UNDERSTANDING THE INFLUENCE OF INVISIBLE FACTORS ON KNOWLEDGE WORKER PRODUCTIVITY AT WORK: A QUALITATIVE STUDY AMONG KNOWLEDGE WORKERS IN A SOUTH AFRICAN SOFTWARE DEVELOPMENT COMPANY

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DATE

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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Action Research</td>
<td>Action research is a method that is used to improve a situation. It is cyclical and involves planning, action, evaluation, and critical reflection. Changes are implemented based on the research results or evidence that was collected.</td>
</tr>
<tr>
<td>Affinity Diagram Interrelationship Digraph (ADID)</td>
<td>A diagram that illustrates cause and effect in a complex situation between grouped or categories of concepts.</td>
</tr>
<tr>
<td>Archetype of Eroding Goals</td>
<td>The archetype is a pattern of behaviour that creates a downward spiral of performance. It occurs when there is a gap between the goal and in performance. Instead of taking actions to improve the conditions to meet the goal, the goal is decreased, where typically standards are relaxed to make it easier to reach the goal</td>
</tr>
<tr>
<td>CATWOE</td>
<td>CATWOE is a pneumonic and was defined by Checkland as part of soft systems methodology. It is used to formulate a root definition that is a structured definition of the system. The C = customers, A = actors or agents, T = Transformation of the process, W = Weltanschauung or world-view, O = owners and E = environment. The CATWOE and is typically used to form a root definition that is constructed as: A system owned by O to do W by A by means of T given the constraints of E in order to achieve X for C</td>
</tr>
<tr>
<td>Causal Loop Diagram (CLD)</td>
<td>A model that visually illustrates how different variables in a system are interrelated. The model consists of nodes that represent core variables. The links between nodes represents how the core variables change if a change is made to one. A positive causal link means the two core variables either increases or decreases. A negative causal link means that they change in opposite directions, i.e. an increase in one core variable will result in a decrease in the associated core variable and vice versa. The core variables are connected to form a cycle or a loop.</td>
</tr>
<tr>
<td>Term</td>
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<tr>
<td>Cultural Historical Activity Theory (CHAT)</td>
<td>It is a framework to understand and analyse the relationship between what people think and feel and what they actually do. The key ideas are that:</td>
</tr>
<tr>
<td></td>
<td>1) humans act collectively, learn by doing, and communicate in and via their actions; 2) humans make, employ, and adapt tools of all kinds to learn and communicate; and 3) community is central to the process of making and interpreting meaning (Foot, 2014)</td>
</tr>
<tr>
<td>Chillisoft Practices</td>
<td>Includes Chillisoft technical practices such as scrum, continuous integration 5S and Chillisoft’s Focus Practices.</td>
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<tr>
<td>Deliberate Practice</td>
<td>A compulsory company-wide practice that caters for deliberately planned activities to foster collaboration and learning.</td>
</tr>
<tr>
<td>Focus Time</td>
<td>A practice that is followed in a block of uninterrupted time, that allows an individual to do complex tasks. The practice that teaches physical, mental and goal preparation, task execution and reflection. It also teaches individuals about noticing distractions and interruptions.</td>
</tr>
<tr>
<td>Focus Practices</td>
<td>A range of supportive and complementary focus practices that includes Focus Time, Deliberate Practice, Pairing and yoga to support the staff, so that they are able to concentrate better.</td>
</tr>
<tr>
<td>Framework of Ideas</td>
<td>An initial set of ideas or theories that a researcher has prior to commencing research that are untested.</td>
</tr>
<tr>
<td>Interpretivist Paradigm</td>
<td>A research paradigm that assumes that the world and knowledge is created by a social or contextual setting. It entails understanding a person’s unique world-view and uses qualitative methods</td>
</tr>
<tr>
<td>Invisible Factors (that influence knowledge worker productivity)</td>
<td>Factors that are intangible such as such as trust, drive, alignment of purpose, challenge, peer recognition and several other factors that are collectively referred to as “soft issues”, that are difficult to measure. These invisible factors are undefined and shape the pace and process of doing knowledge work</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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</tr>
<tr>
<td>Knowledge work (as an activity)</td>
<td>Tasks such as creating information and knowledge, finding, developing and using knowledge. (Davenport, 2005, p. 28).</td>
</tr>
<tr>
<td>Knowledge work (as a noun)</td>
<td>Work products that are a result of doing knowledge work activities (Perotti, Wall, &amp; McLaughlin, 2010)</td>
</tr>
<tr>
<td>Knowledge work practice</td>
<td>A set of deliberate organised activities that encourages thinking and performing knowledge work activities.</td>
</tr>
<tr>
<td>Knowledge worker productivity</td>
<td>The production of knowledge artefacts, where the primary activity is cognitive processing. Quality and output are equally important.</td>
</tr>
<tr>
<td>Pairing</td>
<td>An optional shared practice where two individuals jointly work to complete a task</td>
</tr>
<tr>
<td>Phronesis</td>
<td>Phronesis is the study of social science with a modern interpretation of the Greek concept of Phronesis, where we regard phronesis as practical wisdom.</td>
</tr>
<tr>
<td>Psychological Contract</td>
<td>Refers to an employee’s perception of the relationship between him or herself and his or her employers. It is about perceived fairness about how he or she is treated by the employer considering what he or she puts into his or her job.</td>
</tr>
<tr>
<td>Shifting the Burden Archetype</td>
<td>It is a pattern of behaviour where the symptom is treated because finding and addressing the root cause is more difficult to do. Because the solution addressed the symptom the problem creates the symptom again, or it may manifest as a different symptom or side effect. The problem remains until a fundamental solution is applied.</td>
</tr>
<tr>
<td>Team Lead</td>
<td>A senior software developer who manages a team of a maximum of seven individuals and who is also accountable for software development.</td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

Completing this paper is the highlight of an extraordinary two year “journey of life”, which had the elements of shock, tragedy, birth, renewal, inconceivable joy and dogged perseverance. The experience and life lessons have been invaluable, unexpected and have taught me resilience, how to “dig deep” and how to live in the moment.

I would like to thank my family and Chillisoft for their belief in my strength, providing me with the opportunity to study and their unwavering support. I am especially grateful to my mum Mrs Premilla Rampersadh, who cooked, fed and nurtured me throughout this journey and my darling Kevin Bosman, who was my pillar of strength, love and fortitude. To all of my wonderful friends at Chillisoft, thank you for engaging so willingly, openly and inquisitively. Thank you, Jenny McDonogh, for your constructive and encouraging feedback. Finally, to Tamieka Kalina, my exquisite baby girl, thank you for reminding me what life is all about….nothing gives me greater pleasure than anticipating the free time that I now have, to be with you.
ABSTRACT

Since the passing of the information age and the rise of the conceptual age, knowledge creation, innovation and knowledge worker productivity has never been more important than now, as companies strive for innovative and creative solutions to solve complex problems. Knowledge worker productivity is increasingly featured on the management agenda, yet there is still little understanding of what drives knowledge worker productivity, and what the silent or invisible factors are that can either destroy or encourage knowledge worker productivity. However, there are organisations that are seemingly more sensitised to the growing problem of how to manage knowledge worker productivity. The software industry is typically viewed as being sensitised to the issues of knowledge worker productivity, due to their nature of knowledge creation work and the adoption of practices such as Agile.

The research documented in this paper analysed the software development company Chillisoft. Chillisoft is an organisation where knowledge work is at the core of our services and products as we assist companies with salvaging their failed or failing software projects. Knowledge worker productivity has become of vital importance, as we seek to optimise and leverage our development team across many industry sectors, competing globally, in a landscape of rapidly changing software and hardware technologies. Chillisoft has experimented with focus practices and socialised practices that are dependent on numerous invisible or intangible factors, such as trust, drive, alignment of purpose, and task challenge. These invisible factors, although undefined, shape the pace and process of doing knowledge work. To be able to increase productivity it is imperative that we begin to understand the influence that these invisible and intangible factors have on knowledge worker productivity.

This study investigates the relevant and persistent problem of understanding what invisible factors affect knowledge worker productivity. It also seeks to understand how these factors interact to impact knowledge worker productivity. My dissertation seeks to explore a single case study of Chillisoft. The objective of the research and the dissertation is to add practical knowledge that will equip any manager with a better understanding of knowledge worker productivity.
The study’s methodology is based on a Phronesis approach, with an action research focus. I have used Charmaz’s grounded theory to collect and analyse data via propositions about my observations. My research consisted of interviewing and observing a mixed sample of knowledge workers who ranged in age, roles, seniority and skill levels. I also conducted two surveys with the Chillisoft team. The action research approach consisted of two cycles of planning, doing, reflecting and taking action, where the findings of cycle one were used to plan cycle two. I used Flyvbjerg’s four questions to weave in a phronesis focus during the reflection phase of each action research cycle. The propositions were categorised and modelled to produce a causal loop model that illustrated the context, mechanism and outcome.

The results indicated that stakeholder perspectives on knowledge worker productivity could be grouped according to the roles that they performed, such as Production Developer, Product Developer and Team Lead. There appeared to be challenges with the perception of productivity in dual roles such as those performed by Team leads. The practice of Focus Time without considering the productivity levels of these roles and the extent of collaboration that is required appeared to be problematic. For example, a survey on Hertzberg’s two factor theory of hygiene and motivating factors indicated that the selected motivating factors are largely related to achievement, the work itself and responsibility. The hygiene factors that were selected are largely classified as interpersonal relations and working conditions.

A survey on knowledge worker productivity factors indicated that both management and the team had common needs, in that both groups chose the three most significant factors as “Shared vision and purpose”, “Learning” and “Trust”. The underlying causal loop mechanism is similar to the archetype of Shifting the Burden, where the problem of improving knowledge worker productivity was solved by applying a symptomatic solution, such as implementing more structured and tangible production practices and metrics. In this case applying a symptomatic solution was temporarily more effective than implementing a fundamental solution that is difficult to adopt and takes longer to implement. The ‘impact level’ of organisation design and culture was identified as a key driver (in the causal loop model) that is triggered by the implementation of both the symptomatic and fundamental solution.

My research contributes to a growing body of knowledge by highlighting a practical situation that is common in software development, where product innovation occurs in parallel with
software production. My research describes a practical reality of Team Leads who are coaches and players, and who practice the common management approach of introducing metrics to manage growth and workloads. The existing literature alludes to autonomy, which builds trust and influences motivation and commitment, and in turn affects performance, but it does not provide practical examples of these interactions. My research provides evidence and a practical understanding of how changes to a strong culture impacts the extent of a shared social identity, and the levels of autonomy and agency. It also highlighted what the invisible factors are, that are at play in organisations with a strong group culture, strong process controls (that are typical of Agile Methodology) and an internal focus on high performance.

The study concludes by recommending further investigations into the Focus Time practice, investigating metrics to measure trust, and additional research to link models of culture to Davenport’s model of collaboration.

Key words: Soft issues, collaboration, Focus Practice, Knowledge worker productivity, culture and organisational design, motivation, trust, autonomy, work enjoyment, socialisation practices
1. CHAPTER 1: INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION

Drucker, the self-described “social ecologist”, and famous management theorist is known for stating that “the single greatest challenge facing managers in the developed countries of the world is to raise the productivity of knowledge and service workers” (Drucker, 1999, p. 2). He coined the phrase “knowledge worker” in the 1950’s and since then spent the rest of his life describing and theorising about an age (that we are experiencing now) where people use their brains more than doing manual work. Drucker stated that raising the productivity of knowledge workers “will dominate the management agenda for several decades, will ultimately determine the competitive performance of companies” (Drucker, 1991, p. 2). Today knowledge worker productivity is an urgent issue. There is a growing body of literature on knowledge work topics. However, there still remains scarce literature on how to practically manage knowledge worker productivity. What intangible factors does a manager encounter and can shape to influence knowledge worker productivity?

This dissertation seeks to explore a single case study with the objective of adding practical knowledge that will equip managers with the information required to better manage knowledge worker productivity.

This chapter provides a rich background that contextualises the reasons why knowledge work productivity is a critical issue. The chapter describes the background, the situation, concern and the research question. Its purpose is to provide a background to the research question and why this research is important to Chillisoft.

1.2 BACKGROUND

Knowledge worker productivity is a pressing concern, because it is becoming less viable for companies to recover the rising costs of material, labour and resources by increasing prices or by eliminating costs (Ramírez & Nembhard, 2004). Companies have to compete by adding value to services and products, which is dependent on knowledge work, confirming Drucker’s statement (Drucker, 1999) that “The
challenge today is not to increase manual worker’s productivity but to measure and increase knowledge workers productivity.” Even though knowledge work was coined in 1959, little progress has been made in measuring knowledge work productivity. As Ramírez and Nembhard have stated, “currently there are no universally accepted methods to measure knowledge worker productivity” (Ramírez & Nembhard, 2004, p. 602) An accepted metric or method of measuring knowledge worker productivity will make it easier to manage and improve productivity.

1.3 THE SITUATION

I am the Chief Executive Officer (CEO) of a software development company, called Chillisoft. Its core business is custom software development for the local and international market. We are a small team of thirty software professionals (consisting of developers, analysts, testers and UX designers). Since we have limited capacity, it is critical that we are highly productive to compete in the market place. As a result, Chillisoft’s operating model focuses on operational excellence grounded in lean practices, high levels of productivity and quality. Despite operational excellence being focused on high levels of productivity, it is still difficult to measure knowledge worker productivity. In spite of the difficulty, it remains critical for most businesses, including Chillisoft to measure and improve knowledge worker productivity. Consequently, as a step towards achieving these goals, Chillisoft has invested a large amount of time in understanding knowledge work productivity.

As management of Chillisoft, we have observed that productivity is linked to the working environment and context and have continually strived to understand and improve our knowledge of worker practices. Accordingly, we developed a set of social practices and etiquette that is embedded in Chillisoft’s strong, and now established company culture. We recognise that it is critical that knowledge workers have autonomy, purpose, mastery, and are continually learning. We instituted a range of supportive and complementary Focus practices that includes Focus Time, Deliberate Practice, Pairing and yoga to support the staff.
Focus Time is a practice that was introduced by Chillisoft and occurs for two hours twice a day from Tuesday to Thursday and once a day on Mondays and Fridays. The practice is adopted as a company-wide practice and is implemented so that “deep thinking” or knowledge work can occur without any interruptions from the organisation. The practice is subject to a set of rules (refer to Appendix A1).

Focus Time accounts for 46% of the production week and allows individuals to do deep thinking and to be productive during working hours. We assist our team with the practice of Focus Time by implementing and using our software product that provides feedback to the user on the amount of time that he or she has spent in value adding activities, whilst subtly teaching the user about how to focus their attention.

Deliberate practice is a company-wide practice that occurs on Mondays and Fridays. The practice is designed so that employees collaborate, learn and share ideas as they work on learning goals. Deliberate Practice accounts for 15 percent of the production week and caters for deliberately planned activities to foster collaboration and learning.

Pairing is an optional shared practice where two individuals jointly work to complete a task. It is a collaborative practice that is advocated to increase the quality of the output, since it involves joint problem solving and seeking of better ways to craft solutions. Pairing occurs at any time of the day including Focus Time.

Chillisoft’s management is therefore aware of and sensitised to knowledge worker productivity. Our investment and focus on knowledge worker productivity continues to be significant, as is illustrated by Figures 1 and 2. It must be noted that pairing is not reflected in the Figures below, because it is optional and the percentages will therefore vary.
Understanding the influence of invisible factors on knowledge worker productivity

Figure 1: Illustrating Chillisoft focus practices scheduled during the production week

Figure 2: Illustrating the % of investment in time of focus practices (deliberate practice, focus time and yoga) compared to remaining production time.
In the last four months, Chillisoft was managed by the operations director whilst I was on maternity leave. In an attempt to spread the accountability and workload in my absence, we defined and designed a new management structure where our Team Leads assume more managerial tasks. The test phase of this structure was implemented during my absence. On returning to work, I have observed focused activity and delivery amidst high levels of stress. Curiously, and at odds with the focused activity, I have noticed a general feeling of complacency, where focus practices have become part of the landscape and don’t seem to be having the desired effect of driving productivity or improvements in practice. I have also heard murmurings from new employees of not seeing the benefits of our Focus Time practices and of not understanding why we have these practices. As a manager I am aware that the seemingly negative mood can decrease performance and render teams dysfunctional (Denning, 2012) and therefore I want to find out the cause for the shift in the mood. I am surprised, and at the same time alarmed, because Chillisoft is currently developing a product that encapsulates our productivity practices and our philosophy of self-mastery.

The situation is illustrated in Figure 3. The rich picture describes the situation prior to and after my leave. The operations director (who is the customer) worked with me, prior to me going on leave to translate our strategy and our current business maturity into a new management structure where more accountability was delegated to team leads. Since I have returned from leave, there is a lot of stress that appears to be caused by the external environmental pressures of filling the sales pipeline in a recession, satisfying and maintaining customer satisfaction and the threat of competitors. Internally there appears to be stress due to high workloads. The rich picture illustrates the world-views of the key actors and the conflict between actors.
We need to implement a structure that lightens the workload while I am away. I don't see the point of Focus. Do we have to practice it?

New employee: What's happening? Chillisoft and the level of focus does not feel right!

Focus is fine. What do you mean? The team is fully loaded and we are busy producing.

I don't see the point of Focus Time...do we have to practice it?

This is great. I can implement this whilst you are on leave.

Copyright UCT
1.4 THE SITUATION OF CONCERN

I am alarmed because the investment so far in our practices and the product is massive and I am anxious that we may have been incorrect in our assumptions about what leads to greater knowledge worker productivity. I am faced with making a decision to either abandon or continue with our practices and the product. Practically, any change from our stance of self-mastery, craftsmanship and operational excellence, may cause upheaval, mistrust and perceptions of in-authenticity where there is a discrepancy between what we advocate and what we practice. If I abandon our practices, it may mean that we have to revisit our values and identity or that I need to modify the existing practices. If I keep the status quo, and continue with developing our product, we may be losing money without realising potential productivity benefits and we risk producing a product that is based on organising practices that don’t work or that are not sustainable.

To date Chillisoft has focused on shaping the context of work by instituting shared practices to govern behaviour. The socialized practices are dependent on numerous factors that are invisible or intangible. These factors are termed “invisible factors” and encapsulate factors such as trust, drive, alignment of purpose, challenge, peer recognition and several other factors that are collectively referred to as “soft issues” and that are difficult to measure. These invisible factors are undefined and shape the pace and process of doing knowledge work. I recognise that these factors seem to have
a significant effect on an individual’s productivity, however I am unaware of which factors are significant. I am also unaware of the underlying mechanism of how they affect productivity.

1.5 MY GOALS AND THE RESEARCH QUESTION

My research question stems from my personal, practical and intellectual goals that reflect my reality. My personal goal is to articulate and make sense of my experience as a manager of knowledge workers and as a knowledge worker myself. I want to understand the challenge of knowledge work practices and productivity at a deeper level.

Practically, I want to bridge the gap in the market between the need for certainty and the need for loosely coupled knowledge worker practices, so that I can expand the company’s offering as a consultancy practice. Presently, there is a gap between the existing productivity solutions and practices. The practices are algorithmic and appeal to managers even though they don’t work. My experience has indicated that managers are looking for sustainable solutions. I believe these solutions should be coupled to knowledge worker practices that are structured in such a way as to provide the degree of certainty that managers need, since this is their existing mindset.

Intellectually, I need to understand and develop a metric for knowledge work productivity factors that will appeal to managers who advocate a scientific management approach. Consequently, my research goal is to understand how managing the context of invisible factors drives the productivity of knowledge workers. My research goal is essential and is a prerequisite to being able to achieve my intellectual goal of understanding and developing a composite metric for knowledge work productivity factors.

My research questions are, “What invisible factors influence knowledge worker productivity at work?” and “How do these invisible factors interact to influence knowledge worker productivity?” Once I am able to understand the results of these questions, I then have the required information to pursue my intellectual goal in separate research.
The sub goals are to:

1. Understand the perspectives and definitions of:
   a. Knowledge work,
   b. Knowledge worker,
   c. Knowledge worker productivity, and
   d. Knowledge work practices and the important factors that shape it.
2. Identify key factors that drive the levels of knowledge worker productivity that are considered important to both knowledge workers and their managers.
3. Understand and theorise about the possible mechanism that impacts knowledge worker productivity.

1.6 RELEVANCE OF RESEARCH QUESTION

The issue of knowledge worker productivity is a known problem and there is significant literature on the need to improve productivity and on managing the context within which knowledge work occurs (Davenport, Jarvenpaa, & Beers, 1996; Drucker, 1991; Ramírez & Nemphard, 2004). In the corporate world, according to Efimova (2004), it also appears that:

> No one seems to own the problem of knowledge-worker performance (Davenport, Thomas, & Cantrell, 2002):25, resulting in the lack of attention to improving productivity of an individual knowledge worker. When it comes to knowledge workers, we pretty much hire smart people and leave them alone. No quality measurements, no Six Sigma, no reengineering. We haven't formally examined the flow of work, we have no benchmarks, and there is no accountability for the cost and time these activities consume. As a result, we have little sense of whether they could do better. (Davenport, 2003)(Efimova, 2004).

Numerous researchers over the years have searched for a metric to measure knowledge work productivity. The research suggests that, although there are metrics that be can be applied to manufacturing and service-based organisations, these metrics (such as calls per week) are inappropriate for knowledge intensive companies, including software development companies. It is also generally believed that knowledge work
is so diverse, because it occurs in numerous sectors, specialisations and skill levels that it is impossible to define a single generic metric to measure productivity. However, there are factors “to measure the degree to which the conditions propagate great knowledge worker performance (“Measuring knowledge worker productivity - AWA,” n.d.).

It is my experience that software development companies are aware of the need for knowledge worker productivity and that they attempt various initiatives to ameliorate and increase productivity. These could include minimising disruptions, promoting knowledge work management, introducing collaboration tools, and establishing workplace settings that are designed for knowledge work. However, even though these companies are sensitised to the need, there is still an absence of an overarching practice that allows knowledge workers to be consistently productive at work during working hours. There is a need in “sensitised” organisations for a practice to acknowledge and manage the invisible factors that are associated with knowledge worker productivity or that “propagate great knowledge worker performance” (“Measuring knowledge worker productivity - AWA,” n.d.).

The research questions are therefore relevant to companies who are aware of the need for knowledge worker productivity or companies who have started to implement interventions that are conducive to knowledge work. There is a core need to understand how knowledge worker productivity is influenced in an environment that is sensitive to the need for knowledge worker productivity.

The objective of this paper is to contribute to the existing body of knowledge by presenting a case study of a software development company that explores the significant factors that impact knowledge worker productivity.

1.7 Conclusion

This chapter described the background of the topic of knowledge work, the situation, concern and research goals. It set the theoretical context and personal background behind knowledge work productivity and why an in-depth understanding of
influencing factors, and their measurement, is important and relevant today. It posed the two research questions “What invisible factors influence knowledge worker productivity at work?” and “How do the invisible factors interact to influence knowledge worker productivity?” The chapter provided a background of why knowledge work productivity and measurement is important and relevant today. The chapter explained how personal experience and a productivity and cultural challenge at work has emphasised the critical importance of understanding how managing the context of invisible factors drives knowledge worker productivity. The next chapter describes an overview of the literature that is relevant to knowledge work and to this research paper.
2. Chapter 2: Framework of Ideas and Literature Review

2.1 Introduction

Chapter one provided a background of why knowledge work is an issue today. It also defined and contextualised my research questions of “What invisible factors influence knowledge worker productivity, at work?” and “How do the invisible factors interact to influence knowledge worker productivity?”

In this chapter I discuss my framework of ideas and the literature that is relevant to my research. I discuss the literature at three levels of abstraction, namely the parent discipline of knowledge work, the problem context and the core variables to manage the invisible factors of knowledge worker productivity. The theoretical framework and process for my literature research is described in Appendix A2.

I have included my framework of ideas in the literature review because it is essential to provide a context of the problem and it has influenced my understanding of the topic and has therefore influenced my research. I have used a CHAT framework to describe the social interaction which is one of the elements of my Framework of understanding.

2.2 Framework of Ideas

I have been interested in researching knowledge worker productivity for the last two years because it is part of my duties as CEO at Chillisoft. I began researching knowledge worker productivity because it is essential to Chillisoft that we implement practices and an environment that is conducive to our software development team’s productivity.

At the outset of this research I was conversant with Drucker’s views about knowledge work and knowledge worker productivity and the reasons as to why managing attention and self-regulation are important. I observed and believe (from my experience as a knowledge worker myself) that knowledge work is a social practice. These ideas form my preliminary framework of ideas, which allowed me to shape and
be conversant with the topics that I chose to investigate in my preliminary research. Although I have a framework of ideas, I only commenced my full literature review after the classification of grounded theory categories, to limit researcher bias. This approach conforms to Charmaz’s viewpoints of grounded theory and the prerequisite condition in Action Research, where it is essential to declare your Framework of Ideas in advance, to retain your intellectual bearings in a changing situation (Checkland, P.; Holwell, 1998). I will discuss my research methodology in Chapter 3.

I declare upfront that I believe that knowledge workers differ from other workers because:

- The work is less standardised when the scope of inquiry and the exact tasks that are required to achieve the goal, are fuzzy.
- It is difficult to know if and when knowledge workers are working
- Knowledge workers own the rate of productivity because knowledge work is dependent on their thinking abilities
- Knowledge workers require autonomy and want to enjoy their jobs.

I am making the assumption that Chillisoft is an organisation who supports knowledge work and is sensitive to the issue of knowledge worker productivity.

The constituent elements of my framework of ideas consists of Drucker’s Productivity Theory, recognition that regulating attention is critical for productivity, that Focus Time is an essential productivity practice and that the act of producing knowledge is a social practice, that impacts productivity. I have used the CHAT model to illustrate and describe the social tensions that exists within the social practice of knowledge work.

**2.2.1 DRUCKER’S PRODUCTIVITY THEORY**

I understand knowledge work to be thinking work as knowledge workers are individuals who think for a living and they are not primarily engaged in manual labour. My understanding of knowledge work emerged out of Drucker’s Productivity Theory in which he stated that the following significant factors influence productivity:

1. Establishing what is the task, where knowledge workers must understand what is task before acting.
2. Self-management and autonomy, where it is critical that knowledge workers understand that they control the pace of productivity and are responsible for their productivity. It is also essential that they understand that they have to manage themselves and that they must have autonomy.

3. A commitment to continuously innovating, where innovation is part of their work and responsibilities.

4. A commitment to continually learn, where knowledge workers learn by learning from others and by teaching.

5. Understanding that quality is essential for productivity, where productivity is not viewed as only a producing quantity.

6. Treating knowledge workers as "assets" instead of "costs", because knowledge workers can choose where they want to work (Drucker, 1999).

2.2.2 REGULATING ATTENTION

Drucker advocated self-management because knowledge workers are responsible for their own pace of productivity. Noticing and managing how we pay attention is a foundational practice for self-management. According to Hunter and Scherer, attention determines how we process experiences and how well we perform, “the first step towards self-awareness, self-control, self-transformation, and connection with others is to master attention. Attention is fundamental” (Hunter & Scherer, 2009, p. 4). Therefore if self-management is essential for knowledge worker productivity and regulating attention is essential for self-management it can be concluded that attention regulation is an essential practice for knowledge worker productivity.

2.2.3 FOCUS TIME

We at Chillisoft believe that attention regulation is critical to knowledge worker productivity. Focus Time was designed to enhance an individual’s awareness to what and how he or she pays attention to during the process of working. It was designed to create space in the work day so that individuals can focus deeply for ninety minutes without being interrupted whilst becoming better at mastering their skills. Chillisoft recruits and retains employees who are intrinsically motivated, therefore Focus Time is designed for intrinsically motivated employees and it appeals to Maslow’s self-fulfilment, recognition and social needs (as illustrated in Figure 4).
Figure 4: Maslow's hierarchy of needs and motivation theory
Last referenced from https://culcokerekeb.wordpress.com/category/uncategorized/, 29 October 2015

We have structured Focus Time as a compulsory company-wide practice with specific rules and behaviour, to encourage self-determination theory (“Theory - selfdeterminationtheory.org,” n.d.), which assumes that people need to feel competence (a feeling that they have gained mastery of skills), connection (feeling a sense of belonging), and autonomy (feeling they are in control of their own behaviours and goals to achieve psychological growth). Focus Time is a practice that teaches physical, mental and goal preparation, task execution and reflection. It also teaches individuals about noticing distractions and interruptions. The practice is facilitated by a software product that tracks where and how individuals spend their time, providing feedback on time that is spent on value-added activities and unproductive activities. It also provides feedback on goal attainment. The practice is designed to encourage the action reflection learning cycle whilst educating individuals on how to focus their attention.
2.2.4 The CHAT model of social practice

I argue that knowledge work is a social practice based on my observations of and participation as a knowledge worker myself. This belief is supported by Kelloway who notes that:

*The establishment of a user community or affinity groups is increasingly recognised as an important part of knowledge management in organisations (Nonaka, 1991b). There is increasing evidence that increasing such social interactions will impact on both individual and organisational performance’* (Kelloway & Barling, 2000, p. 12).

I have chosen to use the CHAT model (i.e. Cultural Historical Activity Theory model that is a framework and is described in the Methodology section) to describe the social interactions, because Foot maintains that CHAT is a “robust framework for analysing professional work practices” (Foot, 2014, p. 2), and because Foot also maintains that the CHAT model describes a social system where the “activity centres on human collectives rather than individuals. It involves people operating jointly in a persistent system of relationships” (Foot, 2014, p. 9).

Two CHAT models are provided to describe the social interaction. Figure 5 describes a generic social interaction that is represented by a CHAT model and Figure 6 describes the social interaction in Chillisoft.
Figure 5: CHAT model of knowledge work as a social practice
In the CHAT model illustrated in Figure 5, the subject is a knowledge worker who is producing knowledge. The knowledge worker is situated in a community of co-workers where the work is produced by a team. There are internal social tensions and contradictions between the elements of the CHAT model that are in a constant state of flux, where the contradictions manifest as problems, breakdowns, and conflict. The contradictions are opportunities for development and growth.

Typical examples of the tensions between the elements are briefly described in Table 1.

Table 1: Examples of tensions that are typically found in the software development environment

<table>
<thead>
<tr>
<th>Tensions</th>
<th>Between nodes</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>subject and the object</td>
<td>• individual’s awareness of implicit knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• his or her ability to be in tune with body reactions such as intuition and gut feel</td>
</tr>
<tr>
<td>B</td>
<td>knowledge worker and the rules</td>
<td>• rules about learning and sharing of knowledge</td>
</tr>
<tr>
<td>C</td>
<td>rules and knowledge that is produced</td>
<td>rules that governs:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• how the team collaborates or focuses on a problem</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the quality of the knowledge that is produced.</td>
</tr>
<tr>
<td>D</td>
<td>knowledge worker and team</td>
<td>• Trust that impacts ability to create and to work together</td>
</tr>
<tr>
<td>E</td>
<td>team and the rest of their co-workers</td>
<td>• competitiveness in the company</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• culture</td>
</tr>
<tr>
<td>F</td>
<td>Rules and team</td>
<td>• rules such as sharing of knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the awarding of bonuses and incentives for work</td>
</tr>
<tr>
<td>G</td>
<td>Knowledge worker and his/her tools</td>
<td>• Effectiveness of tools impacts productivity</td>
</tr>
</tbody>
</table>
An instantiation of the CHAT model is the production of knowledge work at Chillisoft specifically. The CHAT model that is applicable to Chillisoft is described below in Figure 6.
Figure 6: CHAT Model of Chillisoft
In summary, the constituent elements of my Framework of ideas consists of Drucker’s Productivity theory, specifically his observation that regulating attention is critical for productivity; the CHAT model which recognises that the act of producing knowledge is a social practice that impacts productivity; and recognition that Focus Time is an essential productivity practice.

2.3 LITERATURE REVIEW

The purpose of a literature review is to provide a synthesis of the literature that is relevant to the area of study. The literature review which is described in this section is structured in three levels, namely the parent discipline, the research question that describes the key aspects of what to solve, and the core variables of the grounded theory process. These variables are involved in interactions that describes how to solve the problem.

2.3.1 PARENT DISCIPLINE: MANAGING KNOWLEDGE WORK AS A CONTINUUM

Today, it is widely accepted that the world that we live and work in, and our concept of knowledge work has changed drastically since the Industrial Revolution. The Industrial revolution heralded the productivity revolution, in which Taylor’s scientific management demystified the craft and tacit knowledge of knowledge work. The concept of knowledge work changed as it converted experience into knowledge, apprenticeship into methodology and doing into applied knowledge.

Today, knowledge work is viewed in a more objective manner, where we regard knowledge workers as assets or investors, who add value to the company via their knowledge work contributions. This raises the question of what is knowledge work and what activities constitute knowledge work? I have summarised the popular definitions of knowledge work and activities that typically constitute knowledge work in the sections below.

2.3.1.1 DEFINITIONS OF KNOWLEDGE WORK

Knowledge work is a term that was first coined by Peter Drucker in 1959, in his book, *The Age of Discontinuity*. 
Since Drucker’s definition, knowledge work is associated with occupations that require higher education and training, or work that requires knowledge that is acquired through formal education (Ramírez & Nembhard, 2004). This promotes an elitist perspective separating thinking from doing, and is regarded as a spill-over consequence of Taylorism.

Knowledge work is most frequently defined in terms of professional occupations such as “scientists, engineers, professors, attorneys, physicians and accountants” (Kelloway & Barling, 2000, p. 289). The other key perspective, is that a definition that focuses on professions only caters for professional status and rank and it is based in the past. It only focuses on what has been done and does not focus on what is actually being done.

2.3.1.2 Activities that constitute knowledge work

If we all engage in knowledge work, what categories or types of activities (i.e. cognitive and tacit) constitute knowledge work? Table 2, summarises the prevalent perspectives what constitutes knowledge work activities.

Table 2: The various perspectives of knowledge workers based on knowledge work activity classifications.

<table>
<thead>
<tr>
<th>Authors who defined knowledge work</th>
<th>Key classifications of knowledge work</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davenport</td>
<td>• Finding existing knowledge&lt;br&gt;• Creating new knowledge&lt;br&gt;• Packaging existing knowledge for understanding&lt;br&gt;• Applying knowledge to a process or problem</td>
<td>(Davenport, 1996)</td>
</tr>
<tr>
<td>Ruggles</td>
<td>• Generating new knowledge&lt;br&gt;• Accessing valuable knowledge from outside sources</td>
<td>(Ruggles, 1997)</td>
</tr>
</tbody>
</table>
- Using accessible knowledge in decision making
- Embedding knowledge in process, product or services
- Representing knowledge in documents etc.
- Facilitating knowledge growth
- Transferring existing knowledge into other parts of an organisation
- Measuring knowledge assets

**Nonaka et al**

- Socialisation: transmission of tacit knowledge between individuals e.g. apprenticeship programs, pairing
- Combination: transmission of explicit knowledge e.g. teaching
- Articulation: conversion of tacit knowledge to explicit knowledge.
- Internalisation: Conversion of explicit knowledge to tacit knowledge.

(McLean, 2004)

**Dove**

- Dove classifies knowledge workers as knowledge creators, potable knowledge workers and specialty type knowledge workers.
- Knowledge creators create knowledge work based on innovation, where individuals:
  
  *Are not doing a pre-established task. Instead they define and perform their task for the very first time. They create tools that will be useful for other knowledge workers to do their job* (Ramírez & Nembhard, 2004, p. 605).
Knowledge work continues to be discussed and defined extensively throughout literature, however, there is still no common definition of knowledge work. Today there is a shift in thinking, moving away from categorising knowledge work towards an understanding that knowledge work exists in almost all jobs in an organisation.

Kelloway proposes that knowledge work is a continuum and is not limited to specific categories. It is best understood as a “dimension of work” (Kelloway & Barling, 2000, p. 5). This perspective resonates with the business world, where it is acknowledged that in today’s world of complexity, we are all knowledge workers, in varying degrees.

<table>
<thead>
<tr>
<th>Understanding the influence of invisible factors on knowledge worker productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Portable knowledge work</strong>, where knowledge is applied so that can be re-used.</td>
</tr>
<tr>
<td><strong>Specialty knowledge work</strong>, is niche work that has high utility. These individuals have a “specific knowledge that is needed to perform a task and are considered experts at what they do” (Ramírez &amp; Nembhard, 2004, p. 604).</td>
</tr>
<tr>
<td><strong>Knowledge work</strong> is discretionary behavior and consists of creating, applying, transmitting and acquiring knowledge.</td>
</tr>
<tr>
<td><strong>Individuals</strong> engage in knowledge work depending on their access opportunity, ability and motivation.</td>
</tr>
<tr>
<td><strong>It is preferable to refer work characteristics rather than at professions</strong></td>
</tr>
<tr>
<td><strong>Knowledge work must entail a high level of expertise, education and or experience.</strong></td>
</tr>
<tr>
<td><strong>Knowledge workers should be researched in their separate professional categories and not be viewed generally.</strong></td>
</tr>
</tbody>
</table>

(Kelloway & Barling, 2000) | (Pot & Smulders, 2012)
A Harvard Business Review article succinctly advocates this shift in thinking as early as 2010:

*Perhaps the single greatest lesson from Japanese auto manufacturers is that all employees are ultimately knowledge workers and that the role of the firm is to both encourage and support problem-solving by all employees* (Hagel, Brown, Lang, 2010).

I believe that this perspective, (based on my own experiences in innovation, managing a software development company and in managing talent) will result in the greatest contributions towards knowledge worker productivity. I have adopted this perspective of knowledge work for this research paper.

### 2.3.2 Problem Context: What Factors Affect Knowledge Worker Productivity?

The previous section described why it is important to manage knowledge worker productivity as a continuum and it summarised the popular definitions and activities of knowledge work. In this section I wanted to understand how productivity is measured and what factors affect productivity.

Ramírez and Nembhard state that there is an “absence of accepted methods to measure knowledge worker productivity” (Ramírez & Nembhard, 2004, p. 604). They conclude that in approximately sixty years of literature that they examined, there is “no single method that covers all productivity dimensions” (Ramírez & Nembhard, 2004, p. 605). However, specific productivity dimensions can be identified by the frequency with which they are used in methodologies. In the absence of a common knowledge worker metric or method, I have focused on the popular productivity dimensions productivity methods that were described by Ramírez and Nembhard. The section below also describes factors that are relevant to knowledge worker productivity.
2.3.2.1 Knowledge Worker Productivity Dimensions

The thirteen most common productivity dimensions are as follows:

- **Quantity** accounts for quantities and outcomes (which is the quantification of qualitative variables such as customer satisfaction)
- **Costs and or Profitability**
- **Timeliness**
- **Autonomy**
- **Efficiency** i.e. doing things right
- **Quality**
- **Effectiveness**: doing the right things
- **Customer Satisfaction**
- **Innovation /Creativity**
- **Project success**
- **Responsibility/importance of work** – accounts for the importance of performing well at critical times
- **Knowledge worker’s perception of productivity** accounts for the possible misinterpretations of other standard factors
- **Absenteeism** (Ramírez & Nembhard, 2004, pp. 617–618)

The most popular dimensions were quantity, cost and timeliness. Although quality is often mentioned synonymously with knowledge work, it was only included 21% in methodologies.

2.3.2.2 Productivity Methods

There are numerous productivity methods. I have limited the research to methods that are used in the software development industry.

Knowledge worker productivity methods includes Function Point Analysis (FPA) that was popular in software development and was used to estimate the size and complexity of code. Bok and Raman define FPA as a “simple measure of points delivered per person per day” (Ramírez & Nembhard, 2004, p. 608), and is a good relative base line to measure productivity. This technique is used in agile techniques to estimate the
complexity of software and is used to predict and monitor the number of points delivered.

A popular productivity method is the Achievement method or completion of goals. The method evaluates how much of what was needed to be done was actually done. The Productivity ratio is the number of accomplished tasks to the total number of assigned tasks. The ratio does not account for quality. This method is popular in software development companies and has recently been popularized by David Allan’s book, *Getting Things Done*. This technique emphasizes execution and assumes that it is a known task or that the approach to the task is known, which may not be the case in knowledge work where tasks are fuzzy and there are large amounts of exploration and uncertainty.

The method of Percentage of time spent in value added activities, identifies useful “activities based on how much the activities help achieve goals and it tracks the amount of time spent in these activities. The productivity measure is the number of hours spent in such value added activities divided by the total hours worked” (Ramírez & Nembhard, 2004, p. 613). This method is popular in productivity software applications that provide feedback on the amount of time spent in software applications that are associated with productive and unproductive activities. This method measures effectiveness, not efficiency or quality. Chillisoft’s Focus Time software uses this technique and a qualitative version of the Achievement Method techniques.

2.3.2.3 KNOWLEDGE WORKER PRODUCTIVITY FACTORS

There is a growing sentiment of equating knowledge workers with intellectual capital.

Kelloway and Barling, comments that Ulrich defined intellectual capital as a multiplicative function of competence and commitment, which is similar to Barling’s performance formula, consisting of motivation and ability (Kelloway & Barling, 2000). Kelloway suggested that this formula be extended to include employee opportunity to produce the model, depicted in Figure 7. The model illustrates that an employee’s performance is determined by the opportunities that are provided to them,
to demonstrate their abilities. If an employee lacks motivation then his or her performance will be less than optimal.

![Diagram](https://example.com/diagram.png)

**Figure 7: Kelloway's model of performance**

The model implies that knowledge work is discretionary, as initially proposed by Drucker. Therefore, the company’s role in harvesting and in applying the knowledge is critical. A company’s role is therefore to provide appropriate conditions to enable knowledge worker productivity. Simply increasing the number of knowledge workers does not increase a company’s intellectual assets.

Kelloway’s research assumes that knowledge work differs from normal work in that it is discretionary; however, what if knowledge work was shaped by organisational policies and practices, which provides for autonomy and therefore discretion? It is argued that knowledge work is about quality and not quantity and therefore organisational practices and policies will fail. However, this argument assumes that policies and practices are control based. What if the policies and practices are participative and encourage self-organising behaviour that is loosely coupled?

It can be concluded that in the absence of an algorithmic metric of knowledge worker productivity, and an absence of a common method, heuristics such as productivity dimensions and productivity factors are essential to improving knowledge worker
productivity. Since productivity is dependent on the knowledge worker, it is critical to examine how a knowledge worker manages his or her experience, filters and the knowledge work process (Drucker, 1991). There is a need to understand these core variables that drives knowledge worker productivity that is discussed in the section below.

2.3.3 CORE VARIABLES TO MANAGE THE INVISIBLE FACTORS OF KNOWLEDGE WORKER PRODUCTIVITY

The theoretical sampling phase of Charmaz’s grounded theory process, requires a brief literature review to understand the nature of the core variables. In this section, relevant literature relating to the core variables of trust, collaboration, work enjoyment, shared social identity, motivation, autonomy and agency, focus practice and the impact of organisational culture is summarised. The literature reviewed in this section demonstrates causal constructs to the section above and between the core variables themselves.

2.3.3.1 TRUST

Trust is an internal perception that is influenced by an individual’s wellbeing and levels of resilience. According to Jacobs each of the factors, “Belong and Connect; Voice and Recognition; Significance and Position; Fairness; Learn and Challenge; Choice and Autonomy; Security and Certainty; Purpose” (Jacobs, 2013, p. 2), can be leveraged to build workplace trust. Building trust is important because according to Jacobs, mentally we equate trust with safety and reward. (Jacobs, 2013, p. 1)

Kelloway (Kelloway & Barling, 2000), views motivation as being influenced by trust and commitment. So what affects commitment, and is there a relationship between trust and commitment? Chan Kim and Renee Malbourgne state that “fair process profoundly influences attitudes, and behaviours critical to high performance”, where a knowledge worker’s perception of a fair process affects commitment. Krot comments that:

Before an organisation builds some commitment supported by positive emotions in its employees, it must first win their trust in managers, colleagues
and the organisation as a whole. It is only then that it will be possible to build commitment (Krot, 2014, p. 1471).

It can therefore be concluded that autonomy builds trust, trust influences motivation and commitment, which affects performance.

2.3.3.2 Collaboration

Knowledge work entails a high degree of iteration and collaboration, however knowledge workers value their knowledge because it is their tools of the trade and they don’t share it easily (Davenport, 2005). This implies that knowledge workers may want to collaborate, but are not pre-disposed to easily collaborating.

This leads to the question of whether all tasks require the same level of collaboration. According to Davenport, the classification of work complexity, determines the levels of collaboration and intervention that will be required. Figure 8, illustrates Davenport’s collaboration model.
Figure 8: Davenport’s collaboration model (Davenport, 2005, p. 27)
2.3.3.3 Work Enjoyment

What is work enjoyment? Work enjoyment is associated with doing meaningful work, where the work itself is fulfilling. However, meaningful work is subjective. Vuori, San and Kira maintain that the levels of meaningfulness decreases if individuals feel as if they are not making a contribution or if they are not benefiting from or enjoying their work. If the positive effects of work are emphasised, and individuals develop competencies and are able to influence their work, the level of meaningfulness of work increases (Vuori, San, & Kira, 2012).

Work enjoyment has also been associated with doing a good job. What specifically is a good job? Davenport comments that knowledge workers want to do a good job, where a good job means staying busy, making a positive impact, being intellectually engaged in the work that they are doing and getting feedback on their work, (Davenport, 2005).

According to O’Donohue, Sheehan, Hecker and Holland, work enjoyment and a good job is associated with the psychological contract factors of “freedom to do my job well”, “enjoyable work” and “resources needed to perform the job” (O’Donohue, Sheehan, Hecker, & Holland, 2007, p. 78). These results clarify the links in the psychological contract of a knowledge worker, where there are links between productivity, autonomy, “responsibility for task direction and productivity”, (O’Donohue et al., 2007, p. 78).

2.3.3.4 Shared Social Identity

Corporate culture is complex and is said to consist of practices, symbols, values, beliefs and underlying assumptions that individuals share as a behaviour. It socialises employees into a specific way of thinking and behaving. The essence of corporate culture is the set of values that speak to the heart and create a sense of community. Shared values describes the alignment between an individual’s values and his or her company’s values. Shared values are tacit in nature and employees view these as company promises that must be upheld by managers (Wallace; Hunt; Richards, 1999).
Work place identity is embedded in the social interactions between employees and between managers and employees. Social identity refers to “how individuals and groups define themselves by their relationships with the organisational culture”, (Balmer, 2008, p. 891). Social identity is affected by self-esteem, cognitive and affective states. Individuals may migrate between groups to affirm their self-esteem.

2.3.3.5 Motivation

There are many theories of motivation. I have chosen to understand the Hertzberg’s theory of motivation (since this theory is still applicable to the business world today) and Daniel Pink’s theory of motivation for knowledge workers.

Frederick Hertzberg developed a theory of motivation that was based on a two factor hypothesis that leads to job satisfaction. The factors were motivational and hygiene or maintenance factors. Motivation factors are directly related to the job itself, where their presence causes an increase in motivation but their absence does not cause dissatisfaction. Motivational factors can be classified as “recognition, advancement, and responsibility, possibility of growth, achievement and work itself” (“Hertzberg hygiene factors and motivators theory,” n.d.). Hygiene factors can be classified as “company policy, technical supervision, interpersonal relations, salary, job security, personal life, working conditions and status” (“Hertzberg hygiene factors and motivators theory,” n.d.). Hygiene factors are prevent dissatisfaction but do not cause satisfaction if they are present.

Daniel Pink the author of Drive, states that research has shown that the traditional “carrots-and-sticks” (Pink, 2011, p.33) paradigm of extrinsic reward and punishment doesn’t work in motivating knowledge workers. He states that intrinsic motivators, such as autonomy; mastery or the need to get better at something that matters and purpose which doing something that is meaningful, motivates knowledge workers.

2.3.3.6 Autonomy and Agency
In non-knowledge work it is possible to do a job without making a mental and emotional commitment to it. This is not the case with knowledge work. Therefore if commitment is required for performance then knowledge workers require a say in what they work on and how they work on it.

Knowledge workers are paid for their experience, skills and “think for a living” (Davenport, 2005, p. 3) implying that they think and make decisions for themselves. “Knowledge workers don’t like being told what to do, and they don’t like to see their work reduced to a series of boxes and arrows” (Davenport, 2005, p. 15). Knowledge workers regard autonomy as fair exchange for their education and skills. Since knowledge work itself is fuzzy and it’s difficult to tell if knowledge workers are working, both knowledge workers and supervisors prefer guidelines in terms of what needs to be done and when it needs to be delivered. However, it is not advocated that knowledge workers should be given complete autonomy, because this may not result in the best performance. It is suggested that discretionary autonomy be provided. It is also suggested that organisations must be careful about impinging on knowledge worker’s agency in decision making and how they work since if they need more autonomy, they will find another job. Davenport found that software developers responded well to high process maturity and that it did not restrict autonomy, provided that it was a participative process involving them in designing the process (Davenport, 2005). He found that:

\[
\text{Every effort to change how work is done requires a dose of both process – the design of how work is done, and practice, an understanding of how individual workers respond to the real world of work and accomplish their assigned tasks} \]

(Davenport, 2005, p. 73)

Davenport comments that since Taylor’s days our first instinct is to try and reduce a process to a set of tasks and workflow (Davenport, 2005). This approach is counter-intuitive to knowledge workers and will not improve knowledge worker performance because there are so many variations, iterations and collaborations to the process. However, there is evidence that “taking a process orientation to knowledge work was found to be liberating and was an effective way to improve performance” (Davenport, 2005, p. 82).
2.3.3.7 Focus Practice

Knowledge work requires a practice of long uninterrupted time that allows for cognitive processing and complex work, and collaboration that allows for interaction with others. Perlow (Perlow, 1999) comments that Weick defined the concept of enactment, which is a process where individuals create conditions that function as constraints or opportunities. The research indicates that in an organisation individuals are conditioned to act in patterned ways in response to “socially constructed temporal rhythms” (Perlow, 1999, p. 58). Perlow concludes that “the way people interact "enacts"-or further generates-the temporal rhythms that, in turn, regulate individuals' behaviours” (Perlow, 1999, p. 58). Therefore an individual’s work patterns perpetuate behaviours that establishes these patterns, as is illustrated in Figure 9.

![Figure 9: Illustration of a typical behavioural pattern that is enacted and perpetuated in companies (Perlow, 1999, p. 71).](image)

Similarly an organisation that is chaotic and prone to “busyness”, perpetuates the culture of “busyness”, creating interruptions. This implies that the probability of knowledge work or deep cognitive processing, occurring at work is limited. Perlow comments that the current literature of time management such as:
Understanding the influence of invisible factors on knowledge worker productivity

(Covey, 1989; Jones, 1993; Covey, Merrill, and Merrill, 1994; Griessman, 1994) "(Perlow, 1999, p. 58), asserts that individuals are able to make the required changes to gain better control over their work day. However at best they become more efficient within their current way of interacting. The changes don’t impact the synchronisation of interactions or the context within which they occur.

Perlow as part of his experiment, introduced the concept of “quiet time”, where individuals work on the own without interruptions. He found that individuals preferred a shorter quiet time because they treated the time as a precious commodity and it occurred in one continuous block. He also found individuals productivity increased to an average of 65%, with quiet time. Perlow’s studies indicates that there is a need for a practical practice that allows individuals to focus their attention in a stretch of uninterrupted time, within the social context of work.

2.3.3.8 Impact of Organisational Design and Culture

It has often been stated that in attracting and retaining knowledge workers, culture and a new style of management is everything. Davenport states that managing knowledge workers requires that the style of management that differs from the industrial age. But what is a recommended management style that is conducive to knowledge work? According to Davenport, managers are required to be both players and coaches. Management must change from:

- Overseeing work to doing it too.
- Hiring and firing workers to recruiting and retaining them
- Organising hierarchies to organising communities
- Building manual skills to building knowledge skills
- Supporting bureaucracy to fending it off
- Ignoring culture to building a knowledge friendly culture

(Davenport, 2005, p. 191)

A manager’s job is to form communities that facilitate knowledge sharing. An important part of skill building is teaching as well as learning. Knowledge workers should be allowed to show dissent, otherwise they will feel stifled. It is the manager’s
job to ensure that the dissent is channelled into constructive criticism (Davenport, 2005).

Organisational design and culture are often used interchangeably. What is culture? There are many definitions of culture. However, according to Prajogo and McDermott, culture refers to a combination of artefacts such as practices, symbols, values and beliefs that organisational members share about appropriate behaviour, distinguishing one organisation from another (Prajogo & McDermott, 2011). According to Wallace, Hunt and Richards, Jones and James define an organisational climate by “leadership facilitation and support; co-operation, friendliness and warmth; conflict and ambiguity; professional and organisational esprit; job challenge, importance and variety; and mutual trust (Jones and James, 1979)” (Wallace; Hunt; Richards, 1999, p.552).

According to Prajogo and McDermott’s research, Quinn and Spreitzer commented that organisations exhibit characteristics of internal and external, control and flexibility orientations simultaneously, in their model where culture is a driver of performance, as illustrated in Figure 10.
Figure 10: Control versus Flexibility model of organisational culture (Prajogo & McDermott, 2011, p. 5).

Prajogo’s and McDermott’s research highlights culture as a key resource for performance, recommending that organisation’s view culture as an organisational asset which has practical implications that affects “managerial skills, styles as well as organisation’s design” (Prajogo & McDermott, 2011, p. 17).

Can culture be changed by employees? Whitely, Price and Palmer comment that “people play an active role in making and remaking culture, and the manner in which their psychology is culturally organised”, thereby highlighting that culture is continually shifting and in the process of being remade (Whiteley, Price, & Palmer, 2013, p. 489).

In companies with strong cultures, there is a deep structure identification that is developed through “exchange relationships where employee and employer act to benefit each other and when the locus of control shifts from individual to firm” (Whiteley et al., 2013, p. 6) Whitely et al comments that such a process may thrive in
company’s with strong corporate cultures, but it should be viewed cautiously because it secures organisational control of employees’ organizational identification.

### 2.4 CONCLUSION

This section described my framework of ideas that is based on Drucker’s Productivity theory, the concept of regulating attention via a Focus practice, a CHAT model that describes the social practice of interactions that impacts productivity. The literature review described why it is important to manage knowledge worker productivity as a continuum, explored popular definitions of knowledge work, and the constituent activities of knowledge work. It was found that there is no commonly accepted definition of knowledge work or set of activities that comprises knowledge work. The literature review of the problem context sought to understand how knowledge worker productivity is defined and measured. It was found that although there are no commonly accepted definitions, there are common knowledge work dimensions that impact productivity. There are also numerous methods to calculate productivity and three methods seem to be commonly used in the software industry. A review of the core variables highlighted the strong causal relationships between trust, collaboration, work enjoyment, autonomy and agency, the impact of design and culture and focus practices. The literature emphasised the dependence on the social context and subjective experience of work that is situated in a specific social context. The next chapter discusses my research paradigm and design of the methodology.
CHAPTER 3: RESEARCH PARADIGM AND DESIGN

3.1 INTRODUCTION

I manage a software development company, Chillisoft and have worked extensively with knowledge workers and, a knowledge worker for eighteen years. I want to understand knowledge worker productivity to improve the situation of concern. My close relationship (as a researcher) and my vested interest in the situation of concern (as a participant) has shaped the design of my research.

This chapter describes and discusses my research paradigm (refer to Figure 11) that is comprised of the ontology (the beliefs and perspectives that shapes my research), epistemology (the process, scope and limitations of how I plan to discover knowledge), and the methodology (which consists of the tools, techniques and process) that are applied to the situation of concern.

In essence, my research paradigm is interpretive, where I believe that reality is constructed by individuals in the social setting of work. The epistemology is where I want to discover the underlying meaning of actions and events, resulting in me choosing a qualitative methodology. In the section on Methodology I will describe the key points relating to Phronesis, the Research Design and Context, an Action Research approach and the Data Gathering and Analysis techniques that I used.
Figure 11: The components of a research paradigm

3.2 Ontology

Ontology refers to ways of constructing reality “How things really are” and “How things really work” and the “ontology is where the world and knowledge is created by social and contextual understanding” (“Research Paradigms: Ontology’s, Epistemologies & Methods,” n.d.). My research looks at reality as made up of the perceptions and interactions of knowledge workers in Chillisoft.

I chose an interpretivist paradigm because, according to Davenport (Kelloway & Barling, 2000, p. 239), knowledge worker productivity is largely dependent on the perspective of a knowledge worker, specifically the extent to which they choose to invest their experience, knowledge and skills in the company, the organisational setting and the company’s practices. Accordingly, my research entails exploring knowledge worker perspectives and the impact of the social context in the organisation on knowledge worker productivity.
3.3 **EPISTEMOLOGY**

Epistemology refers to the manner in which we obtain knowledge. I have chosen to focus on understanding what is happening and investigating the underlying meaning behind actions, in a holistic manner. Consequently I have chosen to focus my research on a single case study. The single case study allows me to develop a nuanced view of the reality that I have to deal with at Chillisoft. It also allows me to delve deeper into the context, whilst enabling me to develop my skills as a researcher. As Bent Flyvbjerg states, “if researchers wish to develop their own skills to a high level, then concrete, context-dependent experience is just as central for them as to professionals”. He continues “concrete experiences can be achieved via continued proximity to the studied reality and via feedback from those under study” (Flyvbjerg, 2006a, p. 223).

3.4 **METHODOLOGY**

My situation of concern is similar to the conditions described by Shotter and Tsoukas, which led me to naturally choose a Phronesis approach. Shotter and Tsoukas note that Phronesis is best practiced by:

*Practitioners (namely, individuals who are immersed in a practice, experiencing their tasks through the emotions, standards of excellence and moral values the practice engenders or enacts) face a bewildering situation in which they do not know, initially at least, how to proceed, the judgment they exercise emerges out of seeking to establish a new orientation to their puzzling surroundings (Shotter & Tsoukas, 2014, p. 378).*

My situation of concern is similar to the conditions described by Shotter and Tsoukas, where I am integrally immersed in the situation because I am the CEO of Chillisoft and I have a vested interest in the situation as a researcher and a practitioner. I am experiencing my decision-making via the complex blend of emotions of surprise, anxiety and curiosity. I am also committed to initiatives that apply and conform to our software development technical standards of excellence and the moral values of Chillisoft’s espoused philosophy and culture. I am faced with bewildering situation of having to evaluate whether our assumptions regarding our practices are sustainable and effective. I am unsure of how to proceed and will allow the situation to unfold as
I practice being reflexive. I also want to participate in the change initiative. For all of these reasons, I have therefore used a Phronesis approach. I have combined a phronesis approach with an action research focus to provide a loose structure and direction to my research as I muddle through the complexity.

Figure 12 below, illustrates the elements of framework, methodology, and area of concern, since Checkland and Holwell recommend that these be declared in advance to maintain my intellectual bearings in a changing situation (Checkland, P.; Holwell, 1998). The diagram indicates that a framework of ideas informs and is embodied in my chosen methodology that is applied to the area of concern. Both the conceptual framework and the area of concern yields learning that helps me make sense of the situation, as I apply the newly acquired insights and knowledge. In undertaking this action research I learn about the situation and about myself in the process.
My methodology of Phronesis with Action Research using data analysis and data gathering techniques of soft systems methodology (SSM) and grounded theory allows me to explore the situation of concern in depth, from multiple perspectives, using multiple approaches to confirm my findings.

The key elements that constitutes the Methodology, namely, Phronesis, Research Design and Context, Action Research Approach, the Research Process and the Data Gathering and Analysis techniques are described in the sections below.
3.4.1 Phronesis

Phronesis is the study of social science with a contemporary interpretation of the Greek concept of Phronesis, where we regard phronesis as practical wisdom.

Aristotle viewed Phronesis as an intellectual virtue that is “reasoned, and capable of action with regard to things that are good or bad for man” (Flyvbjerg, 2006b, p. 370). It is therefore a suitable and apt outlook to use in this case study since the primary work is software development and ideas which are knowledge work and intellectual work.

Phronesis focuses on values and interests and delves beyond analytical and technical knowledge. It focuses on what is variable and requires an interaction between general or abstract and the concrete. Most importantly, phronesis requires that you use judgement, choice and experience.

According to Flyvbjerg, the researcher’s role in Phronesis is to “perform analysis and derive interpretations of the status of values and interests of organisations, aimed at organisational change”, by reflecting on and summarising four questions namely:

1. “Where are we going?”
2. Who gains and who loses, and by which mechanisms of power?
3. Is this development desirable?
4. What, if anything, should we do about it?” (Flyvbjerg, 2006b, pp. 373–374)

In essence the primary purpose of adopting a Phronesis approach:

*Is not to develop theory, but to contribute to society's practical rationality in elucidating where we are, where we want to go, and what is desirable according to diverse sets of values and interests. The goal of the phronetic approach is to add to society's capacity for value-rational deliberation and action (“What is phronetic planning research? What is phronetic social science?,” n.d.)*

Phronesis combined with an action research focus is the appropriate approach for this case study because Chillisoft is undergoing change, and I as the CEO and researcher am participating in this change.
It is also suitable as a methodology because in Chillisoft our focus is on managing people, therefore understanding the status of values and interests is critical to Chillisoft.

Phronesis is concerned with the art of judgement, which is the key competency of a manager or CEO. My role as CEO necessitates that I use Phronesis daily, which made it a natural choice. Using Phronesis increased my skills as a researcher, increasing the value and depth of the research.

### 3.4.2 Research Design and Context

My research is designed using Maxwell’s Interactive Model of Research Design (Maxwell, 2008, p. 218) that is illustrated in Figure 13 below. The research question, is shaped by my intellectual goal, and the conceptual framework. The conceptual framework serves as a lens, by summarising relevant aspects of what is known about the concern, enabling theoretical sensitivity about the topic of knowledge worker productivity.

The methodology is influenced by the research question and validity criteria. It is also influenced by contextual factors, such as the research setting and my skills as a researcher.
Figure 13: Illustrating contextual factors that influence the Research Design.

In this study, the key research setting factors are Chillisoft’s culture and knowledge worker practices. Chillisoft’s culture is shaped by our core values that are illustrated in Figure 14. The culture is aligned to doing knowledge work where there is a strong focus towards developing the requisite expertise and mastery. It is an engaging
environment where individuals work closely with each other and have formed friendships outside of the working realm. The culture encourages autonomy, with a team-based structure. Chillisoft is governed by strong practices that shapes individual behaviour and delivery.

Figure 14: Illustrating the house of Chillisoft with Chillisoft’s values, principles and products.
This section described the logic behind the research design and the relevant contextual factors that were considered in the research design. The following section describes what an action research approach entails within the context of my research.

3.4.3 Action Research Approach

The action research process is described in Figure 15 below that, illustrates the interaction between themes and the framework of ideas, and the action research process. The model (Figure 15) is based on an interpretation of both McDonogh’s (McDonogh, 2014, p. 10), and Checkland and Holwell’s models (Checkland; Holwell, 1998, p.15). It illustrates that the situation of concern is used to develop research themes and questions, leading to a framework of ideas. The framework of ideas serves as a lens through which to view the situation of concern.

In the action research process I am the researcher who enters and participates in the situation of concern with a preliminary framework of ideas, themes and questions. I participate in the action by planning my approach and by participating in the change process. My participation enables me to reflect on my experiences, which lead to findings and new themes, which I add to my framework of themes and questions.
Research Question: How to manage intangible factors to improve knowledge worker productivity?

Themes and questions

World Views
What are the stakeholder perspectives of Knowledge work, knowledge worker and knowledge worker productivity?
Factors impacting Productivity
What factors impact knowledge worker productivity?
How does attention and self management affect knowledge worker productivity?
How do the factors possibly interact to impact productivity?

Framework of Ideas
Concept of Knowledge work, knowledge workers
Druckers Productivity Theory
Regulating Attention
Focus Time
Knowledge work as a social practice i.e. CHAT model

Figure 15: Model illustrating my participation in the action research process and the interactions between situation of concern, the framework of ideas, themes and questions.

This section describes conceptually how I had envisaged the action research process working in this project. The following section describes the research process.
3.4.4 Research Process

The research process consists of two action research cycles – Phase 1 and Phase 2, as is illustrated in Figure 16.

Figure 16: Diagram illustrating the sequence of activities in the investigation
Preliminary research is conducted so that I can understand the relevance of the concern, and so that I can understand the key findings of relevant literature and theories. The literature is used to develop my research framework.

Besides the recommendation that action research be participative and reflective, it is widely believed that knowledge workers should be included in any initiatives that decide how to measure productivity. Consequently, I have designed the research so that the Chillisoft team contributes to the discussion on intangible factors that impacts knowledge worker productivity. My research largely consists of interviewing and observing a mixed sample of knowledge workers (outlined in table 3), who range in age, roles, seniority and skill levels, to obtain a balanced perspective of knowledge worker productivity.

<table>
<thead>
<tr>
<th>Research Participants</th>
<th>Relationship</th>
<th>Type of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Juniors</td>
<td>Direct interviews, recurrent contact</td>
<td>Interviews, Participation/Observation</td>
</tr>
<tr>
<td>2 Intermediates</td>
<td>Direct interviews, recurrent contact</td>
<td>Interviews, Participation/Observation</td>
</tr>
<tr>
<td>2 Seniors</td>
<td>Direct interviews, recurrent contact</td>
<td>Interviews, Participation/Observation</td>
</tr>
<tr>
<td>3 Team leads (senior role combined with management)</td>
<td>Direct interviews, recurrent contact</td>
<td>Interviews, Participation/Observation</td>
</tr>
<tr>
<td>1 Manager</td>
<td>Direct interviews, recurrent contact</td>
<td>Interviews, Participation/Observation</td>
</tr>
<tr>
<td>Team of 25</td>
<td>Intermittent observation</td>
<td>Participation/Observation</td>
</tr>
</tbody>
</table>

I used the intensive interviewing technique because I want to create an open space where participants could relate their experience, and where they could focus on their concerns and priorities. Intensive interviewing techniques are characterised by the following:

- Selecting participants with first-hand experience of the research topic
- Exploring a participant’s experience, in depth
• Relying on open-ended questions
• Obtaining detailed responses
• Emphasising understanding of the participants perspective
• Following up on unanticipated areas of inquiry, hints and accounts of actions (Charmaz, 2014, p. 56)

I observe the team of twenty five participants as they engage in Focus Time and Deliberate Practice (in which I too take part). I use SSM tools (described in the following section) to discover the worldviews of the participants and to establish a richer perspective of the current state of knowledge worker productivity. I observe the practices of knowledge workers throughout the investigation and make propositions about the impact on knowledge worker productivity.

The action research approach consists of two cycles, namely phase 1 and 2, where each phase consists of planning, doing, reflecting and acting (refer to Figure16). The reflection phase of each action research cycle draws on Bent Flyvbjerg’s questions for reflection (Flyvbjerg, 2006b, p. 374), namely: “where are we going; is this development desirable; what if anything should be done about it; and who gains and who loses?”.

The investigation produces a set of propositions that are categorised and modelled, using grounded theory techniques that result in a causal loop model that illustrates the context, mechanism and output. The model is analysed for similarities to generic archetypes to try and understand the behaviour and the mechanisms.

This section described the activities that occurs within the research process. The following section describes how the data is collected and analysed during the research process.

3.4.5 DATA GATHERING AND ANALYSIS TECHNIQUES
The research process requires the concurrent processes of data collection and analysis. The methods that I use are soft systems methodology and grounded theory to collect and analyse data. These methods are described in the sections below.
3.4.5.1 **SOFT SYSTEMS METHODOLOGY (SSM)**

SSM is both a methodology and a method. I use SSM as a method in the Action Research methodology. According to Checkland (Checkland, 2000a), SSM enables multi-levelled thinking about a situation, where the political cultural dynamics are also considered.

I use the following SSM techniques to uncover stakeholder world-views from various perspectives during the action research process:

In order to develop a stakeholder perspective during phase 1 (refer to Figure 16), of the action research cycle the following questions are asked:

1. What is the input, output and transformation?
2. Who is the beneficiary (client/customer)?
3. What is the purpose of this transformation?
4. What are its measures of performance?
5. What assumptions are being made for this transformation to be meaningful?
6. What constraints impact directly on this transformation?

The key activities of SSM entails:

- Investigating the problem
- Modelling the situation using CATWOES (refer to glossary) to form root definitions and rich pictures
- “Taking action in the situation to bring about improvements” (Checkland, 2000b, p. 21) by sharing perspectives to establish world-views.

3.4.5.2 **GROUNDED THEORY**

Grounded Theory refers to empirical research in a specific area to formulate of a theory consisting of interrelated concepts to explain the issues in the situation of concern (Bohm, 2004). It is based on two key principles, namely that the phenomena that are being observed are constantly changing and that actors have a choice (i.e. actors are able to control their responses to conditions, even if they don’t exercise that choice (Corbin, Strauss, Clarke, Gerhardt, & Glaser, 1990).
Cho and Lee refer to Martin and Turner who state that:

Grounded theory is appropriate when no theory exists or when a theory exists that is too abstract to be tested, but it is not appropriate for the test of a theory or generation of knowledge from objective reality (Martin & Turner, 1986; Suddaby, 2006)(Cho & Lee, 2014, p. 5).

Given the dearth of theories about the impact of intangible factors on knowledge worker productivity, grounded theory (GT) is a suitable choice as a research technique in this study.

I use Charmaz’s view of grounded theory, which is reflexive, in contrast to Glasser’s classic grounded theory. Charmaz’s perspective of grounded theory enables the researcher to develop a framework of ideas, especially if entering the field with unexamined pre-conceptions.

Charmaz’s perspective of grounded theory therefore does not contradict my choice of using action research, since both approaches assumes the researcher enters the situation with a framework of ideas. Charmaz states that “in contrast to the classic GT tradition, but in accordance with constructivist GT tradition, an informed grounded theorist sees the advantage of using pre-existing theories and research findings, in the substantive field in a sensitive, creative and flexible way instead of seeing them as obstacles and threats”, (Charmaz, 2014, p. 306). Charmaz’s approach focuses on the importance of meanings that individuals attribute to the focus of the study. It focuses on the participants’, thoughts, feelings, viewpoints and assertions instead of just gathering facts and describing acts, as per Glasser’s approach.

The data propositions are classified using Charmaz’s coding process of initial coding, focused coding and theoretical coding. Initial coding is similar to open coding, where categories of information are developed. Focused coding is used to narrow the codes to those that are frequently used or that are important. Theoretical coding focuses on finding relationships between codes and categories, that has the potential to result in a theory (Charmaz, 2014).
3.5 CONCLUSION

This chapter has provided an understanding of my research paradigm and a justification of the research design. The chapter described the contextual setting such as Chillisoft’s focus practices and the Chillisoft culture that influenced how the research was designed.

I used Phronesis because Phronesis entails the use of practical judgements, which is a skill that I use everyday as a CEO. It also requires that the research examine the status of the values, in an organisation that is planning on change. Chillisoft is in the process of change, so the use of Phronesis and Action Research is appropriate because as a researcher I am participating in change and being changed as a result. Chillisoft is a values based company, where we focus on managing people, therefore it is critical that I examine the underlying values and judgements.

The Chapter also described the activities that comprised two action research cycles and the chosen research data gathering and analysis methods. I chose to use SSM methods because my process of enquiry necessitated me obtaining a rich collection of various stakeholder’s perspectives. I used Charmaz’s grounded theory approach because it caters for the researcher to enter the situation of concern with an existing framework of ideas. Chamaz’s grounded theory catered for a scenario where I am familiar with the topic of knowledge worker productivity, but had not examined it in-depth prior to this research.

Chapter 4 discusses the output of the implementation of the Research Methodology.
4. **CHAPTER 4: RESEARCH OBSERVATIONS AND FINDINGS**

4.1 **INTRODUCTION**

My research questions are “What invisible factors influence knowledge worker productivity, at work?” and “How do the invisible factors interact to influence knowledge worker productivity?”

In this chapter, I will relay the results of the research that was designed to answer my research questions, conducted over phase 1 and phase 2 of my action research cycle. The objective of this chapter is to describe the results of my research and to demonstrate how phase 2 of the research stems from the findings of the phase 1 action research cycle. It also demonstrates the relevance of the research actions that were taken in phases 1 and 2.

I will discuss the results of each cycle using the plan, do, check, act sequence of activities. I have structured the check activity to address Flyvbjerg’s four questions (Flyvbjerg, 2006b, pp. 373–374), “where are we going?”, “who gains and who loses, and by which mechanisms of power?”, “is this development desirable?” and “what, if anything, should we do about it?”

4.2 **PHASE 1 OF ACTION RESEARCH CYCLE**

4.2.1 **PLAN (OF ACTION RESEARCH CYCLE)**

Each interview was recorded, transcribed and memo’ed. An outline of the interview questions and format is listed in Appendix B2. The questions were designed to elicit rich data where “rich data is detailed, focused and full. They revealed participant’s views, feelings, intentions, and actions as well as the contexts and structures of their lives” (Charmaz, 2014, p. 23). I also asked multiple related questions to build context and to assist the participant in abstracting their thoughts as all participants think at a detailed level, I was concerned that they would become side tracked with the detail.
Each participant is referred to by their initials e.g. KDB (refer to Appendix B1: Interview log). I interviewed each participant for a maximum of twenty five minutes, during which I followed an interview question guideline (refer to Appendix B2).

4.2.2 Do (Action Research Cycle): Results of Interviews

4.2.2.1 Synopsis

Knowledge work was viewed as thinking work. A knowledge worker was viewed as an individual who did intellectual work that was non-routine. There was a perception from a new employee that knowledge workers are specialists or experts who have many years of experience. All participants felt prestige at being known as knowledge work because they enjoyed the intellectual nature of the work.

Knowledge work was perceived to be fuzzy, however the approach adopted was concrete and structured. There were individuals who agreed that the approach was structured but that too much planned structure was limiting and that they preferred a more reflexive approach. There was also agreement that different types of works involved varying levels of fuzziness such as production development compared to product development.

All participants were able to differentiate between productivity and focus, where productivity was associated with progression in tasks, and a sense of accomplishment. Focus was associated with deep concentration. All participants felt strongly that quality is one of the outcomes of knowledge worker productivity. They were unanimous in their viewpoint that productivity without quality was pointless and wasteful since it will result in rework.

All participants were productive and were acutely aware of when they were unproductive. They were unanimous in their belief that productivity could be improved because there is always room for improvement. AR had a unique perspective where he associated productivity with generating revenue for the company. There were reward mechanisms adopted to motivate individuals to be productive such as moving stickies to complete on the Kanban board.
The extent of how productive an individual is depends on the expectations of the role for example the productivity outcomes for management tasks differ from productivity outcomes for developers. There appeared to be difficulties in feeling productive where individuals played dual roles such as team leads.

The participants seemed to have a set of hygiene factors such as no disruptions, and correct tooling that they needed to be productive and motivating factors that seemed to be specific to their personalities such as bright creative environment that could be customised. They required that their managers manage team dynamics including the mood and assistance with tasks.

All participants agreed that they needed Focus time, because it created the space in the organisation for them to work without being disrupted. There was an indication that Focus time had a massive impact on the way individuals worked. Focus time was also useful because it made the rules of working clearer where individuals were empowered to not stop interruptions and noise. Management (PTW) indicated that there will be a strong future focus on Deliberate practice because it encouraged learning and collaboration.

The research findings confirmed my assumption that Chillisoft is sensitised to the issues of knowledge work productivity because, all employees were easily able to define knowledge work, knowledge worker productivity and relevant issues that impacted productivity. They also confirmed that Chillisoft supports knowledge work by stating that they need the current practices in Chillisoft to be productive.

4.2.2.2 Results of Interviews
The pertinent points of the interviews are summarised below, under each set interview questions.

1. Explain why you think that you are or are not a knowledge worker?
2. Who are knowledge workers?

All participants (with the exception of RS) viewed themselves as knowledge workers since they spent the majority of their day solving problems, thinking and learning.
They viewed themselves as knowledge workers because they were engaged in intellectual work. For example PTW stated “my work is purely based on what I know, there is no physical aspect to it.”

There was consensus that knowledge work is not routine work. Typical terms that were used to describe knowledge work were “thinking work”, “solving problems or using creative thinking skills to achieve an end goal”, “being innovative, using and creating knowledge”, “fluid in nature” and “solving dynamic problems.”

Knowledge workers were seen as people who used knowledge or created knowledge. PTW stated that knowledge workers “bring their knowledge and understanding to solve problems”. They were engaged in doing non-routine work, where they were able to apply creative solutions to real world problems. In contrast non-knowledge workers were individuals whose work was procedural and where they were not solving creative and complex problems. CN and SM stated that knowledge workers needed to have the drive to acquire knowledge. Examples that they gave of non-knowledge workers are call centre operators, receptionists, and factory workers in an assembly line, who did routine work that “did not entail much thinking”. Non-knowledge workers were perceived to be “cogs in a machine”, as stated by MvR.

The participant RS, who was an exception, saw himself as doing knowledge work but did not view himself as a knowledge worker because the majority of his tasks were routine, thus conforming to the group’s definition of a knowledge worker. RS associated a knowledge worker with an individual who has expertise and experience. He associated knowledge work with experience and practice that is acquired over time. He did not think that it was possible for a junior to be a knowledge worker, and he viewed himself as a novice. In contrast to this perspective, CN and BD saw knowledge work as providing individuals with equal opportunities to add value irrespective of their experience, explaining that he is a junior but he is able to make contributions that are as valid as more experienced individuals.
All participants who identified themselves as knowledge workers felt pride in being known as knowledge workers because they enjoyed thinking and enjoyed the intellectual nature of their jobs.

3. **What types of tasks do you do in your daily work?**

Typical knowledge work tasks consisted of analysis, creativity, problem-solving skills, research, synthesis, decision making that entailed the application of heuristics and general management.

All participants besides RS, felt that they were engaged in knowledge work for the majority of their work day. CN did research as the first step in his approach, to find inspiration and to start creating from a baseline of knowledge e.g. creating a set of icons.

There was general consensus that knowledge work was fuzzy. CN, SM and MvR commented that although the scope of the task is fuzzy, the approach to knowledge work is concrete and that there is structure in the thinking. They commented that being creative requires structure. MvR stated that “Knowledge work is a thought process and varies in structure, depending on the field. The nature of knowledge work is fuzzy but the process by which you solve it, or go about it is not fuzzy”. In contrast to a structured approach KDB stated that his approach is reflexive and that he did not like upfront structure because it was rigid and limited his options. AR stated that when you have a fixed scope and specific customer requirements, tasks are tangible but “they are fuzzy when you are working on a product because it’s something you dream up”. This confirms KDB’s perspective as KDB works in product development.

4. **When were you last productive?**

5. **What is productivity? What did it feel like?**

6. **How do you identify when you are productive?**

All participants recalled a recent event (within the last two days) when they were productive. Productivity was associated with fulfilling an objective or outcome of a task, or moving forward. MvR, BD, JB2 stated that being productive is “when I have moved towards my goal, when more is known about my problem domain than I did at the start of the session’. PTW stated that being productive was “hitting short, medium
and long term goals, moving forward, and producing results. Productivity is doing what needs to be done, figuring out what needs to be done, and generating a result”. AR differed from the team’s definition in that he added the dimension of generating value. He stated that he thought of productivity as “generating revenue or working towards something that is going to generate revenue [for the company]”.

All participants could describe the actual action or reward mechanism for being productive such as TF’s statement of “moving stickies across the board, knowing that these are the things I achieved yesterday. It’s nice and tangible” and RS’s statement of “striking a task off a list” when it was completed.

RS stated that “Being productive gave me more energy. I need more work. I want to do more work because I am enjoying work.” CN stated that being productive made him feel energised. Being productive was associated with a sense of accomplishment e.g. JB stated that he “feels a great sense of accomplishment, to take a problem and come out with a tangible solution. There is personal gratification especially when I am delivering a solution to a client”. KDB stated that “you can feel when you are productive; it feels good to justify that you are achieving something that has value”. MvR and KDB associated being productive with the reason why they are knowledge workers because they felt a sense of accomplishment and value when they were productive.

KDB stated that “if there are multiple roles, what you do to be productive depends on your role. The sense that you get depends on whether you enjoy the role, so you can be productive in a role that you don’t like and it will feel like drudge work or you can be productive in a role that you like and it will be enjoyable”.

Participants stated that they had a sense of being productive but that it did not always register whilst they were working. Being productive was easier to identify in hindsight or during reflection. PTW stated that “we know in hindsight if it was the right thing, [from] feedback from others, but I have a sense that I am being productive. You can recognise good work, I can recognise it in other people, so I can recognise it in myself”.

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In contrast to post reflection awareness of productivity, all participants were acutely aware of when they were unproductive, when they were working. They were aware of procrastination and annoyance when they were unproductive. KDB stated that “you can tell when you are not being productive, there is frustration, and you don’t feel like you are achieving anything”.

AR stated that “the team is productive, on the xxx project I must have been more productive than I felt when I look at the burn down graph and I look at the comments from the team. I was not bashing out all the work, but I was clearing a path for other guys to do the work that they needed to do”. AR’s insight suggests there is a difference in understanding of productivity when it is applied from a manager’s perspective as compared to doing the work yourself. KDB also stated that he saw his role as ensuring that his team always had what they needed so that they could be productive, therefore he himself was not productive if you looked at his role as a developer but that he was productive as a manager. Therefore productivity must be viewed as outcomes for a specific role. There appeared to be challenges with the perception of productivity in dual roles such as Team leads where they are fulfilling the role of senior software developer and manager.

I have used a representation of a tag cloud to summarise the key points from the feedback of questions 1 to 6, as illustrated in Figure 17 below.
**Thinking work**

- "Being productive gives me energy"
- "Bring their knowledge and understanding to solve problems"
- "Non-knowledge workers are cogs in a machine"

**Knowledge work**

- Process by which you solve problems is NOT FUZZY
- "I feel like I did not achieve anything when I am unproductive"

**Productivity**

- Productivity = traction = moving towards my goal
- Aware when I am unproductive

**Productivity is an outcome of a specific role**

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**Figure 17: Key words to capture pertinent points from the feedback of questions 1 to 6.**

7. *What do you need to be productive as a knowledge worker?*

All participants agreed that the less distractions the better. They also agreed that the correct tools and access to resources, and not being interrupted was required. TF, CN, SM, JB2, RS, MvR and AR needed clear deadlines, direction and requirements. CN and KDB needed time and space to explore and do research. In addition to requiring the space to explore, KDB needed the space to decide what needs to be done.

MvR required access to the right material (such as components and hardware), and not having tunnel vision, to be productive. PTW needed prioritisation by understanding what is important to be productive. PTW and KDB needed the space to think without having to switch context or be interrupted. PTW stated that "my tasks requires a huge
amount of context, so I need to know that I am going to have the amount of time, preferably a block, taken up without interruptions.”

AR was productive when he was doing work that was interesting and that had meaning to him. He needed to know that there was an end goal and he stated that he wanted to “follow something through to the end because it’s rewarding”.

JB needed variety and feedback so that he could get a sense of progression. He stated that “a lack of variety is de-motivating. Huge tasks, gargantuan problems where it is not split into tasks is demotivating. I needed feedback, where you can feel progression, moving forward, you have done something good”. He also needed collaboration, interaction and a creative environment that he could customise to suit himself. This creative environment was described as “bright coloured walls, visually creative outlay, human interaction, creative space, to get your mind to spark. To be able to talk [to] someone; to bounce ideas off people to have boards to draw on”.

8. What do you need to be productive from your manager?

All participants agreed that they needed their manager to provide them with the correct equipment and tooling and an interruption-free environment. They all saw the need for the Focus Time practice and required that a manager supports Focus Time. TF stated that he needed Focus Time, since it provided his team with “this sacred space to put [on] their head-phones and go”. He also stated that having Focus Time forces you to plan because people are not available and it gets you into the habit of planning.

CN required managers to monitor the team’s mood and to ensure that the team is happy and motivated, “a manager would be accountable for managing the environment to ensure that there is not too much pressure, that conflicts are resolved and that the team is happy.” RS, CN and MvR required that managers are accessible and available for help. MvR required that a manager keep track of the direction and progress to ensure that he is still on track with the delivery.

AR and PTW required a clear communication of expectations of what the team was delivering. PTW and KDB had the expectation that a manager needed to have prepared work for the team so that they could be productive. PTW also required initiatives to
inspire creativity such as Deliberate Practice and that a manager be supportive and provide critical feedback. KDB required a manager’s respect, which enables the individual to achieve and makes management of a team easier.

9. **Do you need to improve your productivity? Why?**
All participants felt that productivity can be improved because there are always ways in which they could do better. The participants did not allude to problems or shortcomings in their current productivity levels.

10. **What do you need from Chillisoft to improve your productivity?**
All participants needed the current environment, equipment, Chillisoft practices and team to continue being productive.

RS stated that he needed help with planning his tasks so that he can move onto another task if he gets stuck with solving a particular task during Focus Time, as he is unable to interrupt anyone else during Focus Time.

PTW advocated the continuation of Deliberate Practice, since it encouraged “learning, people to be continuously improving, and more collaboration”. He felt that there is a lot of knowledge in silos, and that expertise must be harnessed across the company to be effective.

11. **How do you prepare to be productive?**
All participants took the time to prepare to be productive, although they did not necessarily have a preparation routine.

12. **Is there a difference in productivity between Focus Time and non–Focus Time.**
There was a general consensus that there was a definite decrease in noise levels during Focus Time. This assisted participants to focus because they are not distracted by noise. It also made the rules governing behaviour clearer, where MvR stated that “the rules made it possible for me to tell someone who is talking to stop talking.” MvR stated that Focus Time has had a massive impact in the way he works “I used to stay up all night and work then before I knew about Focus Time”. Both RS and CN stated
that when they are productive in Focus Time, they often continue being focused even when Focus Time has ended. PTW stated that he is productive in Focus Time because space is created in the organisation and Focus Time is now a habit. He said that “you know that it is expected and you are supported to turn off distracting stuff. You know that you are not going to get a call”. The facilitated process of Focus Time helped him to get into a thinking space.

13. Is being focused the same as being productive in knowledge work?

All participants saw focus and productivity as two different concepts that were related for knowledge worker productivity. MvR stated that “Productivity is getting tasks done”. Productivity was defined as making traction towards your goal or completing your goals. Focus was defined as the ability to concentrate on a particular goal. If you had better focus you could increase your output.

Participants agreed that it was possible to be highly focused and still not be productive, and highly productive without being deeply focused. AR stated that when you are productive you can focus on execution, but you may not access a deep thinking style work or project type work.

It was suggested that knowledge worker productivity requires that you are productive whilst being focused. PTW stated that if you needed accuracy then you need both productivity and focus. CN stated that “loving your work is required for focus and productivity”.

Other interesting insights were that the type of role determined the level of productivity and focus that is required. For example in management, when you are dealing with people, you are productive but not accessing a deeply focused state. It was suggested that it is difficult to feel productive if you are not creating something tangible. It was also difficult to feel productive when you are achieving outcomes indirectly, such as through the management of a team.

14. Does quality detract from productivity?

15. Is being focused the same as being productive in knowledge work?
All participants felt strongly that quality is one of the outcomes of knowledge worker productivity. They were unanimous in the viewpoint that productivity without caring about quality was pointless and wasteful since it will result in rework. CN felt that you needed to care about what you are doing, to be productive so that “you met the deadline with quality instead of just wanting to meet the deadline”.

Figure 18 below, summarises the key points from the questions.

Figure 18: Key points from the feedback of questions 7 to 15.
4.2.3 CHECK (OF ACTION RESEARCH CYCLE): REFLECTION

The following section structures the reflection according to Flyvbjerg’s questions that he advocates in adopting a Phronesis approach (refer to Chapter 3, section on Methodology, subsection on Phronesis).

4.2.3.1 WHERE ARE WE GOING?

The participants’ perspectives revealed that while they had not previously considered their levels of productivity, there was a strong sense that they were generally productive. They stated that there was always scope for improvement, but they did not specifically state that there was a need to improve their current productivity levels. This leads me to believe that either there is no need for concern or that they were complacent as long as they were generally more productive than unproductive and were merely voicing their continuous improvement beliefs.

4.2.3.2 IS THIS DEVELOPMENT DESIRABLE?

The culture of supporting knowledge work is desirable and is required by employees who highlighted it as a requirement that they need to be productive.

The development of compulsory Focus Time without considering the role played or the role’s expected productivity levels, and the extent of collaboration is undesirable because it will not lead to higher levels of productivity and productivity will eventually plateau or will erode. I think that the current behaviour is similar to the archetype of Eroding Goals (refer to Glossary) where targeted productivity levels decreases over time as performance levels are not met. Without clearly understanding the productivity goals and its underlying mechanism, there is pressure to adopt quick fixes, creating a recurring pattern of interventions that aims to solve the same set of symptoms, whilst productivity levels drop.

4.2.3.3 WHAT IF ANYTHING SHOULD BE DO ABOUT IT?

There appeared to be hygiene and motivation factors at play. Hygiene factors are factors that don’t cause increases in productivity but without them, productivity drops, and definite factors cause an increase in productivity levels. There also appeared to be
agreement that Chillisoft provides a set of hygiene and motivation factors. We therefore need to investigate what specifically constitutes hygiene and motivation factors and how these factors interact.

4.2.3.4 WHO GAINS AND WHO LOSES
Currently knowledge workers gain if they are directly responsible for achieving productivity. Individuals who manage others and have to achieve via other individuals appear to be disadvantaged as their productivity is perceived as less important than the team’s productivity levels. In future scenarios (where Chillisoft incorporates the research findings into our practices) both knowledge workers and their managers will be perceived as equally productive, via different expectation of outcomes.

4.2.4 ACT OF (ACTION RESEARCH CYCLE: FINDINGS)
A workshop was held with the Chillisoft team during Deliberate Practice, to discuss the results of the interviews.

The interviews reveal that there are strong concerns and similarities amongst groups within the participants (as illustrated in Figure 19). Groups were formed along functional roles where KDB, SM and TF fulfilled multiple roles as team leaders, whilst PTW is a manager (where the team leads and manager are collectively referred to as management).
Figure 19: Illustrating the multiple perspectives of knowledge work and knowledge worker productivity.

My Framework of Ideas and the results from phase 1 were used to initiate discussion and to develop the world-views (as illustrated in Figure 20 below). The perspectives the root definitions and answers to the SSM questions that are advocated by Checkland (that were described Chapter 3, sub section Data Gathering) is enclosed in Appendix C1.
Figure 20: Stakeholder perspectives that were obtained from the workshop
The sharing of the research results and the development of the world-views resulted in increased discussion and an increased understanding of productivity. The results clearly indicate the different types of knowledge work that each stakeholder performs, where the product developer worked with large degrees of uncertainty that called for a collaborative model of working, since it requires large amounts of collaboration and interpretation (refer to the Literature Review, section on Collaboration). The production developer relied to a large degree on following systematic processes, and therefore primarily uses the integration model of Davenport’s Collaboration model. However, the production developer is expected to use his or her judgement to define the thin slices, which requires the use of an expert model. The management stakeholder responds to his or her team and is usually the senior technical resource. The management stakeholder therefore should use a mixture of the collaboration and expert model.

The discussion highlighted the complexities in defining productivity and in identifying a productive state, and it triggered a deeper level of discussion. The perspectives highlighted that the extent of conditions that enable productivity are different for each role (e.g. research and autonomy is required in all three roles, however it is key in product development). The intervention served to move the conversation from “Am I productive?” to “How can I be more productive?” and “What is stopping me from being more productive?”
4.3 PHASE 2 OF ACTION RESEARCH CYCLE

4.3.1 PLAN (OF ACTION RESEARCH CYCLE)
According to Ramirez and Nembhard, there is a “general belief that knowledge workers should be included in efforts of deciding how to measure productivity” (Ramírez & Nembhard, 2004, p. 625), since they have the best understanding of potential metrics that could assess performance. I therefore decided to conduct two surveys eliciting their perspectives on knowledge work. The research results from phase 1 were used to develop a questionnaire (refer to Appendix B3). The objective of the questionnaire was to determine perceptions about the hygiene and motivating factors. A hygiene factor is a factor that does not cause an increase in knowledge worker productivity but without it, productivity drops, and the presence of a motivating factor causes an increase in productivity. A second survey (refer to Appendix B4) was conducted to determine which factors are important to managers and knowledge workers. Both surveys were conducted within a week and were issued to the Chillisoft team. The surveys were anonymous and optional. I continued to observe the team during Deliberate Practice, Focus Time and Pairing.

4.3.2 DO (OF ACTION RESEARCH CYCLE): RESULTS OF SURVEYS

4.3.2.1 SURVEY 1
Twenty respondents indicated that the significant hygiene and motivating factors were the factors indicated in Table 4.
<table>
<thead>
<tr>
<th>Hygiene Factor</th>
<th>Motivating Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>No interruptions</td>
<td>Autonomy to do research</td>
</tr>
<tr>
<td>Creative work environment</td>
<td>Focus Time</td>
</tr>
<tr>
<td>Knowledge worker treated as an asset instead of a cost</td>
<td>Autonomy to shape the approach to the task</td>
</tr>
<tr>
<td>Good Equipment and Tooling</td>
<td>Knowing what the task is</td>
</tr>
<tr>
<td></td>
<td>Clear outcomes</td>
</tr>
<tr>
<td></td>
<td>Job enjoyment</td>
</tr>
<tr>
<td></td>
<td>Positive mood</td>
</tr>
<tr>
<td></td>
<td>Culture of continuous Improvement</td>
</tr>
<tr>
<td></td>
<td>Attention to high quality</td>
</tr>
<tr>
<td></td>
<td>Personal drive</td>
</tr>
<tr>
<td></td>
<td>Feedback or rewards for completion of tasks</td>
</tr>
</tbody>
</table>

The respondents chose motivating factors over hygiene factors (i.e. on average a respondent chose four hygiene factors compared to sixteen motivating factors). The most significant hygiene actors ranged between 50% and 70% of the respondents whilst the most significant motivating factors ranged between 70% and 85% as illustrated in Figures 19 and 20.
Figure 21: Participant’s response to hygiene factors.
Figure 22: Participant's response to motivating factors.

The most popular factors were “Positive mood” (i.e. it was selected by 85% of the respondents). “Personal Drive”, “Culture of continuous Improvement”, “Autonomy to do Research” and “Clear Outcomes” were selected by 75% of the respondents.

It is interesting that the chosen motivating factors are largely related to achievement, the work itself and responsibility (i.e. according to the Literature review, in the section on Motivation, motivational factors can be classified as “recognition, advancement, and responsibility, possibility of growth, achievement and work itself” (“Hertzberg hygiene factors and motivators theory,” n.d.)). The hygiene factors that were selected are largely classified as interpersonal relations and working conditions (i.e. according to the Literature review, in the section on Motivation hygiene factors can be classified
as “company policy, technical supervision, interpersonal relations, salary, job security, personal life, working conditions and status” (“Hertzberg hygiene factors and motivators theory,” n.d.)).

It is interesting that Focus Time was selected as a motivating factor and not as a hygiene factor. This is in contrast to my Framework of Ideas where I thought that our practice of Focus Time is an essential practice that regulates attention and is therefore critical for productivity. According to Hertzberg’s definition of a motivating factor, the sample results where 70% of the group selected “Focus Time” as a motivating factor implies that 70% of the group believe that they can be productive without decreasing productivity if Focus Time was not practiced.

Sutaria comments that Myers defines motivation seekers as:

As inner-directed, whose belief patterns were deliberately chosen and less influenced by environment. They had a tendency to work hard and to strive for quality. They took interest in their work and derived pleasure from it. The hygiene seekers were described as outer directed; their values tended to blow with wind and were highly influenced by external environment. They had little interest in work; were careless about quality of work, and expressed cynicism regarding positive virtues of work and life in general. (Sutaria, 1980, p. 221)

Since the majority of the respondents preferred motivating factors to hygiene factors, it can be concluded that the team is skewed towards being motivation seekers or intrinsically motivated individuals. This result could be attributed to Chillisoft’s strong culture and recruitment criteria where we screen candidates and deliberately recruit individuals who are intrinsically motivated. The selection of “Creative work environment” could be attributed to preference of the type of individual that Chillisoft employs. The selection of “no interruptions” is expected since we practice Focus Time and the effect of interruptions on concentration is clearly understood and has been experienced by the team. This selection of “no interruptions” is corroborated by the interview results in phase 1.
The selection of the motivating factors of “Job enjoyment”, “Positive mood”, “Focus Time”, “Attention to high quality” and the “Culture of continuous improvement” is expected because it is strongly ingrained in our company values and culture. “Autonomy to do research” and “Autonomy to shape the approach to the task” were expected results since we typically recruit individuals who want and require autonomy (i.e. these individuals choose to work for Chillisoft because our practices requires self-organisation and high degrees of intrinsic motivation to accomplish tasks). These results are also corroborated by phase 1 interview results.

It is significant and unexpected that the team chose “knowing what the task is”, “clear outcomes”, “drive” and “feedback”, because Chillisoft does not have traditional management controls such as performance feedback and waterfall project management where tasks and performance are made explicit. We follow Agile principles, where there is a large amount of unknowns, uncertainty and complexity. The selection of these factors could mean that Agile processes are being implemented well since small increments provides more certainty and according to Davenport, “agile methods and techniques are typically better than engineering methods where knowledge work is concerned” (Davenport, 2005, p. 83).

Initially it was surprising that “Personal Drive” and “Feedback or rewards for completion of tasks” were selected, because it is expected that this combination is typical of an individualistic, competitive culture, whilst Chillisoft’s culture is collaborative and team based. On further study, the selection of these factors is expected because it matches the traits of the individual that we typically hire, namely individuals who thrive with feedback, since it would act as a motivator.

The factor “Feedback or rewards for completion of tasks” was unclear and further questions examining reward systems were included in the second survey.

4.3.2.2 Survey 2
The survey indicated that there was a very strong alignment between management and the Chillisoft team where both groups chose “Trust”, “Learning” and “Shared vision and purpose” as the most significant factors, as is illustrated in Figure 23.
Figure 23: Venn diagram illustrating significant factors chosen by management and the Chillisoft team.

Oscar Berg, popularised a model (illustrated in Figure 24) that indicated discrepancies between management and knowledge workers viewpoints on knowledge worker productivity.
According to his model, the only commonality between both groups was a decent salary that appeared to be a hygiene factor.

Figure 23, illustrates the strong alignment between management and the Chillisoft team which differs significantly from Oscar Berg’s model. According to Berg’s model, in the Chillisoft model, both the management and the Chillisoft team have chosen almost all the factors that matter to knowledge workers, with the exception of “Recognition” (that was not significant to either group) and “Mastery” that was significant to the Chillisoft team and not to management. The strong alignment can be attributed to the culture of “Doing” where managers are knowledge workers themselves, where they perform other knowledge work besides management, such as
software development. It can also be attributed to the deliberate organisation and culture design where we specifically set out to support knowledge work.

The three most significant factors to both groups were “Shared vision and purpose”, “Learning” and “Trust”. The survey’s results corroborates Berg’s depiction of a “Decent Salary” as a hygiene factor to both groups. It is significant that both the management team and the Chillisoft team did not choose “Supervision”, “Fear”, “Performance metrics”, “Competition” and “Prestige or exclusivity”. “Bonuses”, “Career ladder” and “Recognition” were minor factors, where less than 10% of the Chillisoft team chose them and management did not choose them at all (as illustrated in Figure 25). This result confirms that individuals are motivated by feedback and not financial rewards for completion of tasks.

Figure 25: Illustrating the choice of productivity factors
A summary of my observations relating to Focus Time, Deliberate Practice and Pairing is enclosed in Appendix C2

4.3.3 Check (of Action Research Cycle): Reflection

4.3.3.1 Where are we going?
The selection of the hygiene and motivating factors demonstrated the strong effect of the Chillisoft culture and practices on the productivity of our team.

The selection of the values also indicated that Chillisoft stakeholders will not respond well to typical scientific management style of KPI’s and tangible performance metrics. The surveys indicated that Chillisoft has a strong culture that supports knowledge worker productivity, however, there still appears to be issues with productivity.

The following CHAT diagram (Figure 26) illustrates the structure–agency impact (in orange text) on an individual in the team, where the survey’s selected factors and feedback from the interviews (adds clarity to my initial CHAT model from my Framework of Ideas).
Figure 26: Illustrates the structure—agency impact (in orange text) on an individual in the Chillisoft team.

The pervasiveness of Chillisoft’s culture and the tight coupling to the practices and belief systems is desirable because it creates a strong identity. However, the situation is also problematic because it restricts the agency of individuals, as indicated in the literature review in the section on Organisational Design Structure and Culture (i.e. such a process may flourish in strong corporate cultures, but might also be viewed...
Understanding the influence of invisible factors on knowledge worker productivity
cautiously by some”, since it secures organisational control of employees’
organizational identification (Whiteley et al., 2013, p. 6).

The discussions with the team during the (action phase) revealed that “Trust” was the
pivotal factor that allowed for individual agency in Chillisoft. According to the
literature review on Trust, the factors: “Belong and Connect; Voice and Recognition;
Significance and Position; Fairness; Learn and Challenge; Choice and Autonomy;
Security and Certainty; Purpose” (Jacobs, 2013, p. 2), strengthened trust in a company
If there is a breakdown in trust, where the individual loses his or her trust in the
organisation company actions or behaviour, the above factors, Positive mood, Work
Enjoyment, Knowledge worker treated as an asset instead of a cost, the Shared vision
and purpose, Learning, Belonging and Collaboration) will be absent.

Since the maintenance of trust is essential, we need to continually focus on initiatives
that build and maintain trust.

4.3.3.2 IS THIS DEVELOPMENT DESIRABLE?

The surveys indicated that there is strong alignment between the management team
and the Chillisoft team. This alignment is very desirable since it is indicates that the
worldviews of both groups are shared, making communication and understanding of
issues easier. It also indicates that Chillisoft’s management style is suitable for
knowledge workers, since the literature review in the section on ‘Impact Of
organisational Design and Culture’ indicates that in order to manage knowledge
workers, management must shift from “overseeing work to doing it, from organising
hierarchies to organising communities, from building manual skills to building
knowledge work” (Davenport, 2005, p. 191)

The selection of shared vision and purpose and learning factors was expected since
Chillisoft has a very strong identity and we focus heavily on learning and growth. Both
shared vision and purpose and learning are also factors that are needed for trust. The
selection of trust as one of the three most significant factors was surprising because
trust is implicit in the Chillisoft environment and it is not a topic that is discussed at Chillisoft.

Trust is a complex concept that has multiple interpretations and can be viewed as interpersonal, organisational or total trust. It is not a discrete, tangible factor that is easily measured or managed. However, the existing literature proves that if there are high levels of either interpersonal, organisational trust or both, then there are high performance (Petrella, 2013). A situation of high levels of trust is therefore desirable since an increase in trust will increase knowledge worker productivity.

4.3.3.3 WHAT IF ANYTHING SHOULD BE DONE ABOUT IT?

Trust is difficult to measure, the artefacts and behaviour that signifies trust or a breakdown of trust must be understood by management. It is important to understand what leadership, interpersonal and organisation actions are most likely to impact the levels of trust. It is critical that we understand how trust impacts knowledge worker productivity.

4.3.3.4 WHO GAINS AND WHO LOSES

Chillisoft will benefit overall if there are initiatives to promote trust, learning, shared vision and purpose, because it will result in stronger alignment, identity and effort, increasing productivity. All three factors requires an understanding of how value will be generated and how the effort applied to the initiative should be balanced with the value that is generated for the business e.g. too much effort towards learning will benefit individuals, but it may not benefit the business if there is weak alignment between technologies learnt and technologies that are applied in our business. Similarly too much trust invested in individuals may cause excessive stress in an individual. Too much time spent on espousing our shared vision and purpose may result in group think, shutting out diversity and limiting the agency of individuals. The selection of shared vision and purpose signifies that this is an important element and our efforts at clarifying and communicating strategy, and company direction should continue.
4.3.4 Act of (Action Research Cycle: Findings)

The insights from my reflection was used to determine the action. The reflection indicated that trust needed to be understood in greater detail and was selected as the action intervention.

A team discussion was held where I shared the results of the survey and where we discussed the teams’ understanding of trust and its impact on knowledge worker productivity. The team understood trust as interpersonal trust and organisational trust. The key element of trust that was mentioned by several individuals was consistency and alignment between what is said and what is done. The following aspects were identified as factors that increases interpersonal and organisational trust:

- Competency and Skills
- Consistent approach and behaviour
- Alignment between talking and doing
- Ability to be vulnerable e.g. people want to pair with someone who is prepared to be seen as imperfect and vulnerable to making mistakes. The team wants managers who are “human” and not perfect.
- Integrity e.g. putting the company’s or project’s interests first

Mistrust was associated with a discordance in behaviour, where the individual does not behave in a way that is expected, and further explanations of why the team selected trust is enclosed in Appendix C3

The workshop helped us to identify patterns that we associate with trust and mistrust as is illustrated in Figure 27. The discussion was engaging and following causal loop diagram (Figure 27) was modelled with the team during our discussion.

The model illustrates that integrity, discordance in behaviour, openness, skill and competency levels are the main factors that impact trust levels. As trust increases, the levels of autonomy, collaboration and motivation increases. An increase in collaboration, and or motivation levels, increases knowledge worker productivity, which results in an increase in skill and competence levels. The higher the skill and
competence level, the higher the levels of trust. In essence an increase in skill and competence levels, increases autonomy, trust, collaboration and motivation.

Figure 27: Impromptu model of trust as discussed by the team

4.4 CONCLUSION

This chapter described the research results of phases 1 and 2. All participants agreed defined knowledge work as cognitive or “thinking work where knowledge workers used and created knowledge, to solve real world problems”. Phase 1 indicated that stakeholder perspectives on knowledge worker productivity, could be grouped according to the roles that they performed, namely Production Developer, Product Develop or Manager. There appeared to be a challenges with the perception of productivity in dual roles such as Team leads where they are fulfilling the role of senior software developer and manager. Participants had a strong sense that they were generally productive, and did not seem to have an indication or care about how productive they were. The practice of Focus Time without considering the role or the role’s expected productivity levels and the extent of collaboration that is required appears to be problematic.
A survey on hygiene and motivating factors indicated that motivating factors are largely related to achievement, the work itself and responsibility. The hygiene factors that were selected are largely classified as interpersonal relations and working conditions. The strongest hygiene factors were “no interruptions” and “attention to quality”, which is aligned to Chillisoft’s practices, indicating a strong identification with Chillisoft practices. The strongest motivating factor was a positive mood, illustrating an awareness of the effect of mood on knowledge worker productivity. A survey on knowledge worker productivity factors indicated that both management and the team had common needs in that both groups chose the three most significant factors as “Shared vision and purpose”, “Learning” and “Trust”. The non-selection of specific productivity factors indicated that the Chillisoft team will not respond well to a metric based management style or a style. The team’s discussions revealed that an increase in skill and competence levels, increases autonomy, trust, collaboration and motivation. The next chapter describes the process of building a theory using grounded theory and it also discusses the theory that has emerged from the data.
5. CHAPTER 5: RESEARCH DATA AND THEORISATION

5.1 INTRODUCTION

This chapter describes the grounded theory process that was used to collect data and to develop a theory. The chapter describes the theorisation process, the theory and discusses data validity concerns.

5.2 UNDERSTANDING OF WHAT CONSTITUTES A THEORY

According to Charmaz (2014), there are two stances on grounded theory, namely the objectivist and the constructivist. Objectivists assume that data exists in the world and that the researcher finds data and generates theory about the data. The objectivist’s view of grounded theory is that data observations exclude the social context, the influence of the researcher, the interaction of the researcher and research participants. It assumes an “external reality and an unbiased observer who records facts about it” (Charmaz, 2014, p. 237). The purpose of an objectivist’s theorising is to generate a theory that is not dependent on time, place and context.

The constructivist’s view of grounded theory is that the resulting theory is an interpretation and that it depends on the researcher’s position, influence and viewpoint. The resulting research data and analysis is a social construction, where the research process and products occurs under pre-existing structural conditions. The observations that we choose to make, how we make them and the views that we form from them, reflects these structural conditions. The purpose of a constructivist’s theorising is to create situated knowledge and not abstract theory.

I have adopted a constructivist’s approach to grounded theory and accordingly aspired to create situated knowledge. In grounded theory a theory could mean empirical generalisations, categories or core variables, relationships between core variables, an explanation, description or an abstract understanding.
5.3 Theorisation Process

According to Charmaz, Glasser describes grounded theory as “a theory resolving a main concern” (Charmaz, 2014, p. 241). I have attempted to develop a theory that resolves the main concern. I used Charmaz’s interpretation of grounded theory to build a theory. My theory consists of a causal loop model to describe and to understand the underlying mechanism that results in the situation of concern. The section below describes the coding process.

5.3.1 Coding Process

The three phases of developing a theory are initial coding, focused coding and theorisation. Charmaz’s techniques are reflexive, and cater for observations about participant’s emotions and feelings. The reflexivity of the coding primarily focuses on what the data is saying and not on the technicalities of techniques such as axial coding, which may detract from the data. Observations were made during phases 1 and 2 and were recorded as propositions in a proposition log as is illustrated in Figure 28 below.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Data</th>
<th>Proposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1, CN Interview</td>
<td>CN: “KW is fuzzy because you are dealing with user experiences</td>
<td>User experiences are fuzzy, therefore developing software for users is fuzzy.</td>
</tr>
<tr>
<td>Phase 3, 3.47</td>
<td>Observation of Pairing</td>
<td>Knowledge borne of experience recognises patterns and can make connections between what is happening now and what has happened</td>
</tr>
</tbody>
</table>
Understanding the influence of invisible factors on knowledge worker productivity

<table>
<thead>
<tr>
<th>Relevance</th>
<th>Impact</th>
<th>Driver/Restrainer</th>
<th>R/I</th>
<th>Memo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness that work is thinking work or knowledge work, increases acceptance that it is fuzzy</td>
<td>medium</td>
<td>R</td>
<td>R</td>
<td>Fuzzy nature of KW makes it difficult to grasp and plan for work execution</td>
</tr>
<tr>
<td>Experienced KW'ers recognise patterns easily</td>
<td>High</td>
<td>D</td>
<td>R</td>
<td>pattern recognition from experience adds elements of intuitiveness</td>
</tr>
</tbody>
</table>

**Figure 28:** Illustrating how propositions that formed the proposition log were coded.

During the initial coding phase, a hundred propositions that originated from ten interviews (seven interviews for phase 1 and three interviews for phase 2) were recorded, as illustrated in Figure 29. The propositions were categorised using open-coding resulting in nineteen categories after the seven interviews, and twenty-seven categories after the three interviews from phase 2. The twenty-seven categories were
then reduced to eight core categories, which were saturated after the theoretical sampling to have a total of a hundred and sixty two propositions. The theoretical coding was reflexive and relied on prior knowledge of the topics (from the literature review) that allowed for theoretical sensitivity.

![Figure 29: Simultaneous process of data collection, coding and analysis](image)

### 5.3.2 Categorisation

Table 5 below lists the initial twenty seven categories that were developed.

**Table 5: List of Categories**

<table>
<thead>
<tr>
<th>Categories during initial coding</th>
<th>Accessibility to resources, equipment and skills required for work</th>
<th>Preparation for deliberately focusing</th>
<th>Reflexivity to environment and context</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Collection</strong></td>
<td><strong>Data analysis and coding</strong></td>
<td><strong>Action Research Phase 1</strong></td>
<td><strong>Action Research Phase 2</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Initial Coding</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>19 Categories</strong></td>
<td><strong>60 propositions</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Initial Coding</strong></td>
<td><strong>8 additional Categories</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>40 propositions</strong></td>
<td><strong>Focused Coding</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>27 to 8 categories</strong></td>
<td><strong>Theoretical Coding</strong></td>
</tr>
<tr>
<td><strong>Focused Coding</strong></td>
<td></td>
<td><strong>62 additional propositions</strong></td>
<td><strong>Reclassification of 162 propositions</strong></td>
</tr>
</tbody>
</table>

Copyright UCT
<table>
<thead>
<tr>
<th>Accountability for self-management and productivity</th>
<th>Progression and motivation for productivity</th>
<th>Understanding of productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy in work design and approach</td>
<td>Attributes of being in a focused state</td>
<td>Meaningful work</td>
</tr>
</tbody>
</table>
My Framework of Ideas provided the initial sensitising concepts to start my initial coding process, however it did not determine the proposition’s content. The coding process required that I look beyond the concrete statements to search for the underlying meaning that the data conveyed. This analysis guided the questions that were being asked during the interviews as I sought to clarify issues. The simultaneous process of data analysis and data gathering helped me to delve deeper into the research domain. As each proposition was added, the propositions were constantly compared
and emergent themes were identified and compared to existing themes. This process entailed continual comparisons and recoding as emergent themes developed.

During the Focused Coding phase, the propositions were re-classified using the most frequent emerging themes to better describe them. The modification of the themes allowed for a higher level of abstraction.

The categories were reduced from twenty seven to eight categories where categories were aggregated to form new categories, as is illustrated in the following affinity model (Figure 30).
Figure 30: Affinity model of initial codes for propositions
5.4 Development and Description of a Theory

5.4.1 Development of Core Variables

A brief literature review was conducted to provide me with more insight regarding the eight categories. The eight categories were developed further by collecting another sixty two propositions. The final number of propositions per category is listed in brackets in the core category label, in the affinity model above (Figure 28).

Table 6: The final eight categories were renamed to form variables as is illustrated below

<table>
<thead>
<tr>
<th>Number</th>
<th>Category</th>
<th>Core Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Collaboration</td>
<td>Extent of collaboration</td>
</tr>
<tr>
<td>B</td>
<td>Work enjoyment</td>
<td>Work enjoyment level</td>
</tr>
<tr>
<td>C</td>
<td>Trust</td>
<td>Trust level</td>
</tr>
<tr>
<td>D</td>
<td>Shared social identity</td>
<td>Extent of shared social identity</td>
</tr>
<tr>
<td>E</td>
<td>Motivation</td>
<td>Motivation level</td>
</tr>
<tr>
<td>F</td>
<td>Autonomy and agency</td>
<td>Level of autonomy and agency</td>
</tr>
<tr>
<td>G</td>
<td>Focus practice</td>
<td>Commitment level to focus practice</td>
</tr>
<tr>
<td>H</td>
<td>Impact of organisational; design and culture</td>
<td>Impact level of organisational design and culture</td>
</tr>
</tbody>
</table>

Each of the core variables that encompasses the grouped propositions is described below.

Extent of Collaboration
The core variable describes the Pairing practice, the required attributes of collaboration, the knowledge transfer, and acquisition that occurs via collaboration. The variable refers to the degree that an individual is prepared to collaborate in the knowledge production process.

Trust Level
The core variable describes trust between individuals and between the individual and the company and vice versa. It also describes the antecedents and attributes of trust
such as being prepared to be vulnerable, being skilled and competent inspiring trust and being consistent and reliable in the behaviour that is associated with trust.

**Extent of Shared Social Identity**

The core variable describes the extent to which an individual shares in or associates his or her identity with the company identity. This variable refers to the extent that the individual values and company values are shared.

**Motivation Level**

The core variable refers to aspects of motivation such as having personal drive, good tooling, receiving feedback and acquiring a sense of progression in your tasks. It refers to an individual’s personal incentive to be productive at work.

**Level of Autonomy and Agency**

The core variable refers to the amount of autonomy that an individual feels in his or her job, that includes aspects such as deciding what to do, the task definition, approach to task and setting deadlines for the task. It also refers to the amount of control that a person feels over their ability to accomplish their work.

**Commitment Level to Focus Practice**

The core variable refers to the disciplined approach to focusing attention. It entails being aware of your individual state as well the surrounding context. It encompasses preparation, execution and reflection of the task.

**Impact Level of organisation design and culture**

The core variable refers to the structure-agency effect where Chillisoft’s organisational design and culture (which are structure attributes) impact an individual’s decision making and actions (which refers to the agency).
5.4.2 PROPOSED THEORY

An Affinity Diagram Interrelationship Digraph (ADID) was developed where the dominant loops were identified to create a causal loop diagram. The artefacts of the modelling process (namely the ADID and the identification of loops) are illustrated in Appendix D.

The causal loop diagram represents the context, mechanism and outcome (as is illustrated in Figure 31). The model below illustrates a balancing loop that represents a symptomatic solution (identified by green arrows), a balancing loop that represents a fundamental solution (in grey) and a reinforcing loop that represents the side effects and is represented in orange. The contextual factors are indicated as boxes that impact on the core variables. The mechanism is represented by the driver that was identified as “Impact level of organisation design and culture”. The core variable “Impact level of organisation design and culture” is triggered by core variables in both the symptomatic and fundamental solution balancing loops, namely “the extent of shared social identity” and “work enjoyment levels”, to produce an outcome of “Knowledge worker productivity”.
Figure 31: Causal loop model illustrating the context, mechanism and outcome.
The causal loop model is similar to the archetype of Shifting the Burden, where the problem of improving knowledge worker productivity can be solved by applying a symptomatic solution (such as implementing more structured and tangible production practices and metrics), or by applying a more fundamental solution that is difficult and longer to implement (such as teaching knowledge workers the discipline of Focus Practice).

Once the symptomatic solution appears to be working, there is a temporarily sustained positive side effect of an increase in knowledge worker productivity. These gains trigger very little effort to apply a fundamental solution.

As new employees high performing, driven individuals, motivated to excel are recruited, the collective social identity in Chillisoft is weakened, because the new employees do not yet understand the culture, values and implicit behavioural traits of Chillisoft. As the shared social identity is weakened, the cohesiveness and self-managing ability of the team weakens, prompting an increased focus on rules and on managing the tangible aspects of production such as the practices, reporting structure and tangible metrics.

The increased focus on complying with workplace practices (such as Deliberate practice, continuous integration and test-driven development) increases knowledge worker productivity levels, work satisfaction and enjoyment levels. Employees have an increased sense of work enjoyment because their tasks are manageable in small chunks and they have a sense of accomplishment from continually delivering smaller pieces of work. An increase in work enjoyment levels results in an increase in trust in the organisation due to the increased reliability of delivery, consistency in quality and clear management structures. Trust is increased because of the increase in belonging and connecting, learning, certainty and purpose (refer to Literature Review, section on Trust). This behaviour results in symptomatic relief as it temporarily increases knowledge worker productivity. It is temporary because employees are motivated by extrinsic rewards and feedback and have not yet learnt how to be intrinsically motivated by the work itself (that is learnt in the focus practice). Management also intervenes to shape and make tasks less fuzzy for their team, assisting them with
delivery, adding to the management workload and stress. Employees have not learn’t to deal with fuzziness and complexity of their work at this stage.

It must be noted that the symptomatic results are such that knowledge workers are productive, but are not as productive as they could be. This statement is supported by the interview feedback of phase 1 where employees felt productive, but recognised that there was room for improvement.

In the underlying mechanism, in the fundamental solution loop, the increase of the impact of the organisational design and culture by the strong practices and culture that defines behaviour, decreases the individual’s agency and autonomy. The decrease in autonomy is acutely felt by seniors who crave more autonomy than juniors. This statement is supported by feedback from seniors in the phase 1 survey where they were acutely aware of when they were unproductive and craved autonomy in research and in shaping their tasks. The seniors are accountable for delivery, and set the tone and pace of delivery. Therefore the decrease in autonomy and the resultant decrease in motivation levels and commitment to the focus practice has a significant impact on productivity because commitment is required for performance (refer to Literature Review, the section on Autonomy and agency).

This decrease in motivation, decreases knowledge worker productivity levels and work enjoyment levels. This is a significant finding because work enjoyment levels demonstrates the links between productivity, autonomy, responsibility for task direction and productivity (refer to Literature Review, section on Work enjoyment).

The senior’s decreased commitment to focus practices sets the tone of behaviour (refer to Literature Review, section on Shared values) and ultimately decreases the effect of Chillisoft’s organisational design and culture on individuals. Seniors perceive the restricted autonomy as a change in Chillisoft’s culture, introducing an element of mistrust. In the reinforcing symptomatic results loop (in orange), the decreased motivation is deliberately increased by providing motivational factors such as shorter deadlines that trigger increased focus and stress. This statement is supported by the research results in phase 1 where the production team was driven by delivery and by
Understanding the influence of invisible factors on knowledge worker productivity

completing tasks. Motivation is also increased by management providing team assistance and making tasks and complexity less fuzzy, as stated in the research results of survey 1 and the manager’s world-view in phase 1, where the team chose “knowing what the task is”, “clear outcomes”, “drive” and “feedback” as significant factors that increased productivity.

The provision of access to good tooling, equipment and resources also improves motivation. The increase in motivation increases the extent of collaboration. The extent of collaboration is improved significantly as juniors (who are assigned as apprentices) pair with seniors on projects. The increase in collaboration improves knowledge worker productivity and is well received by the team, escalating their sense of work enjoyment due to a heightened sense of accomplishment, belonging and learning. An increase in work enjoyment builds the trust between individuals and in the company. The increased trust improves corporate citizenship and escalates the extent of social identity.

The underlying mechanism was difficult to identify because the production team’s world-view is very delivery-centric and heavily focused on metrics and tangibles, thereby encouraging the management paradigm of focusing on practices and procedures, and increasing the symptomatic solution and its results. This dynamic resulted in a situation that is described by the rich picture in Chapter 1, where I could sense the high stress levels and a discordance, whilst the operations director perceived the situation to be under control, where everyone was productive.

In essence in response to my research questions I propose that even though a company may have a strong culture that is supportive of knowledge work and knowledge worker productivity, invisible issues (such as trust, work enjoyment, shared identity, autonomy and motivation) easily impact productivity. These invisible factors form part of the psychological contract between employees and the company. Management actions with unintended consequences causes a subtle shift in these factors breaking the psychological contract, and a change in culture. Culture is continually being shaped and enacted in each social interaction. The resultant response which may surface subtly as a change in a mood is typically a symptom of the deeper underlying
issue. The extent to which the symptom is displayed and the mood surfaced, depends on the strength and effect that the rules, practices and resources have on individuals in the social context of work and their shared identity with the organisation. Platforms that increase an individual’s agency and collaboration are required to voice these disharmonies because a continuation of the situation deepens the unvoiced assumptions, decreasing productivity.

This section described the context, mechanism and outcome of the causal loop, explaining why the model was similar to the Shifting the Burden archetype. The next section explores the data validity and constraints of the research.

5.5 DATA VALIDITY AND CONSTRAINTS

This section describes the validity and trustworthiness of my research data and process. It also discusses the research constraints.

5.5.1 DATA VALIDITY

The adoption of a subjective stance implies that the facts in this research are “culturally and historically located, and therefore subject to the variable behaviours, attitudes, experiences, and interpretations” (O’Gorman, 2014, p. 57) of the researcher and participants. I have catered for this variability by ensuring that I was immersed intensively in the research, working in the open-plan office, observing and interviewing participants across different days and time periods. My sample set was varied, catering for different roles, genders and ages to limit bias. I also used triangulation via multiple and different questions and perspectives of interviewees. Data sources such as survey data, was triangulated against literature review findings and interview data so that I could cross-check my findings.

Data validity in qualitative research refers to the trustworthiness and rigor of the data. My research methodology and Chapter 4: Research Observations and Findings demonstrates the rigor and conformance to the methodology. All interviews were recorded and are available for corroboration with the resultant propositions. The rigor and my attempt at capturing the kernel of the interview can be corroborated by
comparing my interview results with the recorded interviews. An outline of the interview questions and format is listed in Appendix B2. I also used thick and rich descriptions of the observations and interviews, reporting discrepant information (refer to Chapter 4: Research Observation and Findings) and ensuring that I recorded memos throughout the research process.

Trustworthiness in qualitative research requires that the researcher consider that reality is constructed and that the researchers perspective be considered with those of the participants in the observed setting ("Trustworthiness," 1995). During the research I was aware of and articulated my world-view as well as those of the participants.

The effectiveness of the research methods chosen is dependent on my skills as a researcher. I was aware of that there may be hesitancy from the interviewees since I am the CEO of the company. I was aware of this and framed questions so that interviewees could also ask me questions to clarify, provide additional information, or eliminate bias due to my position.

A limitation is the inherent constraint of using an Action Research approach, where it is recommended that the approach demonstrate rigor that can be replicated. This rigor is demonstrated and described in Chapters 4 and 5, the theorisation process. In accordance with action research principles, my frame-work of ideas were declared up front to limit bias. In order to further reduce bias and the risk of inadvertently becoming influenced by theory, I only conducted a literature review during the theoretical coding stage of the grounded theory.

### 5.5.2 Constraints

The limited time that was available to do research and complete this research was a major constraint. The time constraint limited the research scope to conducting two surveys and excluded my prepared surveys on the practice of Pairing and Focus Time. These surveys would have added depth to understanding trust, collaboration and intrinsic motivation. The research would have been richer and more complete if the research covered periods where both the management styles (mine and those of the
operations director) were dominant. There was also insufficient time to test the proposed theory by implementing an intervention.

It is recognised that in using the Action Research approach, there would be the depth of understanding of the given situation of concern and context, but that the validity of producing a generalised theory would be limited. I have accordingly focused on developing situated knowledge (that is discussed in the next Chapter) that is practical and specific to this case study, where the managers are able to recognise and identify key behavioural patterns.

5.6 CONCLUSION

This chapter described the grounded theory process, the theorisation process, the theory, and concerns about the data validity. My initial research questions were “What invisible factors influence knowledge worker productivity, at work?” and “How do the invisible factors interact to influence knowledge worker productivity?”

My research has indicated that the invisible factors that affect knowledge worker productivity consists of trust levels, the extent of collaboration, work enjoyment levels, the extent of a shared social identity, motivation levels, levels of autonomy and agency, the commitment levels to a focus practice and the impact of organisational design and culture. My research indicated that the key driver is the ‘impact level of organisation design and culture”. This core variable was triggered by the implementation of both the symptomatic and fundamental solution.
The underlying mechanism is similar to the archetype of Shifting the Burden, where the problem of improving knowledge worker productivity was solved by applying a symptomatic solution such as implementing more structured and tangible production practices and metrics, instead of implementing the fundamental solution that is difficult and longer to implement. The fundamental solution entailed teaching knowledge workers a Focus practice. The symptomatic solution appeared to be working, generating temporarily sustained positive side effects. This temporary respite, made it more difficult to apply efforts towards implementing the fundamental solution. The significance of the results relating to the research problem and the research topic will be explored in the next chapter.
6. Chapter 6: Reflection, Evaluation and Areas for Further Research

6.1 Introduction

In considering the plausibility and cogency of a theory it recommended that the “problem space” that the theory is applied to, “the solution space” and “the relationship between them” which claims that the theory has utility be specified (Venable & Baskerville, 2012, p. 144).

This chapter accordingly synthesises the research findings, and summarises the research’s relevance, utility, validity and ethical considerations to companies in the software industry. It describes how the research has contributed to the existing body of knowledge. The chapter also describes my reflection of the research, research process and the areas that I have identified for additional research.

6.2 Reflection and Significance of Results for Research Problem

6.2.1 Did the research fulfill the research question and goals?

I believe that the research has answered the research questions, which are: “What invisible factors influence knowledge worker productivity, at work?” and “How do the invisible factors interact to influence knowledge worker productivity?”

The research has helped me to make a decision of whether I should abandon or continue with our practices and the product (as discussed in the Concern). I have decided to continue with our practices and our product, and will incorporate the research findings to improve our practices and the product. It helped me to understand what on-boarding and pre-assessment consulting should accompany the product because the research highlighted that the intensity and frequency of the focus practices will vary with the role types and the extent of collaboration that is required.

My initial understanding of my framework of ideas were clarified and the research helped me to understand and contextualise the actions of my intuitive, collaborative
management style. Prior to this research, I knew that the design of our organisational culture were important but I did not know or understand how strongly it influences knowledge worker productivity.

Practically I wanted to bridge the gap in the market between the need for certainty and the need for loosely coupled knowledge worker practices by building a consultancy practice. The research results has provided me with a better understanding of the invisible factors and the underlying mechanism that is most likely to be present in high performing teams, helping me to design practices for the consultancy.

Intellectually I wanted to understand the domain of knowledge worker productivity. I believe that I have a better grasp of the productivity dimensions and factors. This new knowledge increases my chances of being able to develop a composite metric that will function as a productivity heuristic. The significance of the research problem to Chillisoft is described below.

6.2.2 RELEVANCE
This section explains the relevance of the research to software companies, including Chillisoft regarding software practices and leadership style.

I believe that providing a structure and process focus without steering critical conversations back to the “why” and the underlying passion or “heart”, results in the temporary immersion in work. This causes a micro-focus on work that becomes mechanical, but that does not inspire intrinsic motivation and joy in the work itself.

The metric driven approach to management improves knowledge work productivity but it causes stress and is “lustreless”. An inspiring authentic vision and purpose cannot be replaced by processes and structure. It is therefore critical that we remain cognisant of the value of continually having conversations about the purpose of work, why mastery is important and why managing attention and focus is the key to mastery and knowledge work. It is also critical that we are aware of always including our team in decisions about changes in the way we work since unilateral changes are associated with mistrust.
The underlying mechanism of focusing on practices and rules strengthened the effect of rules, practices and resources on individuals, in the social context of work. This caused a temporary improvement in knowledge work productivity, but caused a growing level of unease. The general unease was caused by an increase in stress and a perceived deviation from our typical management style that entails more autonomy regarding what and how work is performed.

The proposed theory that invisible issues (such as trust, work enjoyment, shared identity, autonomy and motivation) forms part of the psychological contract between employees and the company is relevant to Chillisoft and companies who adopt an Agile approach since there is a strong focus on working agreements and team charters. These agreements are similar to a psychological contract because it represents expectations that must be fulfilled by both parties and the contract hinges on soft issues that are generally not explicitly articulated.

It is critical that management actions are continually viewed in context of its impact on these contracts since a subtle shift in the invisible factors may break the contract. A break in the psychological contract may lead to a change in team dynamics and culture. It is also important to understand that culture is continually being shaped and is continually enacted in the social interactions, therefore platforms for collaboration and spaces for deep concentration are important.

Software companies are sensitised to knowledge worker productivity issues and many have implemented practices to deepen concentration and increase productivity. In this research individuals used the Focus Time practices but did not apply themselves to the same degree, across the team, because of the backlash from the tightening of controls, and the different types of work that required differing levels of collaboration (refer to Research Results and Observations, Phase 1, Act, where stakeholder world-views were discussed).

My initial concern was that the practice of Focus Time did not work and that we had misunderstood the factors that influenced productivity. The study has indicated that
Focus Time is effective but that the importance of the practice must be contextualised and the extent of collaboration that is required in the team must be considered. The invisible factors that influence productivity must be assessed for each situation where the practice of Focus Time is applied. The research has indicated that in situations that use the integration, expert and transactional model, our Focus Time practice works well and is effective. However, Focus Time practice has limited support for collaboration via pairing and it is not suitable for collaboration.

In the software industry we are familiar with a project or productivity issues when they fail, however we are still immature at pre-empting failures by managing reflexively. The research is relevant because it indicated that shifts in culture and the symptomatic behaviour is subtle and often masks the underlying reason. It gives credence to managers managing in a reflexive manner and exercising practical wisdom to uncover what is happening.

6.2.3 Utility
This section demonstrates that by understanding the underlying mechanism, it has allowed me to apply the key insights to Chillisoft, demonstrating high utility to Chillisoft. It has utility to other software companies who practice Agile, because it serves as practical example of how we will interpret the lessons learnt.

After considering the CMO, the research results and my insights, I am able to apply specific factors that are relevant to Chillisoft using Kelloway’s model (refer to Literature Review) in Figure 32, below.
1. Leadership

Chillisoft’s leadership style is a values based style where we focus on living our espoused values, and on integrating our values into everything that we do. During the research period there was a shift in leadership style to a metric driven performance style. Even though the metrics are aligned with our operational excellence practices, the sudden change in leadership style triggered mistrust in the team leads, who perceived a reduction in autonomy. The research results, in Phase 2, survey 2, indicated that autonomy is very important to the Team Leads, who are instrumental in setting the tone of team interactions.

2. Job design

Prior to the research period, all employees followed productivity and focus practices. Employees had autonomy in deciding what and how to do their jobs. Team leads (management) were focused on assisting their teams and spent the rest of their time developing software. During the research period, team leads were engaged in defining their roles and accountability more clearly. This intervention was positively received. However, we also expected team leads to fulfil more managerial responsibilities via reporting, which was perceived as a decrease in autonomy and work enjoyment. The team leads perceived the attempts to structure the process even further with mistrust. We need to be cognisant of Chan Kim’s and Renee Malbourgne’s statement that “fair
process profoundly influences attitudes, and behaviours critical to high performance. It builds trust and unlocks value” (Davenport, 2005, p. 22). We implemented the new structures collaboratively, but we did not contextualise why the structure was being implemented. We also did not pay attention to the warning signs of resistance and drove the pace of implementation.

3. **Social interaction**

The research results indicated that Shared vision and purpose, Trust and Learning is significant to the entire team. The Directors Feedback meetings, the explicit and continual mapping of actions to strategy is absolutely critical for the shared social identity of the team. It is also essential that we continue with our practices of Deliberate Practice because it increases collaboration, social interaction and learning. Pairing encourages interaction, however we need to encourage seniors to pair with each other so that the interaction is not limited to juniors and seniors pairing.

4. **Organisational culture**

Chillisoft’s culture is formed by our strong set of values which are:

- Becoming experts in our domain
- Adding measurable value
- Delighting users
- Meaningful work is fun
- Building collaborative partnerships
- Being kind, working hard at mastery and having fun.

As is evident from our values there is a strong theme of mastery, a focus on productivity and work enjoyment. In the quest to deliver efficiently and effectively, it is important that we provide feedback and continually emphasise the skills that are being learnt, so as to create an increased sense of meaningful work, according to Vuori, San and Kira (Vuori et al., 2012).

The strong and mature practices shape individual’s behaviour and expectations, where the team is very delivery oriented. It is therefore critical that we continually create and narrate the purpose and vision at a project level for long running projects like product...
development. This is particularly important for product development because there is less feedback from customers since the products are in the development stage.

5. **Ability**

We need to continually promote the practice of Focus Time to allow individuals to practice and develop their skills. The current Focus Time practice is less effective than it could be because there is no collaboration and there is no feedback that links our operational practices or our learning practice such as Deliberate Practice. The practice of Focus Time is focused on the individual and our culture is shifting towards becoming more collaborative. We need to review our Focus Time practice so that it becomes integrated with other practices.

6. **Motivation**

The motivating factors that were chosen were related to achievement, the work itself and responsibility, whilst the hygiene factors that were selected were related to interpersonal relations and working conditions. We therefore need to be cognisant of this when defining reward systems because motivation factors related to recognition, advancement and the possibility of growth were not selected. The survey also indicated that our team is largely intrinsically motivated, therefore it is critical that we pay attention to the types of work that is accepted, and the levels of autonomy that is balanced with our structured processes.

7. **Social interaction**

Chillisoft has pairing and deliberate practice where individuals collaborate and interact with the team. The structured Focus Times also results in individuals taking their breaks and socialising at common times. In addition to these social interactions we have a Director’s presentation where there is a discussion about the company and that serves as a platform for individuals to raise any issues. During the period being discussed, we did not have the director’s presentation. The team therefore had a shift in leadership style without any contextualisation. They also did not have a platform to raise concerns and issues. During this time we also did not have our regular values workshop, thereby limiting the induction of new employees into Chillisoft values.
8. **Opportunity**

The nature of the work that we do at Chillisoft provides the entire team with the opportunity to do knowledge work. However, our implementation of the management structure, provides the Team Leads with less opportunity to develop software. We need to monitor this initiative and we need to make the new job requirements of Team Leads meaningful.

### 6.2.4 Validity

In qualitative research external validity is equivalent to transferability of a working hypothesis to similar situations, where the researcher does not specify transferability. The researcher provides sufficient information so that the reader can decide whether the findings are applicable (“Trustworthiness,” 1995, p. 2).

I propose that in companies with a values based leadership style and a high performance culture, there are specific invisible factors that interact to drive knowledge worker productivity. The research is relevant to software development companies where technical specialists are typically promoted to managers. The research is valid because it demonstrates that in such organisations there is a very strong set of shared values that are dependent on the culture. In these high performance organisations the focus is on performance, and the practices that are adopted will shape behavioural interaction. It is critical that managers are trained in the issues of collaboration and in creating a shared sense of purpose and learning. This research highlights the need to continually balance perceived individual autonomy with process structure. It also draws attention of work enjoyment being strongly associated with autonomy, responsibility for task direction and productivity. It is significant to software companies because if knowledge workers experience mistrust or a decrease in work enjoyment they will leave to find a better organisational fit.

### 6.2.5 Ethical Considerations

Velasquez, Andre, Shanks and Meyer state that justice is “a central part of ethics and should be given due consideration in our moral lives. In evaluating any moral decision, we must ask whether our actions treat all persons equally” (Velasquez, Andre, Shanks,
& Meyer, 2014). The following section highlights two key issues that a manager must consider in shaping the organisational design of a company’s culture and practices.

Organisations with strong cultures shape the behaviour and values that employees buy in to. A manager needs to consider the effect on employees whose values conflict with the organisation’s values. Is there adequate flexibility within the culture and existing practices to allow for the voicing of a different value set, opinion or an existing dissonance? A company that is rigid in its belief systems and practices that does not create platforms for discussions, is likely to be prejudiced against non-conforming employees.

Knowledge work productivity also raises ethical questions about monitoring and management. Since knowledge work is intangible, managers may tend to want to obtain a view of what work is being done. This may lead to a simplistic interpretation where the work and applications that are used, are monitored, creating a “big brother is watching” syndrome. Is this behaviour ethical, just or fair, even if the justification is that the employer owns all the work that is produced by a salaried employee since it is performed during working hours, using company time and resources?

The application of the Justice Test requires us to ask “Is this a fair distribution of benefits and burdens.” (Hamilton III, 2012). More importantly, it requires that we recognise situations where everyone does not have an equal claim such as circumstances where someone has worked harder than others. It requires that managers ask factual questions such as ‘Who is getting the benefits and the burdens?’ and “Do those who get benefits share in the burdens?” In my opinion, there is a fine line in both of the situations outlined above and managers have to guard against being unfair and unjust. There needs to a vigilance where managers are honest and do not justify unethical behaviour under promoting corporate governance or management.
6.3 Significance of Results to Managing Knowledge Work as a Continuum

The intention of my research was to explore a single case study with the objective of adding practical knowledge to the body of research, to equip a manager to manage knowledge worker productivity. I believe that this research fulfills this intention and adds to the existing body of literature because it provides practical insights that can serve as heuristics for managers. The research does not prescribe to managers how to manage because I consider management to be a craft where practical wisdom and judgement is leveraged. The contributions made are summarised below.

In companies that have a strong team-based culture (refer to the Literature review, in the section on Impact of Organisational Design and Culture) it is assumed that the culture is predisposed towards team work, participation, empowerment and a concern for ideas. These traits are also traits that Agile Methodology advocates, where there is a strong focus on collaboration, and strong controls for the agile process. This situation (i.e. the adoption of an agile methodology and techniques) is similar to that described by Prajogo and McDermott (Prajogo & McDermott, 2011), who commented, that in reality a company is most likely to have contradicting perspectives, occurring simultaneously, requiring different degrees of flexibility and control. My research highlighted a practical situation that is common in software development where product innovation occurs whilst other teams focus on software production. The causal loop model, underlying mechanism and its resultant behaviour (discussed in Chapter 5, in the section on Proposed Theory) is very applicable to managing software companies.

My research contributes to the body of knowledge, because although Davenport advocates a different management style that requires managers to be coaches and players, he does not discuss the practicalities of what happens when managers assumes dual roles. My research described a practical reality of Team Leads who are coaches and players and who adopt a common practice of introducing metrics to manage growth and workloads. The research highlighted the need to cascade the control versus flexibility model of organisational culture (refer to Chapter 2, on the section on Impact
of Organisational Design and Culture, Figure 10) through to the processes that may require different degrees of collaboration.

The research highlighted the invisible factors that are at play, in organisations with a strong group culture, strong process controls (that are typical of Agile Methodology), and with an internal focus on high performance. The existing literature alludes to autonomy building trust, that influences motivation and commitment, which affects performance. My research provides evidence and a practical understanding of how changes to a strong culture, impacts the extent of a shared social identity, and the levels of autonomy and agency. It highlights how these factors drives motivation, which determines the extent of commitment to practices and collaboration, impacting work enjoyment. This ultimately affects the trust levels between individuals, and between individuals and the organisation. My research also has practical benefits because it highlights factors that are considered as motivating factors for knowledge workers, although it is accepted that the importance of these factors are dependent on the organisation’s culture and the extent to which the individuals share the organisation’s values.

In conclusion, this section has summarised the key contributions my research has made to the body of knowledge.

6.4 AREAS FOR FURTHER RESEARCH

The research was broad and specific to the conditions at Chillisoft. It would have been interesting to have researched more than one case study to increase the transferability of the findings.

The research would have been more beneficial if I focused more on the Focus Time Practice. The research indicates that individuals were productive, even though it was perceived that production decreased. It would have been useful to measure or assess how much productivity dropped. Ramirez and Nembhard’s productivity metrics could also be used to quantify the extent of knowledge work complexity for the tasks (Ramírez & Nembhard, 2004) and that this calculation be used in conjunction with their proposed value added activity metric, to provide employees with an indication of
Understanding the influence of invisible factors on knowledge worker productivity

...task complexity, planned productivity and actual productivity. These measures would serve to make productivity more tangible and measurable.

The culture in any organisation is continually shifting so it will be useful to assess the levels of trust on a frequent basis, because trust is critical and is linked to autonomy, motivation, work enjoyment, shared identity and collaboration. It is therefore recommended that further research be undertaken to develop an instrument that will allow the measurement of trust.

It is also recommended that research be undertaken to link the control versus flexibility model of organisational culture that was discussed by Prajogo and McDermott (Prajogo & McDermott, 2011, p. 715) to Davenport’s collaboration model (Davenport, 2005, p. 27).

6.5 CONCLUSION

This chapter discussed the significance of the research results, the lessons that I learnt and that I want to apply to Chillisoft.

My research questions of “What invisible factors influence knowledge worker productivity, at work?” and “How do the invisible factors interact to influence knowledge worker productivity?” were answered. I have also fulfilled the sub goals of this research that are described in the Chapters, Results and Findings and Research Data and Theorisation. In essence, the symptomatic result of the increased Knowledge worker Productivity was encouraged by a shift in leadership style that focused on tangible results, procedures and skilling juniors via the apprenticeship program. The symptomatic results detracted from Chillisoft implementing the fundamental solution of continuing with our Focus practices.

My framework of understanding was enriched allowing me to see and understand how my “intuitive” management style triggers and initiates behaviour. It allowed me to see how we should manage using Kelloway’s model and the findings from the research. The research also highlighted classical management errors that we were in the process
of making such as implementing more metrics too suddenly and without contextualisation, allowing platforms for discussion to lapse and expecting our talented team leads to manage more instead of doing technical work that provides them with job fulfilment.

The research highlighted that Chillisoft’s practices are strong, which is positive for software production. However, implementing practices without considering the extent of collaboration that is required is generally counter-productive. Chillisoft’s culture is so strong that it is “rigid”, where employees share our identity and values, therefore deviations without contextualisation will be seen as breaking the psychological contract causing mistrust. We must therefore make considered changes in small increments.

The research is relevant because it highlights how important factors such as trust, autonomy, motivation and the impact of organisational design, structure and culture on individual agency, interact to influence productivity. The chapter highlighted a practical scenario that is common in software development and looks at providing managers with practical insights and heuristics, thereby adding to the existing body of knowledge.

The chapter highlighted that the Focus Time practice, the method of gauging trust and linking culture to the extent of collaboration be researched further to add more depth to the existing research findings.
7. **REFERENCES**


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http://doi.org/10.5465/AMBPP.1996.4980545


doi:10.1108/01443571111144823


8. **APPENDIX A1**

8.1 **FOCUS TIME PRACTICE RULES**

1. Focus Time starts promptly at 09:30 and ends at 11:30.
2. During Focus Time, individuals will not be disturbed unless the issue is urgent.
3. There are no telephone calls made or taken during this time unless it is an emergency or it is urgent.
4. There is an awareness that interruptions cause individuals to swap context which takes them on average twenty minutes to recover from the interruption, therefore and there are no interruptions or small talk made even if the person is taking a break or is in the coffee room.
5. All cellular phones are switched off or are on silent.
6. Meetings are arranged so that they do not occur during Focus Time, unless the meeting is the task for Focus Time.
7. There is an awareness that individuals are focusing deeply therefore meetings and conversations are not held in the open plan space.
9. Appendix A2: Literature Research Framework

The literature research was conducted at three levels of abstraction, the parent discipline that discusses the why, the problem context that discusses the “what” and the concern variables (from the grounded theory process) that discusses the “how”. I use concept development to flesh out my understanding of the topics where each core concept has been researched using a structure of antecedent, attribute and consequences. The terms and concepts that are used to cross link and relate concepts are bolded. The concepts have been researched to find commonality across them in the same level of abstraction and between levels of abstractions.

In addition to the above framework, the following guidelines were considered in crafting the literature review:

- Supporting the research topic
- Identifying literature that will contribute to the topic and contextualising the literature
- Building an understanding of concepts and definitions
- Evaluating information sources so that the sources are credible

Parent Discipline: Knowledge Work as a Continuum


<table>
<thead>
<tr>
<th>Antecedants</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge work is undefined</td>
<td>Knowledge work defined in terms of professional status</td>
<td>Promotes Elitism and divisions in a company</td>
</tr>
<tr>
<td>Knowledge work is an activity</td>
<td>Different classifications of knowledge work activity categories</td>
<td></td>
</tr>
</tbody>
</table>
Belief that work is too complex and all jobs involve aspects of knowledge work

Knowledge work is a continuum. Laissez Faire on one extreme and a Reengineering approach on the other

encouraging employers to create job descriptions that are innovative and that promotes opportunity for performance improvements

Increases performance

Spreads accountability for performance across organisation instead of it being an enclave for a few individuals

PROBLEM CONTEXT: KNOWLEDGE WORK PRODUCTIVITY


<table>
<thead>
<tr>
<th>Antecedants</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood exists, manager who is skilled at perceiving moods responds</td>
<td>Positive moods</td>
<td>Enhance performance</td>
</tr>
<tr>
<td>Negative moods</td>
<td></td>
<td>Can detract and render teams dysfunctional</td>
</tr>
<tr>
<td>Need to understand productivity dimensions</td>
<td>Productivity dimensions of: <em>Quantity accounts for quantities and outcomes (which is the quantification of qualitative variables such as customer satisfaction)</em></td>
<td>Quality is difficult to measure. Quantity, cost and timeliness most popular dimensions</td>
</tr>
</tbody>
</table>
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| Costs and or Profitability | Timeliness | Autonomy | Efficiency i.e. doing things right | Quality | Effectiveness: doing the right things | Customer Satisfaction | Innovation /Creativity | Project success | Responsibility/importance of work – accounts for the importance of performing well at critical times | Knowledge worker’s perception of productivity accounts for the possible misinterpretations of other standard factors | Absenteeism (Ramírez & Nembhard, 2004, pp. 617–618) |

**CORE VARIABLES**

**ORGANISATIONAL DESIGN AND CULTURE**


| Antecedents | Attributes | Consequences |
## Need for creativity

<table>
<thead>
<tr>
<th>Work-environment factors</th>
<th>Individual and organizational performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate as defined by &quot;leadership facilitation and support; co-operation, friendliness and warmth; conflict and ambiguity; professional and organisational esprit; job challenge, importance and variety; and mutual trust&quot; (Jones and James, 1979)&quot; (Wallace, J.; Hunt, J.; Richards, 1999, p.552)</td>
<td>Modifying psychological processes, organizational effectiveness</td>
</tr>
</tbody>
</table>

### Motivation

<table>
<thead>
<tr>
<th>Strategic Focus</th>
<th>Specific type of culture</th>
<th>Type of Performance e.g.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need to understand what cultural priorities to pursue to support product/process/innovation focus</td>
<td>Control Vs Flexibility</td>
<td>Quality or innovation</td>
</tr>
<tr>
<td>Control rational culture</td>
<td>Internal vs external</td>
<td>Process vs Product</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control rational culture</th>
<th>High process quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group culture</td>
<td>Process quality and process innovation</td>
</tr>
<tr>
<td>Hierarchical culture</td>
<td>Process quality</td>
</tr>
<tr>
<td>People play active role in culture. They are active agents, displaying agency</td>
<td>Manifests as self-actualisation, action, influence</td>
</tr>
<tr>
<td>Shared Organizational values represent deep generative promises and psychological contracts</td>
<td>Assumption is that identity is sustainable (shared identity)</td>
</tr>
</tbody>
</table>

## Motivation

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<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Characteristics such as skill variety, task identity, task significance, autonomy and feedback</td>
<td>Self Motivation</td>
<td>Performance</td>
</tr>
<tr>
<td>Low achievers are concerned with extrinsic rewards and hygiene factors</td>
<td>Need to assess individual’s need for growth and higher order needs.</td>
<td></td>
</tr>
<tr>
<td>Individuals who are high achievers, develop traits where they seek intrinsic rewards in the work itself</td>
<td>Levels of work satisfaction or dissatisfaction if motivating factors are absent.</td>
<td></td>
</tr>
<tr>
<td>Need to design job enrichment programmes</td>
<td>Individuals who attached importance to higher order needs were motivated by motivating factors and not hygiene actors.</td>
<td></td>
</tr>
<tr>
<td>Individuals who attached importance to lower needs were motivated by hygiene factors</td>
<td>Levels of work satisfaction or dissatisfaction if hygiene factors are absent.</td>
<td></td>
</tr>
<tr>
<td>Mood</td>
<td>Apathy</td>
<td>Lack of motivation to try.</td>
</tr>
<tr>
<td>Autonomous motivation is where individual is engaged in the task of their own</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Understanding the influence of invisible factors on knowledge worker productivity

<table>
<thead>
<tr>
<th>Volition. I work because it's fun</th>
<th>Controlled motivation is where engagement happens because of external factors such as stress applied. Sense of having to engage.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social environment</strong> (i.e. Challenge, choice, rationale, feedback, managerial autonomy support) and Individuals’ orientation to autonomous causality</td>
<td><strong>Autonomous Work Motivation</strong></td>
</tr>
<tr>
<td><strong>Job Satisfaction</strong></td>
<td><strong>Well being</strong></td>
</tr>
</tbody>
</table>

### COLLABORATION


<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood, need appreciation, trust and commitment</td>
<td>You and others share a strong desire for a particular outcome and are committed to working together to achieve it.</td>
<td>Collaboration works</td>
</tr>
<tr>
<td>Want to collaborate</td>
<td>Willingness to share knowledge</td>
<td>Increased Collaboration</td>
</tr>
</tbody>
</table>
Understanding the influence of invisible factors on knowledge worker productivity

<table>
<thead>
<tr>
<th>Need to collaborate but doing different types of work</th>
<th>Types of work complexity</th>
<th>Levels of Collaboration</th>
</tr>
</thead>
</table>

**TRUST**


<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement within the organisation</td>
<td>Psychological contract that is based on <strong>autonomy</strong>, responsibility for task direction and productivity</td>
<td>High <strong>productivity</strong></td>
</tr>
<tr>
<td></td>
<td>Interpersonal, organizational and overall trust</td>
<td></td>
</tr>
<tr>
<td>Individual’s perception</td>
<td>“<strong>Belong and Connect; Voice and Recognition; Significance and Position:</strong> Fairness; Learn and Challenge; Choice and <strong>Autonomy:</strong> Security and Certainty; <strong>Purpose</strong>” (Jacobs, 2013, p. 2)</td>
<td>Increased work place <strong>trust</strong></td>
</tr>
</tbody>
</table>
Understanding the influence of invisible factors on knowledge worker productivity

<table>
<thead>
<tr>
<th>Individual’s perception</th>
<th>Fair process</th>
<th>Increased work place trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpersonal is about dependability, integrity, ability and benevolence (sympathy and cooperation with others). Integrity refers to “word-deed” consistency (Petrella, 2013, p. 7)</td>
<td>Better motivation, higher performance</td>
<td></td>
</tr>
<tr>
<td>Interpersonal trust</td>
<td>Related to organizational citizenship behaviour</td>
<td></td>
</tr>
<tr>
<td>Organisational trust is expectations of policies and practices that affects employees</td>
<td>High levels of organizational trust display behavior that exceeds what is expected from them.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Openness in communication and sharing of information, high involvement, help seeking behavior, broad role definitions</td>
<td>Indicator of organizational commitment</td>
</tr>
</tbody>
</table>

AUTONOMY AND AGENCY


<table>
<thead>
<tr>
<th>Antecedants</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for agency</td>
<td>Valid space for dialogic process</td>
<td>Allow agency to enact who they really are</td>
</tr>
</tbody>
</table>
Understanding the influence of invisible factors on knowledge worker productivity

<table>
<thead>
<tr>
<th>Recognition by managers of the duality proposed by Giddens</th>
<th>Opportunities created for collaboration and negotiated practice</th>
<th>Making employees interpretations visible and meaningful to managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need to structure process</td>
<td>Collaboratively engaged and participative process</td>
<td>High process maturity</td>
</tr>
</tbody>
</table>

**Focus**


<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge work is too fuzzy</td>
<td>Process Orientation to Knowledge work</td>
<td>Liberating and a sense of autonomy</td>
</tr>
<tr>
<td>Need to concentrate</td>
<td>Long uninterrupted time that allows for cognitive processing and complex work</td>
<td>High productivity and concentration</td>
</tr>
<tr>
<td>Social structure</td>
<td>People enact patterns</td>
<td>Regulated behaviour</td>
</tr>
</tbody>
</table>

**WORK ENJOYMENT**


<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Psychological contract of expectations</td>
<td>Autonomy, enjoyable work, resources needed to perform</td>
<td>Work enjoyment Influence over work</td>
</tr>
<tr>
<td>Individuals develop skills and competencies</td>
<td>Meaningful work, Making a contribution</td>
<td></td>
</tr>
</tbody>
</table>
Understanding the influence of invisible factors on knowledge worker productivity

<table>
<thead>
<tr>
<th>Benefits from their work</th>
<th>Productive, productive, productive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Want to do a good job</td>
<td>Being productive, productive, productive</td>
</tr>
<tr>
<td></td>
<td>Making a positive impact, positive impact, positive impact</td>
</tr>
<tr>
<td></td>
<td>Getting feedback, feedback, feedback</td>
</tr>
<tr>
<td></td>
<td>Increased engagement, engagement, engagement</td>
</tr>
</tbody>
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**Shared Identity**


<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Attributes</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture</td>
<td>Practices, symbols, values, beliefs, assumptions</td>
<td>Sharing in corporate identity</td>
</tr>
<tr>
<td>Alignment between individual and organisational values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social identity is in the social interaction and collaboration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. **Appendix B1**

<table>
<thead>
<tr>
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<th>Purpose</th>
<th>Signature</th>
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<td>RS</td>
<td>Rechique Sukdheo</td>
<td>Action Research Phase 1 Perspectives of a knowledge worker</td>
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<tr>
<td>19/09/2015</td>
<td>AR</td>
<td>Andrew Russell</td>
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<td>Kevin David Bosman</td>
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<tr>
<td>25/09/2015</td>
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<td>Jaryd Bernade</td>
<td>Action Research Phase 1 Perspectives of a knowledge worker</td>
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<td>PTW</td>
<td>Peter Thomas Wiles</td>
<td>Action Research Phase 1 Perspectives of a knowledge worker and director</td>
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<tr>
<td>16/09/2015</td>
<td>CN</td>
<td>Chaelin Naidoo</td>
<td>Action Research Phase 1</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>initials</td>
<td>Name</td>
<td>Research Phase</td>
<td>Notes</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>-----------------</td>
<td>----------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>16/09/2015</td>
<td>MvR</td>
<td>Mathew van Ryn</td>
<td>Action Research Phase 1</td>
<td>Perspectives of a knowledge worker</td>
</tr>
<tr>
<td>05/10/2015</td>
<td>JB2</td>
<td>Jessica Benson</td>
<td>Action Research Phase 2</td>
<td>Perspectives of a knowledge worker</td>
</tr>
<tr>
<td>05/10/2015</td>
<td>BD</td>
<td>Barry Dwyer</td>
<td>Action Research Phase 2</td>
<td>Perspectives of a knowledge worker</td>
</tr>
<tr>
<td>16/10/2015</td>
<td>SM</td>
<td>Sherwin Moodley</td>
<td>Action Research Phase 2</td>
<td>Perspectives of a knowledge worker</td>
</tr>
</tbody>
</table>
11. Appendix B2

Thank you for agreeing to be interviewed. During this interview, I will refer to knowledge work and knowledge workers. I will also ask you questions about your work and viewpoints about knowledge work and knowledge worker productivity. The content of this interview is used purely for research and will not negatively affect you or your position at Chillisoft. Please feel free to draw upon work experiences or examples as you see fit. As we discussed before, I will audio record the interview so that I can accurately transcribe your remarks for my data analysis. I may still take notes, as I do not want to interrupt your train of thought.

Do I have your permission to record this interview?
[If OK, turn on audio recorder, if not then make notes and keep the recorder switched off]

Do you have any questions or comments before we begin?
[Question Outline]

1. Explain why you think that you are or are not a knowledge worker?
2. Who are knowledge workers?
3. What types of tasks do you do in your daily work?
4. When were you last productive?
5. What is productivity? What did it feel like?
6. How do you identify when you are productive?
7. What do you need to be productive as a knowledge worker?
8. What do you need to be productive from your manager?
9. Do you need to improve your productivity? Why?
10. What do you need from Chillisoft to improve your productivity?
11. How do you prepare to be productive?
12. Is there a difference in productivity between Focus Time and non–Focus Time.
13. Is being focused the same as being productive in knowledge work?
14. Does quality detract from productivity?
15. Is being focused the same as being productive in knowledge work?
12. **Appendix B3**

The purpose of this research is to understand how to manage the invisible factors that influence knowledge worker productivity. At work, Chillisoft has been selected as my case study where I will interview and observe you as you engage with our current productivity practices namely Focus Time, Deliberate Practice and Pairing.

This research has been approved by the Commerce Faculty Ethics in Research Committee.

Your participation in this research is voluntary. You can choose to withdraw from the research at any time.

Thank you sincerely for participating and engaging with this topic.

Please complete the following survey, which is anonymous, and submit your completed questionnaires to Samkelo.

Please indicate whether a factor is a hygiene, or a motivating factor. A factor cannot be a hygiene and a motivating factor. It can however be neither a hygiene nor a motivating factor. Please review and make selections for all factors.

**A hygiene factor does not** cause an increase in knowledge worker productivity but without it, productivity drops.

**A motivating factor** causes an increase in knowledge worker productivity levels if it is present.

<table>
<thead>
<tr>
<th>Factor</th>
<th>hygiene (Y/N)</th>
<th>motivating factor (Y/N)</th>
<th>neither</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 No interruptions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Music</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Good Equipment and tooling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Access to resources and skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Access to help</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Understanding the influence of invisible factors on knowledge worker productivity

<table>
<thead>
<tr>
<th></th>
<th>Creative work environment such as bright walls, chalkboards, funky ducks, humour etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Clear communication of expectations</td>
</tr>
<tr>
<td>8</td>
<td>Collaboration</td>
</tr>
<tr>
<td>9</td>
<td>Deliberate Practice</td>
</tr>
<tr>
<td>10</td>
<td>Practice of Focus Time</td>
</tr>
<tr>
<td>11</td>
<td>Autonomy to research</td>
</tr>
<tr>
<td>12</td>
<td>Autonomy to shape approach to task</td>
</tr>
<tr>
<td>13</td>
<td>Direction and management</td>
</tr>
<tr>
<td>14</td>
<td>Knowing what the task is</td>
</tr>
<tr>
<td>15</td>
<td>Clear outcomes</td>
</tr>
<tr>
<td>16</td>
<td>Job enjoyment</td>
</tr>
<tr>
<td>17</td>
<td>Positive mood</td>
</tr>
<tr>
<td>18</td>
<td>Attention to high quality</td>
</tr>
<tr>
<td>19</td>
<td>Culture of continuous improvement and learning</td>
</tr>
<tr>
<td>20</td>
<td>Individual accountability for delivery and productivity</td>
</tr>
<tr>
<td>21</td>
<td>Ability to plan ahead</td>
</tr>
<tr>
<td>22</td>
<td>Personal drive</td>
</tr>
<tr>
<td>23</td>
<td>Clear expectations of productivity for a specific role</td>
</tr>
<tr>
<td>24</td>
<td>Knowledge worker treated as an asset instead of a cost</td>
</tr>
<tr>
<td>25</td>
<td>Feedback or rewards for completion of tasks</td>
</tr>
</tbody>
</table>
13. Appendix B4

The purpose of this research is to understand how to manage the invisible factors that influence knowledge worker productivity. At work, Chillisoft has been selected as my case study where I will interview and observe you as you engage with our current productivity practices namely Focus Time, Deliberate Practice and Pairing.

This research has been approved by the Commerce Faculty Ethics in Research Committee.
Your participation in this research is voluntary. You can choose to withdraw from the research at any time.
Thank you sincerely for participating and engaging with this topic.

Please complete the following survey, which is anonymous, and submit your completed questionnaires to Samkelo.

<table>
<thead>
<tr>
<th>Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What makes or would make you more productive as a knowledge worker?</td>
<td></td>
</tr>
<tr>
<td>Tick factors that are important to you in Column B</td>
<td>B</td>
</tr>
<tr>
<td>From the significant factors in Column B, choose a maximum of 5 factors that are most significant to you, in Column C</td>
<td></td>
</tr>
</tbody>
</table>

- shared vision and purpose
- decent salary
- supervision
- clear rules
- recognition
- training
- career ladder
- mastery
<table>
<thead>
<tr>
<th>Fear</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>belonging</td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td></td>
</tr>
<tr>
<td>learning</td>
<td></td>
</tr>
<tr>
<td>bonuses</td>
<td></td>
</tr>
<tr>
<td>collaboration</td>
<td></td>
</tr>
<tr>
<td>autonomy</td>
<td></td>
</tr>
<tr>
<td>performance metrics</td>
<td></td>
</tr>
<tr>
<td>competition</td>
<td></td>
</tr>
<tr>
<td>prestige/exclusivity</td>
<td></td>
</tr>
<tr>
<td>responsibility</td>
<td></td>
</tr>
</tbody>
</table>
14. **APPENDIX C1**

**PRODUCT DEVELOPER**

**WORLDVIEW**

The Product Development Team (i.e. consisting of KDB, MvR and CN) favoured creativity, and the space to research as these are the key pre-requisite conditions for innovation. They also sought autonomy in their approach to problem solving and decision making. The team used heuristics to shape the scope of their tasks and to make it less fuzzy. Examples of this behaviour are CN who chatted to team members to get their input before doing research and KDB using an intuitive and reflexive approach to continually shape the direction of his work. They both used a defined approach, even though the scope of the problems are typically fuzzy.

**CHECKLAND’S SSM QUESTIONS**

<table>
<thead>
<tr>
<th>SSM Question</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the input, output and transformation?</td>
<td>Transform ideas into concepts and concepts into new functionality in the software product. The process of transforming ideas and concepts requires creativity and technical skill, as abstract thoughts are converted into tangible working software that has a specific user experience. The generic transformation process consists of requirements, wireframing, storyboarding, coding, testing and deployment. The difficulty in the transformation process lies in the requirements that are generally at a high level and are not implementation specific. The team interprets the requirements and converts the requirement into a technical solution with a specific user experience. Product development therefore requires a strong combination of creativity and technical expertise.</td>
</tr>
</tbody>
</table>
### Root Definition

A system of product development and innovation is owned Chillisoft where product developers deliver software and functionality that assists users to develop a habit of working intentionally. They have to make the existing product sticky, where users feel compelled to continue using the software by interacting with other software developers. Product developers transform ideas into concepts and concepts into new functionality, in a stressful environment where there are technical limitations,
Understanding the influence of invisible factors on knowledge worker productivity

constraints in delivering the conceptualised functionality in a pragmatic manner and highly critical users.

**PRODUCTION DEVELOPER**

**WORLDVIEW**

The Production Team favoured clear deliverables, requirements and deadlines in order to be productive. They favoured strong visual signals such as “moving stickies” or “crossing off a task” as strong reward mechanisms for being productive. Both the production and product development teams sought to make their tasks clearer and more tangible even though their level of concreteness of their tasks varied.

**CHECKLAND’S SSM QUESTIONS**

<table>
<thead>
<tr>
<th>SSM Question</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the input, output and transformation?</td>
<td>Transform requirements into working software that the client can see and use, as soon as possible, by developing the software in thin slices. The transformation process is complex and hinges on understanding what functionality has the highest priority to the customer. Development in thin slices implies that only the essential scaffolding is developed so as to minimise waste and to realise value as soon as possible. The process requires attention to details, estimating effort, and excellent communication skills to manage customer expectations.</td>
</tr>
<tr>
<td>2. Who is the beneficiary (client/customer)?</td>
<td>Customers who requested a specific set of functionality within a specified time period.</td>
</tr>
<tr>
<td>3. <strong>What is the purpose of this transformation?</strong></td>
<td>To demonstrate working software as soon as possible with as little frills as possible. This is so that the customer can experience the software before requesting or prioritising features.</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4. <strong>What are its measures of performance?</strong></td>
<td>Number of points delivered per week                                                                                                          Bug per release                                                                                                                  Weeks to deliver project.</td>
</tr>
<tr>
<td>5. <strong>What assumptions are being made for this transformation to be meaningful?</strong></td>
<td>The software is well architected and is robust.                                                                                                 The customer understands the agile process.                                                                                       The gap between what the customer has communicated and what he or she expects is small.</td>
</tr>
<tr>
<td>6. <strong>What constraints impact directly on this transformation?</strong></td>
<td>Technical limitations such as existing or functionality that is needed before the slice can be delivered.                                                                                      Understanding of how to develop in thin slices without compromising on quality.</td>
</tr>
</tbody>
</table>

**ROOT DEFINITION**

A system of software production is owned Chillisoft where production software developers develop software as soon as possible with as little frills as possible for customers who requested a specific set of functionality within a specified time period. Production software developers transform requirements into software that is going to add the most value as soon as possible. The transformation process is complex and hinges on understanding what functionality has the highest priority to the customer. They deliver thin slices in an environment a complex environment where there are technical limitations such as existing or functionality that is needed before the slice can be delivered, and complexity in understanding of how to develop in thin slices without compromising on quality.
MANAGEMENT

WORLDVIEW

Management (that is KDB, TF, PTW and SM) agreed that they needed to prepare work and to assist the team to be productive so that they could then focus and be productive.

CHECKLAND’S SSM QUESTIONS

<table>
<thead>
<tr>
<th>SSM Question</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>What is the input, output and transformation?</strong></td>
<td>To equip teams so that they can be productive. To inspire, motivate and direct teams so that high quality software is produced with a reasonable time period.</td>
</tr>
<tr>
<td>2. <strong>Who is the beneficiary (client/customer)?</strong></td>
<td>Individual team member</td>
</tr>
<tr>
<td>3. <strong>What is the purpose of this transformation?</strong></td>
<td>To ensure that teams are cohesive and function well. To ensure that individual members feel supported technically and from an individual perspective.</td>
</tr>
<tr>
<td>4. <strong>What are its measures of performance?</strong></td>
<td>Software metrics produced by the team, such as number of releases, Feedback on quality and creativity of solutions</td>
</tr>
<tr>
<td>5. <strong>What assumptions are being made for this transformation to be meaningful?</strong></td>
<td>There is trust, collaboration and a willingness to request and receive critical feedback. A happy team results in improved productivity.</td>
</tr>
<tr>
<td>6. <strong>What constraints impact directly on this transformation?</strong></td>
<td>Available time, ability to direct and a lead a team, Ability to manage team mood and soft issues like motivation.</td>
</tr>
</tbody>
</table>
ROOT DEFINITION

A system of management that is owned Chillisoft where managers ensure that their teams are cohesive and function well. They perform management duties for their teams of six or seven individuals, by equipping teams so that they can be productive. They inspire, motivate and direct teams so that high quality software is produced with a reasonable time period. They manage in an environment where they are constrained by the available time, ability to direct and a lead a team, their ability to manage team’s mood and soft issues like motivation.
SUMMARY OF OBSERVATION ABOUT FOCUS TIME AND DELIBERATE PRACTICE.

From my month of observations of Focus Time and Deliberate Practice, I noted that the rules of Focus Time such as no cell phones and no telephone calls were followed. The product development team did not observe the “no interruption” rule, where KDB was interrupted frequently to provide guidance and assistance with work. The team seemed to break for tea at about 11:00, half an hour before Focus Time ended, where individuals congregated in the coffee room. The individuals who broke for tea chatted and discussed work but were not sensitive to the rest of the team who were working. There appeared to be a lot of discussion about work during breaks and immediately after Focus Time had ended.

It was also obvious when Focus Time started since the noise levels naturally subsided. Pairing and robust discussion occurred in Focus Time and appeared to only disturb individuals who had not accessed a focus state. The rest of the team appeared undisturbed because the majority had head phones on to cut out noise. It was obvious as to which individuals had managed to access a focused state. These individuals did not typically make eye contact and were “distanced’ from the activities around them. It was also possible to identify when the majority of the team had accessed a focused state and when they had not even though Focus Time rules were observed in both scenarios. In both cases the levels of noise were the same.

There were mixed reactions to Deliberate Practice. The majority of the presentations were very technical so non-technical individuals and juniors did not understand or relate to the presentations. Individuals who were disengaged, because the discussions were too technical, appeared bored and zoned out. The rest of the team was very engaged and were excited by the insights and new technologies that were demonstrated. Individuals who presented on topics that were related to their production projects received the most favourable feedback and had the highest engagement.
**SUMMARY OF OBSERVATION ABOUT PAIRING**

The Chillisoft team were unanimous in their support of the Pairing Practice. However, there were very few instances of pairing that occurred in the month of observation. The pairing teams consisted of seniors pairing with juniors. There were frequent instances of two seniors pairing repeatedly, however, the rest of the senior team did not pair. The reason cited for the absence of seniors pairing with seniors was that “it will not increase the productivity and pairing for quality at the expense of productivity was not an option,” given the high workload. All juniors stated that they learnt “exponentially’ when they paired with a senior.
16. Appendix C3

The workshop helped us to understand that there are high levels of trust that are implicit in the way that we function at Chillisoft. The list of trust factors was insightful because it helped management to understand why collaboration did not work in some cases. It also highlighted factors that would be associated with mistrust, guiding the management team in their behaviour

Trust was selected as a significant factor in survey 2 because of the following key reasons:

1. Individuals want to trust that an individual did their best or that they made the best decision that they could.
2. The team wants to collaborate and collaboration is not possible if there is no interpersonal trust.
3. Individuals want autonomy, which requires that the company trusts them to do the best that they can and that they are productive.
4. Individuals want to focus on doing the best work that they can and therefore assume that others are also focusing on doing that they can.
17. Appendix D

Levels of autonomy

Commitment levels to Focus

Impact level of organisational, culture and Driver

Extent of collaboration

Motivation levels for productivity

Extent of Shared Social

Trust levels

Work enjoyment levels

In = 1
Out = 7

In = 6
Out = 3

In = 3
Out = 4

In = 3
Out = 3

In = 5
Out = 3

In = 5
Out = 2

In = 3
Out = 5

In = 3
Out = 2

In = 2
Out = 6

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