level of trust is essential for individuals to open up and confide in one another. Furthermore, trust is boosted when individuals understand each other's motives, especially when these motives are positive in nature. The establishment of trust also plays a pivotal role in supporting individual success within teams, as the level of effort exerted by team members toward achieving the team's overall objectives contributes to everyone's success. Consequently, trust emerges as a critical factor in the effectiveness of both traditional and virtual teams. Therefore, this in turn poses as a hinderance to productivity and can result in unsuccessful endeavours. Participant 2 stated that:

"While trust has been subject to examination in the team context, it's worth noting that initial trust may differ from trust levels during various project phases, with trust evolving as teams approach deadlines or milestones. Trust development takes time and may hold distinct significance for different team members.

To facilitate the cultivation of trust within hybrid collaborative teams, it is imperative to gain insights into how trust evolves within teams and identify crucial junctures where trust is of utmost importance for team functionality." (P2).

Another participant mentioned:

"While current collaboration tools greatly enhance remote communication and collaboration, face-to-face interactions still hold value in certain situations. However, in our profession, the tools we use effectively fulfill the need for collaboration, ensuring efficient and successful software development projects." (P13).

Participant 1 alluded to the fact that the current digital tools are quite effective, and they try to reduce the need for face-to-face interactions. However, in certain scenarios such as brainstorming sessions or when tackling significant new projects and detailed planning discussions that involve drawing diagrams or using whiteboards, in-person interactions offer an advantage that digital tools cannot quite replicate. Furthermore, whilst the participant believes that these tools are undoubtfully very good, he does not believe they have completely replaced the necessity for face-to-face communication. Participant 1 also alluded to the fact that if he had a choice, he would advocate for a return to the office or a more flexible working arrangement where people are required to be in the office periodically with the option to work from home periodically.

"Many of us end up working excessively long hours; personally, I average around 11-hour workdays, and I've noticed many team members doing the same. This extended work schedule blurs the lines between our professional and personal lives, making it challenging to maintain a healthy work-life balance. Moreover, in this remote setup, it's easy to feel like just another cog in the machine, with limited interactions beyond your immediate team. Back when we were in the office, there was a much broader sense of camaraderie and connection. For example, my team had regular interactions with the finance team, even having lunches together. However, in the current remote setup, these interactions are significantly limited, and you tend to only collaborate with those directly involved in your projects, missing out on broader engagement with colleagues from other departments like editorial. So, despite the array of collaboration tools available, the depth and breadth of collaboration remain constrained in the digital realm compared to in-person office environments." (P1).

The above extract echoes the other participants' sentiments noting that the current digital tools are effective, but not a complete replacement for face-to-face interactions, especially in scenarios like brainstorming and detailed planning sessions. They advocate for a flexible working arrangement that includes periodic office

presence to combat long working hours and maintain work-life balance. The participant highlights the limitations of remote work in building camaraderie and broader collaboration outside immediate teams, emphasising that while digital tools are valuable, they cannot fully replicate in-person interactions.

4.8 Chapter Summary

This chapter elucidates the outcomes derived from the comprehensive research conducted at LexisNexis South Africa. The study entailed interviews with fifteen participants occupying managerial roles within the software development domain of the organisation, each overseeing more than two employees. Their profound insights into the organisation's hybrid model were effectively communicated to the researcher. Employing a rigorous process of thematic analysis, multiple overarching themes and corresponding subthemes were unveiled through the interview data. Each theme was meticulously expounded upon, bolstered by participants' viewpoints that substantiated the identified themes. The participants' responses gleaned from the interview inquiries, significantly contributed to a more profound comprehension of the prevailing hybrid work model deployed in the realm of software development, as well as its efficacy. Subsequently, the ensuing chapter delves into an incisive analysis of the outcomes expounded in this chapter, interrelating them with the theoretical framework elucidated in Chapter Two.

CHAPTER FIVE: DISCUSSION OF RESEARCH FINDINGS

5.1 Introduction

The preceding chapter delineated the pivotal findings of the research study, setting the stage for the subsequent chapter's critical role in synthesising these primary research outcomes with the broader body of existing literature, thereby offering a comprehensive interpretation of the phenomena under investigation. Moreover, the primary focus of this chapter revolves around the implementation of the hybrid work model at LexisNexis South Africa, encompassing not only the collective perspectives and experiences of software development professionals, but also contextualising these insights within the global landscape of emerging trends and established research, as expounded in Chapter Two. In essence, this discourse adeptly encapsulates the epitome of the collective experiences and perceptions of these industry leaders, shedding light on the specific challenges, opportunities, and future prospects inherent in hybrid working methodologies, particularly within the realm of software development, by juxtaposing the qualitative data gleaned from interviews with the established body of literature. The research findings are extensively explored, with regards to each of the five core themes and eleven sub-themes identified in the research findings

5.2 Theme 1: Factors Influencing Productivity in Different Settings

The findings revealed that with the shift and transformation of traditional office-based work paradigms into more adaptable and flexible hybrid structures, software development leaders at LexisNexis were constantly faced with upkeeping and monitoring productivity of developers in the different work settings that they work in. This is because software developer productivity is a keystone in the foundation of modern software development practices. In an era defined by technological innovation, time-to-market pressures, and ever-evolving consumer demands, the effectiveness of software development teams directly impacts the success of businesses and the satisfaction of end-users. To assess this productivity, quantitative metrics such as lines of code, function points, task completion, and project duration have traditionally been employed. These metrics serve as objective benchmarks, allowing us to evaluate the efficiency and efficacy of development practices (Bao *et al.*, 2022). However, the landscape of work settings for software developers has undergone a profound transformation. The conventional office-based work paradigm has given way to a more flexible and adaptable hybrid model. As software development leaders at LexisNexis South Africa have transitioned into overseeing this new era of work, they face the unique challenge of ensuring and monitoring the productivity of their development teams across various work settings.

The study unveiled the insights and preferences of LNSA software developer leaders concerning the work environment that fosters peak productivity. The participants generously shared their valuable insights, shedding light on the myriad of factors that significantly influence productivity within diverse work environments. This view is corroborated by Bao *et al.* (2022), who cited that regardless of the specific work setting, the availability and effective utilisation of communication tools emerge as pivotal determinants of software developer productivity.

According to Meyer *et al.* (2014), seamless communication channels play a pivotal role in enabling teams to collaborate effortlessly, exchange innovative ideas, and resolve issues efficiently. In today's contemporary work landscape, collaboration tools such as video conferencing, instant messaging, and project management platforms have emerged as essential assets, particularly in facilitating remote work arrangements and maintaining strong connectivity among developers (Jackson *et al.*, 2022). The study's findings highlighted that LNSA software developers extensively employ a variety of these collaboration tools, relying heavily on them for both project-related tasks and communication needs. Hence, LNSA software developers have become indispensable for enabling remote work and maintaining their connectivity, which in turn facilitates effective collaboration and desired outcomes.

According to Bao *et al.* (2022), adaptable leadership proves to be essential in navigating the challenges posed by various work environments, including both remote and office-based setups. The findings of the study revealed that LNSA software development leaders have come up with activities such as encouraging team members to turn on their cameras during virtual meetings, incorporating icebreakers and team-building activities, rotating facilitators, and structuring discussions with assigned topics to promote participation. Additionally, creating open channels for feedback, utilising chat and polling features, and recognising contributions enhanced engagement and productivity. According to Awada *et al.* (2021), leaders who possess the ability to flexibly adapt to these diverse scenarios contribute significantly to maintaining team cohesion and subsequently, productivity. Their adaptable approach fosters a supportive atmosphere in which team members feel empowered and intrinsically motivated. This perspective is shared with Bao *et al.* (2022) who showed that software developers thrive when afforded the autonomy to manage their schedules and work in a flexible manner. Such autonomy enables them to align their tasks with their most productive hours, resulting in higher-quality work output and increased job satisfaction. Additionally, this flexibility accommodates the diverse needs of developers, promoting a healthier work-life balance.

The findings also revealed that team cohesion and the cultivation of a strong organisational culture emerged as influential factors in motivating software developers. A sense of belonging and camaraderie among

LNSA software development team members fostered collaboration, mutual support, and a positive work environment, which ultimately contributed to a higher job satisfaction and enhanced productivity. Moreover, the presence of minimal distractions and interruptions was vital for sustaining focus and output, regardless of the work environment. This view is consistent with that of Bao *et al.* (2022), which stipulates that the ability to create a quiet and interruption-free workspace, whether at home or in the office, significantly enhances the quality of code, reduces errors and expedites the overall development process.

Additionally, it is crucial to acknowledge the impact of external factors, including infrastructure quality, local regulations and economic conditions, on software developer productivity. The study revealed that addressing these external variables and providing the necessary resources helps mitigate their influence on work outcomes. Lastly, task complexity, the nature of the project, alignment with performance metrics, individual well-being, and team dynamics, all exert varying degrees of influence on productivity across different environments. According to Awada *et al.* (2021), these factors are interconnected and dynamic, emphasising the importance of a holistic approach that considers their multifaceted nature. Moreover, Bao *et al.* (2022) recognised that organisations are required to adapt to these nuances to unlock the full potential of their software development teams, which lead to a more efficient and effective software development workflow.

Hence, this aligns with the discovery that the realm of software developer productivity is intricate and ever-evolving, influenced by a multitude of interconnected factors. Meyer *et al.* (2014) supported this by stating that, as organisations navigate this terrain, it becomes evident that addressing these multifaceted factors holistically is imperative for optimising software developer productivity across various work settings (Smite *et al.,* 2023c). The findings reflect the intricate tapestry that defines the modern software development ecosystem, where the effectiveness of teams transcends the boundaries of physical workspaces. The study also engaged in more depth with two common work settings to explore how these factors intersect with the specific findings related to full-time working from home, working from the office, and the setting that produces optimal productivity. The findings revealed that LNSA software development leaders found that WFH has gained prominence, especially in the wake of the global shift towards remote and hybrid work models. Research conducted by Smite *et al.* (2022) supported this by citing that full-time working from home has proven to be a productive arrangement for software developers, especially when supported by the right infrastructure, technology and collaboration tools. The participants shared that in South Africa, where infrastructure challenges such as load shedding pose a recurring issue, LexisNexis software developers have adapted by embracing solutions like Uninterruptible Power Supplies (UPS) and inverters. These devices have become indispensable in ensuring uninterrupted workflow during power

interruptions. The reliability provided by UPS systems and inverters allows LNSA developers to maintain their work momentum, minimising disruptions.

The findings also revealed that the participants consistently reported increased productivity while working from home, this due to the comfort of one's own home which fosters concentration, as developers can delve into complex problem-solving, coding, and debugging tasks with minimal distractions. This uninterrupted focus leads to enhanced code quality, reduced errors and expedited development processes. Working from home allows LNSA developers to create a quiet and interruption-free workspace, which significantly contributes to a more efficient and effective software development workflow. To optimise productivity, participants emphasised the importance of a well-equipped home office. According to Jackson *et al.* (2022), high-speed internet, powerful computers, ergonomic furniture, and a quiet workspace are crucial for developers to work efficiently from home. Given these considerations, LNSA furnished its employees with office chairs, desks, and dual monitors to enhance their home office setups. This ensured that LNSA software developers could set up the same ergonomic work environments at home, further enhancing their productivity when working from home. As stated by Suryanto *et al.* (2022), WFH offers increased flexibility, reduced distractions, and the ability to tailor the workspace to individual needs. However, it's important to note that the effectiveness of this work setting can vary, depending on individual preferences, project requirements and team dynamics.

The findings also indicated that working from home grants developers the flexibility to manage their schedules according to their most productive hours. Many participants reported working beyond traditional office hours when working from home, and this also allowed for increased collaboration with team members in different time zones. The absence of office distractions and the ability to collaborate effectively online contributed to this flexibility (Suryanto *et al.*, 2022). However, the findings revealed that full-time remote work was not considered ideal for new starters and junior developers. The office setting was seen as more suitable for those who required training and mentorship. The office setting offered advantages like direct access to experienced mentors and a structured learning environment, which facilitated skill development and networking opportunities. Additionally, the office setting provided junior developers ergonomic offices, ensuring they had all the necessary resources for optimal productivity. Therefore, the office environment was seen as particularly advantageous for new starters, training, and projects that required immediate issue resolution and close teamwork (Smite *et al.*, 2023c).

Whilst working from home was favoured by many, the study also highlighted the advantages of office-based work. In the realm of software development, the office had long been the traditional and default work

setting, as it provided access to specialised equipment and technology infrastructure, face-to-face collaboration, and a structured work environment. This was also supported by Chadee *et al.* (2021), who indicated that offices typically provide high-end workstations, servers and networking resources that optimise the development process. The participants indicated that developers could rely on the stability and speed of office-based systems, which can be particularly valuable for resource-intensive tasks like software compilation and testing. According to Jackson *et al.* (2022), the office environment is equipped to support these requirements effectively. The structured nature of the office setting helps delineate work hours and boundaries. The physical separation of work and personal life can support a healthier work-life balance. In-office work environments offer clear demarcations between professional and personal spaces, which can enhance focus and productivity during working hours.

According to Suryanto *et al.* (2022), working from the office fosters immediate face-to-face collaboration, which can expedite issue resolution, idea sharing and decision-making among team members. Chadee *et al.* (2021) supported this, stating that the proximity of colleagues allows for quick interactions, spontaneous brainstorming sessions, and the ability to clarify doubts promptly. This direct collaboration is often considered essential for efficient problem-solving. The study findings revealed that casual conversations, team lunches and impromptu discussions contributed to a positive work culture. LNSA developers often drew inspiration from their peers and colleagues, which can lead to enhanced productivity and job satisfaction. The sense of being part of a team and a shared mission can be a powerful motivator.

The study findings also revealed that the office setting continued to play a vital role in the software development ecosystem, coexisting alongside remote work models. However, a consistent finding among participants was that WFH tends to produce optimal productivity. LexisNexis South Africa developers appreciate the focused environment that allows them to concentrate on their work without the distractions often found in an office setting. This level of concentration leads to higher code quality, fewer errors and faster development processes. Additionally, the absence of office distractions and the ability to create a quiet and interruption-free workspace were highly conducive to efficient software development workflows. LexisNexis South Africa developers can immerse themselves in their tasks without the need to navigate office conversations, meetings or interruptions from colleagues. This results in sustained focus and more efficient work processes.

The study findings also revealed that whilst working from home was the preferred setting for many LNSA participants, some recognised the advantages of a hybrid work model. The hybrid model combines the benefits of both remote and office work, providing opportunities for collaboration and face-to-face

interactions that can enhance productivity in certain situations. In situations where in-person meetings or collaborative sessions are essential, the hybrid model allows developers to leverage the office space. This flexibility to choose the most suitable work setting based on the nature of the work and project requirements is considered optimal by some developers (Chadee *et al.*, 2021). An overarching theme in the study findings is that the optimal work setting may vary, depending on individual preferences, project requirements and team dynamics. Some LNSA developers thrive in the focused solitude of their home office, while others value the social interaction and immediate support of the office environment. Recognising these differences and allowing developers to choose the setting that aligns with their preferences can contribute to higher job satisfaction and consequently, productivity (Bao *et al.*, 2022). This approach also acknowledges the diverse nature of software development tasks, some of which may benefit from remote work, while others may require the collaborative nature of the office.

In conclusion, the setting that produces optimal productivity for software developers is often working from home due to its focused and personalised environment, reduced distractions, and flexibility. However, it is crucial to recognise that the ideal work setting can vary among individuals and for different project needs. A hybrid approach that allows developers to choose the most suitable work environment based on their preferences and the nature of their tasks can offer the best of both worlds.

5.3 Theme 2: Hybrid Model Implementation

The findings revealed that LNSA had proactively implemented a flexible work-from-home policy before the pandemic. This strategic move was designed to serve as both an employee retention tool for software developers and a means to gain a competitive edge in the market. Initially, the flexible work-from-home policy was introduced on a trial basis, primarily within the Software Development department, and its implementation was carried out in phases, gradually extending to various teams (Jackson *et al*., 2022). While some participants had joined the company after the initial policy rollout or had not yet experienced its full implementation, those teams that did benefit from this approach identified themselves as early adopters of the policy introduced in 2018. They shared their experiences, describing how team members could reserve remote workdays and over time, the practice evolved to include two remote workdays per week, typically on Mondays and Fridays, while the rest were designated for in-office work. This approach was well-received for its merits, such as circumventing the daily traffic grind and offering the convenience of beginning work immediately after grabbing a morning coffee. Nevertheless, some team members still grappled with responsibilities like the school run. Challenges inherent to this arrangement included the need for a dependable internet connection, adequate remote work equipment and occasional power outages.

Notably, this early experience underscored the pre-pandemic trend of workplaces increasingly embracing flexible work arrangements, affirming their value even before the pandemic's widespread influence. Chen *et al.* (2023) and Silver (2023b) delved into the historical origins of remote work, uncovering substantial evidence of its enduring practice over an extended period. This historical context was further corroborated in the literature review which emphasised that remote work is not a fleeting trend but rather a natural extension of traditional workplace practices (Chen *et al.,* 2023). The body of research indicates that today's remote working models find their lineage in historical antecedents like geographical isolation, labour on family farms, and even living arrangements above commercial establishments. This historical continuum paints a comprehensive picture, affirming that the inclination for remote work is deeply ingrained, emerging as a response to both necessity and convenience across different epochs. The proclivity for remote work has, in fact, persisted for a considerable duration, underlining its time-honoured existence.

Significantly, the COVID-19 pandemic necessitated a strategic shift toward remote work, even though some of the businesses had pre-existing remote work practices in operation (Nolan *et al.,* 2021). The findings also revealed that in March 2022, LNSA had integrated the hybrid work model into its operations, aligning with a broader trend observed in South Africa, where hybrid work arrangements had become the prevailing standard (LexisNexis, 2022). This hybrid model, which blends remote work with in-office presence, fosters employee collaboration while harnessing the benefits of remote work. The study's findings revealed that the implemented model required 2-3 days of in-office presence, with the remainder of the workdays conducted remotely from home. The historical backdrop of remote work in diverse contexts substantially eased the transition and seamless integration of the hybrid working model at LNSA. This seamless transition was attributed to the pre-existence of essential tools and infrastructure. The flexible work-from-home model positioned LNSA proactively, equipping the organisation to swiftly respond to the challenges posed by the pandemic, including the imperative to work remotely. As a result, both employees and LNSA experienced a smoother and more agile adaptation to the hybrid work model.

Moreover, participants emphasised the vital role of adaptability and flexibility for software developers operating within this evolving framework. They underscored the importance of mastering remote work tools, effective communication skills, and efficient time management. According to Jackson *et al.* (2022), adaptability is portrayed as a dual concept encompassing both a skillset and a mindset, enabling developers to flourish in a rapidly changing professional landscape. The participants recognised that adaptability was not limited to acquiring new technical skills, but also entailed cultivating a mindset that embraced change and uncertainty. This duality enabled software developers to thrive in the ever-evolving and dynamic work

environment. The research findings revealed that LNSA developers were able to easily adapt to the hybrid working model, through mastering remote work tools, effective communication and time management.

The findings also portrayed that the hybrid working model offered flexibility to LNSA developers by recognising their individual needs, facilitating work-life balance, adapting to changing circumstances, and fostering diversity and inclusivity. These aspects collectively contributed to a more adaptive, productive and employee-friendly work environment. The participants shared that the hybrid working model offered significant flexibility to LNSA developers for several compelling reasons. First and foremost, this model acknowledged the diverse needs and work styles of software developers. By combining remote work with in-office work, it allowed developers to tailor their work environments to their preferences and productivity rhythms. This flexibility enabled developers to choose where and how they worked, aligning their tasks with their most productive hours. Furthermore, the hybrid model recognised the importance of work-life balance. LexisNexis South Africa developers, like professionals in many industries, faced personal and family commitments that could impact their workdays. The flexibility of the hybrid model accommodated these needs, enabling developers to strike a balance between their professional and personal lives. According to Ford *et al.* (2021), this not only contributes to employee well-being, but also results in higher job satisfaction, which, in turn, often translates to increased productivity.

Another key aspect of flexibility in the hybrid model was its ability to adapt to changing circumstances. In the wake of the COVID-19 pandemic, businesses worldwide swiftly adjusted their work arrangements. The hybrid model's inherent flexibility allowed LNSA to seamlessly transition from in-office to remote work when necessary, ensuring business continuity and employee safety. Moreover, this flexibility was conducive to a diverse and inclusive work environment. It allowed LNSA to attract and retain a broader talent pool by accommodating individuals who might not be able to commit to traditional office-based work. This diversity of perspectives and experiences often leads to more innovative and creative problem-solving, a substantial advantage for a software development company. Some of the participants cited that the hybrid work model was perceived as advantageous for facilitating global collaboration, particularly with teams distributed across diverse time zones, thereby enhancing overall productivity and adaptability.
The influence of hybrid work policies on in-person attendance unveiled a complex dynamic within the study. The hybrid policy stipulated that employees should be physically present in the office for 2-3 days each week. However, what the study uncovered was a diverse range of responses to this policy. First and foremost, participants highlighted the fact that many software developers did not strictly adhere to the prescribed office attendance schedule. This suggested that a certain level of flexibility and autonomy within the organisation allowed employees to make decisions about their in-office presence, based on their specific

circumstances and work requirements. The reasons behind these variations in adherence were multifaceted. For some, office visits were primarily driven by job necessity. This indicated that employees most likely came into the office when their specific tasks or projects required in-person collaboration, or when there were intensive planning sessions that demanded physical presence. This pragmatic approach to office attendance highlighted a balance between flexibility and the practical needs of the job. Collaboration requirements were another significant factor influencing adherence to the hybrid policy. Some teams within the organisation found it necessary to be in the office when collaborative efforts were at their peak. This suggested that the policy recognised the importance of in-person teamwork and allowed teams to make decisions in line with their specific collaboration needs. Furthermore, the study revealed that adherence to the hybrid policy was more about responding to job-specific requirements than strict compliance. In other words, it was not a one-size-fits-all approach. Software developers could tailor their in-office presence to their unique job roles and responsibilities. This adaptability within the policy allowed employees to strike a balance that worked for them while still meeting the organisation's objectives.

The findings of the study revealed that the influence of hybrid work policies on in-person attendance demonstrated a nuanced and adaptable approach within the organisation. It recognised that the requirements for physical office presence varied among employees and teams, and allowed for flexibility while still maintaining the essential elements of in-person collaboration and job-specific needs. This approach contributed to a more practical and balanced implementation of the hybrid work model. The effectiveness of the hybrid work model, as unveiled by the study, exhibited a spectrum of perspectives among participants, reflecting a multi-faceted evaluation of its impact on the organisation and its employees. On one hand, participants acknowledged the substantial advantages of the hybrid model, recognising it as a solution that offered the best of both worlds. They viewed it as a balanced approach that combined the flexibility of remote work with valuable in-person collaboration opportunities. This blend was seen as conducive to enhancing communication, teamwork, and overall productivity. However, it was not a unanimous endorsement of the hybrid model. The study also illuminated potential challenges associated with its adoption. Some participants pointed to the complexities of maintaining team chemistry, especially during remote onboarding processes. They highlighted that the lack of face-to-face encounters could potentially dilute the sense of team spirit, and virtual meetings might present technical and operational challenges that impacted the efficiency of communication. The study also underscored concerns about mental health, particularly the potential lack of emotional and sympathetic support in a remote work environment, raising questions about the overall well-being of employees.

In essence, the effectiveness of the hybrid model was found to be contingent on various factors, including individual preferences, specific project requirements, and the unique dynamics of different teams. The study's findings underscored the importance of tailoring the implementation of the model to better align with these distinct needs and circumstances. Rather than a one-size-fits-all approach, a more nuanced and dynamic adoption of the hybrid model was recommended to maximise its potential benefits while addressing its challenges. This approach recognised that there is no universally applicable solution and advocated for adaptability in the workplace.

5.4 Theme 3: Collaboration in Software Development

LexisNexis considers collaboration as the cornerstone of successful software development endeavours. According to Mishra *et al.* (2012), it involves the interaction and cooperation of diverse stakeholders, including developers, testers, product managers, designers and sometimes even end-users. The collective knowledge, skills and insights of these individuals are harnessed to create software solutions that meet business objectives and user needs. The study findings revealed that effective collaboration is essential because it ensures that the resulting software is not only functional, but also robust, reliable and user-friendly. The participants cited that collaboration is not just a desirable aspect of software development, but is fundamental to achieving project success and meeting LexisNexis goals. The adoption of agile methodologies, the use of version control systems and code reviews, and the implementation of clear communication channels, are key factors that ensure the quality of software and knowledge sharing among team members (Jackson *et al.*, 2022). Furthermore, the software development industry's increasing globalisation underscores the need for effective remote collaboration tools to support teams working across geographical boundaries. These findings validate and expand upon existing literature on the significance of collaboration in software development.

The research findings revealed that the hybrid working model was implemented so that it creates a significant impact on team collaboration among LNSA software developers. The hybrid model was aimed at striking a balance between the advantages of remote work, such as flexibility and autonomy, and the benefits of in-person interactions. According to Badiale (2020), effective communication and coordination are critical for team collaboration in a hybrid model, as team members may be physically distant from each other. The majority of LNSA software development teams are not located in the same province, whilst some are even dispersed in different countries, therefore, digital tools and technology, as highlighted by the participants, play a crucial role in bridging this gap and enabling remote team members to collaborate seamlessly.

One of the primary drivers behind LNSA's introduction of the Hybrid model post-lockdown was to encourage employees to return to the office and facilitate collaboration. The research findings unveiled the critical role of a comprehensive suite of digital tools and technologies in enabling collaborative work, particularly in software development. These tools were meticulously designed to foster effective teamwork, streamline development processes, and elevate overall productivity. Among the array of tools identified by participants were version control systems, integrated development environments, code repository hosting services, communication platforms, project management software, and collaborative coding environments. This toolkit empowered LNSA's software development teams to communicate seamlessly, efficiently manage projects, collaborate on code effortlessly, and maintain high standards of code quality, aligning with industry best practices. Version control systems such as Git played a pivotal role in code management and collaboration, while communication tools like Slack and Microsoft Teams facilitated real-time information exchange. Project management software and issue tracking tools ensured meticulous project organisation and code review. These findings underscore the paramount importance of a robust toolset in supporting collaborative work in software development. Hence, even though the primary objective of the hybrid policy was to encourage in-office collaboration, these collaborative platforms proved to be pivotal in augmenting the efficacy of collaboration for software developers. This may explain why software developers may not necessarily need to be physically present in the office for 2-3 days a week.

As highlighted, virtual collaboration has become an imperative in the contemporary software development arena. The research findings underscore that within this virtual realm, challenges emerge, encompassing communication barriers, time zone discrepancies, technical glitches, cultural and linguistic variations, as well as the imperative need to address data security concerns and ensure the well-being of team members. These complexities necessitate a comprehensive approach to ensure the effectiveness of virtual collaboration among software developers. Participants have stressed the importance of LNSA's proactive efforts in addressing these challenges to uphold the standards of effective collaboration and sustained productivity.

5.5 Theme 4: Technological Interaction replacing face - to - face interaction

Technology has significantly altered the way in which LexisNexis employees interact with one another, and in many instances, it has substituted for face-to-face interaction. However, it's essential to recognise that while technology provides various benefits in terms of communication and connection, there are inherent limitations (Mishra *et al.,* 2012). Certain interactions lend themselves well to technological

replacements, as evidenced by the effective use of tools like Microsoft Teams for video calls, email and WhatsApp for maintaining connections and facilitating work-related discussions and collaboration with distant colleagues (Jackson *et al.*, 2022). The current study revealed that LNSA software developers are also increasingly relying on technological interactions to facilitate collaboration, particularly in a globalised and remote work environment. According to Jones and Thoma (2019), advances in digital communication tools have significantly altered the way teams collaborate, transcending geographical barriers. Participants also supported that while technological interaction offers undeniable convenience, efficiency and accessibility, it does not completely replace the value of face-to-face interactions.

The findings revealed that the relationship between technological and face-to-face interaction is one of complementarity, rather than replacement. Participants shared that in personal relationships, creative endeavours and nuanced conversations, the depth of human connection, non-verbal cues, and physical presence often prove to be irreplaceable. These elements play a crucial role in understanding emotions, intentions and context. While technology can facilitate various aspects of work and life, it may not fully capture the intricacies of human interaction, and as a result, it can fall short in fostering genuine understanding, empathy and effective collaboration. Participants also cited that in these contexts, face-to-face interactions excel in providing a more comprehensive and meaningful exchange of ideas, emotions, and experiences, ultimately enhancing the way work and personal relationships are established and nurtured. Therefore, while technological interaction offers numerous advantages, it does not fully supplant the value of in-person interactions, and the balance between the two depends on the context and individual preferences.

The findings also resonated with existing literature found in chapter 2, which highlights the persistent value of face-to-face interaction in the context of the trust (Wang *et al.*, 2022). While technology has enabled remote collaboration and bridged geographical gaps, some participants emphasised the importance of trust in virtual teams, where LNSA team members may not have the benefit of physical presence and non-verbal cues to gauge one another's motives and intentions. Trust not only fosters open communication, but also contributes to individual success within LNSA teams, as it influences the level of effort exerted by team members toward achieving collective objectives (Jarvenpaa and Leidner, 1999). The findings corroborate existing research by McLarnon *et al.* (2019) on trust in virtual teams, highlighting its pivotal role in team dynamics and performance. Building trust in the absence of face-to-face interaction presents unique challenges that organisations must address to foster effective virtual collaboration (McLarnon *et al.*, 2019).

The participants of the study also provided insights into the balance between digital tools and in-person interactions. While current collaboration tools were acknowledged as effective for remote communication and collaboration, participants articulated situations where face-to-face interactions offer advantages that digital tools cannot replicate fully. Scenarios like brainstorming sessions, detailed planning discussions, and creative endeavours, were identified as areas where in-person interactions are deemed advantageous. The participants advocated for a balanced working arrangement that includes periodic in-person interactions, even in a predominantly remote work setting. They expressed concerns about long working hours in remote setups and the challenge of maintaining a healthy work-life balance. Furthermore, they highlighted the limitations of remote work in building camaraderie and fostering broader collaboration outside immediate teams.

The analysis of the study's findings unveiled a striking pattern whereby contemporary workforces are navigating the delicate equilibrium between the convenience of digital tools and the intrinsic value of in-person interactions. Participants in the study acknowledged the necessity of adopting adaptable work arrangements that embrace the distinct merits of both digital and face-to-face interactions. This research has significantly advanced the comprehension of the intricate interplay between technological and face-to-face engagement within the contemporary software development landscape, establishing a solid platform for future investigations in this evolving domain.

5.6 Chapter Summary

This chapter has undertaken an in-depth exploration of the research findings presented in Chapter Four, aligning them with the insights from the literature review expounded upon in Chapter Two, all in pursuit of addressing the research objectives laid out in Chapter One. The analysis delved into several key themes and sub-themes pertaining to the implementation and effectiveness of the hybrid working model, particularly concerning software developers. Drawing on the theoretical framework and conceptual model of the hybrid model discussed in Chapter Two, the study found robust support for the identified themes and sub-themes. The subsequent chapter will provide a comprehensive presentation of the study's conclusions and recommendations, alongside a discussion of the study's limitations and the potential directions for further research.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter serves as the culmination of this study, drawing conclusions and offering recommendations that revolve around the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd. This study explored the implementation of the hybrid model at LNSA, assessing its effectiveness for the software developers at this organisation. This study was poised to contribute valuable knowledge to the field by offering qualitative insights into the real-world implementation of hybrid models, thereby enhancing the comprehension of how these models operate within organisational contexts and how they can be refined to achieve optimal outcomes. This chapter begins by addressing the objectives of this study. Then, recommendations to solve the research problem based on the findings of this study are made. The recommendations suggest reviewing the different types of hybrid models and not utilising a one size fits all approach when it comes to implementation. Thereafter, the implications and limitations of this study are discussed. Lastly, recommendations are provided for future research on exploring Event-Based Hybrid model instead of calendar-based hybrid working model, as well as the application process of experimentation prior to application.

6.2 Addressing the Research Objectives

6.2.1 To understand how the hybrid model is currently being applied among software developers at LexisNexis South Africa

The first research objective of this study was to understand how the hybrid model is currently being applied among software developers at LexisNexis South Africa. The findings of this study revealed a proactive initiative undertaken by LNSA in 2018, before the onset of the pandemic, which involved the implementation of a flexible work-from-home policy (LexisNexis, 2022). This strategic measure was instituted with a dual purpose: first, as a tool for enhancing employee retention among software developers, and second, as a means to gain a competitive advantage in the marketplace (Ford *et al.*, 2021). Initially, the flexible work-from-home policy was introduced on a trial basis, primarily within the Software Development department. Its implementation was conducted incrementally, with successive phases extending its applicability to various teams within the department. This phased approach gathered substantial positive feedback due to several notable advantages, including the elimination of daily commuting hassles and the improvement of work-life balance. Notably, this early experience served as a precursor to the broader trend

of workplaces increasingly embracing flexible work arrangements, emphasising their value even before the widespread influence of the pandemic.

Subsequently, in response to the COVID-19 pandemic, a strategic realignment toward fully remote work became imperative (Suryanto *et al.*, 2022). Many businesses encountered difficulties during this transition, with some ultimately ceasing operations entirely. However, certain enterprises that had previously embraced remote work practices were better equipped to navigate this shift. LexisNexis South Africa belonged to the latter category, having established a robust foundation for remote work practices. Nevertheless, in March 2022, following the pandemic's subsidence, LNSA integrated a hybrid work model into its operational framework, mirroring a broader trend in South Africa, where hybrid work arrangements emerged as the prevailing norm (LexisNexis, 2022). This hybrid model, which combines remote work with in-person office presence, was designed to promote employee collaboration while capitalising on the advantages of remote work. Under this model, employees were required to spend 2-3 days working in the office, with the remaining workdays allocated to remote work from their homes. The historical precedence of remote work in diverse contexts significantly facilitated the seamless integration of the hybrid work model at LexisNexis South Africa (LexisNexis, 2022). This smooth transition could be attributed to the pre-existing essential tools and infrastructure that were already in place. The proactive adoption of the flexible work-from-home model had positioned LNSA to respond swiftly and effectively to the challenges posed by the pandemic, including the imperative to transition to remote work. Consequently, both employees and LNSA itself experienced a more streamlined and agile adaptation to the hybrid work model.

6.2.2 To determine the software development leaders' perceptions of the effectiveness of LexisNexis Southa Africa's hybrid model

The second research objective sought to assess the perspectives of leadership within the software development domain concerning the efficacy of the hybrid work model among software developers at LexisNexis South Africa. An intricate interplay between hybrid work policies and in-person attendance emerged as a nuanced phenomenon within the scope of this study. The hybrid policy in place mandated that employees maintain physical office presence for a period spanning 2-3 days weekly. However, the investigation revealed a spectrum of responses to this policy that extended beyond strict adherence. A significant number of software developers did not rigidly adhere to the prescribed in-office attendance schedule. This observation underscored the presence of a certain level of organisational flexibility and individual autonomy that permitted employees to determine their in-office presence based on their unique circumstances and work-related demands. The underlying causes of these variations in adherence were

multifaceted. Some software developers appeared to govern their office visits by job necessity, indicating that their physical presence at the office was most likely driven by the specific requirements of their tasks or projects. In-person collaboration and intensive planning sessions that necessitated face-to-face interaction were common scenarios that prompted their presence at the office. This pragmatic approach to office attendance strikingly underlined a delicate equilibrium between flexibility and the pragmatic requirements inherent to their job roles.

The study's examination of the effectiveness of the hybrid work model revealed a diverse spectrum of perspectives among the participants, representing a multifaceted evaluation of its implications for the organisation and its workforce. On one hand, the participants acknowledged significant advantages associated with the hybrid model, regarding it as a solution that harmonises the benefits of both remote and in-person work. They perceived it as a well-balanced approach that blends the flexibility of remote work with valuable opportunities for face-to-face collaboration (Miller et al., 2021). This amalgamation was deemed conducive to enhancing communication, teamwork and overall productivity. Nonetheless, the endorsement of the hybrid model was not unanimous (Wang et al., 2022). The research also shed light on potential challenges linked to its implementation (Jackson et al., 2022). Some participants raised concerns about the complexities of maintaining team dynamics, particularly in the context of remote onboarding processes. They emphasised that the absence of physical interactions could potentially erode the sense of team cohesion, and virtual meetings might introduce technical and operational hurdles that could impede effective communication. Furthermore, the study underscored apprehensions regarding mental well-being, particularly the potential absence of emotional and empathetic support within the remote work environment. These concerns raised pertinent questions about the overall welfare of employees. Fundamentally, the study revealed that the effectiveness of the hybrid model hinged upon several determinants, encompassing individual preferences, project-specific prerequisites, and the distinctive dynamics inherent to various teams. The findings emphasised the significance of customising the model's implementation to align more closely with these requisites and contexts. This nuanced perspective recognised the absence of a universally applicable solution and advocated for workplace adaptability to optimise the model's potential advantages while addressing its associated challenges (Miller et al., 2021).

6.2.3 To assess the effectiveness of the collaboration tools used by software developers at LexisNexis South Africa

The final objective of this study was to to assess the effectiveness of the collaboration tools used by software developers at LexisNexis South Africa. The research findings unveiled that the implementation of the

hybrid working model was deliberately structured to yield a substantial impact on team collaboration among software developers within LNSA. This hybrid model was designed to strike a delicate equilibrium between the advantages associated with remote work, such as flexibility and individual autonomy, and the merits derived from in-person interactions. Effective communication and coordination assume paramount significance in facilitating team collaboration within the framework of a hybrid model, given that team members may be geographically dispersed. It is noteworthy that the majority of LNSA software development teams are not co-located within the same province, and some are even distributed across different countries. Consequently, as emphasised by the study participants, digital tools and technology play a pivotal role in bridging this geographical divide and facilitating seamless collaboration among remote team members.

One of the primary motivations behind LexisNexis South Africa's adoption of the Hybrid model post-lockdown was to incentivise employees to return to the office premises and facilitate collaborative work. The research findings unveiled the pivotal role of a comprehensive array of digital tools and technologies in enabling collaborative endeavours, with a particular emphasis on the software development domain. These tools were thoughtfully designed to nurture effective teamwork, streamline the software development processes, and elevate overall productivity. The participants identified a diverse range of tools within this toolkit, encompassing version control systems, integrated development environments, code repository hosting services, communication platforms, project management software, and collaborative coding environments. This well-curated suite empowered LNSA's software development teams to communicate seamlessly, proficiently manage projects, effortlessly collaborate on coding tasks, and maintain high standards of code quality, in accordance with industry best practices.

Version control systems, such as Git, played an indispensable role in the management and collaboration aspects of code development, while communication tools like Slack and Microsoft Teams facilitated real-time information exchange. Project management software and issue tracking tools ensured meticulous project organisation and facilitated effective code review processes. These findings underscore the paramount importance of a robust toolset in supporting collaborative work within the realm of software development. Consequently, it is evident that even though the primary objective of the hybrid policy was to stimulate in-office collaboration, these collaborative platforms played a pivotal role in augmenting the efficacy of collaboration for software developers. This may elucidate why software developers may not necessarily need to be physically present in the office for 2-3 days a week.

6.3 Recommendations to address the research problem

The research has demonstrated that the recent implementation of the hybrid model at LexisNexis in March 2022 was executed in a standardised manner. Although the policy specifies that 2-3 days should be spent in the office to facilitate collaboration, the study findings indicated that most software development teams do not strictly conform to this policy. Instead, they selectively opt to be physically present in the office only when it is deemed necessary, primarily due to the efficacy of the collaboration tools at their disposal. Consequently, in light of these study findings, several recommendations have been proposed in the ensuing subsections.

6.3.1 Customised Implementation

Customised implementation of the hybrid work model entails acknowledging the inherent variability in how this model affects different teams and individuals within an organisation. It involves adapting the model to specific project requirements and considering the dynamics of each team, recognising that not all tasks and teams require the same blend of remote and in-office work. This approach emphasises flexibility and autonomy, thereby allowing teams and employees to make decisions that best suit their unique circumstances, ultimately maximising the benefits of the hybrid model for both the organisation and its employees. To ensure success, LexisNexis South Africa should continuously evaluate the effectiveness of the model and be prepared to make adjustments as needed, creating a workplace that is more adaptable and tailored to individual needs.

6.3.2 Evaluation of Best Practices

Evaluating and sharing best practices at LexisNexis South Africa involves a thorough examination of the strategies and lessons derived from their successful transition to the hybrid work model. The focus is on identifying what has worked effectively, understanding the challenges faced, and documenting success stories that showcase the benefits of the hybrid model. These insights are then shared through internal and external channels, such as training resources, industry collaborations, and thought leadership, to support LNSA teams, other organisations, and the broader industry in implementing and optimising the hybrid work model. By creating a feedback loop and fostering continuous learning, LNSA contributes to the collective growth and effectiveness of flexible work arrangements, ensuring both their success and the success of others considering a similar approach.

6.3.3 Tool Optimisation

Tool optimisation within a software development context is a dynamic and proactive process that involves the continuous evaluation and enhancement of collaboration tools used in a hybrid work model. This entails regularly assessing tool performance, gathering feedback from software developers, staying up-to-date with updates and advancements in software development and remote collaboration tools, ensuring seamless integration and compatibility with existing software, providing training and documentation, and focusing on scalability, security, and compliance. By keeping a vigilant eye on the latest technology trends, customising tools to meet specific team needs, and establishing performance metrics, LexisNexis South Africa can maximise productivity and efficiency in a hybrid work environment, ensuring that these tools effectively support the software development process.

6.4 Implications of this research

This research has made significant contributions to scholarship by advancing our understanding of the hybrid model's effectiveness in software development leadership, addressing the limitations encountered, and proposing recommendations for future research. It has provided a nuanced perspective on software development leaders' views within a specific context, while underscoring the importance of industry-specific considerations. The universal approach recommended for future research can contribute to scholarship by creating a more universally applicable framework for understanding and implementing the hybrid model in software development and other professional settings. The longitudinal and interdisciplinary research aspects proposed can provide valuable insights into the evolving dynamics of software development leadership, further enriching scholarly discourse in the field.

In practical terms, the research findings and recommendations can be applied to software development leadership practices. Organisations, particularly those in the legal tech industry, can use the insights to refine their approaches to the hybrid model, considering industry-specific demands and technology-related challenges. The study's emphasis on including both leaders and non-leaders in future research can inform organisations about the perspectives of their entire software development teams, facilitating more inclusive decision-making processes and potentially improving team dynamics.

Furthermore, the various stakeholders identified in the ethical clearance process, including the participating software development leaders and their respective organisations, will benefit from the findings of this study. The software development leaders gained a deeper understanding of the effectiveness of the hybrid model within their unique context, enabling them to make more informed decisions about leadership practices.

Organisations stand to benefit from improved leadership strategies and a more comprehensive understanding of the hybrid model's applicability. In addition, academic institutions and researchers in the field of software development leadership can build upon this research, contributing to a growing body of knowledge and fostering collaborative efforts with industry practitioners. Ultimately, the research has the potential to create a positive feedback loop between academia and industry, leading to advancements in both theory and practice in the realm of software development leadership.

6.5 Limitations of the study

LexisNexis South Africa (LNSA) served as the primary focus of this study, with a specific emphasis on software development leaders within the legal technology environment. It is essential to note that the sample population exclusively comprised individuals holding leadership roles in software development at LNSA. This deliberate selection criterion aimed to capture the unique perspectives of leaders with employees reporting to them, as opposed to including software developers without direct reports. The intention behind this approach was to provide a nuanced understanding from a leadership standpoint. However, it is crucial to acknowledge the potential limitations stemming from the specific organisational context of the legal tech industry. Given the distinct daily processes and commitments in various industries, generalisability beyond the legal tech sector may be restricted. Leaders from other fields might exhibit differing views due to the idiosyncrasies of their respective industries. Consequently, caution must be exercised in applying findings from this study to contexts outside the legal tech domain.

Moreover, the investigation into the effectiveness of the hybrid model exclusively focused on the software development domain within LNSA. The rationale for this narrow focus stems from the recognition of the unique demands, technologies, and processes inherent to software development. This specialisation, while providing depth in the analysis, raised the concern of a potentially non-representative sample size, particularly if the proportion of software development leaders outside LNSA is limited. Additionally, the dynamic nature of the software development industry, coupled with temporal factors, introduces challenges to the long-term relevance of our study. The influence of social desirability bias on participant responses was recognised, necessitating the implementation of strategies to mitigate this effect. Furthermore, reliance on perceptions alone for evaluating the hybrid model may limit the depth of this study. To enhance rigor and transparency, consideration of objective performance indicators was recommended. Finally, recognizing the potential communication and interpretation challenges that emerged during the study. By addressing these potential limitations upfront, the aim was to fortify the overall rigor and credibility of this research.

6.6 Recommendations for future studies

Future research studies should consider diversifying the sample population to include software developers without leadership roles, facilitating a more holistic assessment of the hybrid model's effectiveness by capturing both leadership and non-leadership perspectives within software development teams. Moreover, extending the research focus beyond the legal tech industry and adopting a universal approach in survey instruments can enhance the generalisability of findings to different professional settings. To reinforce external validity, future studies should explore software development leadership in multiple organisations within the legal tech industry, offering a nuanced understanding of how the hybrid model operates within diverse organisational contexts. Additionally, interdisciplinary analyses involving professionals from various departments and roles within organisations can shed light on the broader organisational implications of the hybrid model. Moreover, the researcher employed the qualitative approach in this study. Other research methods, such as those based on a quantitative research approach or mixed methods, should be employed to provide a broader overview of the topic as a whole. Tools such as questionnaires could be used for future research on a larger scale within the country.

Additionally, there is a need for future research to delve into less conventional hybrid approaches, such as the Event-Based Hybrid model, as an alternative to the more commonly adopted calendar-based hybrid working models. Furthermore, exploring the application process and conducting preliminary experimentation before full-scale implementation also warrants further investigation.

6.7 Conclusion

This chapter summarised the study’s findings and offers recommendations regarding the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd. This study investigated the evolution of the hybrid model at LNSA, from a pre-pandemic flexible work-from-home policy to its post-pandemic implementation. The study aimed to explore software developers' adherence to the model, highlighting the diverse responses to the prescribed in-office attendance schedule. The effectiveness of the hybrid model was viewed through a multifaceted lens, with participants acknowledging its advantages, such as a balanced blend of remote flexibility and in-person collaboration, while also noting potential challenges like maintaining team chemistry and addressing mental health concerns. The critical role of collaboration tools, encompassed version control systems, integrated development environments, communication platforms, and project management software, in enabling effective teamwork among software developers was underscored. Recommendations to address the research problem were presented, emphasizing customised implementation, evaluation of best practices, and tool optimisation. Implications for scholarship and

practice was discussed, with insights benefiting software development leaders, organisations, academic institutions and researchers. The researcher acknowledged the limitations of the study and offered recommendations for future research, advocating for diversifying the sample population, a universal approach, and exploring software development leadership in varied contexts while also suggesting the use of different research methods for a comprehensive understanding of the hybrid model's effectiveness.

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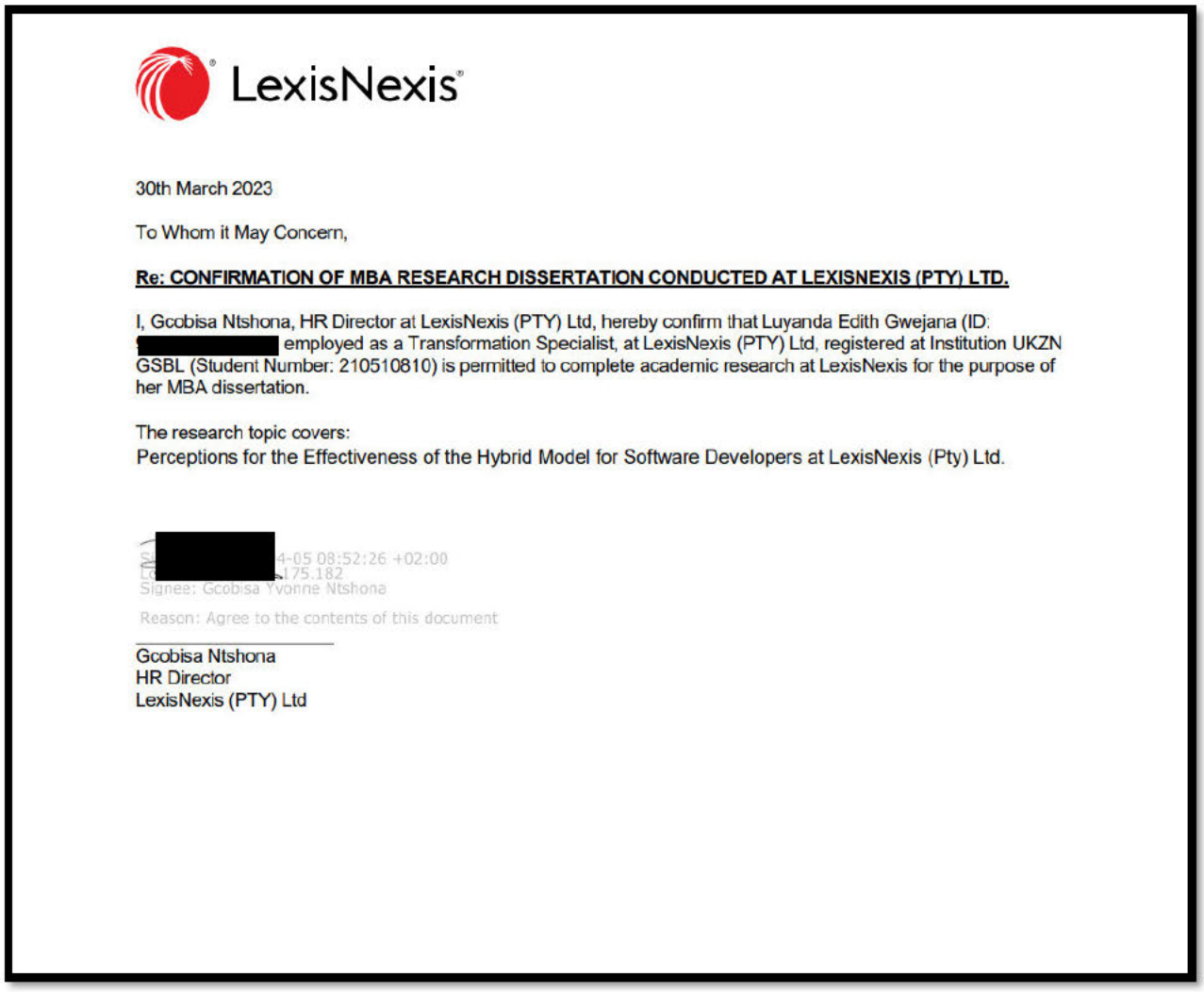
Appendices

Appendix A: Gatekeepers Letter



LexisNexis®

30th March 2023

To Whom it May Concern,

Re: CONFIRMATION OF MBA RESEARCH DISSERTATION CONDUCTED AT LEXISNEXIS (PTY) LTD.

I, Gcobisa Ntshona, HR Director at LexisNexis (PTY) Ltd, hereby confirm that Luyanda Edith Gwejana (ID: [redacted] employed as a Transformation Specialist, at LexisNexis (PTY) Ltd, registered at Institution UKZN GSBL (Student Number: 210510810) is permitted to complete academic research at LexisNexis for the purpose of her MBA dissertation.

The research topic covers:
Perceptions for the Effectiveness of the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd.

[redacted] 4-05 08:52:26 +02:00
[redacted] 175.182
Signee: Gcobisa Yvonne Ntshona
Reason: Agree to the contents of this document

Gcobisa Ntshona
HR Director
LexisNexis (PTY) Ltd

Appendix B: Ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

06 June 2023

Luyanda Edith Gwejana (210510810)
Grad School of Bus & Leadership
Westville Campus

Dear LE Gwejana,

Protocol reference number: HSSREC/00005638/2023
Project title: Perceptions for the effectiveness of the hybrid model for software developers at LexisNexis (Pty) Ltd
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 23 May 2023 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 06 June 2024.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)

/dd

Humanities and Social Sciences Research Ethics Committee
Postal Address: Private Bag X54001, Durban, 4000, South Africa
Telephone: +27 (0)31 260 8350/4557/3587 **Email:** hssrec@ukzn.ac.za **Website:** http://research.ukzn.ac.za/Research-Ethics
Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

INSPIRING GREATNESS

Appendix C: Consent Form

UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

UNIVERSITY OF KWAZULU-NATAL

GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

MBA Research Project

Researcher: Luyanda Gwejana ([redacted])

Supervisor: Dr Xoliswa Majola

INFORMED CONSENT LETTER

Information Sheet and Consent to Participate in Research

Date:

Greetings,

My name is Luyanda Gwejana (Student No. 210510810) and I am a Master of Business Administration (MBA) student, at the Graduate School of Business and Leadership, of the University of KwaZulu – Natal. The contact details for myself as well as my supervisor and the academic department at UKZN are listed below:

Researcher Name: Luyanda Gwejana;
e-mail: 210510810@stu.ukzn.ac.za;
Mobile Contact Number: +27[redacted]

Supervisor Name: Dr Xoliswa Majola;
e-mail: majolax@ukzn.ac.za;
Office contact Number: +27 31 260 7680

You are being invited to consider participating in a study that involves research titled: "*Perceptions for the effectiveness of the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd*." The aim of the study is to determine the perception of software development leaders on the effectiveness of the Hybrid working model among software developers.

The current aspect of the study is directed at obtaining an insight into your experiences of the hybrid working model for software developers. This insight will be guided by a semi-structured interview that will be used to add structure to a conversation regarding your experience of remote working as well as your perspectives on the current hybrid working model being applied to software developers. A significant part

of your contribution towards this research effort will be in the form of your opinion regarding effectiveness of this model. The duration of your participation if you choose to participate and remain in the study is expected to be approximately 45 minutes.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number: HSSREC/00005638/2023).

In the event of any problems or concerns/questions you may contact the researcher by making use of any of the contact details provided above, or by contacting the UKZN Humanities & Social Sciences Research Ethics Committee. The contact details are as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557- Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Your participation in the study is voluntary and by participating, you are granting the researcher permission to use your responses. You may refuse to participate or withdraw from the study at any time with no negative consequence. There will be no monetary gain from participating in the study. Your anonymity will be maintained by the researcher and the School of GSBL and your responses will not be used for any purposes outside of this study.

All data, both electronic and hard copy, will be securely stored during the study and archived for 5 years. After this time, all data will be destroyed.

If you have any questions or concerns about participating in the study, please contact me or my research supervisor at the numbers listed above.

Sincerely

Luyanda Gwejana

CONSENT TO PARTICIPATE

I …… (Name) have been informed about the study entitled: *Perceptions for the effectiveness of the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd* by Luyanda Gwejana.

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at details provided in **Page 1** of this document.

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557 - Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Signature of Participant	**Date**
Signature of Witness (Where applicable)	**Date**
Signature of Translator (Where applicable)	**Date**

Appendix D: Interview Questions

INTERVIEW QUESTIONS
UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP
MBA Research Project
Researcher: Luyanda Gwejana
Supervisor: Dr Xoliswa Majola

Perceptions for the effectiveness of the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd.

Interview Questions

1. Tell me more about your role as a leader in the software development profession at LexisNexis.

2. **Application of the hybrid model currently being applied to LNSA software.**
    a. Did you or your team make use of the flexible work from home policy that was launched in 2018?
        i. What was your experience, please share both challenges and advantages.
    b. Please share your experience of working from home during the COVID-19 pandemic.
    c. Please share your experience of working from home utilising the Hybrid Model?
    d. In your opinion, which of three experiences produced optimal productivity from your team?

3. **Software development leaders' perceptions of the effectiveness of the hybrid model.**
    a. How often does your team come into the office?
    b. Does your team come in to the office comply to the Hybrid Policy or as a necessity of the job?
    c. Would you consider the Hybrid model the same as the Flexible Work from home arrangement?
    d. In your view point are software developers more productive whilst working from home or in the office?

4. **Collaboration tools for software developers.**
    a. How would you define collaboration in the software development space?
    b. Is collaboration a critical component to successfully carrying out a software development job?
    c. How do you and your team communicate with other team members?
    d. In your opinion, is it possible through technology to build online relations among team members?
    e. What tools are utilised for collaboration?

f. Which are the challenges and opportunities when you communicate through technological devices? Please give an example if possible.
g. Which are the challenges and opportunities for computer-mediated communication? Please give an example if possible.
h. Which are the challenges and opportunities for face-to-face interactions? How often do you meet in-person with the other members?
i. Would the current collaboration tools in use, completely replenish the requirement for face-to-face interactions?

Appendix E: Editors Letter

EDITOR'S CERTIFICATE

23 November 2023

Re: LANGUAGE EDITING STATEMENT

I, THE UNDERSIGNED, hereby confirm that I have edited a **thesis** titled ***Perceptions for the Effectiveness of the Hybrid Model for Software Developers at LexisNexis (Pty) Ltd,*** by **Luyanda Gwejana.**

Professional EDITORS' Guild 30 1993–2023

Promoting excellence in editing

Hatikanganwi Mapudzi
Associate Member

Membership number: MAP002
Membership year: March 2023 to February 2024

071 585 1512
floediting@yahoo.com

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Senior Lecturer; Chartered Public Relations Practitioner; Freelance Editor

Appendix F: Turnitin Report

Document Viewer

Turnitin Originality Report

Processed on: 25-Nov-2023 1:25 PM CAT
ID: 2216177318
Word Count: 35609
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210510810 MBA Dissertation - L Gwejana By Luyanda Gwejana

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Submitted to University of Stellenbosch, South Africa on 2021-11-08

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