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A PERSUASIVE FRAMEWORK TOWARDS IMPROVING COMPLIANCE TO QUALITY MANAGEMENT SYSTEM: THE CLUES FRAMEWORK

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Author's Declaration

I hereby declare that I am the sole author of this thesis and all materials used from other sources or in collaboration with other researchers have been properly and fully acknowledged.

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Abstract

With the ever-changing regulations, rules, and standards due to the proliferation of technologies, systems and products, compliance has become a prevalent business and organisation concern. As such, many organisations have put systems in place to ensure that they comply with requirements of regulatory needs and ensure they stay competitive in the global market. Although many have been successful with compliance needs, there have been reported non-compliances in many organisations. The reasons for the non-compliances have been shown to be multifactorial, ranging from ineffective documentation, equipment failures, ambiguous requirements from regulators and human factors.

Current evidence shows that there are limited Systems that seek to understand the reasons behind the non-compliances, with most systems only managing compliance activities. Consequently, there is repeat of non-compliances as the systems fail to understand why people are not complying.

To address this limitation, this study uses Design Science Research Approach to develop Compliance Assessment Model (CAM) and CLUES Persuasive Framework. The CAM model propose that by understanding intention of subjects to compliantly follow rules, regulations, and standards formulated into the Quality Management System (QMS), the reason behind the non-compliance can be assessed. The Compliance Assessment Model provides new theoretical approach in assessment of non-compliance in regulatory and non-regulatory organisations. It is suggested that CAM may be applicable during implementation of new systems by aiding in the user requirement assessment and further in assessment of compliance during use.

The CLUES persuasive framework on the other hand, utilised the Persuasive Systems Design (PSD) to improve compliance based on the interventions derived from the framework. The study provided generic interventions that may be applicable in organisations to improve compliance. It also provided means for interventions to be adapted for specific organisations based on their needs.

The CAM model and CLUES framework were evaluated and found to be effective to assess non-compliance and aid improvement of compliance.

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What shall I render unto the Lord for all his benefits toward me? Surely, his goodness and mercies have been with me, even to this milestone. I say thank you God!

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Dedication

I dedicate this thesis to my Wife, Vivian Danso Dankwa and children, Lois Doe, Kevin Dankwa, Declan Dankwa and Danica Dankwa for their understanding and support during the long days and nights. Also, to my parents and siblings, you have made this a reality.

Related Publication

Dankwa, K. D. (2020). Deciphering the Myth About Non-Compliance and Its Impact on Cyber Security and Safety. In Yaokumah, W., Rajarajan, M., Abdulai, J., Wiafe, I., & Katsriku, F. A. (Eds.), Modern Theories and Practices for Cyber Ethics and Security Compliance (pp. 59-72). IGI Global. http://doi:10.4018/978-1-7998-3149-5.ch004

Dankwa K., & Nakata K. (2018). Getting it right: A model for compliance assessment. In: Liu K., Nakata K., Li W., Baranauskas C. (eds) Digitalisation, Innovation, and Transformation. ICISO. IFIP Advances in Information and Communication Technology, 527. Springer, Cham.

Dankwa K. and Nakata K. (2016). Making Sense of Non-compliance: A Semiotic Approach. In: Baranauskas M., Liu K., Sun L., Neris V., Bonacin R., Nakata K. (eds) Socially Aware Organisations and Technologies. Impact and Challenges. ICISO 2016. IFIP Advances in Information and Communication Technology, vol 477. Springer, Cham

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Chapter 1
Introduction

1.1 Overview

With the ever-changing regulations, rules, and standards due to the proliferation of technologies, systems and products, compliance has become a prevalent business and organisation concern. The usefulness of compliance in organisations and human activities cannot be over emphasised. It is a central component of human behaviour: relevant to the success of many activities and projects. Organisations have employed many technologies, particularly the advanced smart sensors and data gathering devices to collect diversified data about consumers and organizations. These and other aspects that promotes better forecasting and business trending for future applications have also increased compliance needs (Sang and Yong, 2017). As such the need to understand compliance is critical to the success of organisation and businesses (Solomon et al. 2015). According to Abdullah et al, (2010), managing compliance is increasingly challenging and costly for organizations world-wide. It is therefore important to have cost effective and less challenging approach to manage compliance.

Compliance is considered as the means of ensuring conformance to a rule: such as a specification, policy, standard or law (Silveira et al., 2012). There are many facets of compliance as seen in non-regulatory and regulatory organisations and businesses. According to Governatori(2014) Regulatory compliance is the set of activities an organisation does to ensure that its core business does not violate relevant regulations. This may be as means of ensuring safety of consumers, quality of products, meeting agreed contract or as a legal requirement. On the other hand, non-regulatory compliance may involve organisations desire to meet set of standards or agreements in place which may not be a regulation or law.

Compliance may be initiated by societal imposition of rules and regulations which is followed by organisations defining internal responsibility and finally act to implement and manage the regulatory process (O'Neill, 2014). Thus, compliance describes the efforts organisations go through to ensure that they are aware of and take steps to comply with relevant laws and regulations.

In healthcare, access to health data to improve the quality of the healthcare is regulated by legislations to prevent misuse of patient data (Ghanavati et al. 2007). Moreover, standards and guidance have been enacted for patient treatment to prevent drug errors and injury to

patients (Cramer et al, 2008). In blood collection and transfusion healthcare, rules and regulations are in place to ensure patients are clearly identified and correct blood transfused to prevent transfusion reactions.

Accordingly, recognised bodies to regulate licensed organisations have been set up. These regulations are usually backed by law and other industry standards to ensure that organisations comply to protect the customers and users of the service and products. These standards and regulations are properly defined, and act as means of measurement or audit of deviation for the organisations.

Due to the increasing number of regulations to allow for operational transparency, organisations are increasingly adopting consolidated and harmonised sets of compliance controls (Silveira et al., 2012). This is to ensure that all necessary governance requirements are met without unnecessary duplication of effort and activity. Thus, reducing unwanted replication of effort and waste of resources while ensuring that all relevant governance stipulations are attained (Dankwa and Nakata, 2018). Moreover, without relevant systems and processes that enable compliance knowledge, organizations may repeat and duplicate compliance breaches and even risk information leak or loss as they struggle to learn from the past non-compliance experiences (Martins and Meyer, 2012). As such, culture within many organisations have been under constant scrutiny to promote climate that fosters attitude to compliance matters(Jenkinson 1996). Moreover, according to Interligi, (2010), there is increased emphasis on the role of culture in organizational compliance. This is because culture shows the way the individuals in the organisation interacts and operate. As such, the perceived improvement of compliance culture and other implementation systems in many organisations have been shown to be important in the quest to improve compliance.

However, we observe that although many organisations have systems in place to control compliance, there are instances where compliance to regulatory standards are not met. Also, despite systems and measures in place to curtail impact on security, safety and quality of products and services, there are many instances within organizations where non-compliances have been reported. The cause of the non-compliances has been indicated to be multifactorial with different impact on people, organizations and even countries.

Evidence indicates that current solutions are inadequate and do not fully address the compliance needs of organizations despite the use of information technology (IT) and information systems (IS) tools (Abdullah et al, 2010). This is supported by Sang and Yong, (2017) who indicated that some questions remain unanswered although there is improved

appreciation of how IT systems boost corporate execution to address compliance needs. With all systems and resources in place, non-compliances have been reported due to failures by staff and equipment. These failures have been shown to be across different sectors; aviation, nuclear industries, banking, processing and manufacturing(Park & Jung, 2003; Lu & Mande,2014). Furthermore, failures in the health care organisations have also been reported with its direct implication on patient care and treatment (Cramer et al. 2008).

These non-compliance threats to business, organisations, and the health sector, indicate that the current systems to manage compliance are not adequate. There is therefore the need to further investigate and understand the reasons behind non-compliance behaviours to facilitate safety, quality and legal requirements for organisations (Lu & Mande 2014). Moreover, there is the need to develop and implement methods for improving compliance behaviour within organisations.

1.2 Research Motivation

The motivation for this research stem from observed and documented non-compliances to Quality Management System (QMS) in the Blood Centre within the National Health Service in England. As the organisation process and distribute blood, tissues and organs for patients, quality and safety measures are required.

As such, regulations and standards have been enacted: Medicines and Healthcare Products Regulatory Agency (MHRA), Human Tissue Authority (HTA) and Accreditation Bodies. The activities of the organisation are controlled by issuance of licence and certificates by regulators and accreditors respectively.

Although blood centres have QMS in place to meet demands of the regulations and standards, there have been reported instances of non-compliances. These non-compliances have been shown to be across departments and involves different staff grades within the organisation. The effect of the non-compliances is many folds, ranging from delay in supply of products and services which can impact on patient treatment to reputational impact on the organisation. The non-compliances reported is not peculiar to the blood centre. Report by the MHRA for 2014 indicated that the number of Serious Adverse Events (SAEs) reported within the blood transfusion laboratories shows an increase of 8%, (705/766), from 2013 (Birse & Inspectorate 2015).

In the hospital ward, about 20% of patients may receive incorrect medication order at the time of admission due to incorrect preadmission medication history (Tam et al, 2005). Also, reported 34.7% infusions of morphine concentration deviated from the intended concentration by more than 10% (Etchells et al, 2008). Moreover, compared with hospital

medications, about 25% of patients will have an error in their discharge prescriptions upon discharge (Schnipper et al, 2006).

These failures have been mainly due to human failures by wrongful interpretation of procedure and misuse of equipment. According to D'Arcy et al. (2009), industry statistics suggest that between 50%–75% of non-conformances originate from within an organization. Moreover, the challenges and failures organisations face managing compliance are due to diversity of stakeholders in compliance management (Abdullah et al, 2016). We observe that the interactions and operations by the internal stakeholders may be prone to non-compliance due to the varied procedures and processes. A survey on human factors disclosed that the estimated contribution of human error to accidents in hazardous technologies increased fourfold, from minima of around 20% to maxima of beyond 90%. They indicated that one possible inference is that people have become more prone to error (Hollnagel, 1993). This is not only related to health and safety, but this increase has been seen across different business environments and in the health care sectors.

According to Reason, (1995), errors are mainly the failure of planned actions to achieve their desired goal through forgetting, inattention, incomplete knowledge etc. while violations are deviations from safe operating practices, procedures, standards, or rules. These errors and violations indicate that the current actions and systems in place are not adequate to prevent non-compliances. This is because they are failing to identify the root cause of the failure; whether they are errors or violations and to prescribe the appropriate approach to manage it.
There is therefore the need to further investigate and understand the reasons behind the non-compliances with the intention to recommend systems to improve compliance.

1.3 Research Problem

Systems have been implemented by organisations and businesses to manage compliance to rules and regulations. But lack of a common or shared understanding of compliance management concepts is a barrier to effective compliance management practice (Abdullah et al, 2016). Systems in use have not yielded the appropriate impact that organisations may have wanted. As a result, research have been conducted to investigate compliance improvement in many different organisations (O'Neil, 2014). These researches have been conducted in different sectors such as the health, manufacturing, banking (O'Neil 2014, Park & Jung 2003, Lu & Mande,2014). Systems that are in use in compliance management have been to manage compliance without means to understand reasons for non-

compliances that are seen. Moreover, there is limited literature available for systems that are used to understand the reasons behind non-compliance.

Currently, models and theories (TAM, TAM1, TAM2 and UTAUT) that assess acceptance of information systems have been used to address adoption of IS (Hamre, 2008). These theories predict the user behaviour by assessing the behavioural intentions of the users (Venkatesh et al, 2003). We propose that to understand reasons behind non-compliance, theories and models that assesses acceptance and adoption of use of Information systems may be applicable. This is because intention is a conscious plan to either perform or not perform specified future behaviour (Venkatesh et al., 2003). As such, application of the acceptance model may provide means of assessing intention of users. We further submit that understanding acceptance alone may not yield the desired outcome as assessment of continuous application of the IS may be required. As such acceptance model coupled with activity theory may provide assessment model for non-compliance as this incorporates the acceptance and continues use of the IS with prevailing factors in the environment.

Further, to maintain and improve compliance, systems that persuade people to perform the behaviour is considered. This we propose will enable staff to perform the needed behaviour. Currently, there are increasing number of interventions using persuasive technology to deliver changes in health (Silva et al. 2019). According to Orji and Moffatt (2018), there is increased investment in use of persuasive technology to promote health and wellness by health and wellness researchers and practitioners, technology designers, and public health and government agencies. Research indicate that about 84.4% of the persuasive systems have addressed behavioural change (Torning and Oinas-Kukkonen, 2009). As success in use of persuasive technologies have been shown in health sector, we propose application of persuasive technology systems to persuade staff to improve compliance to QMS. The application will be tailored to the outcome of the initial assessment to understand the reasons behind non-compliance.

Consequently, we propose that the use of acceptance models and theories and persuasive technology systems may help in addressing the research questions:

- ***What are the reasons behind non-compliance to QMS?*** This question will be explored by use of acceptance models and activity theory to assess non-compliance of QMS.
- ***How can compliance to QMS be improved as a result of understanding the reasons behind the non-compliance?*** It is suggested that by understanding the reasons behind the non-compliance, persuasive technology systems may be applied to improve compliance.

1.4 Research Aims and Objectives

From the above discussions, this research will seek to analyse and review existing literature to aid in the development of a model to understand the reasons behind non-compliance and to create persuasive framework that improves compliance to QMS. By creating the model for assessment of non-compliance and further creation of persuasive framework, compliance activities will be improved. Therefor the aim of this research is:

To develop Compliance Assessment Model and Persuasive Framework to assess the reasons behind noncompliance and to improve compliance to QMS.

The aim provides avenue to address the research questions with the development of the model and framework. The Compliance Assessment Model should be able to provide means to assess reasons behind non-compliance behaviours and to provide data that can lead to development of a framework to improve compliance behaviour. To do this, the following objectives will be followed:

i. *To conduct literature review on compliance activities and approaches within organisations.*

ii. *To explore existing models and theories used in non-compliance assessment and information systems.*

iii. *To identify appropriate research methods and techniques that can be used for the investigation*

iv. *To develop a conceptual model to be used for assessment of reasons behind non-compliance.*

v. *To evaluate the model by use of appropriate research tools and update model based on outcome of the evaluation.*

vi. *To develop a persuasive framework based on the conceptual model for assessment of non-compliance to improve compliance.*

vii. *To generate interventions based on the change drivers of the persuasive framework.*

viii. *To evaluate the persuasive framework by application of the interventions within chosen research group.*

1.5 Expected Contributions

It is expected that this research will make two key contributions to the understanding of reasons behind non-compliance and improvement of compliance. These contributions will be in the form of theoretical and practical.

1.5.1 Theoretical Contribution

As the research reviews theories and models in acceptance and behaviour change models to assess and improve compliance, the research will propose novel assessment approaches for non-compliance in the workplace. The Compliance Assessment Model will provide new theoretical approach in assessment of non-compliance in both regulatory and non-regulatory organisations. The CLUES framework will provide persuasive means that improves compliance by means of systematic application of interventions from the change drivers of the framework.

1.5.2 Practical Contribution

The model and framework that is developed will facilitate assessment and improvement of compliance within organisations. The model for assessment can be used during implementation of new systems to ascertain acceptance and compliant use of the system. This may be applied as part of the user requirements of a system which will inform what to purchase and implement. It may also be used to assess the reasons for non-compliance during in use of the system. In addition, the framework will allow for persuasion of staff through applications of interventions that may be drawn from the framework. It will provide practical means of applying interventions that are required to persuade staff to use systems in place as required. Essentially, the model and framework may aid in development of procedures and processes to support routine activities in the organisation.

1.6 Outline of Thesis

To enable the assessment of non-compliance behaviour and further improvement of compliance, this thesis will be outlined in eight chapters.

Chapter One presents the introduction and overview of the research motivation by providing highlight of the research problem. It also outlines aim and objectives and how the research will seek to address the research problem identified.

Chapter Two reviews the available literature on compliance and considers the compliance application in various organisation sectors. It also reviews compliance approaches that have been applied in the various organisational sectors and considers other theories and models

that may be applied in the assessment of non-compliance behaviour. The chapter further reviews behaviour change models and persuasion systems that may be applicable in improving compliance behaviour.

Chapter Three considers the research approach for this thesis and propose that design science research paradigm is appropriate. It considers how the design science approach enables the development and evaluation of the conceptual model for assessment of non-compliance behaviour. It further considers the improvement of compliance behaviour through the development of persuasive framework as a result of the gaps identified from the non-compliance assessment.

Chapter Four presents the development and evaluation of Compliance Assessment Model. It considers how the model is developed through literature review and the rational for use of the model as the initial artefact. It further discusses how the model is evaluated and updated using qualitative approach; interviews performed from questions derived from the model. The chapter also discussed the reasons behind the non-compliance behaviour and the gaps that led to the development of the persuasive framework.

Chapter Five considers the steps and the change drivers in the development of the persuasive framework. It also considers how the interventions were developed from the framework for application within the pilot group.

Chapter six considers the implementation and evaluation of the interventions. This chapter considers the data collection from the application of the interventions to improve the compliance behaviour. It also considers the data analysis from the data collected from the implementation of the interventions.

Chapter Seven discusses the evaluation of the research by the design science paradigm. It considers the research process and the limitations as a result of the approach taken. It also considers the implications of the research.

Chapter Eight concludes the thesis. Here, the entire objectives are reviewed to ascertain whether they have been met. It also considers the contributions from the research and future work that may need to be undertaken due to the limitations from the research. Figure 1-1 shows the outline of thesis and how they are linked.

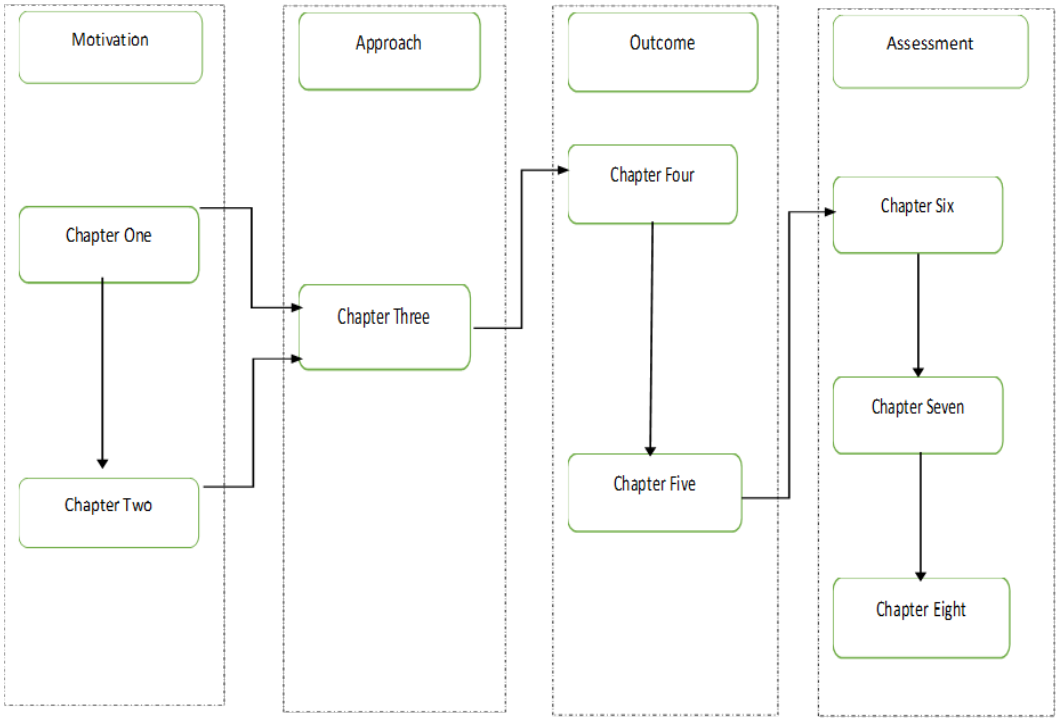

Figure 1-1 Outline of thesis

From the outline, this chapter considered the overview of the research and the need for compliance within organisations, especially regulated organisations. Figure 1-1 divides the thesis into four main streams. Chapters 1 and 2 are captured under motivation, where the problem awareness and suggestions are considered. The approach, which is chapter 3, considered the methodology that is used in this research with chapters 4 and 5 considering the outcome of the research through development of model and framework. The research culminates with the assessment section which involves chapters 6 and 7 where implementation and evaluation are performed before conclusion and future work is considered in chapter 8.

Chapter 2
Literature Review

2.1 Overview

This chapter seeks to address the first and second objectives of the research by reviewing the literature on compliance, how to assess non-compliance and improve compliance. The chapter starts by reviewing importance of compliance activities in organisations and compliance culture and its impact on staff behaviour. It further considers approaches that have been applied in organisations to manage compliance activities. Discussions are also made of exiting theories and models that have contributed to compliance management. Further, Acceptance Models and Activity Theory are considered as means of assessment of compliance behaviour and provided reasons for choosing this approach. By means of improving compliance, the chapter considers behaviour change models and persuasion systems. Also, defines compliance, attitude, behaviour, and persuasion and how they are used in this research. Finally, the chapter review approaches that can be used to assess and improve compliance by consideration of new model and framework.

2.2 Importance of Compliance

The need for compliance within organisations and business have been shown to be important in meeting the rules and regulations that governs their activities. This is because compliance as being in accordance with established guidelines, specifications, or efforts to observe industry regulations and government legislation is relevant for businesses and organisations (Sang and Yong, 2017). Reviewing existing research in compliance is therefore important to ascertain the work that has already been done in this area and any new knowledge that can be realised.

We observe that rules, laws, and regulations that govern organisations and businesses provides benefits while ensuring they always stay in compliance. This is because, in meeting the legal requirements and standards in place, the organisations and businesses in turn protects the health, safety and welfare of their staff and customers. This decreases risk to the organisation and business as relates to fines, penalties, lawsuits or even shutdown of the organisation by regulatory authorities. Accordingly, compliance monitoring is vital for provision of reactive and pro-active countermeasures on compliance violations as there is timely detection and prediction of compliance violations (Caron et al., 2013, Kharbili et al.,2008)

We further perceive that importance of compliance becomes evident with increased complexity in organisations and businesses as staff numbers increase and operations expand. The rules and regulations allow the business and organisation to prevent harm to their staff as complexity of processes increase whiles also meeting the needs of the stakeholders that patronise their services. Thus, compliance helps in creating a better working environment for employees, which can lead to better output and increase productivity. This may also lead to high staff retention as employees feel empowered and motivated to work in a fair, and safe environment where compliance to rules and regulations is priority.

It is therefore not surprising that measuring the 'level of compliance' within organisations has emerged as a key performance indicator for success of many organisations (Read et al. 2015). As a result, organisations have generally developed compliance performance indicators to facilitate analysis of compliance activities and its enforcement trends(Read et al. 2015). According to Silveria et al. (2012), one of the Key Performance Indicators (KPI) in many organisations is the Key Compliance Indicators (KCIs) which gives compliance experts outlook on the compliance performance of the business processes. This allows the business to specifically assess how compliant their processes are with given requirements of rules and regulations. There are many requirements to compliance but as an organisation, the important aspect of compliance is to ensure that requirement needs are met, and stakeholder needs are always fulfilled in full and on time (Abdullah et al, 2016). Essentially, organisations may have different means of measuring compliance, but the output is to meet their needs.

2.3 Compliance Culture

The compliance culture within organisations have been shown to be vital measure of level of compliance. It is also an indication of the organisations preparedness to meet regulatory requirements and to ensure that customer needs are met in the competitive global market. Compliance culture are the values, ethics and beliefs in organization that interact with the structures and control systems to produce behavioural norms that are conducive to compliance outcomes (Abdullah et al, 2016). Thus, compliance culture provides the conducive environment that thrives compliance activities. Consequently, strategic plans that reflects desire to improve compliance culture and to encourage staff to align their values with the values of the organisations have been implemented.

According to Jenkinson (1996), compliance culture is essentially, the climate which fosters the attitude to compliance matters. This tend to set the 'compliance temperature' of the organisation and is relevant in assessing how the organisation react to compliance activities. Moreover, there is increased emphasis on the role of culture in organizational compliance due to regulatory reforms and changing community expectations about organizational behaviour (Interligi, 2010). The compliance culture may vary between organisations with different perspectives on compliance. These differences are useful when dealing with issues of compliance and the approach to take to resolve non-compliance issues. Subsequently, Jenkinson (1996) grouped the compliance culture within an organisation into three main states as: non- compliance, anti- compliance, and pro compliance group.

In Non-compliance culture, the organisation frequently breaches the compliance rules and makes non-compliance more profitable than compliance (Hirschauer, Bavorova & Martino, 2012). With anti-compliance or Negative culture, the organisation is compliant in the barest sense and seem not to be breaching any rules and standards, but compliance is generally seen as a threat and is merely tolerated. In this group, the work is seen as the responsibility of the compliance department which takes quality control/policing attitude. Finally, in the positive or pro-compliance group, the organisation is inherently compliant, and all the activities are compliantly performed as the natural outcome of its system of work. Compliance is identified as an opportunity to provide excellent service to customers and staff have the attitude to incorporate compliance requirements into developments at an early stage. This view of categorisation of different state of compliance culture is also shared by Both Hillson et al. (2004) and Herrmann (2006) who split organisations between those that view compliance as an opportunity for continuous improvement and those that simply see it as tick box exercise to satisfy periodic audit requirements (Hillson et al. 2004).

According to a publication by the MHRA (Churchward, 2019), for pharmaceutical organisation and the healthcare sector that rely on quality of the products to meet patient needs, Quality Culture is a basic requirement. Accordingly, they identified four main areas when it comes to quality culture: knowledge, diligence, vigilance, and Senior management commitment. However, an enabler for good quality culture requires continued effort from leadership and empowerment at all levels of the organisation. This may need further investigation to ascertain the actual impact of leadership on quality culture, but it is evident that quality culture is relevant when considering compliance activities.

2.4 Compliance Activities in Organisations

Many international institutions and conventions share a common aim of establishing and strengthening authorities and mechanisms that deliver effective compliance programs and enforcement(Read et al. 2015). This view is shared by many researchers and the literature shows many researches to improve compliance have been undertaken. As most of the compliance requirements are set by regulatory agencies and accreditation bodies, organisations and businesses must meet the compliance standards. According to Solomon et al. (2015), regardless of the scale of the conservation actions and categories of biodiversity the project focuses on, compliance with conservation rules is critical to the success of any conservation project. In the food supply chain, compliance is critical to ensure safety of food supply chain because as malpractice rises to increase profit margins the quality and safety threats may increase (Hirschauer, Bavorova & Martino 2012). Evidently, compliance is seen as a critical factor in the safety of products and services in the food sector and failure to adhere may lead to detrimental impact on consumers.

These are not the only sectors that require compliance as Park & Jung (2003) emphasized that in many industries such as the nuclear, aviation and chemical industry, compliance is important for the desired outcome to be achieved. Park & Jung (2003) indicated that, non-compliance may lead to breach to legal requirements and impact on service outcome. There has also been research in the banking and the manufacturing sectors, demonstrating the usefulness of compliance in business processes for delivery of services to customers (Gao and Kling, 2012; Governatori, 2014). In education sector, Quality Management System for teaching and learning has been developed for the purpose of quality assurance to monitor thesis in some institutions (Daud et al. 2011). The health care sector is no exception as many researches has been conducted from compliance to drugs to information governance of medical information (Silveira et al., 2012 and O'Neill, 2014). According to Cramer et al. (2008), numerous studies have demonstrated that inadequate compliance and non-persistence with prescribed medication regimens result in increased morbidity and mortality. They indicated that the non-compliance to prescription leads to increased health-care costs and fatal impact on treatment.

Although there is enough evidence to demonstrate that organisations strive for compliance, there is a gap in the literature in respect of systems and frameworks to assist organisations in managing compliance(O'Neill, 2014). Also, Shah et al. (2015) indicated that changes over the decade in improving infection control yielded effective outcome but there is still a gap between behaviour of staff compliance to standards of practice. Moreover, the need

for further research cannot be over emphasise as Read et al. (2015) asserted that despite many actions and systems, inadequate compliance is frequently observed. This shows that there is the need to further investigate non-compliances within organisations with the view to improve compliance behaviour. Better and effective compliance approach is needed to drive compliance management.

2.5 Compliance Approach

Many approaches have been applied when it comes to management and assessment of compliance within organisations. The approach is to ensure that there is a system of internal controls in place that adequately measure and manage the risks that is faced by the organisation. However, problem of managing compliance is complex due to multifaceted compliance requirements in the various business segments within the organisation. This may range from how internal IT is managed, training of personnel, assurance of product safety or how promptly information is communicated to shareholders (Silveira et al., 2012). According to Reimers and Andersson (2017), employees may take actions that ignore the best interests of organizational compliance requirement because they often do not see themselves as part of the drive to improve security compliance.

The compliance intentions of employees increase in organisations when information systems and other policy requirements are planned and executed successfully.

Though organisations expect their employees to comply with the policies and rules in place and not to provoke any violation incidents, the decisions made by staff is usually based on their current work, the environment they work in and the information available to them (Hu et al., 2011). The employee work is usually boarded on completing their personal task without looking at the compliance requirements in place. Moreover, the approach to compliance is usually affected by work impediments, the information system anxiety and influence of non-compliance behaviours of peers (Hwang et al., 2017). According to Venkatesh et al. (2003), the social influence has a significant impact on the intention to use information systems and, the rules and policies that governs them. The work impediments may be the restrictions in procedures and actions that are required to meet the compliance needs. This may also be because of employees struggling to use or follow the safety systems in place due to implementation constraints or difficulties in interpreting procedures in place. As such, non-compliance may increase when employees perceive obstacles in accomplishing their task. When this happens, approach to compliance is negatively impacted as employees see the information systems, rules and policies as causing impediments than helping them achieve their goals.

Furthermore, rules and policies in place are sometimes vague and informally specified. As a result, compliance approach requires understanding and interpreting requirements. There is also a requirement to implement and manage many control actions on a variety of procedures across the business units of a company (Bellamy et al., 2007). The compliance approach requires that each regulation and procedure and their control mechanisms and set of indicators to assess the compliance status of the procedure are in place (Hwang et al., 2017). Based on the above, review of literature for models and theories to understand non-compliance and compliance improvement approaches is needed.

The next sections reviews challenges and factors that affects compliance within organisations.

2.6 Challenges and Factors that affect compliance

To be effective, regulators and standard setting agencies need to ensure that organisations and business comply with the rules and standards in place. However, the challenges faced by regulators in ensuring compliance with the extensive rules, principles and guidance that governs organisations cannot be underestimate (Iscenko et al.,2016). Although the rules and regulations may seem well crafted and easy to apply, practical application may not be easy. In practice compliance depends on a range of factors, including governance, controls, culture and behavioural issues of employers and employees which may lead to challenges to compliance. These challenges and factors which may cut across almost all processes may inhibit compliance. As such, better understanding may aid improvement of compliance behaviours.

According to West (2008), in completing their tasks, non-compliance may increase when employees perceive security activities and compliance requirements as obstacles. This is also shared by Sadiq et al., (2007) who indicated that despite the importance of compliance, many compliance checks are often conducted manually and hence perceived as a burden. We suggest that, this may breed challenges to both employees and employers as they struggle to find convenient and mutual means to meet these compliance requirements. Some of the challenges such as behaviours of staff and the leadership team of the organisation, the culture of the organisation to compliance requirements, provision of resources and controls for compliance have already been discussed in previous sections. Although there may be generic challenges and factors that impacts compliance in organisations, some challenges and factors may be peculiar to specific organisations. As such careful determination should be made to understand these challenges and factors to compliance to aid in compliance improvement. We therefore propose that to address the

compliance requirements, the challenges and factors that affects compliance should be ascertain.

The next section reviews literature on models and theories that have been used in information systems. It also considers how these can be applicable to address the research questions by understanding the reasons behind non-compliance and how to improve compliance.

2.7 Theories and Models for Compliance Assessment

Literature review indicates that many researchers have investigated the importance of compliance in many different sectors by use of theories and models. They have used systems from analytical frameworks to ICT (Information and Communication Technology) support to control and manage compliance. Table 2-1 shows some approaches that have been used to manage compliance activities. It is envisaged that, the review and understanding of these models will aid in ways to assess and improve compliance behaviour.

Table 2-1 Compliance Management Approach

Author	Approach	Industry/ Sector
Silveira et al., 2012	Compliance Governance dashboard and business Activities	Healthcare Sector
O' Neill, 2012	Compliance Action Framework	Data Privacy in Health Care
Hirschauer, Bavorova and Martino, 2012	Analytical Framework for Behavioural Analysis	Food Supply Chain
Gao and Kling, 2012	Agency Theory	Corporate Governance
Governatori, 2014	ICT Approach to Support Compliance	Business processes.
D'Arcy et al. (2009)	deterrence theory	Different organisations

Governatori (2014) proposed ICT approach to support regulatory compliance for business processes. This ICT model allows for compliance checker to be created that permits monitoring of compliance. In other research, Agency theory was used in the study of impact

of corporate governance and external audit (Gao & Kling 2012). Also, in the research performed by O'Neill (2014), action framework which proposes processes for improving the governance capability and compliance outcomes within an organisation for governance of data privacy risk and data protection have been used.

In the health sector, the use of business activities to manage the order of drugs and replenishment has been considered to ensure compliance activities are met (Silveira et al., 2012). These activities in the various sections of the health unit though performed on daily basis, are usually not joined up so the tendency for failure is high. Manually analysing the data in the event log is time consuming and error prone. Therefore, to better control the compliance of processes, an early warning system that allows compliance expert to have updated information on daily compliance issues was implemented.

Because of the large number of misuse incidents, it has become important to understand how to reduce such behaviour. General deterrence theory suggests that certain controls can serve as deterrent mechanisms by increasing the perceived threat of punishment for IS misuse (D'Arcy et al. 2009). Furthermore, an insight gained from ad hoc interviews of compliance officers in the insurance and healthcare gave anecdotal evidence suggesting that they required tools and automated support to assist them (O'Neill, 2014). It is evident that the theories and models seek to improve compliance but there is little or no evidence of a model that seek to understand the reasons behind the non-compliance behaviours.

As compliance management is clearly related to behaviour of employees who fail to follow regulations or policies in the organisation (Sang and Yong, 2017). Understanding behavioural aspects of compliance is of greater importance. This is because, understanding behaviour of employees may indicate areas if failures and how this can be improved. Subsequently, there has been a rise of studies to examine organisational information security practices and individual security behaviours (Herath and Rao, 2009). Table 2-2 shows the representative empirical studies around behavioural security which applied various theories to the examination of information security-related compliance behaviours. These theories have been applied in various research with varying outcomes.

Table 2-2 Empirical studies in the area of behavioural security (Sang and Yong, 2017)

Researchers	Findings	Theories used/proposed
Chan et al. (2005)	Effect of security climate on security policy compliance	Organisational Climate

Pahnila et al. (2007)	Effect of threat appraisal, facilitating conditions, information quality, and TPB variables on IS security policy compliance	Theory of planned behavior, deterrence theory, protection motivation theory
D'Arcy et al. (2009)	Effect of user awareness of IS security countermeasures on perceived certainty and severity of organizational sanctions	Deterrence theory
Herath and Rao (2009b)	Empirical evidence to support the view that social influence plays a role in shaping employee security behaviours	Theory of planned behavior, deterrence theory, protection motivation theory
Johnston and Warkentin (2010)	Response efficacy, self efficacy, and social influence have a positive effect on employees' intention to adopt antispyware software tools	Protection motivation theory
Siponen and Vance (2010)	Neutralization positively affect intention to violate IS security policies	Neutralization theory
Bulgurcu et al. (2010)	Investigated the rationality-based factors that drive an employee to comply with requirements of the ISP with regard to protecting the organization's information and technology resources	Theory of planned behaviour
Ifinedo (2012)	Self-efficacy, attitude toward compliance, subjective norms, response	Theory of planned behavior, protection motivation theory

	efficacy and perceived vulnerability positively influence IS security policy behavioural compliance intentions of employees	
Foth (2016)	Psychological factors such as attitude, subjective norms and perceived behavior control are significantly influential and identified significant differences between the genders in the intention to comply with data protection regulations	Theory of planned behavior, general deterrence theory

Although these theories have been applied in information security compliance, we suggest that the compliance requirements by understanding the behavioural intention can be applied across other activities. This is because the behavioural intention of subjects has been shown to translate to actual behaviour, therefore information security compliance requirement may be applicable to other activities like healthcare, processing, and manufacturing sectors. Moreover, most processes in healthcare sector relies on information systems application, as such these theories may promote compliance improvement if considered. Consequently, the need to further investigate other theories and models in behavioural intentions is deemed useful as other systems in use to manage compliance (as discussed above) does not consider reasons behind non-compliance behaviours.

The next section will seek to investigate some theories and models that have been used in information systems which considers behavioural intentions and how they can be applied in this research.

2.7.1 Models of Acceptance

Over the years' researchers have worked to gain a better understanding of technology adoption rates and implementation success to make the most of technology investments. The adoption and implementation of technology has been shown to be influenced by the intention of the users' acceptance. Thompson et al. (1994) indicated that understanding the factors that influence the acceptance by individuals and organisations is of continued

interest to researchers. This is further asserted by Venkatesh et al., (2003) that there are numerous theories and models that information systems researchers use to help predict and explain how and why individuals and to an extent, organisations adopt and use new technologies.

According to Dillon & Morris, (1996) user acceptance of technology is seen as the demonstrable willingness on the part of the user group to employ information technology for the purpose it is set to be used for. Thus, the theories of acceptance are less concerned with unintended uses of technologies but more focused on understanding the factors that influence the adoption of technologies as planned by the designers (Dillon, 2001). As a result, researchers have proposed different acceptance determinants to assess users' intent to use a new technology in order to predict usage.

Technology acceptance constructs identify strong and weak elements within the organisation that theoretically predict adoption and ultimately use of a new technology (Davis et al., 1989). These constructs can be varied and may interact on different levels to influence acceptance. Therefore, over the years these theories have been used to predict a variety of human behaviours including technology acceptance and adoption (Venkatesh et al., 2003). As the use of technology and the correct use of cyber security and safety measures are critical, it is incumbent on businesses and organizations that acceptance and use are well understood and documented (Dankwa, 2020). As such, many models like the Technology Acceptance Model (TAM) (Davis, Bogozzi & Warshaw, 1989), with the final version of (TAM) by Venkatesh and Davis (1996). Further, Venkatesh and Davis (2000) developed the Technology Acceptance Model 2 (TAM2) and Venkatesh, Morris, Davis and Davis (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT) and finally Technology Acceptance Model 3 (TAM3) Venkatesh and Bala (2008). These have been used to understand the acceptance of technology within organizations with the aim to predict what user behaviour (Lai, 2017).

The introduction of TAM2 and TAM3 by addition of other variables that may influence the behavioural intention to use a technology have been applied. TAM2 was an extension of TAM with variables that comprise subjective norms like image, job relevance, output quality and result demonstrability. The model also looked at the effect of experience and voluntariness on these subjective norms. The subjective norms aided the review of the effects on the perceived usefulness and not on the perceived ease of use. The TAM3 which was another extension of TAM further added other variables to look at the effect on perceived ease of use. Although these models have been successful, another theory was proposed which incorporate the synthesis of many models. The Unified Theory of

Acceptance and Use of Technology (UTAUT) is one of the models which is made up of synthesis of eight existing models of technology acceptance (Oshlyansky et al., 2007). UTAUT proves to be a better predictor of technology acceptance and explains about 70% of variance in intention to use technology than any of the individual models used separately (Venkatesh et al., 2003).

2.7.1.1 Choice of Model

Although UTAUT proves to be a better predictor of acceptance, critics posits that the model is just re-creation of the Theory of Reason Action and Theory of planned Behaviour models (Benbasat and Barki, 2007). This means that in trying to understand the behavioural intentions, the initial theories may provide the same outcome in combinations with other models. Moreover, the UTUAT model considers factors like gender and age in prediction of the acceptance of IS. It indicates that women are more sensitive to others opinion and therefore disposed to be influenced by others. They also indicated that older people are more likely to be influenced by other people especially those in authority.

As this research is considering non-compliance behaviour in the health sector which has varying gender and age groups, the use of UTUAT does not provide much benefit over the other basic models like TAM. Further, recruitment of staff for department does not discriminate based on gender and age. As such the department make up may not reflect the requirement of UTAUT (gender and age consideration) and will not align favourably for this research. Furthermore, the other factors like experience and voluntariness of use though useful, may not add much to the assessment of compliance behaviour. This is because, the requirement to use the systems in place is mandatory and not voluntary thereby the use of UTAUT may not aid this research. Moreover, the departments have varying experience which might influence the compliance behaviour, but the initial theories like TAM may provide approach for compliance assessment to be performed in combination with other models and theories. Therefore, use of an initial model in this research may be favourable.

Consequently, we propose the extension of TAM for this research as meta-analysis of TAM indicates that TAM is a useful model when broader integration is factored to include variables related to both human and social change processes (Hamre, 2008). As such, the TAM model is suited to extension with other theories to predict acceptance. Essentially, the research will seek to look at the extension of TAM and how in combination with other models and theories can be used to develop a model for assessment of compliance. The

next session reviews Technology Acceptance Model, its application and how this can be extended in the assessment of compliance.

2.7.1.2 Technology Acceptance Model

The technology acceptance model (TAM) has been widely used in much of the research into technology acceptance (e.g., Davis, 1989; Venkatesh, 1996; Adams et al, 1992; Segars and Grover, 1993; Succi and Walter, 1999; Matheson, 1991; King and He, 2006). It has been used in different domains and in different situations to predict the behaviour intentions to use a technology as well as actual use of technology (Pinsker and Dominion, 2008). The TAM model was developed by extension of the Theory of Reasoned Action and has been effectively applied to a variety of situations to understand a major problem in the IS field. This conceptual model was later reviewed and reformed; it has since been tested and extended by many researchers with Overall empirical proven success in predicting about 40% of system's use (Legris et al. 2003).

The model proposes that the behavioural intention by a user to use a system influences the actual use of the system. This is further influenced by other factors, external factors, perceived usefulness, and perceived ease of use of the system. The external factors typically include user training, user participation in the design, system characteristics and the implementation of the system (Venkatesh and Davis, 2000). The perceived usefulness measures the degree of believe that use of a particular system would enhance the job performance whiles the perceived ease of use looks at degree of effortless use of the system (Davis, 1989). Figure 2 -1 shows the technology acceptance model and how the constructs interact to predict actual system use.

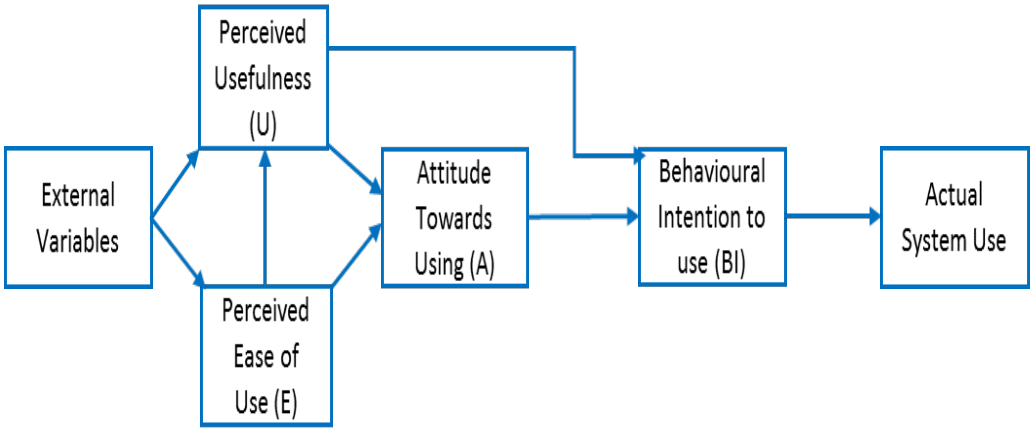

Figure 2-1 Technology Acceptance Model (Davis et al. 1989, P. 985)

It is indicated that TAM usage across different domains has been successful due to the two components of the model (Mathieson, 1991). However, TAM has been widely criticised leading to attempts by the original proposers to redefine it several times to suit the ever-changing world of technology (Hamre, 2008). Therefore, a combination of TAM with other theories or model will aid in better understanding of the acceptance of IS. As the initial stage of this research seeks to assess the reasons behind the non- compliance behaviour, we propose that extension of TAM with other theories that considers in use application of the systems, tools or rules will provide data to address this need.

The next section seeks to consider the reasons for extension of TAM to address the research objective.

2.7.1.3 Extension of TAM to Research

The models of acceptance of technology have indicated that the actual use of the technology is influenced by many factors. These factors can be external or internal to the individual and or an organisation and these play an important role in the acceptance and use of technology. Although these models have been used in technology acceptance, extension to other research areas is limited. However, we submit that the factors that influence user behaviour to adopt and use technology can be applicable to other human activities which may also influence compliance behaviour. Further, the success in using these models of acceptance to predict adoption and use of the technology can be extended to the investigation of compliance. This is because, according to Venkatesh et al., (2003) the foundational theories have been used to predict a variety of human behaviours over the years with TAM being used in many occasions. This can therefore be applied in assessment of reasons behind non-compliance behaviours as compliance activities also involves human activities. Moreover, from the models of acceptance, the willingness of people to accept and use the technology as designed and required by the designers has been shown to stem from the behavioural intent. This behavioural intention is the formulated conscious plans to perform or not to perform certain specified future behaviour (Venkatesh et al., 2003). However, the behavioural intention is influenced by other factors like user training and user participation in the design as indicated in the acceptance models. Therefore, by understanding the factors that influence the behavioural intention, we think that the actual compliance can be assessed.

Consequently, assessment can be made of the behaviour of subjects by understanding their behavioural intentions. As the TAM is more of a prediction of the intention to comply, we suggest that to assess the compliance behaviour, we need a model that considers both the

acceptance and routine use. A combination of theories or models that considers how the subjects compliantly use the systems in place will provide appropriate data for assessment of the reasons behind the use of the system, in this case the QMS. We suggest that, to understand the reasons for use of the system, consideration of other human behaviour should be ascertained. These factors may include the user's interaction with other people and with their environment, the influence of culture and even the problems that may exist within the set up. As such, we propose that Activity theory that considers these factors when assessing how subjects interacts with objects to produce outcome may be useful in addressing the research question.

The next sections review Activity theory which is proposed to be applied with the TAM model as the basic artefact for assessment of non-compliance.

2.8 Activity Theory

Activity theory is a conceptual framework with "activity" being the foundational concept. This is understood as useful, transformative and develops interaction between the subjects and the world objects (Kaptelinin, 2014). The motive for the 'activity' in the theory is created through the strains and inconsistencies within the elements of the system. According to Abdullah (2014) activity theory has been found to be useful in providing insights into all aspects of interactions and contradictions.

It is not a predictive theory but more of a descriptive meta-theory or framework. It looks beyond just one actor by taking a holistic approach to consider an entire work/activity system (including teams, organisations, etc.). In the broad sense, activity is perceived as an interaction of the actor (e.g., a human being) with the world. In addition, through the mediating activity the theory can bridge the gap between the individual subject and the social reality. According to Fjeld et al. (2002), Activity Theory identifies both the internal and external cognitive processes involved in the use of tools and the transformation that results from the interaction. It provides a method for analysing and understanding phenomenon by finding patterns that allows for inferences to be made.

The interaction was initially described as a process relating the ***subject*** (S) and the ***object*** (O) with a common representation of activity as "S ⇔ O" (Kaptelinin, 2014). The interaction between the subject and the object is mainly characterised by two key aspects; the subjects of activities have needs which should be met and activities and their subjects mutually determine one another. Simply put, the subjects have needs and through the activities generates forces that transform both subjects and objects.

To further improve the understanding of how the activities, work, Engestrom (1987) proposed concrete meditational means for the interactions. There are six nodes identified for this system and this includes the object, subject, mediating artefacts (signs and tools), rules, community, and division of labour. Engestrom (1987) posited three main interactions: (1) instruments for the "subject - object" interaction, (2) rules for the "subject - community" interaction and (3) division of Labour for the "community - object" interaction. Figure 2-2 shows the activity system and how they interact to achieve the desired outcome.

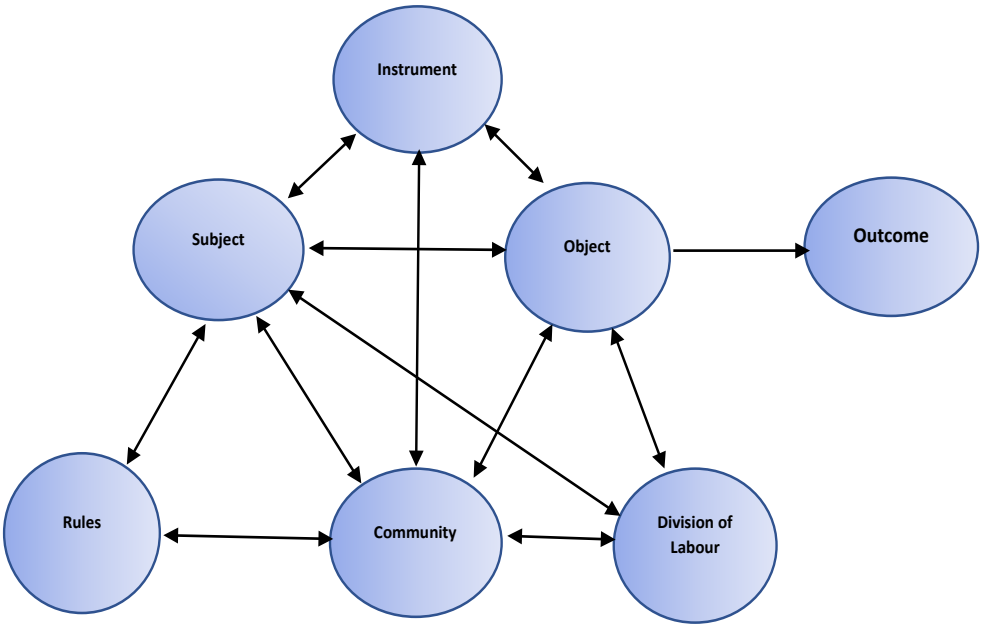

Figure 2-2 The structure of Human activity system (adopted from Engestrom 1987 p.78)

From the diagram, the six nodes form three main interactions with resultant completion of the activity. This activity is a goal-oriented interaction of a subject with an object using tools. It can be suggested that by understanding the different nodes and their interaction, useful data can be collated that can be used in decision making.

2.8.1 Interactions in Activity Theory

To understand the activity that leads to outcome, it is important to understand the three main interactions: subject – object, subject -community and community – object interactions. These interactions provide means to understand the activity and allows for coherent approach to be taken when assessing the outcome of activity.

2.8.1.1 Subject – object interaction

The interaction involves subjects using artifacts as tools or instruments to address tasks they are confronted with. These tools mediate activity which connects the subjects to the physical surroundings of the objects and other subjects in the community (Leont'ev, 1981). The instrument in this set up can be the equipment, tool, sign, or other means that is used to complete or compel the performance of task. This may be very useful as it acts as the mediational means by which the outcome is achieved. Kaptelinin (2014) indicated that the instrument is one of the most important aspects of the activity as it enables the subject to achieve the desired outcome. This mediational means has evolved over the years to allow for actors to interact and compensate for the changing environment. The instrument becomes part of the cultural context for other subjects within the community as they all interact with the instrument.

From the diagram, the instrument is influenced by many factors and careful evaluation of this may help in understanding why the actors fail to accomplish task. The use of the instrument as required by the manufacturer and in line with the standard operating procedures, may be influenced by their perception of the instrument. The perceived ease of use or the usefulness of the instrument to achieve the objective may also determine how they interact with it. In addition, the nature of the object may also influence the interaction with the subject. Here, if the object is not standardised, the application of the instrument in the interaction may be compromised as the settings of the instrument may not always yield the outcome. In this case, the subject may operate outside the agreed requirements or the rules in order to get the outcome. This may lead to non-compliance or failure to meet the outcome.

There may be instances where the instrument is not used as prescribed by manufacturers or standard operating procedure due to demand by customers which are not standard. Accordingly, the staff may use the instrument to perform a task to satisfy the outcome or demand of the customer, but this may not necessarily comply with rules and standards in place. Despite the demand of the customer being met, the required use of the instrument for the subject-object interaction is breached. This may lead to cognitive tension as the subject envisage the correct approach but fail to actualise due to the conflicting demand.

Moreover, the interpretation of the signs and procedures that governs the use of the instrument may not be achieved by the subject. This may be due to complexity of the signs and procedures or inadequacy of the procedures to allow for the desired interaction. In such cases, the outcome is impacted as the subject may fail to follow procedures to get the desired activity and outcome.

Finally, the subject may also influence the operation of the instrument which can contribute to non-compliance. This may be due to physical limitations or cognitive limitations with the subject. There may also be lack of experience by the subject in interacting with the instrument. According to Leont'ev, (1981), the collective experience of the subject may influence appropriate use of instrument. The interaction of the subject and the object using the instrument is therefore important when considering non-compliance.

2.8.1.2 Subjects – community interaction

Subjects in this instance are the actors who have needs and will therefore interact with objects to produce the desired outcome. The notion of "subject" is not limited to individuals but other entities, such as, teams, and organisations that can also have need-based agency and can be subjects of activities (Kaptelinin and Nardi, 2006). The organisation as the subject may have a need which may be derived from the customer demands. This may result in interaction between the subject and the community to achieve the desired outcome.

Here, the subjects as individual staff operate in a community of the organisation is governed and influenced by rules. These rules can be in the form of formal or informal rules that influence the way the subjects operate in the organisation. These rules may be followed by the subject depending on their acceptance of the rules to enable them to achieve their goal. Their perception of these rules, either useful or ease to follow may determine how they interact in the social space to attain their goal. Consequently, the rules shape the understanding and aids the interaction of the subject within the community. Consideration of this interaction may be appropriate in assessing compliance (Dankwa and Nakata, 2016).

Moreover, the activities of the subjects may not only be influenced by the object, but other factors also play a part. This can be different in various settings and circumstances depending on the environment. From the diagram the subject is influenced by the available instrument. This is the staff using the available tool to produce the customer requirement. The instrument as the mediational tool needs to be understood by the subjects to enable appropriate interaction with the object to achieve the desired outcome. Essentially, the signs should have meaning to the subjects to allow for interpretation to achieve the goal. In instances where these signs are not clearly defined, staff may use their own initiative which may result in positive or negative outcome.

2.8.1.3 Object – Community interaction

According to Kaptelinin (2014) objects have their "objective" meanings, determined by their association with other entities existing in their surroundings. To meet their needs, the subject must reveal the objective meaning of the objects and act accordingly. Engeström

(1991) asserts that subjects control their behaviour based on their surroundings and not only from the inside. As such, the interaction of the subject with their community needs considering when assessing compliance. The activities of the subjects within the community to achieve the needs of the objects may be delicate as it relies on various teams that exist within the community to play their part. This involves division of labour where all the teams or parties involved play their part. In the organisation, these various divisions exist that work as value stream to deliver the objective.

Although these various teams may work independently, there are service level agreements and other rules that bind them to deliver outcomes at certain times to meet the goal. In other words, there may be factors like knowledge, expertise, and skills etc. that exist in the community that may influence the outcome of the objective. Obviously, if the division of labour within the community is not fairly done, this can result in resentment with a resultant deviation from standards leading to non-compliance.

An example of the interactions described above: in the blood manufacturing department of NHS Blood Centre, consider the activity of an operator who works as a member of a manufacturing team on production of various blood components for patient use. The object of the activity is the collected whole blood, and the expected outcome is the various blood components. The operator (subject) employs a variety of tools in their work on the object, including physical objects like centrifuges, separator, procedures, and techniques.

The community comprises other members of the team: manufacturing operatives, the manager, supervisors, etc. The operator's relation with the community is mediated by explicit and implicit rules, e.g., taking part in laboratory meetings, ensuring certain guidelines are met, etc. Furthermore, producing the outcome of the activity system, is the responsibility of the entire manufacturing team.

The effort of the operator is a part of a larger effort of the team. Therefore, the work of the operator needs to be coordinated with the work of other team members. This coordination is achieved by employing a Division of Labour, which thus mediates the relation between the manufacturing team and its object. From the example, it is evident that the interaction of the subject with the object and subsequent interactions may influence compliance of the subject.

Consequently, TAM model and Activity theory are considered in chapter four when the Conceptual model (initial artefact) is utilized in line with design science for assessment of non-compliance.

The rest of this chapter considers behaviour change theories and persuasive systems and their application in this research to address the second research question; how to improve compliance.

2.9 Behaviour Change Theories

Change is inevitable and as such behaviour change theories attempt to explain why individual behaviour or attitude change. Behaviour change theories are appropriate in understanding individual behaviour and or attitude and allows for assessment and changes to be made. According to Wiafe and Nakata (2012), In recent years, behaviour theories have been applied in different areas like health(Schwarzer 2008; Prochaska & Velicer 1997), education (Wang & Wu 2008) and information systems (Fogg 2009b). The essence of these change behaviour theories is to understand behavioural change with the view to improve the systems, processes and services.

Researchers have indicated that there is distinction between models of behaviour and theories of change (van der Linden, 2013). Models are focused on understanding the psychological factors that explain or predict a specific behaviour and thus is more of a diagnostic tool whereas the theories of change are more process-oriented and generally aimed at changing a given behaviour (Danton, 2008). They are also highly complementary although they have distinct purposes. In addition, change theory support interventions to either change existing or encourage the adoption of new behaviours.

Nonetheless, although each behavioural change theory or model focuses on several factors, the focus is to explain behaviour and or attitude change. Thus, it is imperative to understand the required change to allow for appropriate theory or model to be used when assessing and observing behaviour change. But for the purpose of this research, we adopt working definitions as found in the Oxford dictionary and extend these to be used for remainder of this research. The definitions are as follows:

Behaviour is the way in which one acts or conducts oneself, especially towards others. The action is exhibited because of influence from the environment, culture, values, which can be conscious or subconscious and voluntary or involuntary.

Attitude is a settled way of thinking or feeling about something. This can be general evaluation that one may hold regarding themselves, other people, objects, and issues.

Persuasion is to cause or induce someone to believe something, especially after a sustained effort. Is a form of process aimed at influencing others by modifying their intentions, beliefs, values, behaviour or attitudes without deception or coercion.

Compliance is being in accordance with established guidelines, commands, specifications or state of meeting industry regulations and government legislation. Process of ensuring that organisations and employees follow the laws and all ethical practices in place.

From the anecdotal evidence of staff behaviour within the organisation, it is evident that staff attitude and behaviour towards the QMS differ depending on many factors. As such, to successfully try to change the behaviour, thorough understanding of all factors that determine and influence the behaviour under investigation should be ascertained (Danton, 2008).

It is therefore essential that theories that considers attitude and behaviour towards target behaviour (in this case use of the QMS) and tension that may exist between correct use or not of the QMS should be assessed. This may enable the development of model to predict or explain the attitude and or behaviour and subsequent application of interventions to change the attitude, behaviour, or both towards the target behaviour.

2.9.1 Cognitive Dissonance Theory

The Theory of Cognitive Dissonance (Festinger, 1957) propose that human beings strive for internal psychological consistency to mentally function because individual become psychologically uncomfortable when there is cognitive tension. Defined broadly, cognitions are any mental representation, and as such, cognitions include attitudes, beliefs, or knowledge of one's own behavior (Hinojosa et.al., 2017). The theory proposes that two cognitions are in dissonance if one opposes the other creating an unpleasant psychological discomfort. Cooper (2012) also explains that Cognitions are discrepant if a person believes that one cognition follows from the obverse of another.

As such for consistency to be maintained, people are motivated to reduce any cognitive dissonance either by changing parts of the cognition or by adding new parts to the cognition that causes the psychological dissonance. Alternatively, they strive to actively avoid any social situations that are likely to increase the magnitude of the cognitive dissonance. As such, people will adjust their attitudes to fit the new behaviours by changing their attitudes, beliefs, and behaviours to minimise dissonance (Festinger, 1957).

People strive to reduce the dissonance by continually aligning their cognitions; align their perceptions of the world with the real world. Due to the stress of the dissonance, there is motivation to change either behaviour or attitude to avoid a distressing feeling (Griffin and McClish, 1991).

In practice, people will attempt to reduce the magnitude of their cognitive dissonance in four ways (Festinger, 1957):

- Change the behaviour or the cognition – This is achieved by the person deciding to eliminate the cause of the cognition or by dealing with the 'root cause of the cognition'. Example, I am stopping the eating of chocolate (seen to be the cause of the cognition).
- Justify the behaviour or the cognition, by changing the conflicting cognition. This occurs when the person convinces themselves that they are permitted to 'eat rough' every now and then. Hence, they eat the chocolate that is causing the cognition but justify it.
- Justify the behaviour or the cognition by adding new cognitions. This is where the person justifies their behaviour by adding some positive action to make them feel better. Example, I'll spend 60 extra minutes at the gymnasium to work off the chocolate.
- Ignore or deny information that conflicts with existing beliefs – Example, this chocolate is not a high-sugar food.

Using example of smoking, Aronson (1969) expounded on the application of the four ways. They explained that a cigarette smoker who experiences dissonance by realising that smoking will cause cancer will try to eliminate this dissonance by finding evidence that contradicts the fact that smoking will cause cancer since they find it difficult to stop smoking. Moreover, the amount of effort invested magnifies the amount of discrepancy reduction, an effect known as effort justification; thus, severity of initiation processes positively predicted organizational commitment (Aronson, E., & Mills, J. 1959). Importantly, to achieve reality, people continually adjust the correspondence of their mental attitudes and behaviour. As a result of this, three possible relationships have been identified to exist between attitude and behaviour: Consonance (two cognitions consistent with each other), Irrelevance (two cognitions unrelated to each other) and Dissonance (two cognitions inconsistent with each other). Although other versions (Self-perception theory, Balance theory, Self-discrepancy theory, Adverse consequences vs. inconsistency) have been formulated from this theory, (Harmon-Jones and Harmon-Jones, 2007) challenged the assertions of the other versions.

Moreover, with proposed newer versions and extensions of cognitive dissonance theory, we consider the application of the Cognitive Dissonance theory for this research as it lends to the work and allows for interpretation of the data collected. With different ways of people trying to manage the magnitude of the cognitive dissonance, it is evident that the Cognitive Dissonance Theory will be useful when considering the behaviour change that is required.

The next section looks at behaviour change support systems to address behaviour change because of cognitive dissonance identified.

2.10 Behavioural Change Support Systems

Behaviour Change Support Systems (BCSS) have been proposed for management of attitude and behaviour changes and its application in this research is appropriate in dealing with behaviour change that is required. It is believed that BCSS provides means and approach that engages users with new behaviour, make it easy to perform the needed process and support them in their routine activities (Harjumaa and Muuraiskangas, 2014).

A BCSS can be defined as "a sociotechnical information system with psychological and behavioural outcomes designed to form, alter or reinforce attitudes, behaviours or an act of complying without using coercion or deception" (Oinas-Kukkonen, 2012). Essentially, BCSS forms, alters, or reinforces attitudes and behaviours without coercion or deception which is required if the appropriate behaviour changes can be made. The theory of planned behavior as one of the most influential determinant models describes the relationship between attitudes, intentions, and the desired behaviour. The understanding of these relationships is relevant if the appropriate behavioural changes can be made
According to (Wiafe et.al 2012) the changes in attitude, behaviour or both to the target state may take different persuasive approaches depending on many factors and this needs to be considered to follow best approach that will yield target behaviour. Importantly, BCSS uses extrinsic (perceptual) prompts like alarms, messages with offers to action, adverts, requests, and more to effect change. A supporting model for BCSS is the Fogg Behaviour Model (FBM).

2.10.1 Fogg behaviour model - FBM

The Fogg Behaviour Model (FBM) is considered as model designed specifically for behaviour analysis. This is because, Fogg's model (Fogg, 2009b) simplifies behaviour change analysis specifically for designing persuasive technologies and lends the opportunity for the new intervention to be aligned.

The Model considers behaviour as the product of three main factors: motivation, ability, and triggers. It suggests that for a behaviour to happen, an individual need to have enough motivation, ability and an effective trigger with all these factors being present at the same time. Figure 2-3 shows the link between motivation, Ability and the trigger to attain the target behaviour. The model advocates that these three main factors are further influenced by other factors which are relevant when analysing the target behaviour.

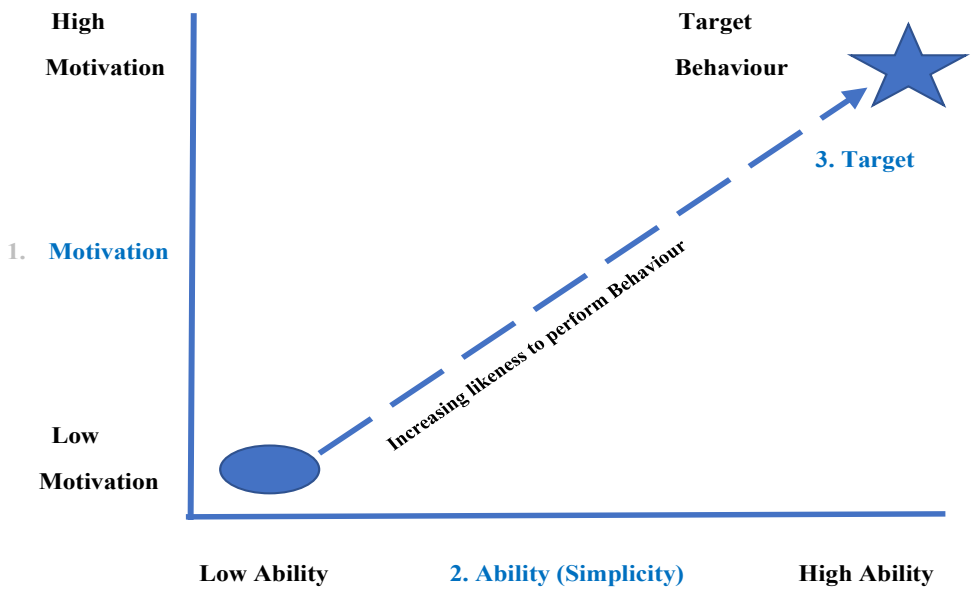

Figure 2-3 A Behaviour Model for Persuasive Design by Fogg (2009b)

Firstly, there are three cores in motivation with two sides for each core. The two sides of the first core are pleasure and pain which in most cases create an immediate motivation. The second core which is hope and fear is characterised by anticipation of an outcome and do not result in immediate motivation in most cases but are more powerful than pain and pleasure (Fogg, 2009b). In some cases, people will accept pain to overcome fear. For example, one will go through the pain of flu shot due to the fear of being infected with flu. The third core is social acceptance or rejection and mostly it controls one's social behaviour.

According to Fogg (2009b), individuals are more motivated when they are socially rejected. Time, money, physical effort, brain cycle, social deviance and nonroutine are the six main types of ability, whilst triggers are categorised into sparks, signal and facilitators. Table 2-3 shows the main factors and the sub factors that influences behaviour change.

Table 2-3 Factors that influence persuasion by Fogg (2009b)

Motivation	**Ability**	**Trigger**
Pleasure/ pain	Time	Spark
Hope / fear	Money	Facilitator
Acceptance/rejection	Physical efforts	signal

	Brain cycle	
	Social Deviance	
	Non-Routine	

The next section will review behaviour change design approaches that have been used in BCSS.

2.11 Behaviour Change Design Approaches

Many behaviour change systems are available that can be applied when effecting behaviour changes and at times variations of those systems to understand the dynamics and principles of persuasive design is necessary. That said, there are times when entirely new persuasive technology is required to aid research or to further changes in organisations in a commercial setting.

For this research, we consider the application of a new intervention or extension of existing intervention to effect compliance behaviour change. As such, coherent process design or a stepwise approach is required to aid in the application and the analysis. According to Wiafe and Nakata, (2012), due to interdisciplinary nature of persuasive technologies, most researchers apply methods and techniques which have been proven to be successful in their respective fields. Others have also resorted to the use of ad hoc approaches to implementation of persuasive technologies with varying success. To this end, consideration of some framework and design steps for design and implementation of persuasive technologies in required.

Here, the eight-step approach (Fogg, 2009a) and the Persuasive System Design (Oinas-Kukkonen, 2009) that have informed the development of Behaviour Change Support Systems (BCSS) will be reviewed. This review is intended to provide a context and design for the proposed persuasive framework and not deemed as an exhaustive review and critique of theoretical models used to inform the development of BCSS. Other sources (Webb et, al., 2010 and Lyons and Hatkevich, 2013) may provide a more exhaustive review of the different models of behaviour change used to inform BCSS development.

2.11.1 An Eight-step Design Process

To increase the probability of success, the eight steps design process by Fogg (2009a) outlines a path to follow to design persuasive technologies. He proposed that, the process

should start with careful thinking, followed by small introduction of ideas, then simple tests to produce measurable success (Fogg, 2009a).

The eight steps in the process of designing persuasive technology as described in Figure 2-4 are as follows: choose a simple behaviour; choose a receptive audience; find what is preventing the target behaviour; choose a familiar appropriate channel; finding relevant examples of persuasive technology; imitate successful examples; test and iterate quickly and expand on success. These steps are divided into two stages and mostly carried out in sequence but are not rigid; they serve as a guide to aid the designer.

Fogg (2009a) demonstrated that the first step in the process—choosing a simple behaviour to target, is one of the most important aspect of designing successful persuasive technologies. Here, the smallest and simplest behaviour that matter is selected, and a clear objective is formulated by simplifying a bigger goal into a seemingly tiny one. He submitted that, achieving the small goal may have bigger effects than expected as getting people to do small things naturally leads to them adopting more ambitious behaviours, even without a bigger intervention.

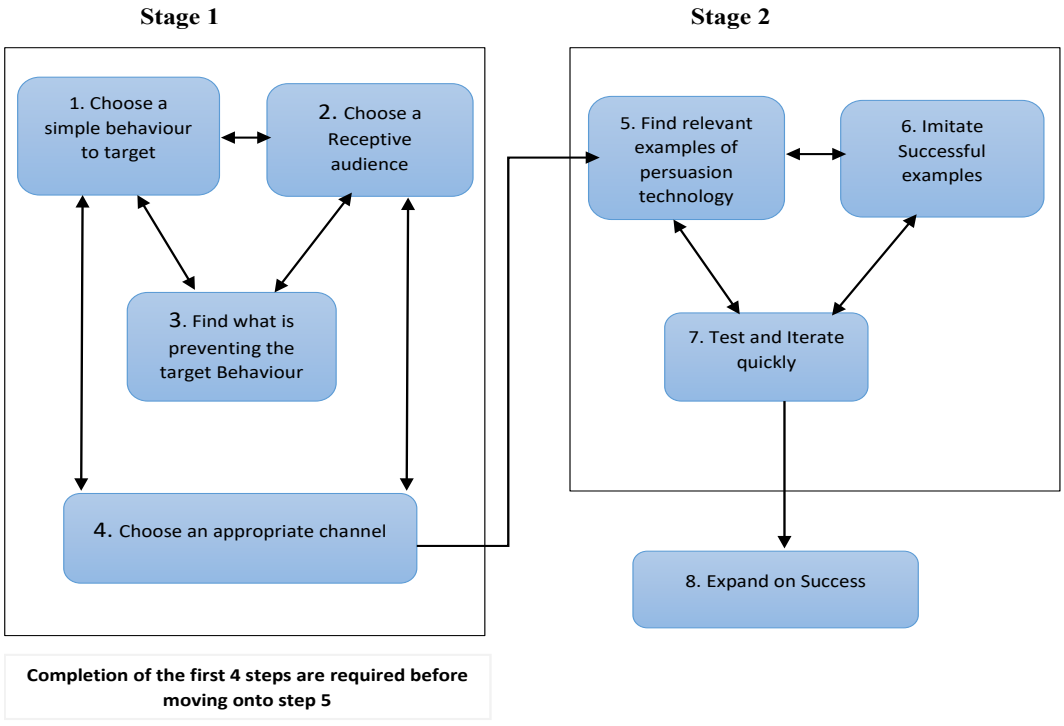

Figure 2-4 Creating Persuasive Technologies: An Eight-Step Design Process (Fogg, 2009a.)

The second step involves choosing the right audience for your intervention; choose audience that is most likely to be receptive to the targeted behaviour change. It is imperative

that the audience chosen for the targeted behaviour are the easiest audience and can be the advocates or champions than selecting audience that are difficult.

The next activity is the identification of what prevents the target behaviour. Here, there is the need to identify issues or activities that serve as impediments to the target behaviour. He proposed that barriers always fall into some combination of the following three categories: lack of motivation, lack of ability or lack of a well-timed trigger to perform the behaviour. This step is crucial as identification of the barriers will help in the design of intervention to achieve the target behaviour.

The fourth step is choosing a familiar technology channel for persuasion. Though there may be instances where the type of device or technology channel for persuasion are the limiting factors due to lack of device, it is more appropriate to implement the technology on devices or channels which are familiar to the target. This is because most people can change only one behaviour at a time as such the additional task of learning how to use a new technology can discourage users from following the intended behaviour.

Although the first four steps in the persuasion are performed following outline of the eight-step design, in some cases an exception can be made to follow different order as the steps are just a guide. This depend on many different factors ranging from motivation, ability or project constraints that informs the approach to take in fulfilling the first four steps. Nonetheless, whichever sequence is followed, the first four steps should come before moving on to Step five as is crucial for the realisation of the desired outcome.

Following the first four steps, in Step five, designers are to search and agree on relevant examples of successful persuasive technologies. But this is always not possible because companies generally don't share their conversion data with outsiders and makes it difficult to know the available relevant examples.

Essentially, Fogg (2009a) proposes that educated guess is the possible approach but the designers should examine at least nine examples in total: three that achieve a similar behaviour they are targeting, three that reach a similar audience they wish to reach, and three that use the same technology channel as they aim to use. This way, enough data is obtained that will help in making effective decision on what persuasive technology to use.

In step six (most important), there is the need to imitate successful examples after assessing all the available systems from step five. At this stage of the process, it is important to identify and adapt successful technology examples as this gives the fastest and surest way to create effective persuasive technologies. There is opportunity for real innovation and

creativity later in the process, but this stage is to try something that has already been done and shown to be successful or to create a few variations of the successful examples.

Having identified successful examples to imitate, step seven requires quick testing and iterating of the proposed persuasive experiences. The tests are not scientific experiments to gather publishable data but to focus on rapid trials to learn quickly about the persuasion design, the target behavior, audience, and channel.

Once success on a small scale has been achieved, the final step requires expansion or scale up on the success. The decision for expansion depends on the goals of the company but this should be systematic; varying only one or two attributes from the success achieved.

Although the eight- step design by Fogg (2009a) is simple and very useful in addressing small target behaviours, the restricted focus does not fit the goals of many interventions that attempt to address more complex problems. Moreover, Users may not know what steps to take to attain their goals and may require some education to identify behavioural goals that are strict or complex to be attained (Mohar et, al., 2014). Harjumaa and Oinas-Kukkonen (2007) also indicated that although Fogg's framework provides a useful means for understanding persuasive technology, it seems to be too limited to be applied directly to persuasive system development and/or evaluation. The next section reviews the persuasive system design and its application in the development of behaviour change support systems.

2.11.2 Persuasive System Design

The Persuasive System Design or PSD model (Oinas-Kukkonen and Harjumaa, 2009) is currently one of the comprehensive frameworks for developing and evaluating persuasive systems. According to Oinas-Kukkonen and Harjumaa (2008), persuasive system may be defined as "computerized software or information systems designed to reinforce, change or shape attitudes or behaviours or both without using coercion or deception".

From the definition, a reinforcing outcome makes the current attitudes or behaviours more resistant to change by reinforcing them, a changing outcome changes a person's response to an issue, whiles a shaping outcome leads to the formulation of a pattern for a situation when one does not exist beforehand. According to Lerbinger (1972), communication have differing success rate as communications that shapes outcome of behaviour may have higher likelihood of success than the communications that aims at changing outcome.

As such, depending on the required goal, different persuasive strategies and techniques may be considered. The persuasive communication is a complicated process that requires

the user (person being persuaded) to act as a human information processor to process the information. Here, the information is presented to the user who then processes the information and either retains it or act by complying with the new position provided by the information when the persuasion is successful (McGuire 1973).

To achieve the required persuasion, the persuasion system design outlines three steps that should be followed when developing persuasive systems. Firstly, for effective system analysis and design, it is crucial to understand the fundamental issues behind persuasive systems before implementing the system. The second phase is to analyse the context for persuasive systems, recognizing the intent, event, and strategies for the use of a persuasive system. Finally, the features of an existing system may be evaluated or the actual system qualities for a new information system may be designed to lead to behaviour change, attitude change or both (Oinas-Kukkonen and Harjumaa, 2009). Figure 2-5 shows the phases in the persuasive systems development.

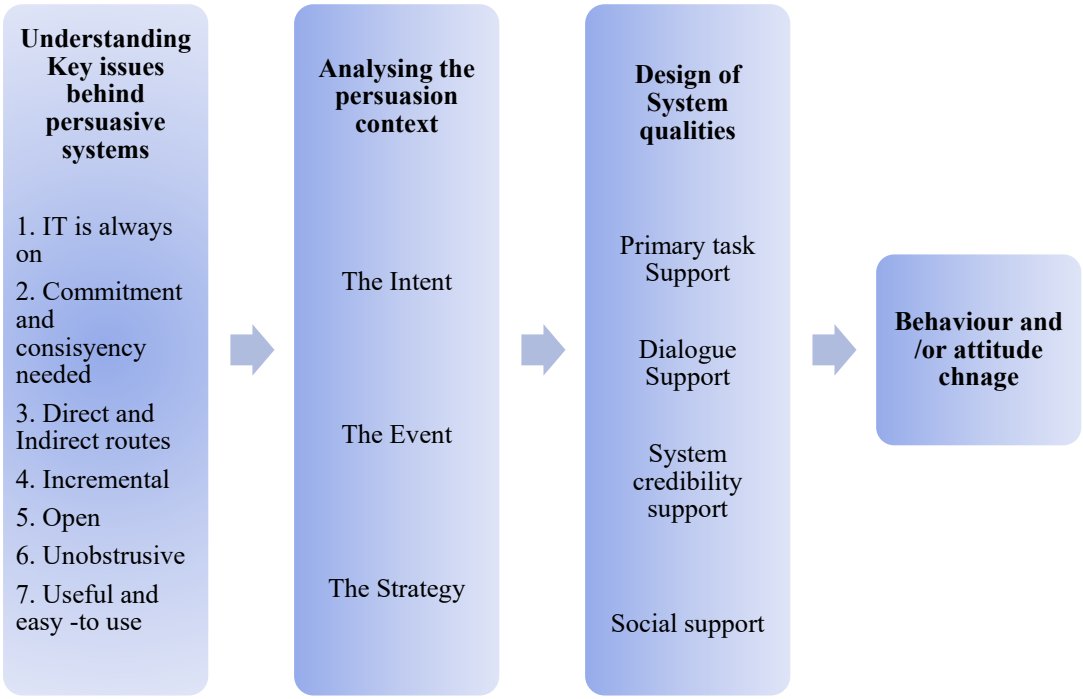

Figure 2-5 Phases in Persuasive Systems Design

According to Oinas-Kukkonen and Harjumaa (2009), based on empirical work and conceptual analyses, seven postulates need to be addressed or considered during design to understand the key issues behind persuasive systems. Two of these postulates relate to the designer's general assessment of the user; two on persuasive strategies; and the remaining three on the actual system features.

2.11.2.1 Postulates behind Persuasive Systems

The first postulate is that Information Technology (IT) is never neutral but "always on, "influencing people's attitudes and behaviour in one way or another. They proposed that persuading a user is a multi-phased and complex task with the IT always influencing the attitude and behaviour of the user in a way. The second postulate states that people like their views about the world to be organized and consistent in line with the idea of commitment and cognitive consistency (Cialdini et al. 1981). They indicated that if systems support the making of commitments, users will more likely be persuaded.

The third postulate indicate that there are direct and indirect routes to persuasion strategies. Individuals who carefully evaluate the content of the persuasive message may be approached by the direct route, whereas indirect routes are used for individuals who are less thoughtful and uses simple cues or stereotypes to evaluate the information.

Both routes may be used simultaneously, but the direct persuasion has turned out to be the more enduring of the two (McGuire 1973; Petty and Cacioppo 1986). Because users have different route for persuasion, there is indication that the background and the use situation have an influence on the information processing of the user. Essentially, users with high motivation and a high ability, will prefer the direct route as they are more likely interested in the content of the persuasive message than users with low motivation and ability.

The fourth postulate states that persuasion is often incremental and is therefore easier to initiate people to perform series of actions through incremental suggestions rather than a one-off consolidated suggestion. This means that the target behaviour could be achieved through enabling incremental steps in the persuasive system.

With the fifth postulate, it is important that persuasive systems always be open with the designer's bias behind the persuasive system revealed. Moreover, it is unethical for content that is based on untruthful or false information to be used as it defeats the overall goal of users' voluntarily changing attitudes or behaviors.

The sixth postulate states that persuasive systems should aim at unobtrusiveness, thus avoiding disturbance of users while they are performing their primary tasks using the persuasive system. This means that, the system should be capable of fulfilling users' positive expectations by carefully choosing opportune moments for a given situation.

Lastly, the seventh postulate states that the persuasive system should really serve the needs of the user by being useful and easy to use. They should make complex task simple and should include a multitude of components, such as responsiveness, ease of access, lack of errors, convenience, and high information quality, as well as positive user experience, attractiveness and user loyalty.

2.11.2.2 Persuasive Context

The persuasion context is critical for evaluation and analysis of attitude and behaviour change. Careful analyses of the persuasion context allow for inconsistencies in user's thinking to be recognized, discern appropriate moments for delivering messages, and effectively persuade users (Oinas-Kukkonen and Harjumaa, 2009). The context analysis includes recognizing the intent of the persuasion, understanding the persuasion event, and defining and/or recognizing the strategies in use. Figure 2-6 shows Analysis of the persuasion context.

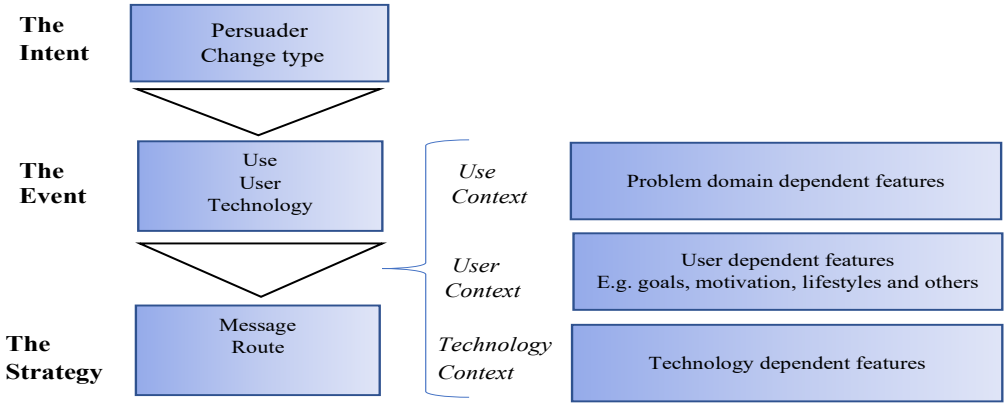

Figure 2-6 Analysis of the Persuasion Context (Oinas-Kukkonen and Harjumaa, 2009)

It starts by identifying the *intent* which comprises of the persuader and the change type. The model recognizes three different sources of intention as proposed by Fogg (1998). These are those who create or produce the interactive technology (endogenous); those who give access to or distribute the interactive technology to others (exogenous) and the lastly, the person adopting or using the interactive technology (autogenous). The change type considers whether the persuasion aims at attitude and/or behavior change.

The next analysis in the persuasion context is the understanding of the *event* which comprise the *use context*, the user context, and the technology context. According to Oinas-

Kukkonen and Harjumaa (2009), central facet of the persuasion event is to consider the use context, particularly features arising from the problem domain.

They argued that, the *user context* should also be analyzed, and designers need to study and understand user specific issues in relation to the design of the system. Individual differences in terms of specific user information processing approach and the target goals should be considered.

In the *technology context,* the strengths, and weaknesses, as well as the risks and opportunities of specific technological platforms, applications and features that are required for design of the system need to be thoroughly understood.

The last feature of the persuasion context is the *strategy* which identifies the route and message to promote the persuasion. The message considers the information from the persuader that triggers an emotion to persuade. Moreover, considering the proper route to be used in reaching the user, to choose a direct or indirect route for persuasion is important. Both the direct and indirect processes may act simultaneously and may be supported through numerous software system features.

2.11.2.3 Design System Principles

Finally, the persuasive design identified four general design principles, each of which contains a number of specific components: (1) primary task support, which includes reducing complex behaviours into simpler ones, tunneling experience, tailoring and personalization, self-monitoring, simulation, and rehearsal, (2) dialogue support, includes: praise, rewards, similarity, liking, reminders, suggestions and social role (3) credibility, by conveying trustworthiness and expertise, and (4) social support, including both social networking components and the provision of social normative information. These four design principles are important and should be considered when designing persuasive systems as they act as a guide for the designer and aid consistency in the design. Figure 2-7 shows the persuasive system design techniques.

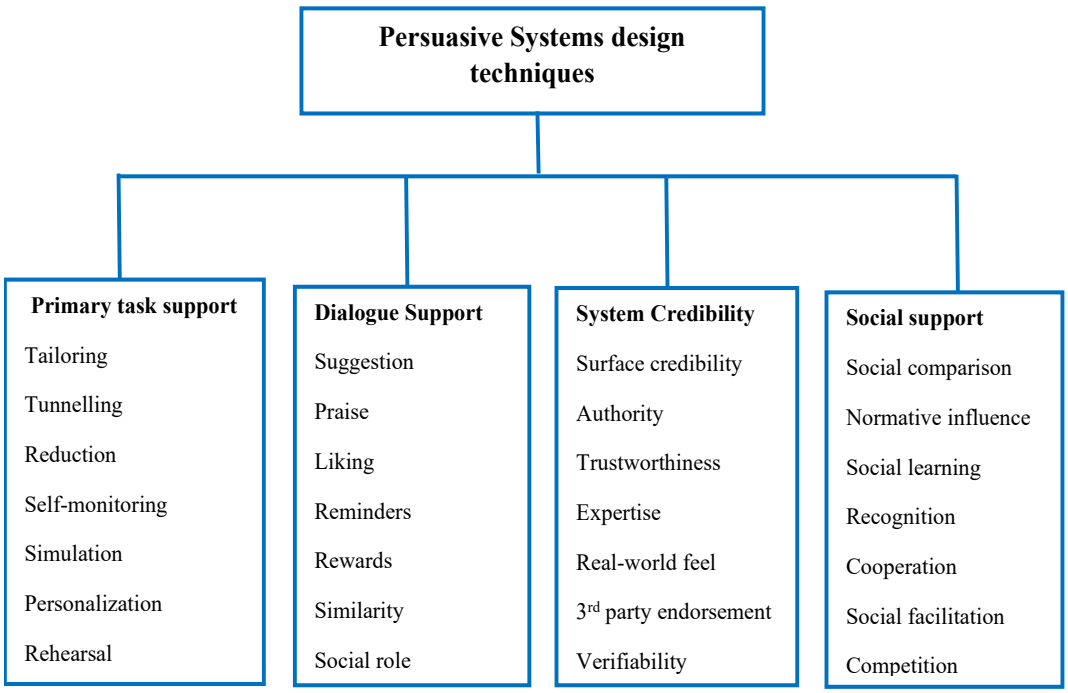

Figure 2-7 Persuasive systems design techniques

Many researchers have used the PSD model which have been shown to be essential because it supports the transfer of design components into software functionality (Mohar et al., 2014) which makes it easy for application in computer technology persuasion. Also, the clear design expression of PSD allows the evaluation of the value of the components involved in the persuasion. This is evidenced by a meta-analysis that evaluated both the frequency of the use, as well as their impact on adherence (Kelders et al., 2012). The use of the PDS and the design principles will be appropriate and provide systematic approach for behaviour change.

2.12 Chapter Summary

This chapter started by looking at the existing theories that have been used in the management of compliance behaviour. The review showed that although systems are in place for management of compliance, non-compliances have been reported. Review also indicated that existing body of theories and models are not adequate to understand the reasons behind the non - compliances. Hence the need for this research to provide systems for assessment of non-compliance and improve compliance. To do this, the chapter reviewed acceptance models that have been used for prediction of acceptance of IS. The chapter then considered the need to extend these models to assess non-compliance. Subsequently, extension of TAM and Activity theory was considered to aid in the initial assessment of non-compliance behaviour to address the first part of the research question.

The chapter further considered behaviour change theories and persuasion systems. Here, consideration of behaviour change and the steps in design of persuasive systems were assessed. The literature review indicated that there are limited models and systems to assess reasons of non-compliance. As such, this chapter has shown that the research questions may be addressed by extension of existing models and theories. Moreover, the literature review has also given indication of the research design that may be used. Later chapters will consider application of these models and theories in the development of new model and framework to address the research questions.

The next chapter will consider the research methodology that is applied in this research. It will review research beliefs and paradigms before considering the approach for the research.

Chapter 3
Research Methodology

3.1 Overview

The research methodology chapter defines the approach and design of the research project and allows for a coherent approach to be followed to address the research questions. It allows the researcher to ask how they go about obtaining the desired data, knowledge and the understanding that will enable them to answer the research question and thus contribute to knowledge. Choosing the appropriate research methodology for this research is important as it serve as core to a successful research work and as a knowledge base for future studies to be conducted.

Moreover, the use of the appropriate methodological approach not only serve as a guide for this research and other researchers to be able to follow and produce similar results but also ensures rigor. It allows for the various stages of the study to be systematically followed and facilitates the managements of the research. Because of the importance of this, researchers are in constant review of ways to better manage research and improve the process within the field of IS. Essentially, it is appropriate to briefly discuss the research paradigm and beliefs used in this research to understand the reasons behind non-compliance.

Accordingly, this chapter will discuss the processes and steps used in conducting this research within the Blood Centre within the NHS. The chapter will also seek to explain why these paradigms were considered appropriate for the research and explain the steps used in achieving the research objective three. The chapter reviews the beliefs and paradigms in research before settling on the design science as the approach for this research. The chapter considers the steps in design science as the approach for the systematic review of the problem.

3.2 Beliefs and paradigms

The choice of the appropriate methodology is important to the realization of the required outcome but underpinning methodology, are research paradigms that relates to the purpose and place of research in general. These paradigms are also based on the beliefs that exist in research and determines the setup of research. The next sections will review the beliefs and paradigms that underpins the research methodology and how they contributed to this research.

3.2.1 Beliefs

To address the research problem, researchers must follow specific research beliefs. According to Vaishnavi and Kuechler (2004), the basic beliefs or the underlying philosophical assumptions in IS research are: ontological, epistemological, axiological, and methodological. Ontology refers to "what we know", what exists, and focuses on the description or the form and nature of reality (Punch, 1998, Scott and Usher, 1996). There are two extreme views of the world, realism, and nominalism. Realists look at knowledge as objective and assume the empirical world is objective and independent of humans. Nominalists are more subjective and feel the empirical world exists through the action of humans (Orlikowski and Baroudi, 1991).

In effect, ontology helps in identifying the fundamentals or foundations of issues. Where ontology is concerned with the nature of reality, epistemology refers to how we know what we know, how we make value judgments, or how we know what is true. Epistemology is concerned with the question of what knowledge is and the relationship between what is known and who knows it (Punch, 1998, Orlikowski and Baroudi, 1991). Axiological belief deals with values and seeks to identify what individuals or society believes in, and why they do believe in such issues (Mingers, 2001). Methodological belief deals with set of guidelines that facilitates the generation of the desired knowledge and understanding.

3.2.2 Paradigms

The paradigms in IS that researchers employ to enable a systematic approach are positivist, interpretive, critical realism and design. These paradigms are linked to the objectivity or descriptive approach to research. The positivist paradigm can take a 'scientific' perspective when observing social behaviour and assumes that reality is objective.

According to Avison and Elliot, (2006) positivist research assumes that reality is objective and can be measured irrespectively of the research instrument employed. Moreover, the positivist paradigm is based on deductive theorising, where a number of propositions are generated for testing, with empirical verification and comprise quantitative research methods (Lehman, 2008).

Interpretive research takes stance that use inductive theory construction with researchers observing aspects of the social world and seeking to discover patterns that could be used to explain wider principles. research conclusions in interpretive are mostly subjective because the study assumes that knowledge is shaped by its social context. In effect,

knowledge can be obtained through social construction such as shared meaning, consciousness, language, etc. (Avison and Elliot, 2006).

Comparatively, to improve the opportunities for the realisation of potential outcome, critical research seeks to assist in the elimination of the causes of unwarranted isolation and domination (Hirschheim and Klein, 1994). Importantly, critical realism allows for the underlying cause to be understood to enable better resolution of the problem.

Finally, design research uses development of artefacts to change the existing organisational situation into a more desirable one (Hevner et al., 2004). Design science is seen as a problem-solving paradigm that is concerned with the design and development of artefacts to help social actors to respond to a given reality. Vaishnavi and Kuechler (2004), demonstrated how the various basic beliefs in natural and social science compares to design science in table 3-1.

Table 3-1 Adapted Design Science Research Perspectives and Outputs by Vaishnavi and Kuechler (2004)

Basic Beliefs	*Research Paradigm*			
	Positivist	*Interpretive*	*Critical Realism*	*Design*
Ontology	A single reality, knowledge, probabilistic	Multiple realities, socially constructed	Stratified/layered (the empirical, the actual and the real) External, independent Intransient Objective structures Causal mechanisms	Multiple, contextually situated alternative world states, socio-technologically enabled
Epistemology	Objective, dispassionate, detached observer of truth	Subjective, i.e. values and knowledge emerge from the researcher-participant interaction	Epistemological relativism Knowledge historically situated and transient Facts are social constructions Historical causal explanation as contribution	Knowledge through making: objectively constrained construction within a context, interactive circumscription reveals meaning
Methodology	Observation, quantitative, statistical	Participation, qualitative, hermeneutical, dialectical	Retroductive, in-depth historically situated	Developmental, measure artefactual impacts on the

			analysis of pre-existing structures and emerging agency. Range of methods and data types to fit subject matter	composite system
Axiology	Truth: universal and beautiful predictions	Understanding: situated and description	Value-laden research Researcher acknowledges bias by world views, cultural experience and upbringing Researcher tries to minimise bias and errors Researcher is as objective as possible	Control, creation, progress (i.e. improvement) understanding

In considering design as a paradigm, Vaishnavi and Kuechler, (2004) proposed that design science results in the production of novel artefacts which changes the state of the world. Thus, design science researchers are comfortable with alternative world-states in contrast to positivist ontology in which the typical unit of analysis is a single composite of socio-technical system. Besides, the multiple realities of the interpretive research are different from design science. This is because design science believes in a single, stable underlying physical reality that limits the multiplicity of world-states. Therefore, ontologically, design science permits physical laws to be tentatively composed into configurations that results in artefacts with the intention of solving an existing problem.

Epistemologically, design science assumes that a piece of information is factual, and the meaning of the information is established through process of development and circumscription (Vaishnavi and Kuechler, 2004). The artefact developed is predicted as product of interactions of components. Methodically, it allows for rigorous, and stepwise processes to be followed in the research process which enables the creation of artefacts. Axiologically, the design science deals with creative manipulation and control of the environment in pursuant of truth or understanding.

Essentially, since the research aim to develop artefact to understand the reasons behind non-compliance and to effect behaviour change to compliance activities, design science

will be employed as the approach for this research. The next sections will seek to explain the design science paradigm as the approach for this research.

3.3 Design Science Paradigm

Many researchers in the field of information systems have drawn attention for information systems research to follow the design science paradigm. According to Venable and Baskerville (2012), design science is a research that develops an innovative and meaningful artefact to solve a generalised problem. Hevner et al. (2004) claimed that unlike natural science, which tries to understand knowledge, design science is a problem-solving paradigm that is concerned with the design and development of artefacts that attempts to create things that serve human purposes.

Moreover, Walls et al. (1992) also proposed that whiles the traditional explanatory and predictive theories found in behaviour (natural and physical) science attempts to understand reality, design science attempts to create artefacts. Thus, design science aims in transforming current state of organisational or social systems into a more desirable one through creation of novel artefacts (Baskerville, et al. 2009). It is seen as an outcome-based information technology research that offers specific guidelines for designing and evaluating research programmes with outputs mainly in the form of constructs, models, frameworks, architectures, design principles, methods, and/or instantiations (March and Smith, 1995). Table 3-2 shows the design science outputs and their descriptions. The output from the design science research allows for the problem investigation and analysis to solve and address business needs.

Table 3-2 Outputs of Design Science Research (March and Smith, 1995)

	Output	**Description**
1	Constructs	The conceptual vocabulary of a domain
2	Models	Sets of propositions or statements expressing relationships between constructs
3	Frameworks	Real or conceptual guides to serve as support or guide
4	Architectures	High level structures of systems
5	Design Principles	Core principles and concepts to guide design
6	Methods	Sets of steps used to perform tasks—how-to knowledge
7	Instantiations	Situated Implementations in certain environments that do or do not operationalize constructs, models, methods,

		and other abstract artefacts; in the latter case such knowledge remains tacit.
8	Design Theories	A prescriptive set of statements on how to do something to achieve a certain objective. A theory usually includes other abstract artefacts such as constructs, models, frameworks, architectures, design principles, and methods.

As research is an activity that contributes to the understanding of a phenomenon and to address issues, design science allows evaluation of artefacts that are designed to meet identified business needs (Hevner et al., 2004). It also allows specific guidelines for evaluation and iteration within research projects with the explicit intention of improving the functional performance of the artefact. Importantly, depending on the researcher's viewpoint and desired goals, design science allows for a multi-ethnic research approach which include elements from either the interpretive or positivist paradigm (Weber, 2010).

While behavioural science focuses on "what is reality", design science aims at establishing "the utility of an artefact" (Carlsson, 2006). These utilities should be usable and consistent with associated knowledge which can be applied using relevant process and methods to resolve a given problem (Myers and Venable, 2014). Furthermore, Hevner et al. (2004) asserted the need for the new artefact to map adequately to the real world, be presented in a clear and concise manner and the implications of the research and practice clearly demonstrated to solve a problem. By developing new artefact, the present state of a socio-technical system is altered that may result in increased efficiency, effectiveness, and customer satisfaction (Hevner et al., 2004). Thus, problem solving could be considered as using available means to achieve desired outcome whilst meeting existing laws that govern the environment in review. As such, even in instances that the research effort may be poorly understood, the target community may consider it as a success as it addresses their needs. Essentially,

3.3.1 Design Science Frameworks and Guidelines for Information Systems

As design science addresses problems related to aspects of design in information systems analyses and development, a designed artefact can be completed and effective when it satisfies the problem requirements and constraints. As such, framework and guidelines were proposed to allow for the design science research to evaluate, to theorise and to justify (March and Smith, 1995).

Essentially, Hevner et al. (2004) proposed seven guidelines to facilitate and allow evaluation of Design Science research as i) the research must generate an artefact ii) the artefact should be relevant to the resolution; iii) its utility, quality, and efficacy must be assessed rigorously; iv) the research should provide a provable contribution; v) rigour concept in DSR must be applied in both the evolvement of the artefact and its assessment; vi) the evolvement of the artefact should be a process that utilises current theories and knowledge to produce a solution to a defined problem; vii) the research must be efficiently connected to suitable groups. Table 3-3 shows the guidelines of design science research.

Table 3-3 Design Science Research Guidelines from Hevner et al. (2004)

Guideline	*Description*
1. Design as an Artefact	Design science research must produce a viable artefact in the form of a construct, a model, a method or an instantiation.
2. Problem Relevance	The objective of design science research is to develop technology-based solutions to important and relevant business problems.
3. Design Evaluation	The utility, quality and efficacy of a design artefact must be rigorously demonstrated via well-executed evaluation methods.
4. Research Contribution	Effective design science research must provide clear and verifiable contributions in the area of the design artefact, design foundations and/or design methodologies.
5. Research Rigor	Design science relies upon the application of rigorous methods in both construction and evaluation of the designed artefact.
6. Design as a Search Process	The search for an effective artefact requires utilising available means to reach desired ends while satisfying laws in the problem environment.
7. Communication of Research	Design science research must be presented effectively bot to technology-oriented as well as management-oriented audience

Based on these guidelines, it is important that the researcher understands the problem to address and to develop, evaluate and communicate the output of the artefact to address the problem. (Niehaves, 2007).

Further to the guidelines, an information research framework by Hevner et al., (2004) was developed to help researchers in building artefacts to resolve problems (figure 3-1). This framework focuses the researcher on areas to consider such as the environment, the

relevance to business needs, the knowledge base and the need to assess and refine the artefact to ensure that the research problem is resolved.

The framework also outlined the need to understand the people involved, organizational structure and strategies and the available technologies to support the processes. Moreover, the knowledge base allowed for the foundational theories and methodologies to be rigorously tested to develop and refine the artefact. Finally, the framework proposes the need to consider the business needs to ensure that the developed artefact is relevant to address the needs.

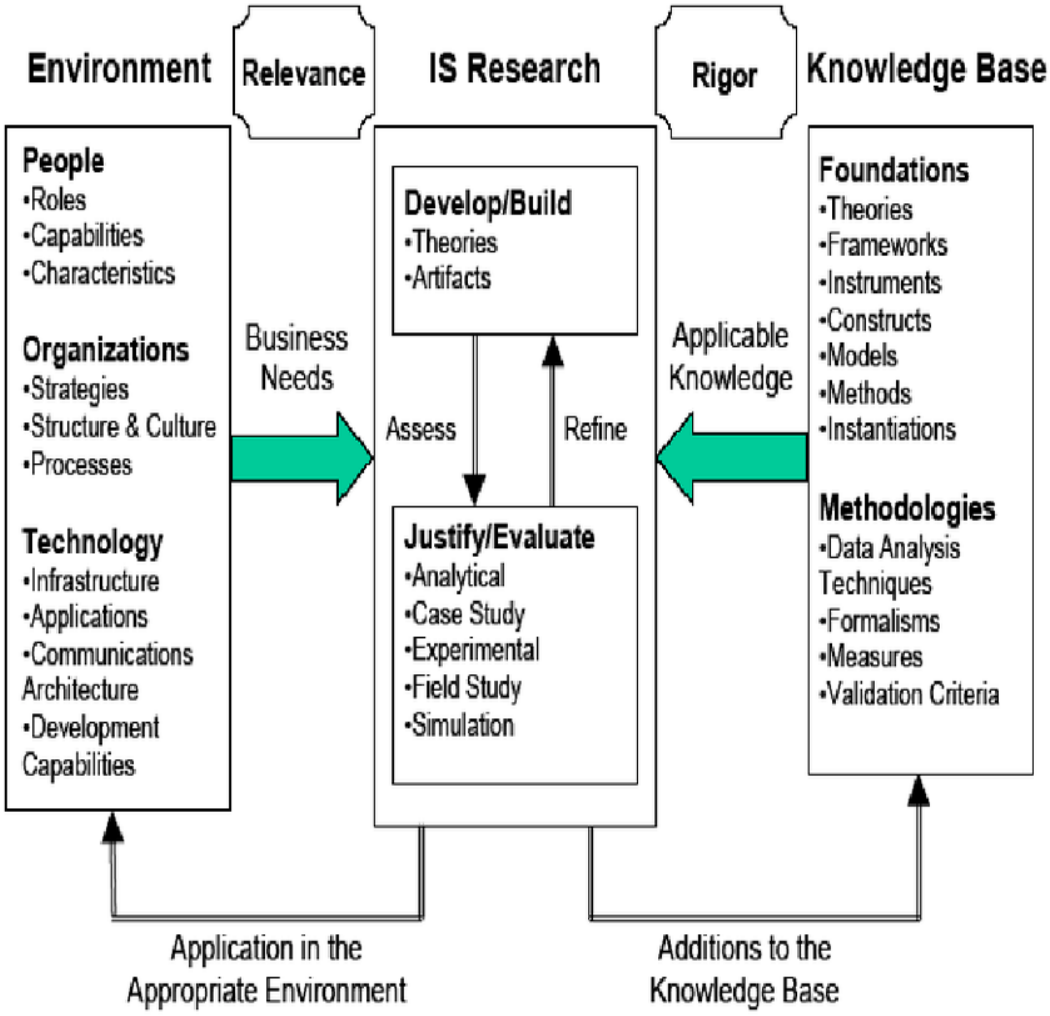

Figure 3-1 Information Systems Research Framework (Hevner et al., 2004)

Further to the framework by (Hevner et al., 2004), the need to have a framework that provides step wise approach in design science research was proposed by Vaishnavi and Kuechler (2004). They elaborated the Information Systems Research Framework to develop a model that provides step wise approach that can be utilised in the design science

research to achieve the goals outlined in the framework (Figure 3.1). Figure 3-2 shows the design science research model with the process steps to aid in designing an artefact.

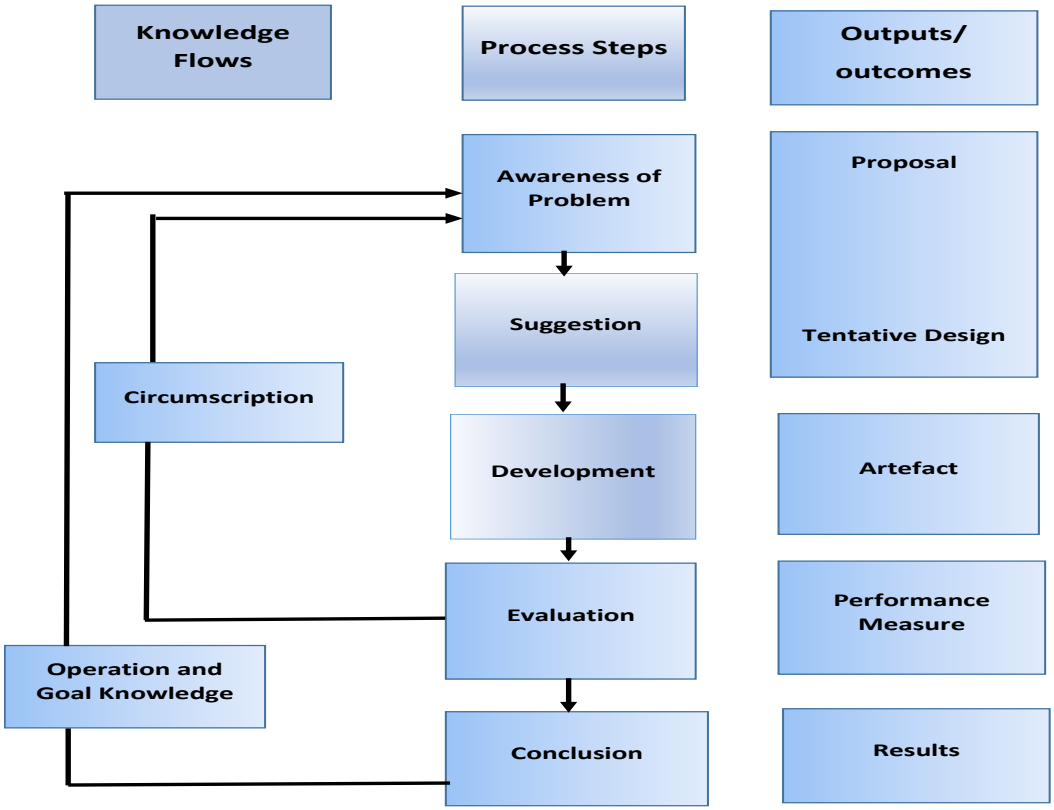

Figure 3-2 Design Science process research Model, adopted from Vaishnavi and Kuechler (2004)

The process step starts with the awareness of the problem as it is important to understand the problem that needs solving with the aim to improving research. They indicated that the awareness of the problem can come from multiple sources like new developments in industry with the output of this phase resulting in formal or informal proposal for a new research effort.

The suggestion phase follows immediately behind the proposal and is intimately connected with it, as a link around Proposal and Tentative Design indicates (the output of the suggestion phase). This is an essentially creative step where new functionality is visualised based on a novel configuration or from the existing knowledge or theory base from the problem domain.

The development phase follows which is where the tentative Design is developed but elaboration of the tentative design into complete design may require creative effort. The techniques for implementation will vary, depending on the artefact to be constructed and

the novelty is primarily in the design, not the construction of the artefact. Once constructed, the artefact is evaluated according to functional specifications which may be implicit or explicit (Awareness of Problem phase). Deviations from expectations are carefully noted and addressed till a complete artefact is realised. This allows the researcher to carefully review the artefact and to make changes to resolve the research problem; a process known as circumscription. According to McCarthy (1980), circumscription is discovery of constraint knowledge about theories gained through detection and analysis of contradictions when things do not work according to theory

The conclusion phase is the finale of a specific research effort and usually implies that a satisfying output is achieved. Although there are still deviations in the behaviour of the artefact from the revised hypothetical predictions, the results are adjudged good enough to address the business problem.

3.4 Research Approach for the study

To address the research problem, the framework proposed by Vaishnavi and Kuechler (2004) is adopted, and the process steps will be followed. This is to allow for a coherent approach to be utilised to address the research problem. The application of the proposed model and framework is applied within the Blood Centre of the NHS to address the business needs. We submit that, in following the process, there is the need to utilise other methods to clearly establish the problem to lead to development and evaluation of the artefacts. Again, the justification for the use of design science is because, this research seeks to "add value" to existing models by extending it for use in understanding non-compliance and lead to development of an artefact for persuasion to improve compliance.

3.4.1 Awareness of problem

The awareness of a problem may come from multiple sources but importantly, it should be relevant to business and the organisation needs (Vaishnavi and Kuechler ,2004). The output of this phase produces new developments in industry or in a reference discipline that allows for further investigation to be carried out to resolve a problem. Consequently, design science research should be explicit on what it aims at producing (Carlsson, 2006), as the goal will be to resolve a problem.

For effective awareness of the problem, critical realist propose that what is observed may not be the underlying cause of the problem. As such, thorough analysis should be performed to establish the real cause of the problem. By performing thorough analysis of the problem, it enables the researcher to gather information about knowledge and to ask questions as to why that outcome was obtained. The awareness of problem questions what

is seen to allow for determination of what is behind what we actually observed. For example, the researcher who is a realist would argue about the decisions they have made: 'I record them as they are!'. On the other hand, the researcher who is a critically assessing reality would argue that: 'I record them as I see them!'. According to Saunders et al., (2009), there are unobservable events which cause the observable ones; as such, people can understand the social world only if they understand the structures that generate such unobservable events.

For this research, the problem is to understand the reasons for non-compliance and to improve compliance. This was done by review of literature and data that exist in the blood establishment. The awareness of the problem allowed for review of literature for existing artefacts which enabled the development of new artefact or application of extended artefact that contributed to solving the problem. Here, TAM model which predicts intention of subjects to accept Information System is considered in addition to Activity Theory which predicts and assesses subjects need to attain an outcome by application of instrument on the object. The awareness of the problem for this research proposes the synthesis of these two models as the initial artefact for assessment of the business problem.

The awareness phase is reported in chapter one and two of the research where research problem, motivation, aims, objectives, and literature review were considered.

3.4.2 Suggestion

The suggestion phase is a creative step where tentative design and likely performance of a prototype based on that design is made as part of the Proposal. This stage allows for review and understanding of literature on the problem to be resolved. Essentially, the phase permits application of rigorous methods in both the construction and design of the artefact (Hevner et al., 2004) in this case, reviewing existing models in compliance and related attitude and behavioural assessment.

Particularly, the effective and appropriate use of knowledgebase and theoretical foundations are considered at this phase which aided the initial model to be made. This is useful as it allows for ideas and proposals to be set aside if it is deemed as not appropriate to address the research problem after the initial assessment (Vaishnavi and Kuechler ,2004).

To facilitate review of existing methods and ensure appropriate rigour, this phase enabled review of relevant literature in compliance and persuasive systems which served to enhance the purpose of this research to develop assessment model and persuasive framework. In addition, the phase enabled identification of appropriate methodology that guided the

research and design. This phase has been criticized as introducing non-repeatability into the design science research method. However, it has been shown to be comparable to all research methods. For example, the creativity inherent from the curiosity about some organizational situation to the development of appropriate constructs that operationalize the phenomena in positivist research is the same as design science (Vaishnavi and Kuechler ,2004).

Again, as we seek to establish how well the model and the framework can be applied to solve problem and not about theorising about why it should be used, emphasis is laid on better understanding the problem that needs solving. This helps to build a knowledge base and methodology that can be used for further research. This supports Hevner et al. (2004) who indicated that one of the key contributions of design science is the creation of knowledgebase of foundations and methodologies. This is useful in addressing business needs and creating theoretical basis for the research.

As one of the research questions is to understand reasons behind non-compliance, it is important that underlying causes behind the observable behaviours are considered. In doing this, Compliance Assessment Model (CAM) is developed based on literature and data of non-compliance as observed in the blood establishment. The model was developed by synthesis of TAM and Activity Theory as the means to assess the intention of staff through initial and routine application of the QMS. The CAM model is designed to assess the underlying cause of non-compliance behaviour by asking questions to establish what caused what is observed.

As critical realism accepts that there are underlying mechanisms that influences what is observed, it is appropriate to use CAM to capture this using qualitative methods. As a result, purposeful sampling technique is used to select participants within the Blood Centre of the NHS based on their interaction with the Quality Management System (QMS). The participants were interviewed based on questions formulated from the CAM model (Appendix 3.4.2) to understand the cause of the observed non-compliance and to establish the reasons behind the observable events. The model was evaluated using thematic analysis of data collected from interviews with staff who were chosen from the departments within the Blood centre of the NHS. Although TAM is a quantitative model, the resulting CAM model from synthesis of TAM and Activity Theory applies qualitative approach for assessment of non-compliance. This is because, although TAM is a quantitative model what it demonstrates is an influenced relationship between the factors. As such, it is appropriate to use it in the qualitative model to assess the relationships and their impact on non-compliance. This is because the research seeks to understand the concepts, opinions,

or experiences of the subjects. Also, as we seek to gather in-depth insights into the problem of non -compliance and generate new ideas to improve compliance, qualitative approach provides appropriate data. Analysis of the relationships and questioning why that was observed will enable the real cause to be established.

The data analysis allowed for an updated CAM model to be considered and led to the next phase of the design process to develop a persuasive framework to improve compliance

The suggestion stage allowed for various theories and models to be assessed and to take the initial approach in development of the model and framework to address the research problem.

This phase is addressed in chapter two and addresses the first three objectives which seek to explore existing literature and appropriate method to apply.

3.4.3 Development

This phase comprises design of the tentative artefact but the techniques for implementation may vary depending on the artefact to be constructed. It depends on the previous stages in the framework as it relies on the clear definition of the awareness and the suggestions that is proposed based on the literature review and the available theories and models. For effective and appropriate development, a process for searching for best or optimal solution is employed and, in some cases, heuristic search strategies are utilised (Hevner et al., 2004).

According to Vaishnavi and Kuechler (2004), the implementation itself can be very pedestrian and need not involve novelty beyond the state-of-practice with the novelty being primarily in the design and not the construction of the artefact. Subsequently, appropriate, and effective approach is identified that enabled the development of the Compliance Assessment Model (CAM) and the Framework of Persuasion for Compliance Behaviour (CLUES Framework).

To develop the model and the framework, the initial CAM model was developed through the review of literature and data from the business. Development was based on formulating an artefact that addresses the business problem. The tentative CAM model is assessed, and the limitations addressed to develop updated CAM model which is used for future analysis to improve compliance. Following the data from the updated CAM analysis, CLUES persuasive framework is developed. Further interventions were developed from the CLUES persuasive framework application in the blood establishment to improve compliance. Thus, the result of the research would be a purposeful artefact created to

address the current existing problem of non-compliance and a persuasive framework to improve compliance.

The development phase addresses objectives four, five and six. Further evaluation is carried out during the next phase of the design.

3.4.4 Evaluation

To address the problem, the artefact is evaluated according to criteria set as an objective from start of the research. According to Hevner et al., (2004), for a designed artefact to be considered as complete and effective, it should satisfy the requirements and constraints of the problem it was meant to solve. Moreover, the artefacts must be analysed to establish the use and performance as possible explanations for changes in the behaviour of systems, people, and organisations (Vaishnavi and Kuechler, 2004). As such deviations from expectations, both quantitative and qualitative are carefully noted and incorporated or rectified.

This phase is seen as important in design and it can be in the form of observational, analytical, experimental, testing, and descriptive. In this study, to evaluate the designed artefact; the observational and analytical approach was adopted to evaluate the end products. There were two sets of evaluations performed as two artefacts were developed (a model and a framework).

Firstly, the CAM model was evaluated within the Blood centre of the NHS by formulating questions based on the constructs/variables from the model that had been developed from TAM and Activity theory from literature. Meetings were scheduled with the participants (from different departments) to allow for interviews to be conducted for up to one hour for each session and recordings were made of the interview.

The next step was to thematically analyse the data gathered from the interview of the purposefully chosen participants who interacts routinely with the parameter under review; in this case the QMS. This allowed to establish the novelty of the model as required in design science. This also enabled the evaluation of the model to enable for further improvement of the tentative artefact to develop the updated CAM model.

The construction process aims to demonstrate the explanatory, predictive and normative aspects of the design to aid in addressing the research problem. As such, following the updated CAM model, analysis is performed of the data to establish the gaps that exists. A framework is proposed to address the observed gaps. This data from the updated CAM served as the current or the baseline of behaviour of the subjects within the blood

establishment and acted as the awareness, suggestion, and the development phase. The outcome of the evaluation feeds into the next phase of the research. Figure 3-3 shows the design science outline of the research. The needs awareness from the CAM evaluation led to the realisation of the change drivers for the proposed framework.

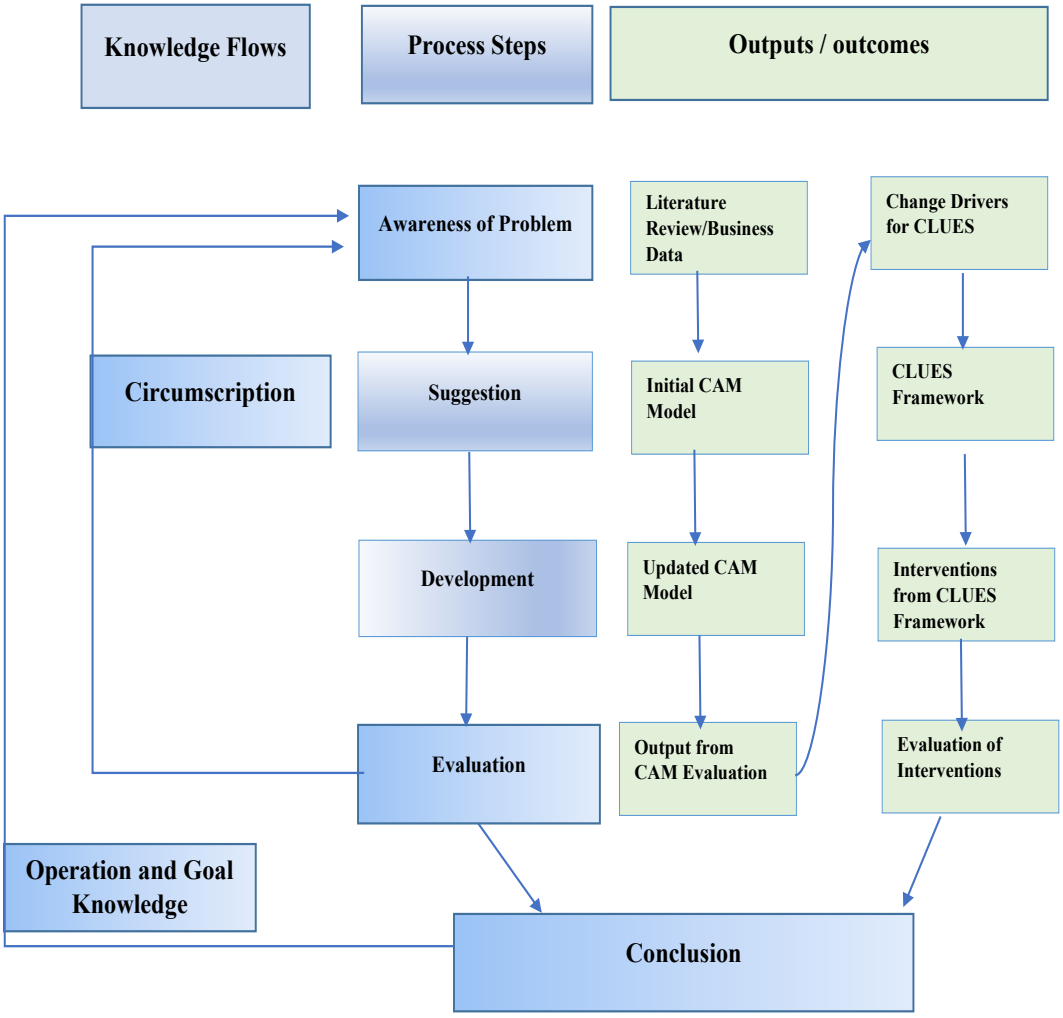

Figure 3-3 Design Science outline of the research

The CLUES framework is developed based on the data from the updated CAM model and interventions were drawn from the change drivers of the framework. Further to this, the interventions were applied over a period of three months in a pilot department within the Blood Centre of the NHS and data was gathered through observation and interview of the participants from the pilot department. The participants that were used for the evaluation of the CLUES Framework were different from the participants used for the evaluation of the CAM Model. In the evaluation of CAM model, staff were selected from different departments within the organisation whereas in the evaluation of the framework, staff from the same department were used who did not partake in the evaluation of the CAM model.

The data evaluation was performed for pre and post intervention to ascertain the outcome or the impact of the application of the interventions from the artefact.

As stated by Vaishnavi and Kuechler (2004), the novelty of the study is primarily in the design and not the construction of the artefact. Therefore, as a proof of concept, the completion and existence of the product is the demonstration of the feasibility of the product.

The evaluation of design is reported in chapters six and seven and it addresses objectives six to eight. Figure 3-4 shows how the research outline and output links with the process steps of the design science process.

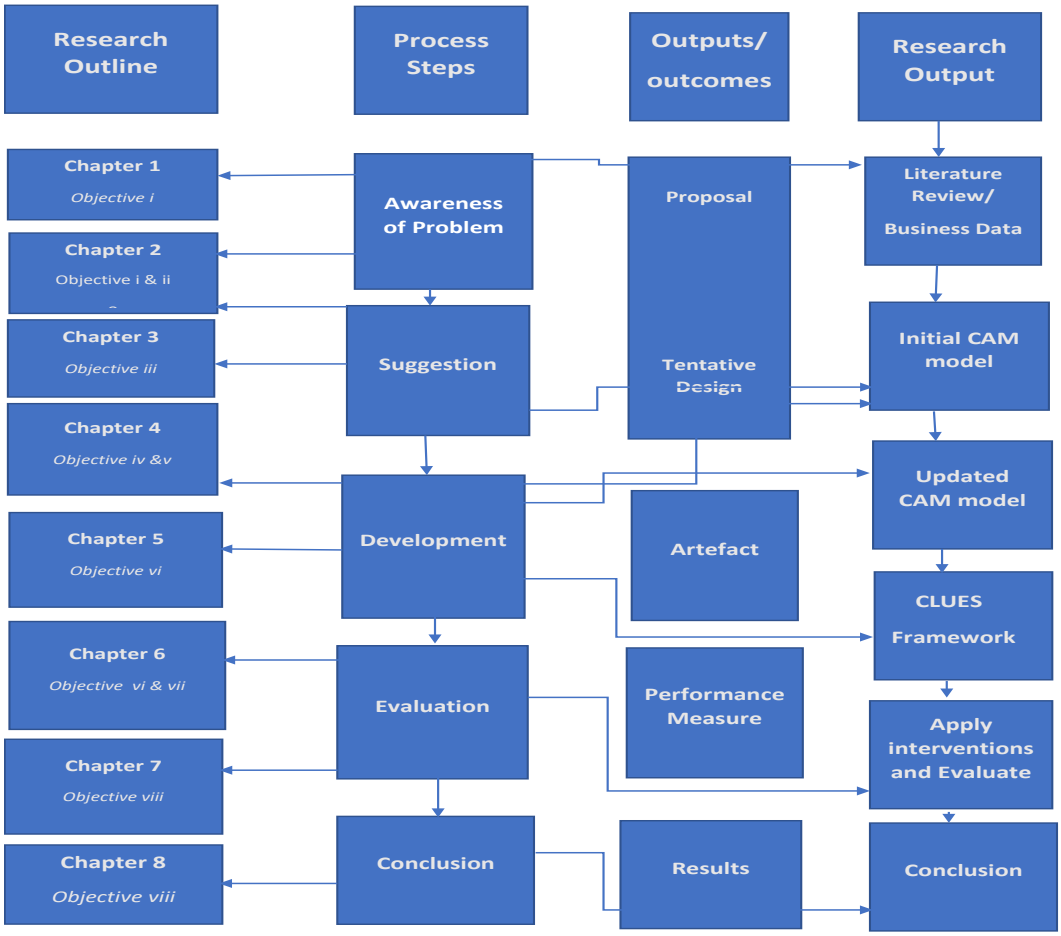

Figure 3-4 Design Science process application in the research

3.4.5 Conclusion

The conclusion phase permits the overall reflection to be done, to restate and summarize the main points of evidence from the research. This is where the overall research cycle is reported, and it is considered as the finale of a specific research effort. According to

Vaishnavi and Kuechler, (2004), Not only are the results of the effort consolidated and "written up" at this phase, but the knowledge gained in the effort is frequently categorized as either facts that have been learned and can be repeatedly applied or behaviour that can be repeatedly invoked. Thus, based on lessons learned and the limitations identified in the study, proposals are made for future research work. The conclusions drawn may serve as a knowledge base for future research explorations.

For this research, the conclusion phase involved the evaluation of all the objectives to assess whether the aim of the research has been fulfilled and future work is considered.

This phase is addressed in chapter eight of the research.

3.5 Chapter Summary

This chapter considered research approach for this thesis to address the research questions, aims and the objectives. As the aim is to develop a compliance assessment model and persuasive framework to influence compliance to QMS, design science paradigm is considered appropriate.

Through this process, the awareness of problem was established through analysis of literature and the review of business data on non-compliances in the blood establishment. The understanding of awareness and suggestion phase of the process led to development of the initial compliance model (CAM). The initial artefact was updated after analysis of data gathered through interviews with selected staff from the departments within the Blood establishment. The development and evaluation of the updated CAM model led to the development of CLUES persuasive framework to influence compliance. Finally, the CLUES model is evaluated by analysis of data from interviews of selected participants within a pilot department after application of the interventions.

The relevancy of the artefacts developed through the design science process compensates for the lack of rigor that is associated with the design science paradigm. This is because, the artefacts allowed for the aims and objectives to be addressed which provides confidence in the outcome of the process. Thus, this chapter enabled the development of two artefacts to addresses objective three. The chapter also provides a systematic and coherent approach to follow for this research.

Chapter 4
Model Development and Assessment

4.1 Overview

This chapter considers development of an artifact as the basis to address the first question of the research which is to understand the reasons behind non-compliance to QMS. In line with design science, the chapter considers application of a model based on literature review. It starts with the discussion of the rationale for application of TAM and Activity Theory as basis of the conceptual model. Here, the use of TAM and Activity Theory is considered as the initial artefact. Further discussion is performed on how the conceptual model operates and its purpose in assessing non-compliance. The chapter then applies qualitative method to evaluate the conceptual model and discuss the outcome of the data collected from interview of staff use QMS in the blood establishment. It further discusses the updated model that is developed from the initial CAM model. The chapter further considers the suitability and benefits of the updated model before concluding with the analysis of non-compliances observed from the results.

4.2 Rationale for Conceptual Model

As already discussed in chapter 3, the research applies design science to address the research questions. As such, an artefact is proposed to address the business problem to provide a vehicle and knowledge base for further improvement. From the literature review, it was evident that there is limited artefact for assessment of non-compliance. Consequently, an artefact is considered that predicts the intention of the subjects to accept the QMS and routinely use the QMS as required. As discussed in chapter two, TAM model and Activity Theory serves as the basis for a new model for assessment of non-compliance. The initial model is a synthesis of TAM and Activity Theory and applies the relationships of the constructs that have been used in previous researches. As such, this research will assume that these relationships work as indicated in chapter two and propose its application for prediction and assessment of non-compliance. The TAM allows prediction of the subject's intention to use QMS while Activity Theory predicts routine use of the QMS by the subject' interaction with the object to achieve their outcome. A combination of TAM and Activity Theory provides means to assess initial acceptance of the QMS and ongoing use. As the proposed model combines Activity Theory which has a mediational role, it is a particularly fruitful avenue for exploration and assessment. The proposed model also focuses on the nature of the relations and activities between actors and their artifacts. Essentially, the proposed model provides a holistic approach from initial use to routine application thereby providing a consistent approach for assessment of compliance.

As design science involves refining of artefact to address a business need, the initial model from synthesis of TAM and Activity Theory provides the initial artefact. Subsequently, the proposed conceptual model provides the initial artifact that is used to address the business need and to provide knowledge base for future compliance improvements. Moreover, as discussed in chapter 3, although TAM is a quantitative model, what it demonstrates is an influence relationship between the factors, so it is appropriate to use it in the qualitative model to understand the reasons for the observed non-compliance. In addition, as Critical realism accepts that there are underlying mechanisms that needs to be established to address the non-compliance, it is appropriate to use TAM (and CAM) by using qualitative approach.

4.3 Development of Conceptual Model

To understand and assess the reasons behind non-compliance, there is the need to investigate the cause. But the existence of gaps in existing theories prevents observation of describable events or supposed phenomena, explanation, prediction, or sufficient controlling events (Horvath, 2019). As such Badina (2015) suggests that some gaps in knowledge can only be eliminated by new theories explored by scientific research. Because of this, we propose a new model in line with Design Science to allow for a systematic approach to investigation. In this instance a new model to address the inadequacy of models and theories to assess reasons behind non-compliance. The development process started with the awareness of the problem. This was based on the literature review and evidence of non-compliances within the blood establishment. For this research, a design is suggested that considers TAM and Activity theory due to understand the initial acceptance and routine application of the QMS. According to Giere (2000), theories are traditionally derived in retrospective, inductive and deductive ways. By this, the proposed model was derived by application of these approaches. Retrospectively, literature application of models and theories in IS demonstrates that the use of the proposed model may provide an approach for assessment of non-compliance. Inductively, the application of TAM to assess acceptance in IS and Activity Theory for the interaction between entities to produce outcome may suggest that combination of TAM and Activity theory will provide means of assessment of non-compliance. Deductively, as TAM and Activity theory have been used in IS, we propose a combination of the two elements to assess noncompliance. This supports Dey (1995) who indicated that literature shows that the direct combination of theories with the goal of establishing more comprehensive and powerful theories is known. Based on this, the combination of TAM and Activity Theory to develop CAM may lead to

derivation of a comprehensive and powerful model to assess the reasons behind non-compliance. In combining different theories, Horvath (2019) asserted that the intuitive elements of the researcher cannot be avoided. They further argued that different component theories may not be completely coherent and consistent, and the researcher may be needed to combine the different theories if facts, evidences, logic, and relationships are missing. So, the combination of TAM and Activity theory may require manipulations to produce a coherent and consistent model.

Despite TAM model allows for the prediction of use of technology, we suggest that using the technology involves the subject manipulating the object to attain a set goal; this develops subject – object interaction (Kaptelinin, 2014). This subject - object interaction is mainly prompted by the desire to meet the needs of the subjects of activities. In this instance, the subject being the staff and or the organization have a need to use the QMS which is the instrument or tool to compliantly interact with the objects that exist in the department to produce outcomes. Essentially, the understanding of the acceptance of QMS alone is not enough as the routine use of the QMS by the subject and the impact of all the factors within the working environment that influences application of the QMS need to be considered. Thus, a model that assesses the interaction of the subject with the object in using the QMS is developed to aid in the assessment and understanding of subjects' compliance behaviour. Figure 4-1 shows the Compliance Assessment Model (CAM), a synthesis of the model and theory for the assessment of the reason behind the non-compliance behaviour.

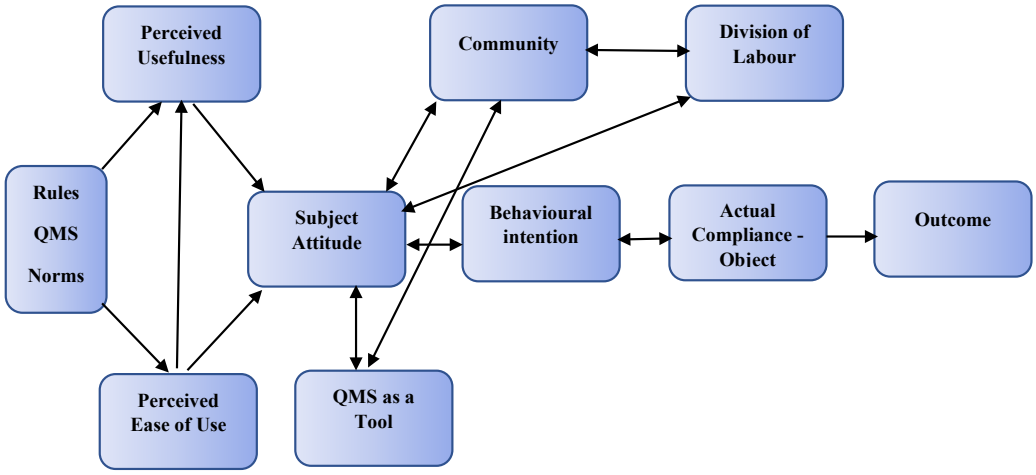

Figure 4 -1 Compliance Assessment Model

To develop the model, Horvath (2019) proposed seven steps: (i) Selection and investigation (ii) Discretization and specification (iii) Relating and diagramming (iv) Merging and

restructuring (v) Connectedness and partitioning (vi) Propositions and transcription (vii) Operationalizing and validation. It starts by semantic investigation of the composite theories according to the purpose at hand which is followed by transferring of the component models, variables, and theories to visualization of epistemic elements. The third aspect is the identification of shared entities and assimilation of relationships with the fourth recognizing and merging alike entities and restructuring of relationships. The connectedness with regards to the subject entities is then investigated to check representation before providing harmonized propositions and coherence. Finally, the application of the target model or theory actualized and validated.

In developing the CMA model, these steps were considered as in figure 4-1. The process started by reviewing literature to ascertain which models and theories can aid in addressing the research questions. The semantic investigation of TAM and Activity Theory was considered with logical and segmentation and identification of the epistemic elements. Here, the visualization of the proposed CAM model was made. Further to this, exploration of the shared entities was done to ascertain combination and merging of relating entities. By exploring the shared entities, it allowed merging and restructuring of TAM and Activity theory to develop the CAM model. To ensure that the relationship between the entities of TAM and Activity Theory are clearly stated, the connectedness and partitioning of the entities in the proposed CAM was investigated. Here, related entities were grouped, and partitioning put in place to better align all the entities. The visualization of CAM model was then actualized by providing narrative description and checking cohesion and consistence of the proposed Model. This also permitted the drafting of questions to enable operationalization and evaluation of the model which is discussed in later sections in this chapter. By following these steps, a systematic approach was adopted that aided development of CAM model.

4.3.1 Application of the CAM Model

From the Compliance Assessment Model (CAM), we suggest that the actual compliance can be ascertained by assessing the behavioural intention. This in effect will allow for the assessment of the outcome that is achieved.

The model projects many interactions that eventually impacts on the behavioural intention with subsequent impact on the actual compliance. Consequently, measurement of activities at each interactive point with the subject may aid prediction of the outcome of the actual compliance. The model therefore takes a systematic approach by assessing from the initial stage of presentation of the rules, QMS and norms to the end stage of compliance. To do

this, the QMS, rules and norms as part of the formal and informal systems acts as the signs in the organization. As Peirce (1958) defined a sign 'as something which stands to somebody for something in some respect or capacity' it is essential to understand the sign. In this respect, a sign may mean different things to different people and the context in which the sign is used is therefore very important. For this research, we consider the QMS as a quality management tool for mediation between the subject and object and as such, the sign that the subjects are required to understand and apply on routine basis. This QMS is influenced and shaped by the rules from the regulatory bodies and the norms that exists within the organisation.

The QMS as the sign act as the mediational means or the instrument through which the subject interacts to achieve the outcome. This sign can be in the form of standard operating procedures, equipment manuals, policies, pictures, and documents which requires interpretation by the subject to perform their routine processes. The interpretation of these signs may be dependent on the training, experience, staff participation, knowledge of the processes and social setup of the department. This is because, the signs represent something which requires individual interpretation and therefore each subject may interpret the signs differently depending on the norms that governs them. As such, the same QMS requirement may be interpreted differently in different departments due to different staff make up, experience, knowledge and other related processes that occurs in that department.

Moreover, the alignment of the values of the staff and that of the organization will influence the observed behaviour. According to Jenkinson (1996) for a compliance behaviour within the organisation, the staff and the organizational values should be aligned. This means that both entities should share the same objective which is to compliantly use the QMS within the department and in the organisation. This is supported by Kaptelinin and Nardi (2006) who indicated that subjects have needs which can drive the outcome they achieve. Essentially, the needs of the subject and that of the organisation should be aligned to achieve the desired outcome as divergent needs will not attain compliant outcome.

However, for the subjects to achieve their outcomes, other factors need considering; how they perceive the QMS that governs their activities. The perceived usefulness of the QMS have been shown to have an influence on the behavioural intention of the subject to compliance. The perception that the QMS positively supports the attainment of the required outcome may drive the subject for compliance. However, if the subject perceives that the QMS has no use in the routine processes to achieve the desired outcome, then this may lead to non -compliance behaviour. According to Davis (1989), perceived usefulness exhibited

stronger and more consistent relationship to adoption and use. The indication is that, if there is strong exhibition by the subject that they perceive the QMS to be useful then the probability of actual compliance is high. Importantly, the perception of the usefulness of the QMS is relevant if the compliance behaviour is to be achieved.

From the model, perceived ease of use also has impact on the observed behaviour. The ease with which the subject can interpret the QMS and fine it easy to apply to their routine processes, the easier it is for compliance. This is because the ease with which the subject perceives the QMS, the tendency for compliance by the subject may be high. According to Park & Jung (2003), the possibility of non-compliance behaviour will increase if the procedures are so complicated that the operators cannot clearly understand the context of required actions specified in the procedures. In effect, the first section of interaction gives indication of how the perceived usefulness and the perceived ease of use influences the subject's behavioural intention for compliance.

From the model, community in which the subject operates may influence the acceptance and use of the QMS and the impact on their behaviour. The community comprises many different subjects that have different needs but are all united by a specific norm within with the community.

The norms are developed through practical interaction and experience of people in a culture. The norms have the ability of directing, coordinating, and controlling the actions within the culture. Norms have been shown as the rules which determine how social organisms interact and control affordances (Salter & Liu 1985). These affordances stress the behaviour patterns that have evolved over time in a community because of interaction between the human agent and its environment. Moreover, Stamper and Liu (2000) described a norm like a field of force that coerces the members of a community to think in a certain manner. The norms determine how a group of people behave and act in a culture and acts as the standard to measure the behaviour of the agents.

Subsequently, a small group with a subculture have a 'local' norm that controls their operations. Therefore, an individual in a community who has learned the norms will be able to use the knowledge to guide their actions. This is because the attained knowledge of the norm can be used in either negative or positive way and by understanding the behavioural norms, measured outcomes can be made. In view of this, the study of the norms within an organisation can be useful in determining the outcome of behavioural actions to comply or not to comply with rules and regulations; in this case the QMS.

To allow for understanding and use of the actions from the norms, Norm analysis is used. This is useful in understanding the agents' behaviour in the organisation which is governed by norms (Liu, 2000). According to Salter & Liu (1985), Norm Analysis is a method for capturing the details of norms enacted by the agents and authorities who are responsible for the norms and the triggers which cause the norm to come into effect. The norm analysis can be useful in understanding how the agents in the organisation act based on the norms. Moreover, the norm analysis will allow detailed analysis of all the aspects of norms that exist within the community. This will enable predictions and assessment of the observable behaviours and practice that may exist within the community. In this research, the QMS as a norm is applied in the analysis.

Five norms, namely, perceptual norms, cognitive norms, evaluative norms, behavioural norms and denotative norms (Liu,2000) have been considered to control human behaviour and, in turn, organisational behaviour. The perceptual norms influence how people react to signals from their environment through their senses. Here, the norms and values are embedded in the physical structures which influences the behaviour of the staff in the department (Dankwa and Nakata, 2016). The cognitive norms enable the staff to interpret what they perceived based on the beliefs and knowledge. The staff interpretation of the QMS is based on the belief and knowledge that exist within the department. Although there is established rules and procedures, the acquired knowledge and beliefs coerces each staff differently to interpret the QMS. As such compliance in the organisation may be different across departments depending on experience of staff and their understanding of the QMS. In analysis, the Evaluative norms aid in explaining the beliefs, values, and objectives in the departments within the organisation. This helps in explaining the behaviour of the staff due to the understanding of the relationship between the formal and informal systems (Dankwa and Nakata, 2016). The behavioural norms govern the behaviour of the staff within the departments. These behaviours are because of the norms that exist within the department and this can influence the non-compliant behaviour observed. The knowledge, beliefs, values, and the objectives that has been established within the departments controls the behaviour of the staff in performing their actions. Finally, the denotative norms direct the choices of signs for signifying. These are culture dependant and may influence performance of task by staff within the department.

According to Liu (2000) an individual in a community who has learned the norms will be able to use the knowledge to guide their actions; these actions may be either positive or negative. Moreover, employees become confident with their actions through similar activities of peers within the departments in the organization (Thompson et al., 1994).

Essentially, as the subjects watch the activities of their peers within the department, their behaviour to the QMS may be influenced. From Venkatesh et al. (2003), social influence has a significant impact on the intention to use information systems. This may not apply to information system alone but by extension to other systems, in this case the QMS. In this regard, the subject in the community may have some informal system of relationship that can influence their behaviour. If the informal system aligns closely with that of the organisation, then there is probability that the compliance behaviour will be positive. On the other hand, if the informal system is contrary to the norms and beliefs of the organisation then there will be negative impact on compliance. To this end, the understanding of the community the subject operates is important in assessing the compliance behaviour.

The final the division of labour within the community may influence the compliance behaviour. Obviously, the activities of the different subjects within the wider organisation needs to be noted as they can impact on each other. This involves delegation and structured systems in place that allows for the final objective to be achieved. However, the division of labour can have an impact on the compliance behaviour. This is because, the knowledge base, the experience and skills of the section taking on the labour can affect the outcome. If the subjects are not conversant with the work they are taking on, then there may be deviation from the procedure. Therefore, by assessing the interaction between the community and the division of labour, the behavioural intention can be ascertained. The hierarchy within the departments and the organisation may also influence the way the subjects interprets the tools and apply to routine processes. This is because, the subjects look to their leaders to give guidance on their routine processes. If the leaders are not aware of the requirements of the QMS then they will not be able to give guidance to the subjects. Moreover, the leaders may have different understanding of the QMS requirements and as such train and direct the subjects accordingly. In both instances, the compliance behaviour of the subjects may be compromised because of the leadership failures. Furthermore, if the subjects observe the leaders not compliantly performing the behaviour, then they may also fail to perform the behaviour.

4.3.2 Purpose of the CAM Model

The understanding of the reasons behind non-compliance is important when addressing compliance requirements; especially in organizations that are regulated. As such, the model allows for constructs and variables that influence compliance to be assessed by analyzing data that explains the reasons for non-compliance behaviour. This is because, the model

provides a coherent approach to be applied for assessment of parameters that influences intention of actual behaviour of the subjects. Moreover, because of the independent interaction of various constructs with the subject, different analysis can be conducted on various segments of the model to allow for decision making that addresses that aspect of the behaviour.

As such, the model can be applied at the onset of a project or when there is consistent non-compliance that requires assessment and resolution. This is in line with the acceptance models that allows for assessment of adoption of information system by users. This way, changes or improvements can be made to address the outcome of the assessment before implementation of the information system. In the same vein, the CAM model allows for initial assessment to be made of the subject's behaviour which then enables appropriate actions to be taken before implementation. Subsequently, by measuring the behavioural intention of staff to comply with the proposed implementation of new systems, informed decision can be made whether to go ahead with the proposed system or make changes (Dankwa, 2020).

Moreover, the CAM model also enables assessment of subject behaviour to existing systems that is not compliantly performed. This is because, the model allows for assessment of the system, the stakeholders, and the perceptions for the subjects to perform the compliant behaviour. As in the assessment of the compliance behaviour within the healthcare centre, the CAM model enables the assessment of the behaviour of staff to identify the gaps to aid improvement (Dankwa, 2020).

4.4 Results from the Assessment of CAM

As stated in chapter 3, data was gathered from interviews performed within the Blood Centre of the NHS using the questions developed from the constructs/variables. To do this, the data collection was performed by use of purposeful sampling method. Seven staff members (table 4 -1 and 4-2) from different departments and staff grades in the blood establishment were selected for the interview. The selection of staff was based on their interaction with QMS and interviews were conducted over a period of 1 month with each interview lasting between 1 – 2 hours using questions generated from the constructs of the conceptual model. See appendix 4.4 for the data from the interviews and the summary of the data in table 4-1 and 4 -2

Table 4-1 Summary of data from interviews with staff (1)

Participants	Constructs / Variables			
	Instrument suitability	**Subject attitude**	**Community**	**Division of labour**
Staff A – Deputy head of Dept. in lab	Used to look up information to comply	Open to use but not all the time	Department is good but organisation not supportive	Structure is fine. I influence my staff, but senior managers don't
Staff B – Lab manager	Fundamental for provision of healthcare products and service	I appreciate the QMS, but I feel disconnection	Shared frustration that level of control is not proportional to work	Set up is negative as KPI's from senior team not helpful.
Staff C – BMS Team manager	Is a legal requirement for quality and safety products	I see the need to follow but can be can unnecessary evil	In the organisation is high value but people see it as a tick box exercise	Staff on shop floor see no benefit as most are not involved in agreeing actions
Staff D – Trainee Biomedical Scientist	It ensures that standards and guidelines are followed.	I find it useful at times but too picky.	Most colleagues see the QMS to be useless especially the role of QA	The managers have failed to set the correct direction for staff.
Staff E – Director of Lab	It is critical to the processes and used to manage the quality of products	Very positive attitude but can be very cumbersome and inadequately resourced	Staff appreciate the QMS but can see it as a chore at times	Not clear responsibility lay out. Structure within organisation can impact on compliance
Staff F – Assistant QA Manager	They are activities that needs doing to help with the quality of the products	Attitude in the labs relegates the QMS to the back bench of what they do.	The collective attitude of staff in the department impacts on QMS	The way the leadership follow the QMS affects the shop floor. Also, departmental differences impact on compliance
Staff G – Team supervisor in lab	Guarantees safe and quality products to save lives	I see it as fore front in all my activities to give me the required confidence	The department as a whole does not hold QMS as it should	The senior leaders may not be able to influence shop floor. Differences in departments as impacts on compliance

Table 4-2 Summary of data from interviews with staff (2)

Participants	Constructs / Variables			
	Perceived usefulness	**Perceived ease of use**	**Behavioural Intention**	**Actual behaviour**
Staff A – Deputy head of Dept. in lab	May be useful but clunky	Not easy to follow - clunky	Intention is always to follow	Yes, I actually follow
Staff B – Lab manager	Some aspects useful but not all	Can be long winded and waste of time. not easy to follow	I intend to comply all times but not happy doing that	I generally comply but not in a timely manner
Staff C – BMS Team manager	I see the use of it but don't believe other staff do	I see it as easy to use but again application is varied across staff and department	My intention is to follow at all times	Yes, I do follow but not all the times.
Staff D – Trainee Biomedical Scientist	I don't think I need the QMS to do my routine process	I see it to be easy to follow	I intend to follow the QMS as I see the need to do so but have my reservation	I try to follow at all times.
Staff E – Director of Lab	I see it to be useful but most of the QMS adds no value to routine work	It is not easy to follow. It is very cumbersome. The QMS is not fit for all the activities	Yes, I intend to follow QMS at all times, but time constraints may influence actions	Yes, I do follow although it is not an efficient system
Staff F – Assistant QA Manager	Yes, I see it as useful and as such I use it	Not always seen as easy to follow which affects outcome	I see it as part of my day to day work, so I intend to follow	Yes, I follow it. People might follow based on the tools and resources available
Staff G – Team supervisor in lab	Yes, I see QMS to be a useful tool	It is seen as a complex and a lot of people don't know much about the QMS	My intention is to follow QMS at all times	No, I don't follow QMS 100%

4.5 Analysis of Data

Following the data collection from the previous section, the analysis of the data is performed. The data analysis process allows for inspecting, processing, and modelling of the data collected. The sole aim of the analysis is for discovering of useful information that supports decision-making and allows meaningful conclusions to be drawn. Thematic analysis was used to analyse the data gathered from the interviews. The data analysis was

performed by assessing codes and themes and the sub themes that emerged from the data collection.

4.5.1 Mediation / instrument/tool

The mediation or instrument or tool has been shown to be an important aspect of the model as it allows for the subject to interact with the object to achieve the outcome. The interaction may also be influenced by the community in which the interaction takes place. As the instrument is important in obtaining the required outcome, by assessing staff awareness and understanding of the use of the instrument, compliance level can be ascertained. Kaptelinin (2014) asserts that the instrument is one of the most important aspects of the activity as it enables the subject to achieve the desired outcome. This is because, the instrument acts as the mediation or a conduit between the subject and the object and therefore vital for the attainment of the outcome.

In the interview, staff were asked about how they characterise the QMS within their departments and the organisation. The question was to assess how the QMS is projected within the department and its use in the attainment of compliance. All staff involved in the interview indicated that they are aware of the QMS within the departments and the organisation. Most of the participants indicated that the QMS acts as a tool or vehicle that impacts on staff interaction with the object to produce safe and quality products.

"QMS is critical to the process and used to manage the quality of the products in the organisation. It has contributed to increasing the quality of patient output and has helped to improve patient engraftment outcome and failed engraftment is now very rare" (Staff E).

There is clear indication that staff understand the importance of the QMS as an instrument to achieve the desired patient care. They indicated their appreciation of the QMS and characterised it as a relevant instrument for the realisation of patient needs, quality and safe products and services. However, some staff also expressed reservations about the QMS and how it can negatively influence the routine processes. Although they understand the usefulness of the QMS, they had other things to say about the QMS.

"The operations of the QMS on the ground may be seen as potential overwork or a hindrance" (Staff B).

"The QMS may be caught up in little things which may infuriate staff" (Staff C).

Clearly, although there is understanding that the QMS is implemented to help achieve a desired outcome for stakeholders (mainly patients and donors), there is indication that the projection of the QMS within the departments and the organisation may be lacking in some respects. There is a requirement on the part of all staff to understand and follow the QMS in all circumstances. However, this may not always be the case, and this may influence compliance behaviour. The projection of the QMS as an instrument in mediating the interaction between the subject and the object is therefore important in achieving the desired outcome. Importantly, there is an indication that, effective projection of the QMS can positively influence compliance behaviour. On the other hand, failure to effectively project the QMS can have negative impact on the outcome. The data showed that, by projecting and explaining the relevance of the QMS and by aligning it to the values of the staff, compliance behaviour may be improved.

4.5.2 Subject Attitude

The attitude of the subject is also important in determining the desired outcome of the interaction between the object and the subject. The subject has a need which in this case is organisational need that is disseminated to the departments and the staff within the organisation. The organisation relies on the departments and the staff to follow approved guidelines and policies to meet these needs. However, for these needs to be realised, the staff and organisational needs must be aligned.

The staff and organisation should align their beliefs, feelings and opinions about the QMS to achieve the desired outcome. The opinion and feelings of the subject is therefore very important in the analysis of compliance behaviour. In the analysis, if the organisation's attitude towards the QMS is not positive, then there the tendency for the staff to also have negative feeling about the QMS. On the other hand, if the organisation's feeling towards the QMS is positive, this can also send positive signal to the staff within the departments for a positive outcome to be achieved. The subject attitude, however, is influenced by other constructs as in the CAM model.

From the Compliance Assessment Model (CAM), we suggest that the attitude of the subject towards the use of the QMS was shown to be a major determinant for acceptance. It is believed that the subject attitude influences their intention which in turn influences the outcome. In the interview, staff were asked about their attitude towards the QMS. Most of the staff indicated that they have accepting attitude towards the QMS but there were also some negative feelings and remarks about the QMS. The attitude of staff may be categorised as positive, negative, and indifferent or neutral.

" the QMS is first to my work as it provides me with the confidence for the products that are released. I don't see why we should be deviating from it" (Staff G).

Obviously, some of the staff were convinced of the importance of the QMS as it gives them confidence in what they do and as such their attitude is to follow the QMS always. They see the relationship between following the QMS and the daily achieved outcome. The rest of the participants had a different attitude towards the QMS.

"Is good and I am open to the use of QMS even though there are occasions where I don't want to face using it. (Staff A).

" It is useful at times when making decisions but at times I find it too picky as things might not be as important in most cases" (Staff D).

These trends observed from the rest of the interviewees are an important indication of their feelings towards the QMS. Obviously, although they seem to have the attitude and desire to follow the QMS, they still have reservations and resentment about the QMS and this may influence compliance. From the data gathered, the attitude of staff was observed to be influenced by other factors like; time, culture, resource and personal relationship with the QMS. Essentially, depending on the attitude of the staff at the point of using the QMS, different outcomes may be achieved. The systems and interventions in place will therefore allow staff to be accepting of the QMS or reject the QMS.

4.5.3 Community

The community in which the staff operate has been shown to influence outcome of their interaction. The understanding of the influence of the community on the subject may be useful in understanding and the assessment of subject behaviours. The community comprise of the beliefs and norms which shapes the way the subject think and act. This makes up the culture of the organisation and may influence the way staff think and act and this becomes the 'way of life' within the organisation. Hofstede defined culture as "collective programming of the mind" that makes one group unique from another and this can influence their pattern of thinking, feeling and potential activities (Hofstede 2001).

As such, one organisation may be different from the other and departments within the organisation may also act differently depending on the culture with the norms underpinning them. The differences between departments may have been established over a period and this may influence the way they think and act in achieving set objectives of the organisation.

In the interviews, staff were asked to assess the impact of attitude of their colleagues in the department and the organisation on the way they relate with the QMS. There were different views presented by interviewees with regards to the attitude of their colleagues within their departments. Most of them indicated that, staff in their department tend to think and act in certain manner in line with departmental beliefs.

"staff attitude to the QMS in the lab is good" *(staff A).*
"general shared frustration with the QMS" (staff B).

The differences in the response from staff in the different departments to the same question may outline the different norms that exist in different departments. Although the organisation may have rules that governs all the staff, the shared norms and believes in the departments influences the way staff operates within the departments.
Clearly, there is an indication that there is a shared belief and understanding within the different departments with the attitude of staff influencing one another. It is believed that staff establish their routines in relation to the practices of their colleagues or peers in order to reduce the uncertainty of their actions and the fear of non-compliance(Hwang et al. 2017). The activities of staff may be influenced by the activities of their colleagues which can be negative or positive.

"Most colleagues see the QMS to be useless especially the role of QA" (staff D).

This means that in the community (department) the QMS may not be followed as the department sees no use of the QMS in their routine processes. The attitude of one staff in the department may influence a colleague which can 'snowball' to an extend that the whole department routinely fail to comply with the QMS.

In effect, the community of staff tend to agree and act as a unit which can have negative or positive impact on the use of the QMS. This is supported by Venkatesh et al. (2003) who asserted that social influence has a significant impact on the intention to use information systems and in this case QMS. As such, although there may be formal procedures and knowledge of its requirements, the social power of the community influences the compliance outcome. This is because the norms and beliefs in the department act like a field of force that coerces the members to think in a certain manner (Stamper and Liu, 2000).

The attitude of the subjects is influenced by the culture and therefore if the organisation implements policies and create an environment that promotes compliance behaviours, then there is higher chance that compliance behaviour will be improved. Jenkinson (1996) indicated that if the department or the organisation agree on compliance beliefs, then this will be reflected in their behaviour to rules and standards. The community created by the organisation can determine the compliance behaviour of the staff.

4.5.4 Division of Labour

As the subjects in the community interacts with the object to achieve the outcome, there are divisions and hierarchies created within the organisation. In the blood establishment, different departments and different staff grades within the various departments work together to achieve the outcome. The interviewees were asked if they think that the setup of their department, the organisation and the relationships that exist within and between different departments may impact on compliance behaviour.

All the interviewees indicated that the staff in the department are influenced by the set up in the departments especially looking up to the senior managers.

"my staff in the department are influenced by me and they take QMS seriously, but senior managers don't influence me to follow the QMS" (staff A).

There is indication that, the staff look up to their manager and follow their example. The behaviour of the manager positively or negatively influences the staff in the department. Each level of management looked at the level above and depending on how the managers interacted with the QMS, there is indication that staff compliance behaviour may be influenced. Although some of the staff understands the importance of following the QMS, the negative influence from their manager may influence their behaviour with the QMS. The efforts of some of the managers to positively influence their staff may be hampered by their manager as their manager negatively influence their behaviour which can also influence the staff they routinely manage.

"the managers in my department sees the QMS and the QA staff as police and as such this notion is transferred across" (staff D).

The behaviour of the managers in some of the staff 's department negatively influence the behaviours of the staff. This is because the managers have the perception that the activities

of QMS and the role of QA is not in their interest and as such this notion is filtered down to the staff. There is the tendency for staff to comply with the QMS when QA staff are around but will not comply when QA is absent as they only act to satisfy the impression of their managers. Because the beliefs and norms control the behaviour of the subjects in the community, the notion from the managers becomes a shared value and influences compliance behaviour of staff.

4.5.5 Perceived Usefulness

The perceived usefulness has been shown to be relevant in assessing the acceptance and using technology by users. The perceived usefulness measures the degree of believe that use of particular system would enhance the job performance (Davis, 1989). The job performance is when a person performs a job as required and this plays an important role in assessing the organisational output. By extension, the perceived usefulness is the believe that staff will routinely use the QMS to enhance the performance of their work.

In the interviews, staff were asked to confirm how useful they perceive the QMS and how this influences their compliance behaviour. Many staff indicated that if the QMS is perceived to be useful, then staff compliance behaviour may improve as they will routinely use the QMS as required.

"*Yes, I see it as useful and as such I use it" (staff F).*

"Yes, I see QMS to be a useful tool" (staff G).

Obviously, the response from both staff indicate that compliance behaviour may improve if they perceive the QMS to be useful. The improvement from one staff may then translate to the other staff in the department due to staff peer response. Moreover, the influence of staff by colleagues may lead to establishment of a community with a common goal that may lead to compliance or non-compliance behaviour.

On the other hand, other staff shared different view of the QMS.

"*I see the use of it but don't believe other staff do" (staff C).*

"*I don't think I need the QMS to do my routine process" (staff D).*

Although staff C perceives the QMS to be useful, they realise that other staff in the department don't see the use of the QMS. This may have negative effect on the compliance behaviour of other staff in the department as the way they interact with the QMS influences others. Their perception of the QMS may have been influenced by other staff i.e. managers

and other stakeholders and this can play an important role in the overall behaviour of the staff in the department.

Also, the staff seem to think that the QMS is not useful to them in routine processes although they have been trained and aware of the requirements of the QMS to be used routinely. The perception of not requiring the use of the QMS on routine basis may be because of their experience with the QMS and what they have observed staff do on routine basis. They may use the QMS in other situations like emergency, but this is not the requirement of the QMS as is always required to be followed. In effect, how the QMS is projected in the department may influence staff perception of its usefulness and as such being routinely used as prescribed.

4.5.6 Perceived Ease of Use

The perceived ease of use has been shown to be relevant in accepting and using technology as required. The perceived ease of use looks at degree of effortless use of the system (Davis, 1989). In conducting the interviews, the staff were asked to confirm how effortless they perceive the QMS and how this influence their compliance behaviour. There was indication that ease with which staff perceive the QMS to be may influence how they interact with the QMS.

"It is clunky and makes following difficult. I am more likely to follow the QMS in emergency situations than in less little things" (staff A).

While staff A may consider using the QMS in emergency situations, they see the QMS to be clunky and getting in the way of simple routine processes. Essentially, the required compliance of the QMS will be undermined during routine simple processes. The perception of staff A can also influence how the rest of the staff in the department perceive the QMS.

"*It is not easy to follow. It is very cumbersome. The QMS is not fit for all the activities" (staff E).*

Obviously, the staff perceive the QMS to be very difficult to follow and not suitable for all activities. This means that, while they are willing to use the QMS for activities that they deem appropriate, they may not follow the QMS for activities that they perceive to be unappropriated. This can influence compliance behaviour for staff in the department as they can relate will only apply the QMS when they deem it appropriate.

"If QMS is simple, accessible, easy to learn and readily available then it will be followed. Vast number of people would like to take the easy way out because the QMS is not seen as easy due to the complexity of our work" (staff G).

The perceive ease of use is therefore very important in assessing the compliance behaviour of the staff.

4.5.7 Behavioural Intention

The behavioural intention to follow the QMS can be used to predict the outcome of compliance behaviour. It is deemed as the perceived likelihood that a subject will engage in a given behaviour. A behavioural element predicts that when someone forms an intention to act, that they act freely without limitation. However, there may be many constraints or variables that may limit the freedom to act by the subject. In the interview staff were asked about their intention to follow the QMS always.

Almost all the staff interviewed indicated that they intend to always follow the QMS, but some stated that they fail to follow the QMS always.

"My intention is to follow QMS in all cases, but I don't follow QMS 100% due to time pressure, target, and tiredness, not easy to follow (staff G).

This shows that, although staff G intends to follow the QMS, there are other constraints that prevent them from doing so.

"I intend to follow the QMS as I see the need to do so but have my reservation" (staff D).

Although staff interviewed have the intention to follow the QMS, they don't always follow due to other factors. By understanding the factors that hamper behavioural intention, predictions can be made about actual behaviour.

4.5.8 Actual Behaviour

There is indication that staff intention to follow and actual behaviour can predict the outcome of compliance. In the interview, staff were asked about actual use of the QMS after they have stated their behavioural intention to use the QMS. Most of the staff interviewed stated that they like to use the QMS although some stated that they have reservation if they will follow it always. There appear to be a link between the behavioural intention and actual following the QMS.

"*I always intend to follow the QMS and they actually follow" (staff A).*

"I intend to follow and do follow" (staff D).

On the other hand, staff who indicated that they don't always have intention to follow also stated that they will not always follow the QMS.

"*I will generally comply but not in a timely manner* ", *"I intend to comply all times but not happy doing that" (staff B).*

Clearly, the behavioural intention of staff to follow the QMS either influences the actual behaviour in a negative or positive manner.

4.6 Further Output from Analysis of Initial CAM Model

Following the analysis, other themes were observed from the data collected. As stated by Howarth (2019), the operationalization and validation part of the seven steps requires defining of the application contexts to improve the proposed theory or model. They continued that, the validation permitted application of the proposed theory or model to explore deficiencies that allows for enhancement of the proposed model. Although the questions for the validation of the proposed CAM were derived from the elements of CAM, the data analysis showed additional elements that needs considering to enhance the model. The consideration of the varied themes aided improvement of the effectiveness of the proposed CAM model. This also helped in defining the application contexts and exploration of any deficiencies of the proposed CAM. Consequently, the new elements were added to improve the proposed model to help address the research question. These themes that emerged from the interviews which were deemed to impact compliance behaviours of staff are stated below.

4.6.1 Competing Key Performance Indicators (KPI)

The key performance indicators are set by senior management team to monitor and assess the compliance activities of staff. All the interviewees indicated that the KPIs set from the senior management team may conflict with the need to follow the QMS always. For an example, most of the KPIs require the departments to raise fewer number of quality incidents (events raised to manage unplanned deviations and failures in the QMS). For the departments to meet their KPIs, there may be staff reluctance to raise quality incident although they may have observed failures in the QMS.

"*Some of the KPI's are to reduce number of QIS and as such staff will prefer not to raise a lot to meet the KPI" (staff B).*

"Failure of management structure in line with KPIs have also contributed to the failures in QMS" (staff G).

Both staff stresses the influence of KPI's set by senior management on the behaviours of staff to the QMS. Although the KPI's are useful to the senior management team, there may be a thin line between meeting the KPI's and meeting the demands of the QMS. These KPI's may conflict with the QMS and can influence compliance behaviours.

4.6.2 Time and resource constraints

Although the staff understand the need to comply with the QMS, most of the interviewees indicated that the resources and time allocation was minimal.

"*No time actually given to actually do the work, but you are expected to do it; only interested in statistics and not the actual process being done effectively" (staff A).*

Staff think that they don't have enough time in the day to complete the work and as such end up with work around to get the work done. They see disparities between the workload and the resource allocated and therefore there is the tendency for staff to try and invent other ways which are not in line with the QMS.

"staff are always rushing off their feet (very busy) which led to the mistake and to ask them to then complete QI and all related QMS paperwork, they will prefer not to report it". 'staff have very positive attitude but can be very cumbersome and inadequately resourced (staff E).

It is evident that, although staff may be aware of the importance to routinely follow the QMS, due to time and resource constraints, compliance may be impeded. This may lead to a short fall because the reporting and actions required by the QMS may be compromised as staff fail to report problems. Moreover, non-compliance behaviour may be high because staff may complete actions to allow them to 'tick the box' for the KPIs but may not have the time and resource to effectively deal with the non-conformance which may lead to repeat non-compliance behaviour.

4.6.3 Misunderstanding/ Misplaced roles

Because of the interactions between different departments, there may be confusion of the requirements and roles of the various stakeholders. Within the departments, different sections may rely on the activities of the other section to be able to complete their task. Depending on the beliefs and understanding that has been established, compliance

behaviour can be affected. This is also the case between departments where the activities of one department feeds into the other.

"*Frontline people think that they are doing QA work as people in production will expect QA to be raising Qis and not them" (staff E).*

"We see QA as overpaid people sitting in an office and comes around to look for dates on equipment etc. and get people in trouble" (staff D).

Clearly, staff D and E see QA activities as an influencing factor in their compliance behaviour. They expect QA to play some of the roles they are required to play in the departments, and this affects their compliance. This is because, as the staff in the departments know that QA works closely with the QMS, they expect QA to raise quality incidents and manage them on behalf of the departments. As such, there may be reluctance on their part to routinely follow the QMS if they think that QA is not playing the role, they expect them to play.

Importantly, the action or inaction of QA in dealing with some of the activities the department expects them to perform, influences how they comply. If the QA team perform all the activities for them, the department may see the QMS requirements as the sole responsibility of the QA team with this affecting the quality and safety output of departmental activities. This is because QMS requirements should be the responsibility of all staff within the organisation. On the other hand, failure of QA to perform the activities as expected by the departments leads to resentment and failure to compliantly follow the QMS.

Moreover, there is an indication that apart from the QA team and other stakeholders may also influence the compliance behaviour of staff. The activities of the stakeholders in other departments was also shown to influence the compliance behaviour of the staff in the other departments. This influence of the stakeholders may be either positive or negative depending on the relationship and the perceived interaction with the QMS.

"Other stakeholders take QMS more seriously (From the leadership team) so is easy to get things resolved with them" (staff A).

"the department is like a hub so other department not conforming to the QMS will have an impact on our services as we can't be reliant on their report /results" (staff B).

The understanding that exist between the stakeholders that each stakeholder routinely complies with the QMS or fail to routinely comply may influence the compliance behaviour. This is because if one stakeholder thinks that the other is not routinely following the QMS and there is no consequence for their inaction, then with time they may be influenced to follow the negative behaviour. Also, by knowing that the other stakeholder is not routinely following the QMS, there is decline in the confidence of what they get from that stakeholder and with time this can influence the way they interpret or interact with resources from that stakeholder.

This shows that if there is indication of misplaced roles within the departments, the interactions between the subject and the object is affected with resultant impact on the outcome.

Figure 4-2 shows the updated CAM model after the analysis of data collection and the other themes identified.

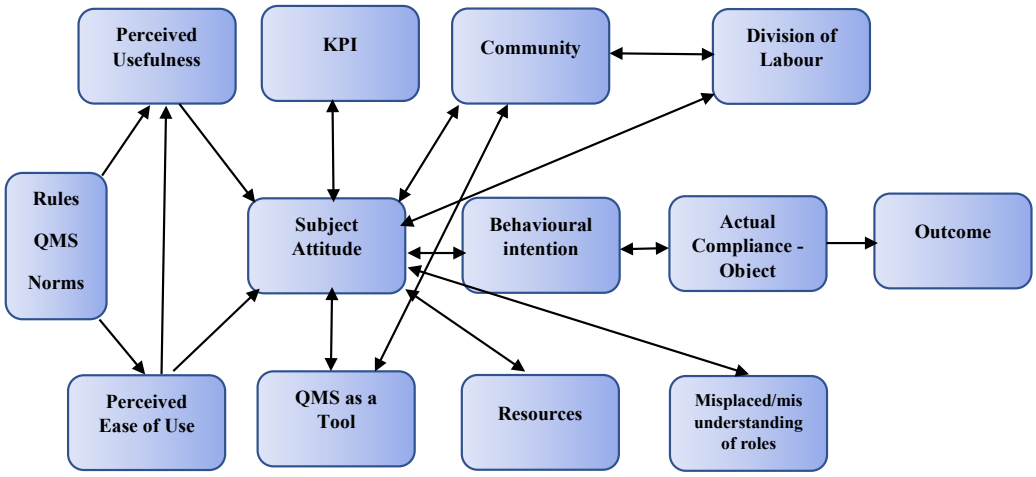

Figure 4-2 Updated CAM Model

From the updated CAM model, the following constructs / variables are observed:

Norms, Rules, QMS - These are the external variables that affects the attitude of the subject in choosing the tool for the required interaction with the object.

Perceived Usefulness (PU) –Is the degree to which a person believes that using a particular system would enhance their job performance (Davis, 1989). In other words, the subject perceiving the technology as useful for what they want to do.

Perceived Ease-Of-Use (PEOU) – The degree to which the person using a particular system believes it to be free from effort (Davis, 1989). Looks at the ease with how the subject can use the technology.

Subject Attitude - Is the individual's evaluation of an object and defined "belief" as a link between an object and some attribute and defined "behaviour" as a result or intention (Fishbien and Ajzen, 1975). This is the subject's settled way of thinking based on the evaluation of the technology.

QMS as a Tool – Quality Management System which comprise all the procedures and processes in place for the subject to use. This involves the policies in place about the use of the technology. It acts as the means or tool for the subjects to interact with the object.

KPI – This is the Key Performance Indicators that are in place to evaluate the success of an organization, employee in meeting objectives for performance. This may be part of the monitoring tool for the assessment of the subject's performance.

Resources – This includes the staff numbers, the time available to perform task and all the relevant materials and equipment needed by the subject to use the technology as required.

Community – The community involves the different sections that may exist within the department and how they interact with each other to achieve the outcome. This may promote the culture that exists within the department and by extension, the organization.

Division of Labour – This is the hierarchy that exist within the department and the organization. This looks at the leadership and management structure and their interaction with the subject which influences their attitude.

Misplaced/Misunderstanding of Roles – This looks at the various roles that exist within the department and how they complement each other in achieving the set goals. This also considers the role of other stakeholders within the organization whose activities impacts on the subject.

Behavioural Intention – The subjective probability that an individual will perform a specified behaviour (Fishbein & Ajzen, 1975). This relates to the intent of the subject to perform the behaviour, especially towards others and things.

Actual compliance – **Object** – This is the actual interaction with the object using the tool, in this case the technology. This considers the actual compliance behaviour observed.

Outcome – The outcome of the interactions between the subject and the object. This is the output of the interaction and this is the goal that is set from the onset.

4.7 Evaluation of Compliance Assessment Model

From the data analysis, it is evident that staff acceptance of the QMS is influenced by many factors and as such the constructs of the model could assist in assessment of the compliance behaviour of the staff by understanding the factors that influenced their behaviour. As the model was developed to assess the adoption and compliant use of the QMS in place, data collected and analysed showed that the tool is seen as relevant by the staff.

"QMS is critical to the process and used to manage the quality of the products in the organisation" (Staff E).

This showed that to attain the required outcome, the awareness of the tool is critical. This is because for the subject to use the tool effectively, they must understand the tool and its requirements.

This supports Engestrom (1987), who indicated that the tool is relevant to attain the desired transformation. Consequently, the availability and awareness of the tool is important for compliant behaviour. Although all the participants showed awareness of the importance of the QMS, there were some reservations. This may be attributed to the presentation of the QMS as a sign in the form of the standard operating procedures, equipment manuals and policies in use within the departments and the organisation. Subsequently, the application of the QMS may be dependent on the interpretation by the agents. As such the training, experience, participation in workshop, knowledge, and social setup etc. of the department is relevant for the outcome.

Moreover, because the subjects have needs (Kaptelinin and Nardi, 2006), they need to understand the requirements of the tool to attain their goal. Because of this the awareness of the tool is important if the desired outcome is to be achieved. Essentially, as the subject aligns their values with the organisation, their perspective and motivations are aligned, and they work together. This may lead to exhibition of positive compliance attitude which may then lead to compliance behaviour. This was evident in the data collected as staff who accepted the values of the organisation were more willing to compliantly use the QMS.

In using the QMS, the perceived usefulness of the tool was shown to influence the intention of the subjects. As stated by Staff G, "*they see the QMS to be useful and as such they use it"*. This is consistent with Davis (1989), who indicated that perceived usefulness exhibited stronger and more consistent relationship to adoption and use. Essentially, if the subjects perceive the QMS to be useful, the more incline they are to exhibit compliance behaviour.

Also, the ease of use of the QMS was shown to influence the outcome. Staff C indicated that "*compliance behaviour may be enhanced if there is ease of interpretation of the QMS"*. This supports Park and Jung (2003), that the possibility of non-compliance behaviour will increase if the procedures are so complicated that the operators cannot clearly understand the context of required actions specified in the procedures. As such, if the QMS is complicated and not easily understood it may not be compliantly followed. This then shows that the development and layout of the QMS should be easy to follow by the subjects in order to facilitate compliance behaviour.

Moreover, the analysis showed that the community in which the subject operated influenced their behaviour. The data showed that this may be due to peer pressure and other existing norms and beliefs in the department.

"there is collective attitude by staff to follow the QMS compliantly." (staff F).

This is consistent with Hofstede (2001) who stressed that community creates "collective programming of the mind" which makes the subjects within the group unique in the way they think and act. As such, although the subjects may have diverse individual needs, they were all united by the norms within the department which compelled and influenced them to perform the behaviour. This social interaction can be either negative or positive to the requirements of the QMS. Subsequently, the social interactions act as the 'force behind' the observed activities. Importantly, social influence and interaction has a significant impact on the intention to use information systems (Venkatesh et.al., 2003); in this case the intention to compliantly use the QMS. Thus, the subjects exhibited confidence in their actions through similar activities of peers within the departments which likely influenced the compliance behaviour.

Furthermore, as the subjects routinely look up to their managers, their behaviour is shaped by them. The hierarchy (Supervisors, managers, or senior leaders) influenced the behaviour of staff either negatively or positively. Also, because of the reliance of the subjects on other stakeholders in the 'process chain', the data showed that there was stakeholder influence on compliance behaviour. Here, the subject relied on the output of the processes from their stakeholders. As such the negative output from the stakeholders subsequently influenced the subject's behaviour. This is consistent with Dankwa and Nakata (2016) who stressed that the reliance on the initiator in the 'life cycle' of responsibility ultimately influences the compliance behaviour; positively or negatively. This is because, as there is trust built between the stakeholders in the process chain, the actions by the initiator or other stakeholders within the chain may have impact on the observed outcome.

Consequently, if the stakeholders do not fully understand their roles, or fail to comply with the requirements of their role, they influence the interactions that exist between the subjects and the object in the other sections or departments. This may affect the compliance behaviour observed as the reliance on the initiators in the process chain influences the outcome.

Moreover, the resources in place (time, material, and reagents) was shown to be essential in the subject's behaviour in that they influenced their approach to the process. The subjects indicated that they may not have enough time or resources to perform the required action

and as such they may not compliantly follow the QMS. This is very critical to the observed behaviour as although the subjects were aware of what was required of them, their behaviour was influenced because they had limited resources. This shows that the available resource may determine how the subject approach the interaction with the object which subsequently affect the observed behaviour.

Another factor is the Key Performance Indicator (KPI) in place which were also seen to influence how the subjects complied with the requirements of the QMS. Although the KPI's are set as indicators to monitor staff performance, some of the KPI's may compete negatively with the requirements of the QMS and may lead to non-compliant behaviour. This is because, the subjects may be required by the KPI to have certain number of reports for quality incidents and as such may fail to report incidents in line with the QMS. As the staff strive to meet some of the requirements of the KPI's they may compete against the compliant requirements of the QMS and non-compliance behaviour may be observed.

Furthermore, the misunderstanding that exist between different sections in the department or other departments in the organisation may influence how the subjects interact and comply with the requirements of the QMS. This was observed in the analysis as the interviewees indicated that they don't always understand the role of all the stakeholders in the 'process chain' and this affects the way they structure their activities and comply with the QMS.

Importantly, from the analysis, there is indication that staff intention to comply as observed from the interaction with the constructs/variables, was crucial in the assessment of the actual compliance behaviour. This is because, staff who indicated that they always intend to comply also indicated that they performed the requirements of the QMS. The increased intentions by the subjects may yield increased effort which may increase likelihood of the subject undertaking the behaviour (Davis,1989). In effect, the data analysis based on the CAM model demonstrated its utility in assessing compliance behaviour in the blood establishment.

4.8 Suitability and Benefit of the Updated CAM

From the evaluation of the updated CAM, the following suitability and benefits were observed, and these are discussed below.

The model will be useful in assessing subject intention to use the tool as prescribed, which will be useful in predicting the actual use. Here, before implementation of a new QMS

system, the intention of the stakeholders may be assessed to ascertain acceptance and use of the system. This may form part in the drawing of the user acceptance criteria.

Because the model assesses the impact of the Key Performance Indicators (KPI) against the QMS, it will be useful in helping to set clear KPI's that supports compliance behaviour. This is because as the leadership team sets KPI's to assess performance of the staff, some of the KPI's fail to consider the requirements of the QMS and as such prevents the subject from performing the compliance behaviour. By including KPI as one of the constructs, it enables the leadership team to carefully consider the KPI's that are put in place.

The model will be suitable in assessing acceptance and adoption of a new tool and aid subsequent 'in use' evaluation of the tool. As the model considers the perception of the subjects and other factors before implementation of the system, it allows for informed decision to be made through assessment of the intention of the subjects and their desire to compliantly use the system.

Again, the model will be useful in assessing and understanding resources required for interaction between the subject and the object to achieve the outcome. Here, the model considers the resource availability and distribution as part of the implementation of the system. It also allows for the ongoing assessment of the resource requirement which makes it easy for the subjects to perform the compliance behaviour as resource is made available.

Furthermore, the model will be useful in understanding and defining roles of the subjects. This will also help in reviewing the impact of the leadership team on subject behaviour. This is because, the understanding of the roles of the subjects as part of the assessment will allow for the appropriate stakeholders to be sourced. This will also help in the development of job description of the subjects, which will help in equipping the department with the appropriate subjects to aid performing the compliance behaviour.

Finally, the model will be suitable in assessing the reasons behind non-compliance behaviour by understanding the intention of the subjects to perform the behaviour. This will be useful in setting clear actions which will help safety critical organisations to meet regulatory requirements. Here, the model allows for the reasons of the observed behaviour to be assessed which allows for better strategic focus to be ascertained and applied within the organisation.

4.9 Non-compliance Observed and resolution

The observed non-compliance as noted from the assessment of the data from the CAM model indicated errors and violation of rules in the interaction between the object and the

subjects using the QMS as the tool. According to Reason, (1995), errors are mainly the failure of planned actions to achieve their desired goal through forgetting, inattention, incomplete knowledge etc. while violations are deviations from safe operating practices, procedures, standards, or rules. The errors which are mainly in two categories, slips/lapses and mistakes were expressed in the data that was collected. In the slip/lapses, the subjects indicated that although they believe that the plan and procedures in place are adequate, the intended actions where not completed. These were related to attentional failures which may be associated with failures of memory.

Moreover, the subjects confirmed that the procedures and policies in place were adequate, but they just failed to complete their actions as required with no clear rationale for their action. Here, the failure occurred at the level of execution (Reason, 1995) with the indication mainly being because of memory failures at the time of the execution. This were mainly due to distractions because of the layout or workflow of the department. It may also be due to the activities of other stakeholders taking place at the same time which led to the interruption or got in the way of the execution of the task by the subject.

Furthermore, there were some mistakes observed which may be as a result of the inadequacy of plans that have been set out to accomplish the intended outcome. These failures were shown to lie with the mental processes involved in the planning, formulating intentions, judging, and problem solving within the departments. Here, the procedures and actions that have been put in place for execution of a task may be inadequate. This may be due to the level of competence or expertise of the subjects initiating the procedures and plans. Due to the reliance of staff on the procedure to perform their task, the inadequacy of the procedure may lead to failure to achieve the outcome. Staff performing the task may fail to ask questions to ascertain the adequacy of the procedure, knowing that the procedure have been formulated by competent team. Moreover, there was indication that some of the mistakes may have been made because of formulating solutions and or procedures for novel situations where the team formulating the procedure had little knowledge of the situation.

Some of the non-compliances observed in the data collected showed some planning and judging mistakes where staff failed to complete task as required. This have been shown to be reduced by improving the quality and the delivery of necessary information within the workplace.

Alternatively, violation by staff as deviations to follow procedures and standards were confirmed. This was deviation by staff by cutting corners to complete task for personal gain or organisational gain; by following different path from the procedure to complete the

task. Form the data collected, there was indication of how the supervision and management within the department may negatively impact on the behaviour of the staff. Here, the data indicated that subjects watching the supervisors and managers perform their routine processes may influence how they also perform the behaviour.

Moreover, there was low morale of the subjects due to impact of other stakeholders' perceived lack of concern to complete their actions on time. This is in line with Reason (1995) who indicated that generally the violation is associated with motivational problems like low morale, poor supervisory, perceived lack of concern, the failure to reward compliance and sanction non-compliance, and occur in a regulated social context. These factors that have been assessed to influence subject behaviour require motivational and organizational systems to remedy the non-compliance.

Subsequently, there is indication that staff may be at different levels when it comes to their cognition with regards to the required behaviour. From the Cognitive Dissonance Theory and the non-compliances observed, four main groups can be identified from the data evaluation.

Firstly, some staff may understand the root cause of the behaviour and are prepared to eliminate the cause by changing the behaviour. Here, staff are willing to stop some of the actions that causes the dissonance in behaviour.

Secondly, some of the staff may be under the impression that they are permitted to make mistakes every now and then, so they are not prepared to resolve the root cause of the problem. They are therefore comfortable when they fail to follow the required process every now and then and see no need to improve compliance.

Thirdly, some staff may be prepared to justify the behaviour of not completing the task in the first instance as required but are willing to stay on after their shift to complete the task that they failed to perform. They fail to see the importance of 'getting it right the first time' but willing to stay over to correct the error. This group are prepared to justify why they are failing to perform the compliance behaviour without understanding the QMS requirements.

Finally, some of the staff may ignore the existence or requirements of the QMS by trying to justify their way of working as appropriate and deny that the QMS improves safety and quality of the products and services. This group are prepared to work outside of the QMS and see no need to perform the compliance behaviour.

From the above, it is evident that for compliance attitude and or behaviour to be achieved there should be a system or process in place that provide the conducive environment for

compliance behaviour. This will enable stable consonance state to be achieved for the subjects in the department. Subsequently, from the data collected from CAM model and the related cognitive dissonance data, there is indication that interventions that promotes and considers the utilisation of systems that removes or reduces the cognitive dissonance will promote behaviour change.

4.10 Chapter Summary

The understanding of the reasons behind the non-compliance behaviour is an essential tool in dealing with compliance issues. As such this chapter started by developing a CAM model from literature for the assessment of non-compliance. Subsequently, the CAM model was evaluated through interviews and the model updated based on the outcome of the data analysis. Further consideration was made of the suitability of the CAM and the observed non-compliance behaviour. As part of design science, the chapter concluded with the data and knowledge base. This provides direction for the next chapter to consider ways to improve compliance behaviour of the subjects within the organisation.

The next chapter will seek to develop framework and interventions that seek to understand the gaps that were observed from the evaluation that may have led to the observed behaviour. This chapter addressed objectives four and five.

Chapter 5
Development of Behaviour change intervention

5.1 Overview

Following the initial compliance assessment, this chapter considers the development of a behaviour change system to address non-compliance behaviour. It starts by identifying the gaps and areas for consideration following the initial assessment of non-compliance. The chapter then considers the rationale for use of system design steps to develop a framework to address the initial findings. Steps in persuasive system design is considered and adapted to the development of the persuasive framework. Based on the persuasive framework, interventions were derived for application.

5.2 Gap analysis

The behaviour change interventions allow for implementation of interventions that will aid persuasion of the subjects. Following the design science process to address the business needs, the Awareness of the problem in the research has been established. This is stated as the need to change attitude and or behaviour following the initial non-compliance behaviour assessment. This phase is derived from the analysis of the CAM model and provides basis for the development of a new artefact (Figure 3.3)

The Suggestion phase will be to address the problem awareness or questions posed from the analysis of data from CAM model. This will consider ways to improve compliance behaviour in line with the second research question. Subsequently, these questions are considered as they were shown to influence the compliance behaviour of the subjects.

- What can be done to improve the ease of use of the QMS?
- What can be put in place to improve usefulness of the QMS?
- What measures can be put in place to improve the culture within the organisation for application of the QMS?
- What can be done to ensure that the leadership team or the hierarchy within the organisation promotes the better use of the QMS?
- What measures can be put in place to ensure that the KPI's that are in place for QMS are realistic and reliable?
- How can resources (staff, equipment, time) be made available for staff to effectively use the QMS?
- How can the roles of all the stakeholders who use the QMS be clarified, established, and improved?

Subsequently, the areas identified in the initial assessment of the non-compliance behaviour is considered in the development stage of the research.

5.3 Development of Persuasive System to Improve Compliance

The development stage considers the generic steps in the Persuasive System Design (PSD) as the main approach while incorporating Fogg's Eight-Step Design Process to develop a framework. This stage culminates in derivation of interventions from the change drivers from the persuasive framework which will be applied to address the current problem of improving compliance behaviour.

5.3.1 Rationale for Use of Design Steps

As discussed in the previous chapter and stated in the objectives, the need to formulate an intervention that aims to improve compliance behaviour is essential to bring about the needed change. The development and implementation of such systems and processes will take into consideration methods and theories that allow people to comply with the requirements of the designed systems and processes. To do this, the attitude and behaviour of the users is important and as such theories that allows for behaviour change management is relevant. Subsequently, change theories that attempt to explain factors which cause individuals to change their behaviour and or attitude is considered. These change theories form the basis of existing models that allows for users to accept systems and processes as designed.

The consideration for use of the generic steps and the eight-step process is because they allow for the analysis of the problem, development of intervention and subsequent application and evaluation of the intervention. Moreover, clear design look of PSD allows for the evaluation of the merit of the components involved in the persuasion and aids the understanding of the behaviour change observed. Figure 5-1 shows the generic steps in the persuasive system design. Although the steps outlined in figure 5-1 is mainly for software and computer systems, for this research, the emphasis will not be on a computerised system.

However, the research will utilise other information systems which include use of computer -mediated (like emails, blogs, and social networks) and other information systems to persuade staff to compliance behaviour. We therefore submit that since the software application is to effect behaviour change, by extending and using the techniques of the design steps, the desired impact can be elicited through the subjects. Thus, the subjects receive the data, process, and utilise the information to achieve the change.

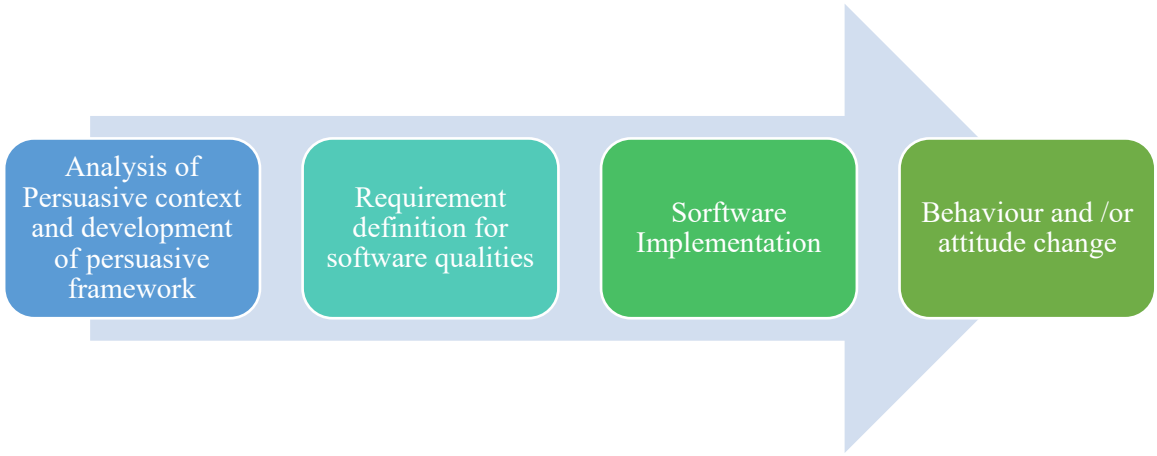

Figure 5-1 Generic Steps in Persuasive System Development (Oinas-Kukkonen and Harjumaa 2009)

The research therefore considers extension of figure 5-1 to allow for analysis and development of the framework, construction of the interventions, implementation of the interventions and subsequent evaluation of the outcome. Figure 5-2 shows the steps to follow in the development and evaluation of the interventions.

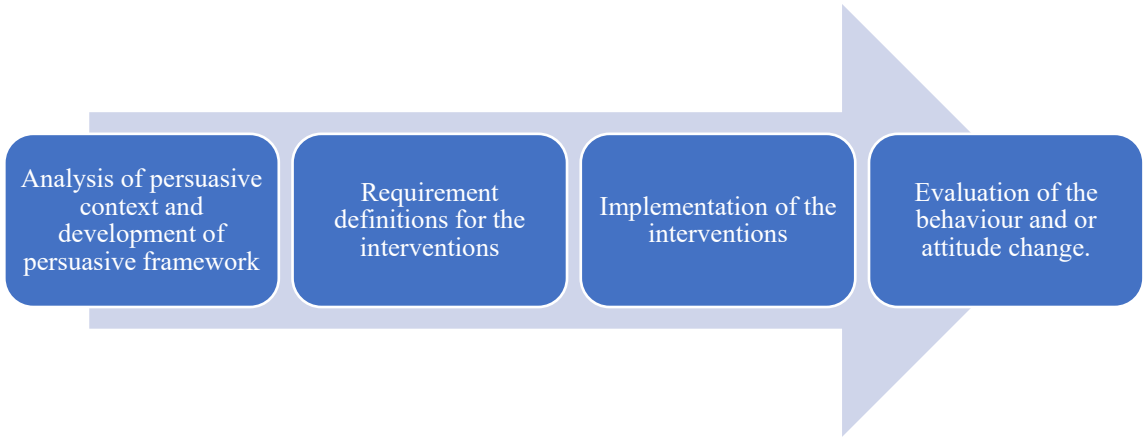

Figure 5-2 Generic Steps in Development and Evaluation of Persuasion Interventions

The extension of PSD gives a systematic and coherent approach to the development, implementation, and evaluation of the interventions from the proposed framework. It is proposed that, the software requirements and the interventions in this research may be comparable with the main difference being the application of the interventions. As such, the extension of PSD allows for the same approach to be followed while developing, implementing, and evaluating the interventions from the proposed framework.

The next section will consider the development of the framework and the interventions from the generic steps. This section continues from section 5.4 with consideration of analysis of the persuasive context and development of persuasive framework, and

requirement definitions for the interventions. The other two aspects of the generic steps: Implementation of the interventions and Evaluation of the behaviour and or attitude change are considered in chapter six.

5.4 Analysis of Persuasion Context and Development of Persuasive Framework

In developing the framework, the context of the persuasion needs to be established because the persuasion context is critical for the evaluation and analysis of attitude and behaviour change of the subject. The analysis of the persuasion context is to allow and recognize inconsistencies in user's thinking, establish the appropriate moments for delivering messages, and effectively persuade users (Oinas-Kukkonen and Harjumaa, 2009). Moreover, according to OinasKukkonen and Harjumaa (2008) analyzing the persuasion context requires a thorough understanding of what happens in the information processing event, namely understanding the roles of persuader, persuadee, message, channel, and the larger context.

As such, to address the questions posed from the previous chapter, there is the need to understand the context of the persuasion (Intent, Event and the Strategy) to aid in the development of a persuasion system to improve attitude and or behaviour staff use of QMS.

The Intent of the persuasion framework is to improve compliance behaviour to QMS. To do this, a framework is considered that addresses the needs that were identified from the gap analysis that prevented the subjects from using the QMS as required. These needs may have been due to the formation of norms within the departments. Underlying this is the belief that every situation has a correct response and persons would like to base their responses on these correct foundations (Friedkin, 2001). As this belief is shared by the people, the understanding of the needs may provide the foundation to create correct responses.

Having established the intent of the persuasion, the Event is considered by the' Use, the User and the Technology context of the persuasion. As the use of the framework will mainly be in the healthcare sector and organisations in general, it is important to understand the drive and or attitude of subjects towards the QMS. This is to create the baseline for the application of the intervention to promote the required behaviour change. In the analysis of the data from the CAM, most of the subjects indicated that their attitude towards the QMS is positive but had problems in performing the behaviour in line with the stated attitude. Essentially, the persuasion technique to consider is to reinforce the proper attitude and make it easier for the subjects to stick with the attitude even in challenging and spontaneous situations.

As the use context is considered, it is appropriate to also analyse the user context. This is because of the individual differences between subjects (goals, lifestyle, motivations) which may influence the way they process the information. By understanding the user context, it helps to establish the goal and the motivation of the subjects to continue with the attitude regardless of the circumstances around them. According to Oinas-Kukkonen, (2010a), understanding the user's goals, progress toward achieving them and their past performances are the most essential aspect of analysing the user context.

This goes to show that subjects with clear and positive goals are more likely to put in more effort to accomplish their goals. Importantly, the framework and the interventions that is established should have a means of setting clear and stretching goals but ensure that the subjects are able to achieve them. Locke and Latham (2002), explained through the Goal Setting Theory that goals can affect performance through directing attention and effort. Accordingly, the highest and the most difficult goals produces the highest levels of effort and performance than just urging subjects 'to do their best'. Thus, understanding the user and setting the appropriate and relevant goal is a driver to achieving the attitude and the needed behaviour.

Despite the use and the user context, the technology aspect of the Event should be considered. As already indicated, some computer mediated means will be utilised in persuading the subject to use the QMS as required.

The Strategy for the persuasion is also factored in the development of the framework for persuasion. This is because the message for the persuasion should be carefully analysed and tailored to elicit the desired action from the subject. As such, the route for the persuasion is considered as part of the application of the intervention. It is believed that, as most of subjects within the organisation are highly motivated and with high ability, it is important to ensure that the content of the persuasive message is set at the right level as they are more likely to check the content. Nonetheless, there are other subjects that may have low motivation and ability and may not be interested in the content of the persuasive message. In effect, both direct and indirect approach may be utilised depending on the department within the organisation.

Having established the context of the persuasion, the persuasive framework is now considered. Although needs were identified, we suggest the needs can be put together onto a framework as most of the needs may align with other needs. This is because, some of the needs identified may be because of failure in other aspects of the process so by amalgamating these aspects, a comprehensive framework can be developed that will aid

improvement. The framework will incorporate the 'change drivers' that considers the needs identified from the CAM model. This framework will enable interventions to be created that addresses the gaps identified with the goal to effect change in attitude and or behaviour both.

The next section considers the proposed persuasive framework and explains the change drivers that produces the interventions that interacts to persuade the staff to change attitude and behaviour.

5.4.1 Framework for Persuasion

As organisations are increasingly asked to show proof that they have sound, robust and adequate systems to meet compliance needs (O'Neil, 2014), a framework is proposed attempts to meet these needs. This framework considers how to embed compliance into the organisation considering management science information systems and psychology. A persuasion framework is proposed as means to address the needs identified from the data collection and analysis from the CAM model to attain the target behaviour. Figure 5-3 shows the link between the CAM model and the proposed framework. It is recognised that the needs identified *Community Influence, Leadership style, Usefulness, Ease of use and the stakeholders* may act as the ***change drivers***. These change drivers are the 'driving force' that influences the subject when using the QMS; they influence the subjects to perform the target behaviour.

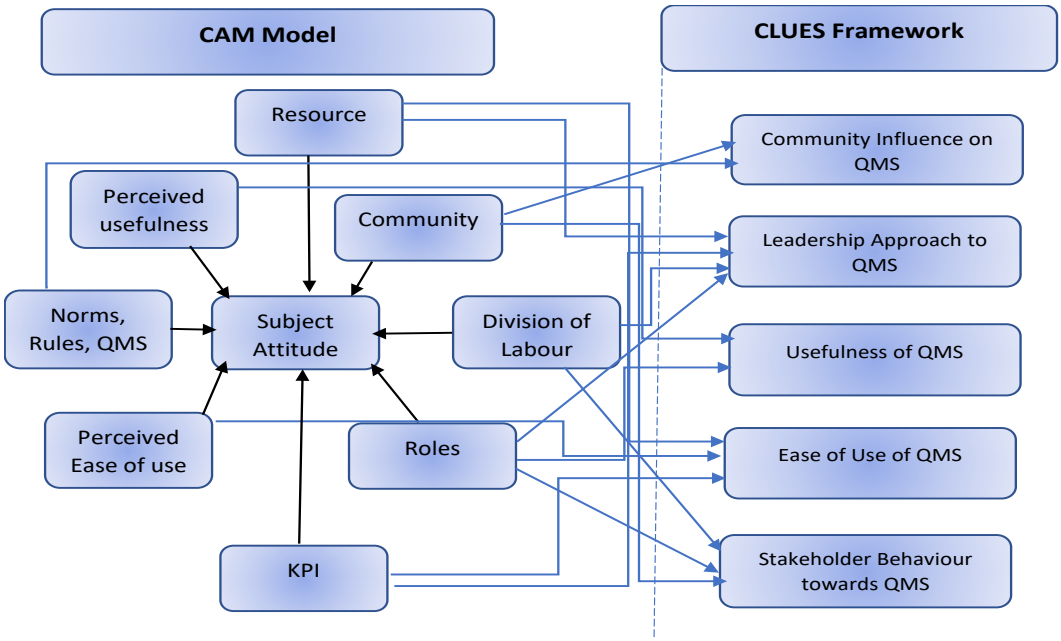

Figure 5-3 Link between CAM and CLUES

Essentially, understanding these change drivers, establishing interventions from them, and applying the interventions may aid persuasion of the subjects. Figure 5-4 shows the framework of persuasion for compliance behaviour that is proposed based on the analysis of the needs from the CAM model.

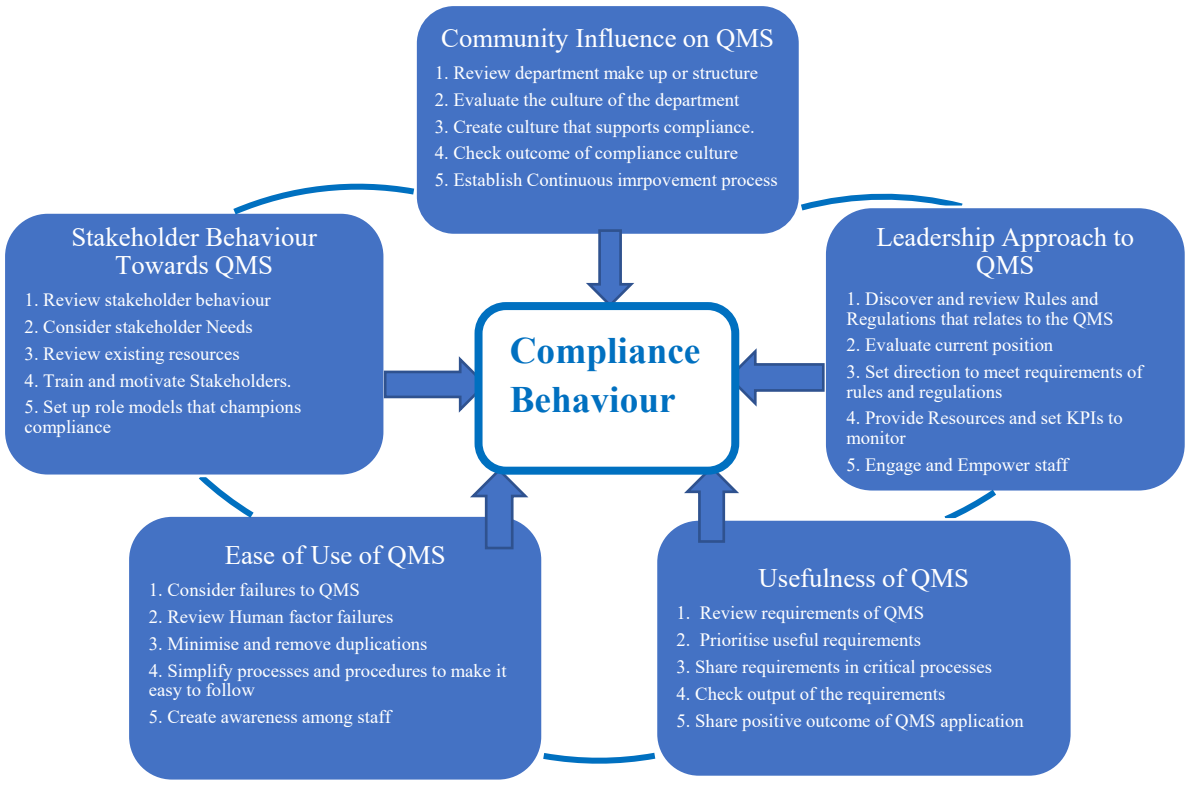

Figure 5-4 CLUES Persuasive Framework

The framework consists of five different parts as illustrated in Figure 5.4. The framework is based on the expectation that both internal and external forces like rules and regulations will constantly change and evolve, as such the parts are designed in cyclical. The next sections consider the five parts and intervention requirements.

5.4.2 Stakeholder Behaviour

The analysis to understand what the stakeholder needs are and its impact on their behaviour is relevant to persuade users. Stakeholders in this research are categorised as customers, the departments, and the users (staff) that operates within the organisation or the set up.

As such, in initiating processes to meet requirements for compliance, the needs of customers are seen to drive decision making of the organisation and by extension compliance activities. This supports O'Neil (2014) who asserted that compliance needs are usually initiated by societal imposition of rules and regulations which are derived from customer needs. The framework proposes that the needs of the customer should be

established at the onset of the process. This is part of the user requirement analysis to understand what the customer needs are. This is because, the sole purpose of the organisation is to meet the needs of their customers. Essentially, the stakeholder analysis enables the organisation to understand what the customer needs which informs the processes and activities that are initiated by the organisation. This informs the systems to implement to influence the compliance behaviours of the staff.

The CLUES framework also considers three main stakeholders within the organisation for effective gain in influencing the compliance behaviour. These are those who can influence decision, those who are affected and those who are involved.

The decision influencers in most cases are the leaders in the organisation or within the departments (to be discussed later under leadership approach). But in some cases, these can be the 'champions' or the 'advocates' in the departments and within the organisation that influence decision. This group can be described as those who have 'caught the vision' and direction of the organisation and are willing to drive the change that is required. The framework proposes that this group is involved from the onset in the plans to improve the compliance behaviour.

In the Cognitive Dissonance theory, these influencers can be those who have identified the dissonance and are willing to change. These are the people who are willing to deal with the root cause of the problem and as such they are very important to the persuasion process. It is proposed that these influencers are identified from the onset to champion the behaviour change that is required within the department. More so, because they exhibit positive action towards changing the dissonance, they can influence others as they observe them perform the compliance behaviour. These champions may have positive attitude and behaviour towards the change and are willing to carry others with them.

The next group are those that are affected or impacted by the decisions made. This can be seen in the context of the users that rely on the output from the other users to complete their task. In the organisation, this will be the departmental level or different sections (work streams) within the same department. Most departments within organisations rely on the output from the other department to complete their activities. As such, the output they receive will influence the way they operate which can impact their compliance behaviour. According to Dietrich (2010), there are several important factors that influence decision making which includes past experiences, individual differences, and a belief in personal relevance.

Because there is a synergistic relationship that exist between the departments, the pasts experience and other personal belief shapes the outcome of products and services. If there is experience that the data or the output from the other department is not of the standard required, output results are subsequently viewed with 'contempt'. Alternatively, if the experience of the output required is of the standard required, there is tendency for acceptance and use of data compliantly. That said, in both instances, there may be requirement for users to check the data for completeness before acceptance and use. The behaviour of this group is therefore affected by the activities of the others and this should be considered when planning intervention to change compliance behaviour.

The third group are those who are involved in the decision-making process who for this framework, are termed the 'routine users '. This group are involved in the routine processes and their attitude and behaviour is essential when considering the intervention to apply. These users may be influenced by the first two groups but can also be considered in the first two groups as well. This is because, the routine users may be the champions or advocates of that decision and may also be part of the group affected by the decision. Subsequently, the analysis and understanding of the routine users is critical in assessing the intervention to achieve to the target behaviour. The user context in this scenario needs considering as individual differences influences information processing.

Having considered the three main types of stakeholders that may exist within the organisation, the experience of the stakeholders should also be factored in when assessing the attitude and or behaviour of the stakeholders. Here, we consider how the experience of the stakeholder in relation to the target behaviour impacts on their attitude and or performance of the behaviour. Because the stakeholder activities are usually based on the information that is available to them, the experience of the stakeholder in assessing the available information is important when considering ways to influence attitude and or behaviour.

In practice, stakeholders may learn or obtain information from several different ways. It is important that this is considered when formulating interventions that persuades stakeholders to change behaviours. This information may be received in three ways: information by description, information by observation and information by personal experience (Haselhuhn et al., 2012).

According to Nisbett and Ross (1980), although all the different sources of information may convey the same factual content, personal experience may convey affective information that other modes of communication may lack. For example, the effect on

attitude and or behaviour change from receiving a speeding fine (information by personal experience) may be different from hearing someone tell a story about how they received a fine for speeding (information by description) or by witnessing another driver receive a fine for speeding (information by observation). This is supported by Yechiam, Barron and Erev, (2005) who indicated that people tend to place more weight on their personal experience when making decision, even when they receive information from multiple sources like description and observation. Essentially, the information by personal experience may convey the needed and weighted information that changes the attitude and or behaviour of the stakeholder.

Consequently, the CLUES framework proposes that the stakeholders should experience the relevant information to aid in the decision-making process. A stakeholder that is exposed to any of the sources of information as stated above, may be better placed in making the informed decision that changes attitude and or behaviour than a stakeholder that have not been exposed or experienced any information. Subsequently, the framework proposes that stakeholders should be exposed to relevant information; whether by description, observation, or personal experience to allow for the desired attitude or behaviour change to be observed. The information should therefore be readily available for the stakeholders to access when operating in the department. The information should be easily processed and understood to allow for the appropriate decision to be made. As 'ignorance is bliss' the stakeholders should be presented with what is required of them so that they can act rather than remain 'in the dark'.

In semiotics terms, the appropriate and relevant signs should be used to allow for the stakeholder assessment and interpretation for the needed decision making. As meaning arises during the perception and interpretation of data, the relevancy of the data is important. This is because all information is carried by signs which can be defined as anything that can be interpreted as having a meaning that communicates information to the person on the other side. It is important that the stakeholders understand the sign that is used in the department and the organisation to communicate meaning to the stakeholder to act. It is therefore contingent on the context in which the sign is communicated in order to enable interpretation for understanding of the signs.

For example: The thumbs-up that signifies "ok," may signify "I want a ride" if you're standing by the side of the road. Both thumbs-up means different things so the sign used should be used in the right context to allow for stakeholders to interpret and act accordingly. Importantly, the signs and communication flow between stakeholders within the department is important when considering the attitude and or behaviour of the subjects. In

the department, making the sign available for the stakeholders to access and process is important for the elicitation of the appropriate behaviour.

Besides ensuring that the signs are applicable to the stakeholders and provided in the right context, the training and development needs should also be considered. According to Fogg (2009b), the stakeholder needs the ability to perform the required behaviour and this can be attained through the training and development. This is in line with the definition by Goldstein and Ford (2002) who refereed to training and development as means of improving individual, team, and organizational effectiveness by systematic approach of learning and development. They indicated that this led to acquisition of new knowledge and skills that helps the stakeholders to meet their purpose.

In persuading the stakeholder to perform the behaviour, it is important to ensure that they are equipped with the ability or the required skills and knowledge. As the stakeholders learn and understand the required action, they will be more persuaded to perform the behaviour if all the needed resources are in place. According to Aguinis and Kraiger (2009), there is evidence to show positive impact on performance of individuals and teams who have been trained and developed to the task. They further indicated that, this can also be beneficial to their attitude, motivation, and empowerment in performing the needed action, in this case the target behaviour. Consequently, the CLUES framework propose that the training needs and development of the stakeholders should be met to serve as a motivator for the target behaviour to be performed.

5.4.3 Leadership Approach

The next stage of the persuasive framework is the leadership approach of the leaders within the organisation. The leadership team and their approach represent the type of hierarchal structure within the organisation and this may influence the compliance behaviour of the staff. The behaviour of the leadership team may be influenced by the leadership approach which may differ based on the culture within the organisation. According to Hofstede (2011), organisational cultures are usually set by the leadership team and this influences the stakeholders that work within the organisation. The culture of the organisation and the departments may be defined by the leadership as stakeholders look up to them. Moreover, they set the strategy of the organisation as such the ‘temperature’ of the organisation which include the compliance needs and direction of the organisation. The strategic direction of the leaders should therefore be considered as part of the persuasion framework as it gives a clear indication of the organisation which may guide staff on compliance activities.

The leadership team also ensure that there is a clear job role or job description to help in recruiting and retaining the appropriate staff for the job. This is important as staff with the appropriate ability in terms of physical and brain cycle are required to deliver to the stakeholder needs. It is therefore incumbent on the leadership team that the job roles are clearly defined with no ambiguity for who performs which task.

Importantly, if the roles are not clearly defined, there is the tendency for misunderstanding of role and as such some of the compliance activities will not be performed. In an event that the activities were performed, they may not be performed to the required standard as there may be no clear role delineation between the stakeholders in the departments. The leadership team don't only ensure that staff with the required abilities are in place but also motivate the staff. This is done through the pleasure the staff experience at the workplace, the hope of what their work provides and creating the environment for acceptance of good behaviour. This persuasion framework therefore proposes that for compliance behaviour to be attained routinely, the leadership team need to set a clear direction in terms of the strategy for staff and recruit the right staff with the motivation and ability to perform in the set job role. With these in place, the appropriate trigger should be applied to achieve the required persuasion.

Moreover, the framework proposes that the leadership team provides the resources that are required for staff to compliantly work to rules and regulations. These resources are in the form of staffing, equipment, materials, and consideration of time allocated for staff to complete their task. These resources are vital to the routine activities of the staff as it may affect the way they approach work and interact with the other stakeholders within the organisation. The data collected by the CAM analysis indicate that if the resources are not available, there is a constraint on staff ability to perform their work which impacts on compliance behaviour. This affirms the requirements set out by Fogg (2009b) that resources as ability are important component for the target behaviour to be achieved. Essentially, by setting a clear plan of resource allocation, and ensuring that staff are aware of this, compliance behaviour may be attained. Furthermore, the resource allocation should be supported by recognition of staff when they achieve the target behaviour. Recognition of staff may serve as motivation for stakeholders, to spur them to continue performing the target behaviour.

Having set the direction and provided the resources that is required, the leadership team also set Key Performance Indicators (KPI) for staff. These KPI's may act as a trigger for staff to complete a set behaviour at a set time. So, with the appropriate motivation and ability, the KPI may trigger the target behaviour to be observed. There are many anecdotal

evidences to show that some KPI's that are not set appropriately may influence compliance behaviour in that users are keen to exhibit good trend to their leadership team. As a result, the persuasion framework proposes that the KPIs set by the leadership team may affect the compliance behaviour of the staff and this should therefore be considered when implementing the interventions.

The framework proposes that the leadership approach to QMS starts by reviewing the regulations nd rules in place that relates to the QMS. Here, the leadership team provides the resource to discover and review the rules and regulation and compare to the current position of the QMS. Having established the gaps between the rules and regulations and the current QMS position, clear direction and focus is provided by the leadership team to address these gaps. This also comprise providing the needed resources for staff and the means to monitor the performance of staff to meet the requirements. Moreover, engaging and empowering the staff to embrace the QMS requirements and to use compliantly.

5.4.4 Community Influence

The community is seen as a group of people living in the same place or having a peculiar characteristic. This involves sharing certain attitudes and interests that is common to them and which may influence the way they behave. In the organisation terms, the community comprises of the departments within which the users operate, and this creates an identity for the users and influences the way they act.

The community is made up of the culture, the norms, and the agreed language etc. of the organisation. It is therefore important component of the CLUES persuasion framework and should be considered to understand the influence on user attitude and or behaviour. According to Hofstede (2001), culture creates "collective programming of the mind" that makes groups unique and this can influence the pattern on thinking, feeling and potential interactions. This definition indicates how the influence of culture is embedded within the minds of individuals and highlights the social nature of culture by the psychological influence which is shared within groups (Vanhée, and Dignum, 2018).

Importantly, with the community compromising of group of people with common cultures, it creates the identity of the group and in this instance, the organisation. Thus, the community creates the compliance identity of the users. The organisation as a community with a unique culture influences the decision making of the stakeholders (Vanhée, and Dignum, 2018) which comprise compliance behaviour. Within the community is a collective of cultures which can be connected to each other. But within each collective

there is a variety of individuals with varying characteristics and variation between these cultures is a shift of the individual characteristic to the other (Hofstede, 2011). The community can therefore influence collective and individual decision making and should be viewed as critical when considering means to persuade people.

Consequently, the different cultures within the organisation's community is reliant on the makeup of the departments and what they consider to be the way things are done or how they operate. This in turn, is influenced by the accepted standard or the way of behaviour that most people agree or expect as the norm. In Fogg's model (2009b), community expressed as acceptance and social deviance further explains why understanding the community influence is important. This research proposes that the relationship between the community, norms and culture should be considered when considering compliance persuasion. As a result, community influence as stated in the CLUES framework considers the culture and norms that exists in the organisation as these influences the attitude and or the behaviour of the stakeholders. Figure 5-5 shows the relationship between the three entities.

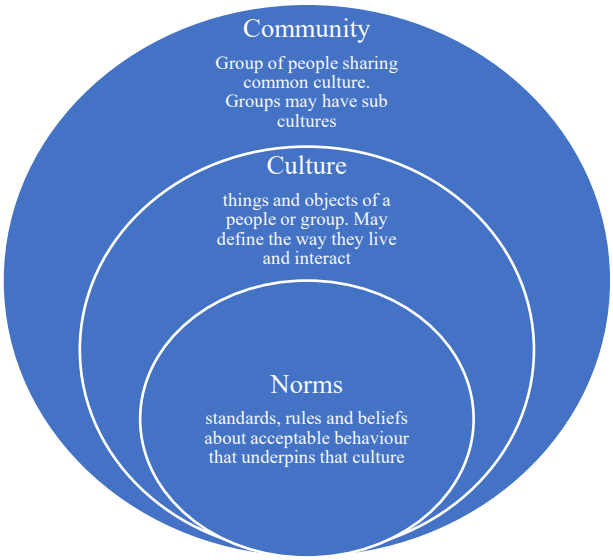

Figure 5-5 Relationship between community, culture, and norms

Culture

In considering the interventions to persuade users to compliance behaviour, it is important that the culture in which the users operate is understood. It is acknowledged that, culture has a psychological influence, which directly impacts individual decisions and behaviours. It is seen as the link between people and their interaction with others with this controlling their behaviour in a deep and persisting ways without their awareness (Pereira et al, 2015).

According to Hofstede (2011), the term culture is used commonly for tribes or ethnic groups, for nations, and for organizations but can also be applied to genders, to generations, or to social classes. Although the term may be used for all these groups stated above, it is important to note that some of the cultures may be entrenched and others can easily be exchanged depending on the circumstances. Further, Hofstede (2011) explained that, cultures as in societal, national and gender, which are acquired from childhood through earliest youth onwards, are much deeper rooted in the human mind whereas, occupational cultures which are acquired at school and in organization are exchangeable when people take a new job or leave the school. This research will concentrate on the organizational cultures which reside in the visible and conscious practices: the way people perceive what goes on in their organizational environment rather than societal cultures which reside in unconscious values (Hofstede, 2001). It is therefore important to note that organisational culture may change as such ensuring creation of positive compliance culture is relevant for compliance behaviour.

A paper by Hofstede et al., (2010) on organisation culture indicated the relevance of culture on individual decision making and its importance when assessing behaviour of staff in the organisation. For instance, the "power-distance" indicator showed that in high power-distance organizations, it is generally assumed that subordinates wait for orders and task-allocation from leaders but in low power-distance organizations, this process tends to be more democratic where subordinates actively take part in decision for job allocation (Vanhée, and Dignum, 2018). The high power- distance organisations may therefore demonstrate high level of micro-managing whereas the low power-distance organisations may give freedom for staff to make decisions and act on them. This means that different organisations will approach things differently based on their cultural dimension and in this case compliance behaviour. Staff operating in these different cultural dimensions should be able to understand their requirements and act accordingly to achieve their goal.

Consequently, profound organizational problems occur if culturally inadequate allocation mechanisms are applied as organisational culture is seen in what they do and what they stand for. This may affect the practices of the staff within the organisation and understanding of the culture may enable compliance decisions to be made. This is supported by Pereira et al. (2015) who indicated that understanding the cultural context in which people live, the way they interact, and their behavioural patterns can offer more information than looking at pre-defined hypothesis. The understanding of the cultural context of the stakeholders is therefore important in assessing and improving compliance behaviour.

Subsequently, the culture within the organisation may lead to setting of clear value system to guide the stakeholders in their operations. According to Hofstede et al. (2010), the practices and values of the organisation are the culturally sensitive cognitive aspects which constitutes the "standard behaviours". These are the most visible side of culture on decision making as the symbols and rituals like the rules and ceremonies are all reflected by the culture. Stamper et al., (2000) also indicated that people's systems of values are largely determined by their culture or subculture and this goes to determine how they perform their function within the department. The values may indicate what an individual generally considers as being "good", in the form of the core and abstract drives like honesty, creativity, cleanliness, efficiency (Vanhée, and Dignum, 2018). The values may be something that a person or a group of people consider important in life (Friedman, 1996).

Consequently, the understanding of the culture and values that exist within the departments will help in understanding the compliance behaviour. In the analysis of the data from the CAM model in the previous chapter, the actions of staff were seen to be influenced by the pressure that exists within the department through the culture and values. Moreover, the activities of stakeholders in other departments of the organisation also influenced the output on the operating department (user consideration). This supports Fogg (2009b) in that staff will be motivated to exhibit the needed ability to be socially accepted and not to be a deviant. By providing a conducive environment where the culture and values promotes compliance to rules and regulations, the staff within the departments are more likely to perform compliance behaviour. Safety and Quality culture are therefore required to encourage staff for routine compliance behaviour to be achieved.

Norms

Having considered the culture and the community, the next aspect of the community influence as part of the CLUES framework is the influence of the norms on attitude and or behaviour. Stamper et al. (2000) proposed that the shared norms are what define a culture, or a subculture and as indicated in the containment model, this informs the culture and the community. These established norms within the organisation can influence the compliance behaviour of staff as they are shown to coerce people to act in a certain way because it is established based on beliefs that has been shaped over a period (Stamper and Liu, 2000).

In influencing the compliance attitude and or behaviour, norm analysis may be applied as it supports the study of an organization from the perspective of the behaviour of agents that are governed by norms. As the norms are understood as collective constructions of agents at the social level to provide guidance for their actions, it allows for actions to be agreed

and discharged. The QMS conveys the compliance intentions to the staff that operate within the departments and the organisation. The goal is to cause or alter changes in the social level within the departments and the organisation, mainly compliance behaviour. The ability of the QMS to produce social effect within the department and the organisation produces the deontic effect. This allows for the establishment of an obligation or the discharge of an obligation by the agents within the organisation. By setting these obligations and ensuring the agents discharge them, the attitude and or behaviour of the agents are influenced. The norm prescription (the QMS), can determine or define what staff must do, may do or must not do depending on the situation and requirements that exist within the department and the organisation (Liu, 2000). These obligations are linked to the interventions that are applied at the later sections to influence the attitude and or behaviour of the agents.

To ensure that the community influence on the QMS is positive for compliance, the framework propose that we commence with review of the structure or make up in the department. This allows for understanding of the diversity and direction of the department and to aid in evaluating the culture within the department. By establishing the culture, the framework suggests that opportunity is created to develop a culture that supports compliance. This is followed by checking the outcome of the compliance culture and its impact on the goal of the department. Further, to have a means of continuous improvement process that allows for routine improvements to be made.

5.4.5 Usefulness

The CLUES framework further indicates that for compliance behaviour to be improved, the usefulness of the QMS should be addressed. It proposes that the usefulness of the QMS should be clearly projected for the stakeholders. It starts with the review of requirements of the QMS with emphasis on its importance to achieve the mission of the department. This allows for the importance of the QMS to be shared with the staff to motivate them in routine use. Staff within the organisation are assigned job roles and clear job description to achieve their desired goals. Having reviewed the requirements, the usefulness is prioritised and added to critical processes. Systems and procedures are put in place that are useful for staff to achieve the set goals. The QMS being a system, should be seen to enhance the performance of staff to achieve their goals.

According to Davis (1989), the usefulness is the degree to which a person believes that using a system would enhance their job performance. Once the requirements have been added to the process, there should be means to check the output through the application of the QMS. Accordingly, staff are reinforced for good performance through praise,

promotions, and other rewards to motivate them. As such a system that is seen to be useful, will in turn give a positive use-performance relationship (Redfern, 2016). This is because, if the staff observe the QMS to improve their performance and lead to better appraisal from the leadership team, they are more likely to use the QMS as required, improving the compliance behaviour. In effect, staff in the organisation are more likely to compliantly use the QMS if they know that it will enhance their work performance. Consequently, the interventions that are derived from the CLUES framework based on usefulness will be to influence staff to perform the target behaviour.

5.4.6 Ease of use

The required application of the QMS depends on many factors as demonstrated in the assessment using the CAM model. The perception of staff of how easy to use the QMS or to perform the target behaviour is important when it comes to compliance behaviour. From the data analysis in the CAM model, it was evident that ease of use of the QMS was shown to affect compliant use of the QMS. Staff indicated their desire to follow the QMS if it is easy for them to do so. This is because they wanted the following of the QMS to be effortless and at times they felt this was not the case. This is line with Davis (1989) who indicated that the ease of use is the degree to which a person believes that using a particular system would be free from effort.

The "ease" as indicated is the "effortless" which is a finite resource that subjects may apply to complete their required responsibility (Davis, 1989). Essentially, an application perceived to be easy to use, may be more likely to be accepted by users. There has been indication of instances where human errors and violations may lead to failure to perform the required behaviour. It is therefore important that interventions are sought that aim to achieve the target behaviour by making it easy for the subject to perform the behaviour.

The framework proposes starting with consideration of failures with emphasis on human factors failures. This allows for clarification of the failures that may have been caused by staff working around the procedures in place due to perceived difficulties in application. Having established the failures, the framework proposes minimising and removing the duplications in the processes and simplifying them for easy application. The updated procedures are then to be shared with all the relevant stakeholders to allow for the improved procedures to be used.

5.5 Requirement Definitions for the Interventions

Following the design of the persuasive framework and the requirements to assess the impact of the change drivers, this section looks at the interventions that are derived from

the framework to effect the needed change of behaviour. To do this, we consider the requirements for development of interventions to improve compliance behaviour. We submit that the design principles for software design provides the interventions to achieve the required outcome; thus, propose extension of the design principles. The design principles propose four main categories. These four categorise namely: *Primary task support, dialogue support, system credibility and social support* are considered for the interventions. These software design principles allow for subjects to be persuaded using information system. Essentially, although this research does not focus on software design and the use of computers to drive the change, the design principles is applicable to this research as the aim is to persuade the user to change their behaviour. Subsequently, the application and extension of the design principles to the CLUES framework allows for interventions to be drawn that motivates and persuades the subjects to change their behaviour.

5.5.1 Primary task support

The *primary task support* is designed to support the subject in performing their primary task of the department or the section they operate in. This is mainly to support the routine processes in the department to achieve the set goals. As such, this support may apply principles of reduction in the complexity of the task which lessens the effort required by the subjects to perform their task. This support also provides means of tailoring the work to the potential needs and interests of the subject to enable them to easily perform the task.

Moreover, the primary support creates avenue that encourages the subject to rehearse the behaviour before putting it into practice. This builds the confidence of the subject and allows them to adjust their attitude and or behaviour ahead of performing the behaviour routinely. There is also creation of means for the subjects to self-monitor their output to help in assessing how they are performing and to make amends if required. According to Torning and Oinas-Kukkonen (2009), the most utilised of the design principles is the primary task support with tailoring, tunnelling, reduction and self-monitoring being the most used features. Essentially, the primary support ensures that the task to be performed by the subject is made simple for them to perform the target behaviour.

As the focus of the primary support is for the user to perform their routine task within the department, we suggest that this relates to the Stakeholder Behaviour in the CLUES framework. This is because as the stakeholders are the users with the primary task to perform the routine processes to achieve the set goals, they are more inclined to utilise the provisions of the primary support. Importantly, by reduction, tailoring, tunnelling, rehearsal, simulation and personalising the task for the stakeholders, the effort required to

achieve the target behaviour is lessened and made easier to perform the behaviour. Table 5-1 shows the Persuasion Intervention for Stakeholder Behaviour and the intervention applications to persuade subjects to perform the target behaviour.

Stakeholder Behaviour

Table 5-1 Persuasion Intervention for Stakeholder Behaviour

Design principles from PSD **Primary task**	**General Intervention Requirement**	**Intervention Requirement for Compliance Persuasion**	**Application of intervention for QMS use**
Reduction A system that reduces complex behaviour into simple tasks helps users perform the target behaviour, and it may increase the benefit/cost ratio of a behaviour.	The Potential Intervention should simplify the task to reduce effort required to perform the target behaviour by the stakeholders. **E.g. – provide regular simple task break down reminders for stakeholders.**	Intervention should simplify the rules, regulations or standards for easy understanding by stakeholders to make it easy for compliance behaviour. The intervention should have a list of simplified options that meets the needs of stakeholders and thereby makes it easy to choose, increasing the chances of compliance behaviour.	Information system that send breakdown of complex QMS task into smaller and simpler task to reduce the effort needed by the stakeholders to perform the compliance behaviour is more likely to persuade the stakeholder. **E.g. send weekly reminder to stakeholders to complete reasonable number (two) of quality incidents a week bearing in mind the target date of the incidents.**
Tailoring – intervention tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group	Potential Intervention should provide tailored information for its stakeholder groups to help in performing the required target behaviour. This should be stakeholder specific and as such understanding of the stakeholder's needs is very important.	Intervention should meet the needs, interest or personality of the stakeholders to make persuasion to perform the compliance behaviour easier. Intervention should consider the stakeholder needs to help in achieving the compliance behaviour. **E.g.: speed limit on motorway should consider the needs of the drivers by making the sign clear and easy to spot with enough time to process the data and act. Thus, makes it easier for**	Use of technology to share examples of how QMS related activities are tailored to the needs of the stakeholders. Share examples of how the QMS activities were performed by other users in the same job role within the department or other departments to encourage other stakeholders to improve their use of the QMS.

		stakeholders to perform the compliance behaviour	
Simulation – System that enables users to observe immediately the link between cause and effect.	Potential Intervention should provide means for stakeholders to observe and understand the impact of their behaviour. There should be regular and immediate sharing of feedback with the stakeholders to help them to understand the impact of their behaviours and make amends.	Intervention should show the impact and consequences on the stakeholder of failure to comply with rules, regulations or procedures to persuade the stakeholders to perform the compliance behaviour. **E.g. failure to comply with speed limit leading to accident (injury or death) or failure to comply with rules and regulations leading to financial penalty or custodian sentence will persuade stakeholders to perform the compliance behaviour.**	The information system shows the achievement and outcome of staff correct use of the QMS to other stakeholders to motivate and encourage them to also perform the target behaviour. **E.g. Show trends of how correct use of the QMS has improved patient/donor or product outcomes.**
Personalization A system that offers personalized content or services has a greater capability for persuasion.	Potential Intervention should offer personalized content and services for its stakeholders. The stakeholders should see the intervention as made for them so that they can own it and use as required.	Stakeholders will easily perform the compliance behaviour if the intervention is seen to be designed specifically for them. Intervention should be accessible, available, understandable and applicable to the desired compliance behaviour to persuade them to perform the behaviour. **E.g. intervention for changing eating habits should be clear and easily available to encourage stakeholders to perform the compliance behaviour.**	Information system personalises or tailors the QMS activities that are sent to stakeholders to encourage them to compliantly perform the behaviour. Content of the QMS activities to stakeholders will be designed to suit individual needs to enable acceptance and compliant performance to the QMS. Make it easy for stakeholders to personalise the QMS activities in the way that suit them without losing the focus and the need for the QMS to be standardised across the departments.
Tunnelling Using the system to guide users through a process or	Potential Intervention should guide users in the attitude change	The intervention should be able to guide or provide information that simplifies and	Share experiences and guide of how QMS activities enables stakeholders to perform

experience provides opportunities to persuade along the way.	process by providing means for action that brings them closer to the target behaviour. The intervention should be able to provide and create experiences that channels the stakeholders' actions into performing the target behaviour.	encourages stakeholders to perform the compliance behaviour. The intervention should be able to guide the stakeholder through the compliance behaviour process, making relevant guide available to make it easy to perform the compliance behaviour. **E.g. easy guide on how to report an incident on a client website will make it easy for stakeholders to comply.**	compliance behaviour to meet customer needs to persuade other stakeholders to also perform the compliance behaviour. **E.g. use trouble shooting information in Q pulse to guide staff on what and how to perform compliance behaviour.**
Self-monitoring A system that keeps track of one's own performance or status supports the user in achieving goals.	Potential Intervention should provide means for users to track their performance or status to encourage behaviour change. The intervention should make it easy for the stakeholder to assess their performance to act as personal feedback to support in attainment of set goals.	The intervention should allow stakeholders to monitor their performance while performing the compliance behaviour. Intervention that shows stakeholders their achievement over the use of the intervention will encourage them to comply. **E.g. Stop smoking website that allows stakeholders to monitor progress they have made in performing the compliance behaviour**	Have a system that share ways for stakeholders to keep track of and assess their performance on QMS activities. The system should allow stakeholders to track compliance behaviour by looking at before and after use of the QMS and how it enables them to consistently achieve the correct outcome.
Rehearsal A system providing means with which to rehearse a behavior can enable people to change their attitudes or behaviour in the real world.	Potential Intervention should provide means for stakeholders to rehearse a target behaviour before putting it into practice. The intervention should create an environment where the stakeholder can rehearse the target behaviour before performing the target	Intervention that provide means for stakeholders to rehearse the behaviour is likely to encourage stakeholders to perform the compliance behaviour. The intervention allowing the stakeholders to rehearse the compliance behaviour will build their confidence to continue	Implement a system that allows stakeholders to observe the compliance behaviour and shadow other stakeholders who are compliantly performing QMS compliance behaviour to see how the behaviour is performed. Also allow for the users to practice the compliance behaviour once they have watched

	behaviour with the aim to allow the stakeholder to master the behaviour in pilot phase before becoming a routine behaviour.	with the behaviour and also afford stakeholders the opportunity to make amends if they struggle with the behaviour during rehearsal before putting it into practice	it, before implementing in routine use.

5.5.2 Dialogue Support

The *dialogue support* helps in the support of the subject in moving towards the target behaviour. It enables and supports the interaction between the user and the system with the aim to move the user to their target behaviour. A way of doing this is by the system offering praise to the subjects in the form of words, images, and even sounds to motivate them to perform the target behaviour. The system also sets up rewards to give credit to users which encourages them to perform the needed behaviour. Moreover, reminders and suggestions are sent to users to help trigger the performance of the behaviour at the set time without failure. Other features like similarities and liking enables the users to perform the target behaviour due to familiarity and attractiveness of the system.

As the dialogue support incorporates features that supports the interaction between the subject and the system, we present this relates to the leadership approach in the framework. This is because the leadership team in the department and the organisation employs the subjects to work for them so provides the systems that supports the subjects to perform their task. The leadership or the management team in the departments and the organisation are required to 'dialogue' (Ensure that there is effective communication) and interact with the subjects to motivate them to achieve the set gaols of the department. The leadership team are required to set a system in place that creates the conducive environment that helps the subject to work towards the target behaviour.

Fundamentally, the leadership team is supposed to provide positive feedback on subjects' performance; either routine feedback sessions or adhoc sessions to encourage and motivate the subject to perform the target behaviour. The leadership teams set reminders to act as triggers for the subjects to check their task and ensure that they are always meeting the target requirement. These reminders may come in the form of KPI's and other trends that reminds the subject to perform the behaviour. In addition, they ensure that there is a system in place that praises and rewards performance of the subjects to keep them motivated and focused to persuade them to perform the target behaviour. Moreover, the leadership team ensures that there are suggestions in place of how best to perform the task, which make the behaviour very attractive and convenient for the subjects to want to perform the behaviour

at all times. Table 5-2 shows the Persuasion Intervention for Leadership Style and the conditions provided to persuade the subjects to perform the target behaviour.

Leadership Approach

Table 5-2 Persuasion Intervention for Leadership Approach

Design principles from PSD **Dialogue Support**	**General Intervention Requirement**	**Intervention Requirement for Compliance Persuasion**	**Application of intervention for QMS use**
Praise - By offering praise, a system can make users more open to persuasion.	Potential Intervention should use praise through words, images, symbols, or sounds to provide user feedback information based on their behaviours. The leadership teams should recognise compliant behaviour and praise the stakeholders to encourage them to continue with the good practice.	Intervention should have a system in place to praise the stakeholders on achieving their set goal to encourage and persuade them to perform the compliance behaviour. Praise from leadership team to stakeholders on compliantly completing a task will motivate them to want to continue to perform the compliance behaviour	Use of emails and other forms of technology to regularly send praise to the stakeholders about improvements made in QMS activities to persuade them to perform the compliance behaviour on regular basis.
Rewards - Systems that reward target behaviours may have greater persuasive powers.	Potential Intervention should provide virtual or other means of rewards for users in order to give credit for performing the target behaviour. The intervention should provide means to give incentives to encourage the user to perform the target behaviour.	Intervention should be able to reward stakeholders on performing the compliance behaviour to encourage them to continue performing the compliance behaviour. The intervention should make available virtual trophies or other forms of reward to encourage stakeholders to perform the compliance behaviour.	A system that allows regular reward of stakeholder by leadership team for achieving set QMS targets will motivate and persuade stakeholders to perform the compliance behaviour. This will be simple rewards in the form of tokens (pens, trophy) or recognition for performing QMS activities, but emphasis should be on encouraging users to achieve the target behaviour and not the size of the reward.
Reminders - If a system reminds	Potential Intervention should	Intervention should have a system for sending	Regular or daily reminders from the

users of their target behaviour, the users will more likely achieve their goals.	remind users of their target behaviour during the application of the intervention. The reminder should be specific to the task they are required to perform to ensure that there is no interference in performing the target behaviour.	regular reminders to stakeholders about the compliance behaviour to enable them to compliantly perform the behaviour. This should be linked to the strategic direction from the leadership team informing stakeholders about the requirement of the rules, regulations and standard in place and the need for stakeholders to always perform the compliance behaviour.	leadership team about the requirements of the QMS and its links with the strategic goals and values of the organisation will motivate the stakeholders to perform the compliant behaviour. The reminders will be tailored to the exact target behaviour that the stakeholders are required to perform to make it easy and reduce any interference to the performance of the target behaviour.
Suggestion - Systems offering fitting suggestions will have greater persuasive powers.	Potential Intervention should suggest that users carry out behaviours during the use of the intervention as this provides greater persuasive power. The intervention should give stakeholders the appropriate suggestions that will enable them to perform the target behaviour.	Intervention should suggest compliant options that are easy and useful for stakeholders to perform the compliance behaviour. The suggested intervention should give options and important reasons why the stakeholders should perform the compliant behaviour and consequences of failing to comply.	Suggestions from the leadership team about ways for stakeholders to compliantly use the QMS. These suggestions will be channelled through the QMS advocates or champions within the departments to encourage and persuade users to compliantly use the QMS.
Similarity - People are more readily persuaded through systems that remind them of themselves in some meaningful way.	Potential Intervention should imitate its users in a meaningful way that allows them to accept the intervention as part of them. As the intervention reminds the stakeholders of themselves, it persuades them to perform the needed target behaviour.	Intervention should remind the stakeholders of themselves and how the compliant behaviour will enable them to achieve a better outcome for themselves and others. The intervention should also specify the impact of failure to comply with the rules and regulations to motivate stakeholders to perform the compliance behaviour. **E.g. intervention about speed limits should**	Use of technology and other means of information system to make the QMS more user friendly and acceptable to the stakeholders by ensuring that user requirements are considered and routinely implemented to meet changing needs. The leadership team should ensure that the values of the organisation are shared and accepted

		remind the stakeholder about impact on them if they are to be on the receiving end of another driver not complying with the rules and regulations and knocking them with their car.	by stakeholders as their personal values, to persuade them to perform the compliant behaviour.
Liking - A system that is visually attractive for its users is likely to be more persuasive.	Potential Intervention should have a look and feel that appeals to its users to entice them to want to compliantly follow the required process. The intervention should be made visually appealing and attractive that stakeholders will be persuaded to use it.	Intervention should be attractive and likeable by the stakeholders to encourage them to perform the compliance behaviour. Intervention should make available positive trends and attractive aspects about the compliance behaviour to motivate stakeholders to perform the behaviour.	The QMS and its instructions will be made more attractive in terms of usability and ease of use by use of technology to encourage stakeholders to compliantly perform the compliance behaviour in line with the requirements of the QMS.
Social role - If a system adopts a social role, users will more likely use it for persuasive purposes.	Potential Intervention should adopt a social role that encourages stakeholders to use the intervention as required. As the potential intervention is seen as part of the stakeholder's social environment, it sends signals and communicates with them making the intervention more acceptable. This makes it more likely for the target behaviour to be performed.	Intervention should create an atmosphere that encourages stakeholders to appreciate what is required and to feel relax in performing the compliance behaviour. The intervention should create a platform that encourages, directs and supports stakeholders to easily perform the compliance behaviour. **E.g. Smoking intervention supports communication (may be virtual) between stakeholders who want to quit smoking, creating the social environment that persuades them to perform the compliance behaviour.**	The leadership team should promote QMS as part of the social environment/set up within the organisation. Again, this will be achieved by using the champions or advocates who will act as peer motivators with the departments to persuade stakeholders to compliantly use the QMS.

5.5.3 Social Support

The *Social Support* principles promotes design of a system that motivates users through the means of social influence. These principles include social facilitation, social comparison, normative influence, social learning, cooperation, competition and

recognition. The social support principle is the social surrounding of the subject which may have direct impact on how they are persuaded in performing the target behaviour. By means of observing others perform the target behaviour, this principle persuades the subject to want to perform the behaviour like the others they have seen.

Moreover, as the system allows the subject to compare their performance with others, they are motivated to perform to the level of the other users in the team or the department. Again, by creating the condition for the subjects to cooperate with other users performing the behaviour, the subject may be motivated to perform the target behaviour. Besides, subject's working with others and seeing them perform the behaviour, acts as means of encouragement and motivation to perform the behaviour. Also, the influence of the norms that exist within the department which acts as peer pressure or normative influence to perform the behaviour will persuade the subject in performing the behaviour.

This non withstanding, by providing a competitive environment that leverages the natural competitive drive of the subjects also help persuade them to perform the target behaviour. However, the competition should be set in a way to prevent any animosity or friction within the department as that can lead to disruption within the team. According to Dohnke et al. (2011), there is evidence that changes in social norms influence behaviour change. Their research indicated that in smoking related behaviours, the intention to change behaviour is based on significant others' quitting, significant others' attitude towards quitting and partners' smoking. Importantly, the behaviour change of the subject based on the social influence may be dependent on other factors in the social space which should be considered.

In the CLUES framework, the social support principle is seen to support the community influence. This is because the community creates a culture and norm system that acts as a driver in the social force that causes the subjects to act in a certain way. We propose that the community motives the subjects through the leverage of the social influence to perform the target behaviour. The community influence is the amalgamation of the social interaction that influences the subject to perform the target behaviour.

Table 5-3 shows the Persuasion Intervention for community influence and the social conditions provided to persuade the subjects to perform the target behaviour.

Community Influence

Table 5-3 Persuasion Intervention for Community Influence

Design principles from PSD **Social Support**	**General Intervention Requirement**	**Intervention Requirement for Compliance Persuasion**	**Application of intervention for QMS use**
Social learning - A person will be more motivated to perform a target behaviour if (s)he can use a system to observe others performing the behaviour.	Potential Intervention should provide means for stakeholders to observe other users while they are performing their target behaviours. The intervention should allow for the stakeholder to watch others performing the behaviour to motivate them to follow suit.	Intervention should make it possible for stakeholders to observe others who are performing the compliance behaviour to persuade them to also perform the behaviour. The intervention should create a community that allows stakeholders to watch or observe how others compliantly performed the behaviour to persuade stakeholders to also perform the compliance behaviour.	Provision should be made for stakeholders to observe or shadow other users who are compliantly performing QMS behaviour within their departments or in other departments to act as means of motivation for them to also compliantly use the QMS.
Social comparison - System users will have a greater motivation to perform the target behavior if they can compare their performance with the performance of others.	Potential Intervention should provide means for comparing performance with the performance of other users within the set up. This will encourage learning and sharing of ideas that leads to performance of the target behaviour.	Intervention should allow stakeholders to compare their performance with others in the same scenario or situation to act as an opportunity to persuade and motivate them to perform the compliance behaviour. Stakeholders watching people compliantly perform the behaviour they are required to perform will be persuaded to also perform the compliance behaviour.	System shares trends /data of QMS related activities across departments or the sections within the departments to encourage the underperforming departments to learn from the stakeholders that are compliantly performing the target behaviour. The system should allow for comparison of data between departments, especially departments on different sites of the organisation that perform the same service or produce the same products to allow for assessment of the target behaviour and to persuade stakeholders that are not compliantly

			following QMS to do so.
Normative influence - A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behaviour.	Potential Intervention should provide means for encouraging people who have the same goal to come together and feel valued and accepted in performing the target behaviour. The intervention should leverage some normative influence on the stakeholder to persuade them to perform the target behaviour.	Intervention should share the norms required by the stakeholders in the community (Department or organisation) to encourage them to perform the compliance behaviour. The Intervention should leverage normative influence by sharing the outcomes of failures and benefits to encourage stakeholders to perform the compliance behaviour. **E.g. share the financial consequences of organisations that failed to comply with requirements to encourage the stakeholders to perform the compliance behaviour in order to prevent facing the same ordeal.**	Encourage champions/advocates within the department to promote importance and benefits of the compliant use and failure to comply to the QMS to promote behaviour change. Encourage likeminded stakeholders who compliantly use the QMS to work together to encourage others who previously did not follow to join them.
Social facilitation - System users are more likely to perform target behaviour if they discern via the system that others are performing the behaviour along with them.	Potential Intervention should provide means for discerning other users who are performing the behaviour. The interventions should explain and share with stakeholders the other users who are performing the target behaviour to encourage users to perform the behaviour; knowing that they are not the only people performing the target behaviour.	Intervention should allow stakeholders to be able to see other users performing the same compliance behaviour to persuade them to also perform the compliance behaviour. **E.g. If drivers see other drivers compliantly following the speed limit, they will also be persuaded to follow the speed limit.**	Share useful outcomes of the use of the QMS with other users to encourage them to use the QMS like the other stakeholders. This can be done in the form of regular updates by emails or monthly newsletters or team talk meetings, which shares how compliant use of QMS has led to meeting deadlines and saving patient/ donor requirements.
Cooperation - A system can motivate users to adopt a target attitude or behaviour by	Potential Intervention should provide means for co-operation between stakeholders to	Intervention should allow stakeholders to cooperate with other stakeholders on a platform that encourages sharing of ideas on how to perform	Promote information system platform for stakeholders to share ideas and outcomes of QMS activities to encourage them to

leveraging human beings' natural drive to co-operate.	motivate them to perform the target behaviour. The intervention should promote a social platform that allows stakeholders to cooperate and share ideas with each other to encourage them to perform target behaviour.	the compliance behaviour to motivate them to perform the compliance behaviour. The intervention should create the opportunity for stakeholders to cooperate with one another by comparing their behaviour against that of the whole group acting as the standard to persuade them to perform the compliance behaviour. **E.g. drivers in speed awareness course share ideas on things to do to encourage each other to comply with the speed limit going forward.**	perform the compliance behaviour. Create a hub where comparison can be made of individual QMS compliance behaviour against that of the group.
Competition A system can motivate users to adopt a target attitude or behaviour by leveraging human beings' natural drive to compete.	Potential Intervention should provide means for stakeholders to compete with other users to encourage the target behaviour to be attained. The intervention should know the stakeholders, the level of where they operate and understand their competitive drive before applying the intervention to ensure that the stakeholders are willing to partake.	Intervention should encourage stakeholders to perform compliance behaviour to win something to motivate stakeholders to perform the compliance behaviour. The intervention should also provide avenues for stakeholders to compete for a prize by performing the compliance behaviour, to persuade them to perform the behaviour. **E.g. intervention that promotes that stakeholders will win a prize for submitting their tax returns on time will motivate them to perform the compliance behaviour.**	The departmental achievement of use of the QMS will be ranked to promote some competition between departments. A friendly approach to the competition will be made clear to all stakeholders to prevent any disruption to the ultimate goal of 'saving patients live'. This will be done as a league table showing regular standing of the departments.
Recognition By offering public recognition for an individual or group, a system can increase the likelihood that a person/group will adopt a target behavior.	Potential Intervention should provide public recognition for users who perform their target behaviour to encourage them to continue performing the behaviour and to also encourage	Intervention should publicly share the achievement of other organisations or stakeholders who have performed the compliance behaviour to encourage others to perform the compliance behaviour.	Use of information system to recognise stakeholders that perform QMS compliance behaviour to encourage others to follow suit. This will be done in the form of sharing outcomes of compliant behaviour on the

	other stakeholders to follow.		intranet or team talk to encourage others.

5.5.4 System Credibility Support

System Credibility Support describes how a system is designed that is more credible and thus more persuasive. The system credibility includes trustworthiness, expertise, surface credibility, real- world feel, authority, third-party endorsement and verifiability. The credibility of the system is shown to influence the application of the target behaviour by the user. According to Lehto and Oinas-Kukkonen (2013), the credibility support is indirectly crucial for effectiveness as its influence mainly relates to the continuance use than to behaviour. As such, the credibility support of the system is crucial for the user to accept and continue to use as required. According to Torning and Oinas-Kukkonen (2009), surface credibility is one of the most utilised features due to the initial assessment that is performed by users before using the system.

As the use of the system relies heavily on acceptance of it and the conscious effort to then use as required, we suggest that it is important to gain the trust of the user by ensuring that the system is credible. As such, by ensuring that the system provide information that is truthful, fair and unbiased, the users considers the system as trustworthy and may be more persuaded to use the system. Moreover, as the users rely on the system to perform the required processes and task, the assurance that the system provides expert information is more incline to persuade the subjects. Subsequently, the system should provide up to date information that is geared towards meeting the needs of the subject. Besides, by providing the people and the experts behind the system (real-world feel) also provides necessary incentive and the credibility of the information the subject is receiving, and this is more likely to persuade the subject to perform the target behaviour.

Despite knowing the experts behind the system, endorsement from well-known and respected sources will also inspire credibility of the system. This is because, although the user may trust the information from the experts behind the system, by knowing that other experts not linked to the system also see the system to be credible will motivate and encourage use of the system. Furthermore, the system should have backing of authoritative endorsement like government regulations to leverage and enhance the system credibility. Moreover, by ensuring that the accuracy and content of the information can be verifiable as truthful and authentic, there is more chance for the user to be persuaded to perform the target behaviour.

In the CLUES framework, we acknowledge that for the subjects to use the system as required, they must consider the system as useful and able to meet their needs. As such, the usefulness of the system is seen to align with the system credibility support. This is because, for the users, the credibility or the usefulness of the system to meet their needs should be established before they will be persuaded to use the system. Importantly, if they envisage the system as not useful to what they aim to achieve, then they are more incline not to use it. Alternatively, if they see the system to be useful to achieving their need; having considered the content of the information, the authority behind the information, the endorsement from third party and verifiability of the information, then they will be more inclined to use it as required. Table 5-4 shows the Persuasion Intervention for usefulness of the QMS and the credibility provided to persuade the subjects to perform the target behaviour.

Usefulness

Table 5-4 Persuasion Intervention for Usefulness

Design principles from PSD **Design credibility Support**	**General Intervention Requirement**	**Intervention Requirement for Compliance Persuasion**	**Application of intervention for QMS use**
Trustworthiness A system that is viewed as trustworthy will have increased powers of persuasion.	Potential Intervention should provide information that is truthful, fair and unbiased that stakeholders can accept. The intervention should be useful and trustworthy for stakeholders to want to use it and share with other stakeholders.	Intervention should address the concerns that stakeholders may have with the compliance behaviour to persuade them to perform the behaviour. Intervention should provide truthful and unbiased information about the compliance behaviour that stakeholders will see as trustworthy to persuade stakeholders to perform the behaviour. **E.g. If stakeholders know that the intervention about weight loss is trustworthy and unbiased, they will be persuaded to perform the compliance behaviour.**	Use of information system to dispel perceived concerns about the QMS to build the trust of users by formulating simple to use approaches and guide for users. Share information about the consistent achievement of providing safe and quality product and services by compliantly following the QMS. This is achieved by sharing stories from patients and donors who benefit from the outcome of the compliant behaviour. Also share testimonies from the stakeholders that perform the

			compliant behaviour on how they use the QMS to achieve their goal.
Expertise A system that is viewed as incorporating expertise will have increased powers of persuasion.	Potential Intervention should provide information showing knowledge, experience, and competence that stakeholders will like to use. By knowing that the intervention has these attributes, stakeholders will be persuaded to use as required.	Intervention should provide the expertise that the stakeholders need to perform the compliance behaviour. The intervention should be current and up to date to provide the needed support for stakeholders to perform the compliance behaviour. **E.g. Financial website that requires stakeholders to submit returns, should have the information that stakeholders require to complete the compliance behaviour.**	By use of information systems, the QMS should provide expertise information for stakeholders to compliantly follow the QMS routinely. The information about QMS should be up to date and should be able to explain 'why' the QMS should be followed and also 'how' it should be used.
Surface credibility People make initial assessments of the system credibility based on a first-hand inspection.	Potential Intervention should have competent look and feel that stakeholders will have confidence to apply the intervention. The intervention should be able to convince stakeholders, just at a glance that it will do what it states it will do to raise confidence of stakeholders and persuade them to perform the target behaviour.	Intervention should be appealing to stakeholders at the first glance to motivate them to perform the compliance behaviour. The intervention should be credible and reliable at the initial assessment of the stakeholders to encourage them to perform the compliance behaviour. Intervention should stick to the claims that are made about the outcome of the use of the intervention and not be changing stance all the time, so that stakeholders will see the claims to be credible.	Provide a package that give assurance of the practical view of the QMS and the management tools to the stakeholders. Ensure that the QMS tools are attractive, appealing and provides credible look to the stakeholders. Provide means of ensuring that the stakeholders always have confidence in the QMS so that they can perform the compliance behaviour.
Real-world feel A system that highlights people or organization behind its content or services will have more credibility.	Potential Intervention should provide information of the organization and/or actual people behind its content and services so that stakeholders can interact with them when required. It is useful for	Intervention should have a means for stakeholders to correspond or communicate with the people providing the intervention. Knowing that there is support for when is needed will persuade the stakeholders to perform the compliance behaviour.	Through use of technology and other information system, promote and provide assurance to stakeholders that there is support for use of the QMS and the expert support behind the QMS

	stakeholders to understand that there are credible people behind the intervention so that stakeholders can relate with them.	The intervention that allows the stakeholders to know the organisation or the people behind the content and who to contact when struggling with the compliance behaviour will motivate stakeholders to perform the behaviour.	Encourage stakeholders to interact with the advocates and the experts of the QMS to enable them to ask questions and observe the good practice, thereby encouraging them to perform the compliance behaviour.
Authority A system that leverages roles of authority will have enhanced powers of persuasion.	Potential Intervention that refer to people or regulations that leverage role of authority are more likely to make Stakeholders take note and perform the target behaviour. **E.g. intervention that is backed with rules and regulations may have enhanced powers of persuasion.**	Intervention should be seen to exert some authority for stakeholders to be encouraged to perform the compliance behaviour. Intervention should support claim with the rules and regulations and stipulate the consequences of failure to perform the compliance behaviour. **E.g. speed camera government rules reminding drivers of the penalty for breaking the speed limit persuades drivers to perform the compliance behaviour.**	Stakeholders will be made aware of the regulatory requirements of the QMS by the Government Agencies like Medicines and Healthcare Products Agency (MHRA) and the Human Tissue Authority (HTA) and ensure that regular reminders are shared with stakeholders to persuade them to compliantly use the QMS.
Third-party endorsements Third-party endorsements, especially from well-known and respected sources, boost perceptions on system credibility.	Potential Intervention should provide endorsements from respected sources that boost the credibility of the intervention. Stakeholders are more likely to use the intervention if there is information about credible sources or users that supports the intervention.	Intervention should encourage stakeholders to perform the compliance behaviour by sharing the endorsement of other stakeholders (Organisations and businesses) that have benefitted from performing the compliance behaviour. Intervention should remind and share with stakeholders, the achievements of other stakeholders who performed the compliance behaviour to motivate them to also perform the compliance behaviour.	Share positive outcomes and feedback of users of the QMS with other stakeholders to encourage them to use the QMS compliantly. The positive outcome will be shared from departments that have used the QMS to attain the needed outcome that is obvious for all stakeholders to see. May also share information from credible organisations that have compliantly used the QMS to

			achieve target behaviour.
Verifiability - Credibility perceptions will be enhanced if a system makes it easy to verify the accuracy of site content via outside sources.	Potential Intervention should provide means for stakeholders to verify the accuracy of the content of the intervention via outside sources that are linked to the provider of the intervention. This enhances credibility of the intervention as stakeholders can verify the content of the intervention from other sources.	Intervention should make it possible and easy for stakeholders to verify the accuracy of the claims to perform the compliance behaviour. **E.g. Intervention claims about how to quit smoking should have means for stakeholders to verify the claims to persuade them to perform the compliance behaviour.**	Make possible avenues or ways for stakeholders to be able to check the credibility of the things they are required to do by the QMS. This will enhance the credibility perception of the stakeholders having verified the accuracy of the things they are required by the QMS.

5.5.5 Ease of use – Primary task, social support, dialogue support and design credibility

The CLUES Framework considers the ease of use as the last change driver in persuading the subject to perform the target behaviour. From the design principles discussed, it is acknowledged that, the ease of use of the system may have features across all the four support systems. This is because by ensuring that all the four features are in place, the user have easy means to meet their primary needs, they have easy system in place that is credible and there is a conducive environment created for them to perform the target behaviour. For this research the following were considered as necessary feature for the ease of use: reduction, tailoring, personalisation, tunnelling, praise, reminders, trustworthiness, Surface credibility, social learning and normative influence.

In considering the primary task support under ease of use, we submit that as the system breaks the complex process into simple tasks, it makes it easy for the subjects to perform the target behaviour. By reducing the complexity of the process or the task to be performed, it lessens the data available to the user to comprehend and interperate, thereby making it easy for them to perform the task. The provision of easily executable goals makes the subject more amenable and easily persuaded to perform the behaviour.

Moreover, by personalising and tailoring the task or the process to the users makes it more appropriate and easier to perform. According to Oinas- Kukkonen and Harjumaa (2009), personalisation adjusts the contents to the individual use and tailoring adjust the content to different user groups. They concluded that personalisation is significant for behaviour change. Essentially, by considering and adjusting the content of the process to the

individual whilst also considering the wider user group through tailoring, the process is made simple and easy for all the stakeholders to perform the target behaviour.

Furthermore, by means of ensuring that there is provision for the system to guide the user through the process makes it easy for the user to perform the behaviour. through the tunnelling process, users are brought closer to the target behaviour and as such makes it easy for them to assess it and make informed decision. Basically, these primary task support makes the behaviour easy to perform as it breaks it down, tailor it to the user and guide them through it.

With the dialogue support, although most of the features may be applicable, we consider praise and reminders for the ease of use change driver. As the feature improves the dialogue between the user and the system, it is more likely to make it easy for the user to perform the target behaviour. As most of the subjects in the department are motivated and with the ability to perform the task, reminders at the appropriate times makes it easy to perform the task and on time. Again, as the support provides praise and deliver positive feedback, the user is more inclined to perform the target behaviour as it becomes easy for them.

According to Kelders et al. (2012), the dialogue support aids better adherence to the process which have been the major setback in many interventions. Importantly, as the dialogue support encourages better adherence to the process, the user performs the process more frequently which increases familiarity to the process and makes it easy to perform the behaviour.

The system credibility support in aiding ease of use as a change driver in the CLUES framework considers how the trust and belief in the system motivates and encourages users to perform the target behaviour. for the ease of use, we acknowledge the surface credulity and the trustworthiness although the other features may also inspire the user to perform the target behaviour.

According to Harjumaa et al. (2009), surface credibility leverages definite style as it relates to the appearance of the of the system. They indicated that surface credibility is important in the early interaction with the system as the acceptance of the appearance may lead to belief that the system is quality and credible even before they use the system. As such, the surface credibility makes it easy for the user to accept the system and use as required. Moreover, the trustworthiness of the system also makes it easy for the user to perform the target behaviour.

Lastly, the use of social support in ease of use is considered. Here, we acknowledge that the social interactions that exist within the department makes it easy for subjects to perform the target behaviour. As the user observe others within the department perform the behaviour, it influences them to also perform the target behaviour.

Although all the features may support the ease of use, we consider the social learning and normative influence. This is because we consider these as creating the peer pressure and the force to leverage the user to perform the behaviour. Essentially, the social support creates the condition for the user to perform the target behaviour by observing others perform the behaviour. Table 5-5 shows the Persuasive Intervention for ease of use of the QMS and the credibility provided to persuade the subjects to perform the target behaviour.

Ease of use

Table 5-5 Persuasion Intervention for Ease of use

Design principles from PSD- Strategy ***Primary Task, Design credibility Support, Social Support and Dialogue Support.***	***General Intervention Requirement***	***Intervention Requirement for Compliance Persuasion***	***Application of intervention for QMS use***
Reduction A system that reduces complex behavior into simple tasks helps users perform the target behavior, and it may increase the benefit/cost ratio of a behavior.	The Potential Intervention should simplify the task to reduce effort required to perform the target behaviour by the stakeholders. **E.g. – provide regular simple task break down reminders for stakeholders. Make it simple and easy to perform the behaviour**	Intervention should simplify the rules, regulations or standards for easy understanding by stakeholders to make it easy for compliance behaviour. The intervention should have a list of simplified options that meets the needs of stakeholders and thereby makes it easy to choose, increasing the chances of compliance behaviour.	Information system that send breakdown of complex QMS task into smaller and simpler task to reduce the effort needed by the stakeholders to perform the compliance behaviour. **E.g. send weekly reminder to stakeholders to complete reasonable number (two) quality incidents a week bearing in mind the target date of the incidents. Make the completion of the task very easy to perform**

Tailoring – intervention tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group	Potential Intervention should provide tailored information for its stakeholder groups to help in performing the required target behaviour. This should be stakeholder specific and as such understanding of the stakeholder's needs is very important.	Intervention should meet the needs, interest or personality of the stakeholders to make persuasion to perform the compliance behaviour easier. Intervention should consider the stakeholder needs to help in achieving the compliance behaviour. **E.g. speed limit on motorway should consider the needs of the drivers by making the sign clear and easy to spot with enough time to process and act. Thus, makes it easier for stakeholders to perform the compliance behaviour**	Use technology to share examples of how QMS related activities are tailored to the needs of the stakeholders by using examples of how the QMS activities were performed by other users in the same job role to encourage others to improve their use of the QMS.
Personalization A system that offers personalized content or services has a greater capability for persuasion.	Potential Intervention should offer personalized content and services for its stakeholders. The stakeholders should see the intervention as made for them so that they can own it and use as required.	Stakeholders will easily perform the compliance behaviour if the intervention is seen to be designed specifically for them. Intervention should be accessible, available, understandable and applicable to the desired compliance behaviour to persuade them to perform the behaviour. **E.g. intervention for changing eating habits should be clear and easily available to encourage stakeholders to perform the compliance behaviour.**	Information system personalises or tailors the QMS activities that are sent to stakeholders to encourage them to compliantly perform the behaviour. Content of the QMS activities to stakeholders will be designed to suit individual needs to enable acceptance and compliant performance to the QMS. Make it easy for stakeholders to personalise the QMS activities in the way that suit them without losing the focus and the need for the QMS to be standardised across the departments.

Tunnelling Using the system to guide users through a process or experience provides opportunities to persuade along the way.	Potential Intervention should guide users in the attitude change process by providing means for action that brings them closer to the target behaviour. The intervention should be able to provide and create experiences that channels the stakeholders' actions into performing the target behaviour.	The intervention should be able to guide or provide information that simplifies and encourages stakeholders to perform the compliance behaviour. The intervention should be able to guide the stakeholder through the compliance behaviour process, making relevant guide available to make it easy to perform the compliance behaviour. **E.g. easy guide on how to report an incident on a client website will make it easy for stakeholders to comply.**	Share experiences and guide of how QMS activities enables stakeholders to perform compliance behaviour to meet customer needs to persuade other stakeholders to also perform the compliance behaviour. **E.g. use trouble shooting information in Q pulse to guide staff on what and how to perform compliance behaviour.**
Trustworthiness A system that is viewed as trustworthy will have increased powers of persuasion.	Potential Intervention should provide information that is truthful, fair and unbiased that stakeholders can accept. The intervention should be useful and trustworthy for stakeholders to want to use it and share with other stakeholders.	Intervention should address the concerns that stakeholders may have with the compliance behaviour to persuade them to perform the behaviour. Intervention should provide truthful and unbiased information about the compliance behaviour that stakeholders will see as trustworthy to persuade stakeholders to perform the behaviour. **E.g. If stakeholders know that the intervention about weight loss is trustworthy and unbiased, they will be persuaded to perform the compliance behaviour.**	Use of information system to dispel perceived concerns about the QMS and build the trust of users by formulating simple to use approaches and guide for users. Share information about the consistent achievement of providing safe and quality product and services by compliantly following the QMS. This is achieved by sharing stories from patients and donors who benefit from the outcome of the compliant behaviour. Also share testimonies from the stakeholders that perform the compliant behaviour on how they are able to do that.
Social learning - A person will be more motivated to perform a target behaviour if (s)he	Potential Intervention should provide means for stakeholders to observe other users	Intervention should make it possible for stakeholders to observe others who are performing the	Provision will be made for stakeholders to observe or shadow other users who are

can use a system to observe others performing the behaviour.	while they are performing their target behaviours. The intervention should allow for the stakeholder to watch others performing the behaviour to motivate them to follow suit.	compliance behaviour to persuade them to also perform the behaviour. The intervention should create a community that allows stakeholders to watch or observe how others compliantly performed the behaviour to persuade stakeholders to also perform the compliance behaviour.	compliantly performing QMS behaviour within their departments or in other departments to act as means of motivation for them to also compliantly use the QMS.
Normative influence - A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behaviour.	Potential Intervention should provide means for encouraging people who have the same goal to come together and feel valued and accepted in performing the target behaviour. The intervention should leverage some normative influence on the stakeholder to persuade them to perform the target behaviour.	Intervention should share the norms required by the stakeholders in the community (Department or organisation) to encourage them to perform the compliance behaviour. The Intervention should leverage normative influence by sharing the outcomes of failures and benefits to encourage stakeholders to perform the compliance behaviour. **E.g. share the financial consequences of organisations that failed to comply with requirements to encourage the stakeholders to perform the compliance behaviour in order to prevent facing the same ordeal.**	Encourage champions/advocates within the department to promote importance and benefits of the compliant use and failure to comply to the QMS to promote behaviour change. Encourage likeminded stakeholders who compliantly use the QMS to work together to encourage others who previously did not follow to join them.
Surface credibility People make initial assessments of the system credibility based on a first-hand inspection.	Potential Intervention should have competent look and feel that stakeholders will have confidence to apply the intervention. The intervention should be able to convince stakeholders, just at a glance that it will do what it states it will do to raise confidence of stakeholders and persuade them to	Intervention should be appealing to stakeholders at the first glance to motivate them to perform the compliance behaviour. The intervention should be credible and reliable at the initial assessment of the stakeholders to encourage them to perform the compliance behaviour. Intervention should stick to the claims that are made about the outcome of the use of the intervention and not be	Provide a package that give assurance of the practical view of the QMS and the management tools to the stakeholders. Ensure that the QMS tools are attractive, appealing and provides credible look to the stakeholders. Provide means of ensuring that the stakeholders always have confidence in the QMS so that they can perform the

	perform the target behaviour.	changing stance all the time, so that stakeholders will see the claims to be credible.	compliance behaviour.
Praise - By offering praise, a system can make users more open to persuasion.	Potential Intervention should use praise through words, images, symbols, or sounds to provide user feedback information based on their behaviours. The leadership teams should recognise compliant behaviour and praise the stakeholders to encourage them to continue with the good practice.	Intervention should have a system in place to praise the stakeholders on achieving their set goal to encourage and persuade them to perform the compliance behaviour. Praise from leadership team to stakeholders on compliantly completing a task will motivate them to want to continue to perform the compliance behaviour	Use of emails and other forms of technology to regularly send praise to the stakeholders about improvements made in QMS activities to persuade them to perform the compliance behaviour on regular basis.
Reminders - If a system reminds users of their target behaviour, the users will more likely achieve their goals.	Potential Intervention should remind users of their target behaviour during the application of the intervention. The reminder should be specific to the task they are required to perform to ensure that there is no interference in performing the target behaviour.	Intervention should have a system for sending regular reminders to stakeholders about the compliance behaviour to enable them to compliantly perform the behaviour. This should be linked to the strategic direction from the leadership team informing stakeholders about the requirement of the rules, regulations and standard in place and the need for stakeholders to always perform the compliance behaviour.	Regular or daily reminders from the leadership team about the requirements of the QMS and its links with the strategic goals and values of the organisation will motivate the stakeholders to perform the compliant behaviour. The reminders will be tailored to the exact target behaviour that the stakeholders are required to perform to make it easy and reduce any interference to the performance of the target behaviour.

5.6 Chapter Summary

The chapter started with the review of the needs identified from the initial assessment of non-compliance using the CAM model. This led to the development of CLUES framework, by use of the PSD model (Oinas-Kukkonen and Harjumaa, 2009). Each of the change drivers in the framework enabled the derivation of interventions from the design principles of PSD. The development of the interventions from the PSD created the means to apply

interventions without using software as in the case of the PSD model. As PSD model focuses on both attitude and behaviour, CLUES is particularly useful in improving compliance behaviour. The CLUES Framework provides a generic approach for improvement of compliance where interventions are generated from the change drivers. The analysis of the interventions from the change drivers of the CLUES framework showed how it may be used to improve compliance behaviour across different organisations due to the generic interventions. This research also provides improvement on PSD as the CLUES framework and generic interventions may provide generic application.

This chapter addressed objective six of the research and provides means for the next chapter to consider implementation and evaluation of the interventions.

Chapter 6
Implementation and Evaluation of Interventions

6.1 Overview

One of the requirements of design science research is to ensure that the developed artefact is appropriate and valid for the intended purpose. Thus, there is the need to demonstrate how interventions from CLUES can be applied to persuade the subjects to change their behaviour. As such, this chapter considers the implementation of the interventions derived from the CLUES framework. It starts by considering an approach to implement and evaluate the interventions. The chapter further considered the selection of department to be used as pilot and the means of selection of the interventions to be applied in the pilot studies. The rationale for the selection of the intervention and the how it is applied to the pilot group was also reviewed. The chapter then reviews the evaluation of the interventions that were applied.

6.2 Implementation of the Interventions

The implementation of interventions was achieved through application within the Blood Centre of the NHS. A department was chosen in the organisation where five of the interventions were applied over a period of three months. The interventions were selected randomly for each of the change drivers in the CLUES model. To do this, all the interventions were numbered (1 to 38 from interventions in section 5.1 to 5.5) and the set of numbers for each change driver (design principle) were placed in separate bags. One of the numbers were randomly selected from each bag to be applied for each design principle. The interventions were applied by initial meeting with the participants to explain the interventions and subsequent email reminders every two weeks during the three months period.

See table 6 -1 for the interventions that were randomly selected for application.

Table 6-1 selected intervention for implementation

Design Principle	**Application of the intervention to the QMS**
Community **Influence**	System shares trends /data of QMS related activities across departments or sections within the department to encourage the underperforming departments or sections to learn from the stakeholders that are compliantly performing the target behaviour. The system should allow for comparison of data between departments, especially departments on different sites of the organisation that perform the same service or produce the same products to allow for assessment of

	the target behaviour and to persuade stakeholders that are not compliantly following QMS to do so.
Leadership **Approach**	A system that allows regular reward of stakeholder by leadership team for achieving set QMS targets will motivate and persuade stakeholders to perform the compliance behaviour. This will be simple rewards in the form of tokens or recognition for performing QMS activities, but emphasis should be on encouraging users to achieve the target behaviour and not the size of the reward. Just as the productivity and other HR related information are displayed, the same should be put in place for QMS activities for the various sections.
Usefulness	Use of information system to dispel perceived concerns about the QMS and to build the trust of users by formulating simple to use approaches and guide for users. Share information about the consistent achievement of providing safe and quality product and services by compliantly following the QMS. This is achieved by sharing stories from patients and donors who benefit from the outcome of the compliant behaviour. Also share testimonies from the stakeholders that perform the compliant behaviour on how they are able to perform the behaviour routinely and how this enables the department to provide the required services and products for patients.
Ease of Use	Information system personalises or tailors the QMS activities that are sent to stakeholders to encourage them to compliantly perform the behaviour. Content of the QMS activities to stakeholders will be designed to suit individual needs to enable acceptance and compliant performance to the QMS. Make it easy for stakeholders to personalise the QMS activities in the way that suit them without losing the focus and the need for the QMS to be standardised across the departments. Processes and procedures should be written in simple words with diagrams where possible to make it easy for staff to understand and apply on routine basis. Q pulse activities directly linked email accounts to remind staff and make it easy to perform compliance behaviour.
Stakeholder **Behaviour**	Implement a system that allows stakeholders to observe the compliance behaviour and also shadow other stakeholders who are compliantly performing QMS compliance behaviour to see how the behaviour is performed. Also allow for the users to practice the compliance behaviour once they have watched it, before implementing in routine use. This can be done by understanding the QMS activities in the sections and getting staff to work with the achieving sections to understand how they do it.

The five interventions were selected for application due to the practicability and timescale for the research. This is because, considering the time frame for the research, it was noted that it will be practically impossible to apply all the interventions and analyse over the period. Moreover, this was to act as a pilot test so there was no merit in applying all the interventions. It is considered that by applying one intervention from each design principle, data can be gathered that helps in and analysis and drawing appropriate conclusion.

Besides the time constraints in applying all the interventions, it is considered that the department have other routine processes that needs performing. By applying all the interventions, it will be difficult to fully ascertain the impact of the interventions on the pilot team as there is possibility for the existing workload in the department to impact on the data that is collected. These factors were the considerations for not applying all the interventions during the evaluation stage of the research.

Furthermore, the three months period was selected to meet the quarterly report that is produced within the department for senior management review. It is considered that, by applying the interventions for the three months, comparison may be made with the senior management report.

Moreover, the department was selected based on the make of staff that reflects the set up within the organisation. The department is big enough and has staff spanning all the grades. This was therefore useful as data from the pilot studies may be easily applicable across the other departments.

6.2.1 Data collection from the application of the interventions

With the questions considered (Appendix 6.2), the participants within the pilot group that were to be interviewed were informed of the completion of the three months. There were seven participants in the department where the interventions were applied, and these participants were selected due to their interaction with the QMS on routine basis. Meetings were scheduled with the participants to allow for interviews to be conducted for one to one half hours for each session. Table 6 -2 shows the participants that were used in the evaluation of the interventions.

Table 6-2 Participants in application of interventions

Participant ID	Department	Position	Experience with QMS
1	Testing Department	Team manager	Between 10 -15 years
2	Testing Department	Team manager	Between 3- 5years
3	Testing Department	Team manager	Between 5-10 Years
4	Testing Department	Team manager	Over 20 years

Although all the seven participants within the pilot department accepted the invitation for the interviews, three of the participants failed to attend the meeting at the scheduled date and time and further reminders yielded no outcome. Four of the participants (participants 1-4) attended the interviews and the meeting data from the interviews are captured in (Appendix 6.3)

6.3 Evaluation of Behaviour Change

Having applied the interventions for the period of three months, interview questions were generated to aid in the data collection (Appendix 6.3). Interviews were arranged with the participants from the pilot department and interviews were conducted using the formulated questions. According to Vaishnavi & Kuechler (2004), for changes (and hopefully improvements) in the behaviour of systems, people, and organisations, designed artefacts must be analysed for performance and possible explanations of what is observed.

The data analysis process allows analysis and review of data with the goal of discovering useful information to support decision-making and draw appropriate conclusion. Hevner et al, (2004) indicated that evaluation is ‘crucial’ to design science research and requires researchers to rigorously demonstrate the utility, quality, and efficacy of a design artefact using well-executed evaluation methods. As such, this section considers the outcome of the interventions on the participants. It reviews the initial attitude and or behaviour of the participants prior to the application of the interventions. It further looks at the impact on the participants after the application of the interventions and draws some analysis and trends from the outcome of the application of the interventions on the attitude and or behaviour of the stakeholders.

6.3.1 Initial Attitude and Behaviour

As the subjects perform their role within the department, there is current attitude and behaviour that is displayed routinely. From the data gathered, the attitude and or behaviour of the staff have been shown to vary depending on personal beliefs and the prevailing conditions within the community. As the participants perform the behaviour on routine basis, some of them indicated that it was difficult to separate the QMS activities from the behaviour they perform routinely.,

The requirements of the QMS is fused with the daily activities of the subjects and as such difficult to separate the behaviour of staff from the QMS requirements.

"It is difficult to explain as the QMS is meshed in the routine processes in the lab and seem like it is embedded in everything we do. It is inherent in what we do and seem part of all the things so difficult to really state my initial attitude to the QMS" (participant 1).

Accordingly, although they have been trained and made aware of the QMS requirements within the department, they either perform the process without even knowing that is the requirement of the QMS.

It was evident that there is inconsistency in the understanding and awareness of the QMS between staff as some indicated that their initial training was deficient.

"*Initially my QMS use was not effective due to my training and understanding of the QMS. I think my job role didn't allow me to use it as required but with time I got the hang of it" (participant 2).*

This was shared by other participants who also indicated that their training records indicated that they did not receive the relevant training when they started work

"I think the reason is that my initial work did not require me to do much with the QMS activities as is seen more like something for the managers. I also think the training received was too generic and did not relate much to what I was doing in the lab" (participant 3).

It is evident that, the initial training and awareness for the staff within the department may not be effective which affected the way they interacted with the QMS. Also, the data indicated that the candidates were aware of the QMS and its requirement but because of the varying level of training and understanding of its importance, compliance level was not always achieved.

"Before the intervention, I think my attitude has been between compliant and non-compliant" (participant 3).

Although three participants indicated that they have some awareness of the QMS, one of the participants indicated that when they started working in the laboratory, there were no procedures to follow. But they have seen some changes in the laboratory now

"*I started off my career in the pathology lab when there were a few rules, procedures and forms in place to capture what is done. I have watched this grow over the years and is fantastic now that we are starting to standardise things within the pathology labs" (participant 4).*

Essentially, it is evident that, all the participants had varying experience to the requirements of the QMS with all acknowledging that they know the importance of the QMS. However, the behavioural requirements were not always achieved.
Moreover, there was indication that they don't see the QMS fitting in all their activities in the laboratory all the time. As such they only perform the behaviour when they deem it fit.

"I will say that at times the QMS does not fit naturally and feels like it opposes the processes we have in place and may become obstacle in the workplace" (participant 1).

The next section discusses the analysis of the data collected after the application of the interventions.

6.3.2 Impact of Interventions on staff behaviour

It is acknowledged that as a department, most of the staff may be motivated, have the ability and with the appropriate level of trigger to perform the behaviour. However, there may be failings in the approach to the performance of the behaviour which the interventions are to address. As such, the interventions where applied to enable the subjects to perform the target behaviour and to assess change in their attitude. Having applied the interventions, the outcome of the application on the attitude and or behaviour of the participants is considered. The evaluation focuses on the outcome of the interview and the observations done during the application of the interventions.

6.3.2.1 Community Influence

As the intention of the interventions was to change the attitude and or behaviour of the subjects, the community was shown to influence the attitude and or the behaviour. The intervention provided a means to share trends of QMS related activities across sections within the department. This encouraged the subjects who were not performing the behaviour in the section to learn the positive behaviour.

"By sharing the trends across board allowed me to better understand the compliance activities of other sections in the department which acted as standardisation activity for me. Standardising the work across board as a result of the intervention helped me and the other staff to follow a simple process at all times, making compliance behaviour easy to perform" (participant 1).

Moreover, by sharing the positive behaviour, there was indication that the subjects were persuaded to change their current behaviour to perform the target behaviour. This may be attributed to the opportunity for subjects being able to compare their output against that of the section or department that were performing the target behaviour.

The data showed that staff were more motivated and persuaded to perform the target behaviour seeing the trend from the other sections. There is indication that as the trends of better use of the QMS was shared with the team, they were persuaded to also perform the required behaviour to meet their target. This also afforded staff the opportunity to fit into the community set up that exist within the department as they perform the behaviour. According to some of the participants, by accessing the trends of the other subjects performing the behaviour, they were motivated and persuaded to also perform the behaviour.

"By sharing compliant trends of other sections and departments, it motivated and encouraged me to strive to attain the achievement I have seen. This I think is the same with the rest of staff as they are more likely to compliantly use the QMS if they are to observe the positive trends from other sections of the department or from other departments in the organisation" (participant 2).

The subject may want to prevent being rejected by the other subjects who are performing the target behaviour as they would like to blend in with the other subjects in the community. As such, the participants showed the willingness to perform the target behaviour as the trend of the target behaviour is shared. In this instance, the trend of the target behaviour acts as a trigger for the subjects to perform the target behaviour to be part of the community.

This supports Sohn and Lee (2007), who indicated that users that can access and compare information from other users that are performing the target behaviour, are more persuaded to perform the target behaviour themselves.

Moreover, the change in behaviour may be compelling evidence that the other section was able to meet their set goals by compliantly following the QMS requirement.
Thus, they can also follow the QMS as required and meet their goals. As a result, the positive trend observed persuaded the other sections in the department to also take on board the target behaviour, knowing that they can also attain their goal by performing the behaviour.

Again, the data indicated that as the subjects observe and perform the behaviour, the positive behaviour becomes the standard across the other sections of the department. All the participants indicated that as they observed others perform the target behaviour, they were convinced and persuaded to also perform the behaviour. importantly, the behaviour becomes the norm of the section as that becomes the force the coerce them to perform their work.

Moreover, as they are persuaded to perform the behaviour, the strong and unpleasant psychological tension that may have existed because of the initial dissonance is gradually eliminated. As the dissonance is reduced, the subjects move to a weak dissonance state and provides positive outlook for the other subjects in the department. This in turn encourages the other stakeholders to also perform the behaviour as they see the subjects who initially didn't perform the target behaviour now performing the behaviour. Effectively, the shared trend for the target behaviour with the other subjects motivated and persuaded them to also perform the behaviour to be part of the community.

There is indication from the data that, as the staff performed the target behaviour, they hoped for something good occurring and to be accepted as part of the community that performed the behaviour to meet the set goals. This is because, the culture within the department is a 'no blame culture' which is to encourage staff to report failures and share ideas to improve practice. They performed the target behaviour so that they are not blamed as not being part of the social set up.
The hope of being accepted as part of the team that performed the target behaviour is a driver for the subjects. As hope is more ethical and empowering to motivate the staff, the sharing of the trend with the other sides that were failing inspired hope in them that they

can also perform the behaviour. This created the social acceptance that is felt by the subjects as seen in the data collected. All the staff were persuaded to perform the target behaviour by observing the trend of the other section.

6.3.2.2 Leadership Approach

This encompassed the ability of the leader to guide other individuals, teams, or entire organization to attain a set goal. Essentially, this change driver recognises the needs of the subjects and puts systems in place to help them achieve the goals. As the intervention was to promote a regular provision of reward for stakeholders by leadership team for achieving set QMS targets, there is indication that the reward motivates and persuades stakeholders to perform the compliance behaviour. The subjects confirmed that they were more likely to perform the target behaviour when their activities were recognised and rewarded.

"I think my attitude and behaviour towards the QMS improved by seeing the effort from the leadership team to recognise and reward my activities. As a manager, the recognition of staff by the leadership team influenced the way they interacted with the QMS" (participant 2).

The reward of staff for performing the target behaviour was shown to be appropriate motivator for the target behaviour. This is because, as the subjects are rewarded, it reinforces the acceptance of their contribution to attainment of the set goal. Moreover, the reward also acted as a form of getting the subjects to participate in developmental activities which again strengthens their resilience and the hope to achieve more. Here, the subjects who performed the target behaviour were made to share and train others to also perform the target behaviour. This acted as motivation for the subjects to continue performing the behaviour.

Importantly, as they were rewarded for performing the target behaviour, they were motivated to do more. This not only persuaded them to continue performing the target behaviour but also influenced other staff to also perform the behaviour. Again, the reward was to motivate the subject to continue performing the good behaviour and as a tool to inspire the other subjects to want to perform the behaviour.

This is because, as the subjects get the reward for performing the target behaviour, other subjects may also work hard to receive the reward. There was indication that, the reward was not only to be about giving a 'token' to staff but also getting them involved in the

processes and projects from the start. This is to empower them to take active part in shaping the processes and to reward their effort in performing the behaviour in previous activities.

Moreover, the reward acted as a way of giving feedback to the staff as this does not require them to review any data or trends for their performance. This also acted as a quick and easier indicator for the quality of their performance as they are rewarded based on the outcome of their behaviour and evident for all to see.

Although all the participants agreed that the reward of good behaviour by the leadership team can motivate and persuade staff to continue performing the behaviour, they also had reservation that this may cause distress among staff as some may think that their work is not 'good enough' to get rewarded.

"*This is because, reward may have the potential of causing consternation among staff rather than helping to motivate and encourage staff to constantly perform the compliant behaviour. I think a set of staff may think that they are not good enough and their efforts are not recognised by the senior management team whilst others are being praised for what they do" (participant 3).*

"I think it depended on how it is presented to the staff though. How the recognition and reward is done is vital as there may be possibility of staff not feeling empowered as a result of this" (participant 2).

Thus, some of the staff may feel rejected as their efforts are not rewarded. As the team within the department works toward the same goal, the perception that the reward is not fairly awarded, may negatively impact the reason for the reward which is to motivate staff. This acted as a social rejection of the staff that fail to get the reward and this may affect the performance of the target behaviour. It is therefore important to ensure that staff are made aware of the criteria for the reward and made to be part of the decision making to ensure transparency in the process. Although this may be a drawback for the staff that did not get the reward, the social rejection also acted as a motivator as staff may not want to be rejected. Here, staff getting the reward will be able to discuss and compare their achievements with others in the team for social interaction and bonding. This may also act as a communicating tool and means to encourage others to also perform the behaviour.

Moreover, some may think that performing the target behaviour is a requirement for all staff and therefore no need to be rewarded for doing what they are paid to do. In general, most of the staff have the intention that they are required to perform the behaviour and not doing it because of the reward.

"Really difficult one because I think is our job to do what we are paid to do so I don't see the need to reward staff for doing their work" (participant 4).

However, they still indicated that reward is essential and should be structured to also reach those who may be trying to perform the behaviour but not quite attaining that.

6.3.2.3 Usefulness

The data gathered from the interviews showed that staff will be willing to perform the behaviour and change their attitude towards the QMS if they see it to be useful by sharing the useful outcome of the use of the QMS. As the focus of the staff is to complete the task they have been given, the realisation that the QMS will help them to complete their task persuaded them to perform the target behaviour. Essentially, the participants indicated that the use of the information system to dispel perceived concerns about the QMS and to build the trust of users was motivating factor in them performing the target behaviour.

"By dispelling perceived concerns and negative attitudes about the use of the QMS, I saw the positive reasons why I should compliantly use the QMS and this really helped" (participant 1).

All the participants regarded the QMS to be trustworthy for the work they are required to perform but there were some perceived negative impacts on use of the QMS. Subsequently, the realisation of applying a useful tool to their work filled them with hope to achieve the goal. According to Fogg (2009b), hope which is anticipation of something good happening, motivates people to want to perform the behaviour.

Consequently, by Sharing information about the consistent achievement of staff providing safe and quality product and services by compliantly following the QMS, the hope of the other staff also performing the behaviour to achieve the same outcome improved. Moreover, the data also showed that staff were willing to perform the behaviour knowing that the process is routine and not new to what they know. This is because, the understanding that the same QMS was used by others as a routine process, motivated the staff to also perform the behaviour.

"There is the belief that the QMS and the management tool is difficult to use and gets in the way but with the intervention explaining and dispelling that belief, it helped me to better embrace and use the QMS as required" (participant).

Again, staff understanding of 'the why behind' the use of the QMS and not just being asked to use the QMS without meaning and understanding, motivated them to perform the behaviour. By knowing that they are going to achieve their goal by performing the behaviour, it reinforced the behaviour of the staff. Importantly, the understanding of the need or the 'why' to use the QMS empowered the user to want to perform the behaviour.

Moreover, as the usefulness of the QMS is seen as a function to perform the task, by dispelling the negative perception about the QMS, staff appreciated usefulness of the QMS. Subsequently, they were more willing to perform the target behaviour, knowing that the QMS is relevant to achieving their goal.

The data showed that, by explaining how useful the activities of staff in line with the QMS is, they were empowered to perform the target behaviour. This is because there were some QMS activities that were performed by staff without even knowing that they are relevant behaviour. As such, by explaining to staff and dispelling the negatives that what they do daily is part of the QMS requirements, staff were willing to perform the behaviour.

"With the system explaining to the staff that the QMS is not just procedures and what to do in an event of an incident, but rather what they do daily like the cleaning, the equipment checks before and after use, the records that are done are the QMS. Because they know and understand the usefulness of these daily activities, they embraced the behaviour much better" (participant 4).

Despite staff previously knowing the purpose of the QMS but failed to use the QMS as required, by sharing the usefulness with them was relevant to the performance of the behaviour. Because it enabled them to buy into the concept and understanding. It also informed them of what is really required of them and why the use of the QMS is important to achieve the set goals. Consequently, there was a desire by the staff to perform the behaviour; there was a gained pleasure in performing the target behaviour.

"I noticed that because people did not really see the importance of the QMS that is why they were not willing to engage with it but when I explained and dispelled the negative notion about the QMS, the behaviour improved" (participant 3).

Again, by dispelling the negative notion about the QMS, the cognitive dissonance that existed may be resolved. This is because, although staff may be performing the behaviour as they must meet their goal, their attitude to the QMS was in dissonance with the behaviour. Thus, the intervention aligned their attitude and behaviour to the positive stable

state where there is no or minimal dissonance. Essentially, staff are more willing to perform the behaviour because they understand why they are doing it. there is desire and pleasure when performing the behaviour and a feeling of social acceptance among the staff.

6.3.2.4 Ease of Use

Data analysis indicated that stakeholders are encouraged to compliantly perform the behaviour when the QMS is personalised or tailored to their activities. As people are generally resistant to training and teaching because it requires effort (Fogg, 2009b), making the behaviour easy to perform was essential. By personalising the QMS to suit them, they were more motivated to perform the behaviour their personal need is considered.

"I think the intervention of personalising the QMS for individual use helped me in achieving what is required. Because when things are the way you want them, then the attitude towards using it is positive. Because it is more tailored to my personal need, I was more willing to use the QMS as required" (participant 2).

The persuasive power relies on providing simplified content of the QMS activities to stakeholders to reduce the effort required to perform the behaviour. As such, the interventions were designed to suit individual needs to enable acceptance and routine compliant performance to the QMS. As the interventions promoted the processes and procedures to be written in simple words, clear format and with diagrams to make it easy for staff to understand and use the QMS on routine basis, it improved the performance of the behaviour.

"Although the QMS and the Q pulse management tool are standard across the organisation, the local feel of personalising the way it is set up and how it is implemented for my routine processes help in boosting my attitude and behaviour" (participant 3).

Moreover, as ease of use reflects the intrinsic property of the user, by making it easy for stakeholders to personalise the QMS activities there was indication that the target behaviour was performed. The participants confirmed that, personalising of the QMS to each staff motivated each to perform the target behaviour. Thus, the design of the activities of the QMS to suit them persuaded them to perform the behaviour. This was done without losing the focus and the need to ensure that the QMS is standardised across the departments example being the standard operating procedures.

Again, because the interventions applied did not incur any monetary expenses, it was readily available for adoption and application by staff. This empowered staff to personalise the QMS and to 'own' it, making it easy for them to perform the target behaviour. Because

of this, they perceived the QMS as more credible and the instructions more relevant for what they hope to achieve.

Moreover, there was indication that because the behaviour was made easy to perform, staff had enough time to reflect on the task and to make informed decision to perform the target behaviour. This is important as time constraints in performing the required behaviour may be one of the reasons why the behaviour is not performed on a routine basis. Essentially, it was evident that because the task was personalised and tailored for the staff, it was easy for them to perform the target behaviour as they had ample time to assess what is required of them.

"I also noticed that it made it easy for staff to do the right thing as although they were aware of the bigger picture. I was convinced that if the QMS is not simple for staff to perform their task easily, it will affect their attitude and behaviour" (participant 1).

Again, there is indication that the simplification of the task reduces the physical effort required for staff to perform the behaviour. Essentially, staff were more willing to perform the target behaviour because it is easy to perform.

6.3.2.5 Stakeholder Behaviour.

The intervention allowed the subjects to track their performance by comparing their behaviour with others who are performing the target behaviour. It is essential that the subjects shadow others who are performing the behaviour as this helps them to make changes to their behaviour. As subjects observe the target behaviour, there is indication that they strive to perform the required behaviour as they don't want to be social deviants. They are motivated and persuaded to work as part of the team that is performing the behaviour. This is because, as they shadow and observe the target behaviour in the section, they also align their behaviour in order not to be the only outlier in the section.

"I think by shadowing someone in the use of the QMS, I was able to learn more about the use of the QMS and I am more willing to use it as required. This is because by watching someone compliantly perform the process, it encouraged and motivated me to perform the same behaviour" (participant 1).

"*I think by shadowing people who are performing the target behaviour, I was more inclined to perform the behaviour" (participant 4).*

It is believed that, as the subjects observe the other users perform the behaviour, it served as a reminder of what is required of them. By observing the others, it served as a feedback

to them to analyse their behaviour and to make amends. Thus, overtime the shadowing transformed into a reward as they expected to get a reminder of what is required of them from observing the other stakeholders which help them to also perform the behaviour.

As they observe the behaviour, the setup allowed for the users to also practice the compliance behaviour before implementing in routine use. This was achieved by getting staff to work with the achieving sections to understand how they do it and get them to perform the behaviour whilst shadowing. Performing this behaviour is made easy as staff are not required to think hard about the behaviour because they observe the target behaviour being performed.

Making the behaviour easy is essential as staff may have other competing things on their mind that distorts their focus. By preventing staff from thinking deeply about what is required of them made it easy for them to perform the behaviour. Moreover, by removing the requirement for staff to think of new ways to perform the behaviour allows them to simply observe and practice the behaviour which makes it easy for the target behaviour to be performed.

There was indication that the arrangement of shadowing should be done in such a way to prevent any animosity and tension within the team. This is because, some of the staff may be critical of their own performance when they observe their behaviour to not be in line with the others, they are shadowing. This may lead to them questioning their activities which may affect their confidence. Essentially, if they are not shadowing someone they know, it may take longer for the persuasion to take place as they are not in a stable cognition.

They might think that they are not good enough and as such just following what they are told. This might bring disgruntlement for the person who is shadowing. As such, the pairing should be done with people who get along very well rather than just asking people to shadow (participant 3).

Importantly, the data indicated that shadowing someone who is performing the behaviour is appropriate to persuade other staff to also perform the behaviour. However, consideration should be given to the arrangement for the shadowing to prevent any tension or resistance from the staff.

6.4 Analysis of Outcome

As already mentioned, cognitive dissonance theory indicates an unpleasant psychological tension that ensue when two cognitions oppose each other. This considers the relationship between attitude and behaviour of the subject and in this context, the behaviour of the subjects and their attitude towards the target behaviour - to change or maintain the behaviour towards the QMS. It is noted that, the state of cognitive dissonance that exist may influence the acceptance of the interventions.

The state where all factors are positive and thus there is no cognitive dissonance is the positive stable state for the subjects. This state being the ideal state (Oinas-Kukkonen, 2010b) for the subject, is the preferred state which the interventions aim to achieve. However, since the interest of the persuader or the applied intervention may be to change behaviour but not change attitude, it might not be necessary to move target users to the ideal state in all cases. The relevancy of the persuasion may be to change behaviour and not the attitude so the interventions for persuasion may not be designed to cause both.

Moreover, in most cases, the user may be required to perform the behaviour only once. Thus, in such cases the need to change attitude is less important as the emphasis may be on just performing the behaviour. However, researchers indicated that total persuasion is only achieved when the favoured target behaviour is performed when both attitude and behaviour are changed (Oinas-Kukkonen, 2010b).

Essentially, changes in one of them will not constitute total persuasion. Moreover, there may be instances where the attitude and behaviour are both negative. Thus, there is no or minimal psychological tension as there is no dissonance (Wiafe et al., 2012). For these subjects, step wise approach needs taking to move them from their current state to the ideal state where both attitude and behaviour are positive.
For this research, the emphasis was to effect behaviour change whilst also looking at the attitude of the subjects before and after the application of the interventions.

From the data collected post application of the interventions, almost all the candidates indicated that their initial attitude and or behaviour towards the QMS was not positive.
Most of the candidates indicated that they had negative attitude towards the QMS due to perceived notions and other factors like resource availability and training, but they still performed the behaviour. Although they acknowledged the importance of completing their processes following the QMS, there was indication prior to the application of the

interventions that the attitude of some the candidates was not always in agreement with the QMS.

According to one of the candidates, the QMS is meshed with all the activities in the department and therefore difficult to separate the activities in the department from the requirements of the QMS. Subsequently, they performed their task without knowing that they are following the requirements of the QMS. As such some of their actions may conflict with the QMS without them knowing. This may not cause them any dissonance as they think that their attitude and behaviour are all aligned.

However, they also indicated that there are instances where they notice a conflict between what they want to do and what the QMS require and these impacts on their attitude and behaviour towards the QMS. Others indicated that their attitude was negative due to lack of training and lack of better understanding of the QMS and its requirements. This influenced how they accepted and interacted with the QMS on routine basis.
These conflicting cognition in some of the participants affected their approach to the QMS and this is observed in the non-compliance behaviours observed.

Moreover, the attitude of one of the candidates though positive, indicated that their experience of working in a laboratory where there were no clear procedures and protocols in place impacted on their attitude and their behaviour. Their attitude was therefore not always positive as there were no clear procedures and protocols in place. Essentially, failure to provide appropriate procedures for the staff is shown to impact on their attitude to follow the procedure as required. This is because, if the subjects are required to perform the behaviour in line with the procedure that is either not available or lack the required detail for the behaviour, then is easy for the subjects to not perform the behaviour.

As the framework provides means for useful QMS and easy to use, it is evident that the implementation of the interventions allowed the subject to assess the required resource for their activities. It is believed that, this may not be peculiar to this staff as the gaps identified in the initial assessment showed that some non-compliance behaviour by subjects were due to lack of resource. These creates cognitive dissonance as their attitude to the lack of the procedures may impact on their performing of the behaviour. This participant having worked in the laboratory for many years, may have lived with the dissonance.

Although there seem to be a cognitive dissonance as their attitude and behaviour are not always aligned, they appear to cope with it. This supports Oinas Kukkonen and Harjumaa (2009), who indicated that there is comfortable level of dissonance that humans can cope with which do not influence their decisions. Although the staff appear to cope with this dissonance, we submit that they still have the tendency to want to minimise the dissonance. This is seen in the data collected from the application of the interventions; staff showed willingness to change their attitude and or behaviour because of the interventions.

The behaviour of the subjects was also seen to be influenced by the community that shares the positive behaviour. It was noted that, as the subjects observed others perform the behaviour, they were more likely to also perform the compliance behaviour. This can be attributed to the fact that as the subjects see others perform the behaviour with no dissonance, they strive to also perform the behaviour to also overcome their cognition tension. This supports Murphy and Chang (2000) who indicated that social networks are an individual's" primary source of influence in relation to their attitudes towards new technology and a key determinant of their eventual behaviour." by extension, this does not only relate to the acceptance of new technology but relates to other social enterprises. It is interesting that the influence by the social network is primary source because of the interaction that ensues. This is important in shaping and changing the behaviour of the subjects as they strive to be part of the group.

Moreover, the sharing of the positive trends of the behaviour allows the subjects to favourably assess and evaluate the behaviour. The sharing of trend allowed the subjects to compare their behaviour and that of the subjects performing the compliance behaviour. in the analysis, it is noted that, by sharing the trend, the subjects were willing to also perform the behaviour. This is because, although the subject may have negative attitude to the behaviour, in order to reduce the dissonance, they accepted and performed the behaviour. the data also indicated that by creating the conducive environment where sharing of ideas and the positive behaviour can be performed, the subjects were willing to perform the behaviour. A careful investigation may reveal that some subjects performed the behaviour due to external forces which may include persuasion or coercion to change their negative attitude towards the behaviour.

The participation of the leadership team in recognising the behaviour of the subjects and praising them was seen to be empowering for the subjects to continue with the behaviour. By praising the subjects in performing the compliance behaviour, this persuaded them to

do more. As most of the subjects look to their leaders for direction, the acknowledgement of the behaviour by the leadership team reinforces the behaviour. The assertion by the subjects that they are more likely to perform the behaviour when they are praised by their leaders goes to show the importance of the role of the leaders. Moreover, because the role of the leadership is important in guiding the compliance behaviour, care must be taken not to cause any consternation between the team as this will have a negative effect on the behaviour. The action of the leaders was a driving force in recruiting the appropriate staff, creating the conducive environment, and sustaining the compliance behaviour of the subjects.

One of the purposes of the framework is to make the behaviour appealing and useful to the subjects. This was achieved by dispelling the perceived concerns about the QMS and to build the trust of users to perform the behaviour. It was evident in the data collected that the subjects were more willing to perform the behaviour knowing that the perceptions about the QMS was not true. The persuasive experience is to transform the subject to the ideal cognitive stage. As they perceived the negative information about the behaviour, this negatively influenced their attitude and as such they failed to perform the behaviour. However, as they received the information about how useful the behaviour is to achieve their goal, they were more incline to perform the behaviour. In Fogg's (2009) behaviour model, the subjects may have the ability and the required trigger to perform the behaviour, but the motivation was low due to the perception of the usefulness of the QMS. Since there is dissonance because most of the participants indicated that their attitude is to perform the behaviour but failed to, by dispelling the perception, they were more motivated to perform the behaviour. Essentially, since they are not performing the target behaviour, persuasive framework was mainly focused on changing their behaviour and thus sustain the behaviour at the ideal state.

Making the behaviour easy to perform helped the subjects to perform the behaviour. As the data showed, the subjects had the attitude to perform the behaviour but were failing because they saw the behaviour to not be easy to perform. This caused strong dissonance that the subject was willing to resolve. By making the behaviour simple, the subjects were persuaded to perform the behaviour to remove the dissonance.

Form the analysis of the data collected, there is indication that the interventions worked as staff attitude and or behaviour improved. All the participants indicated that the interventions were useful and aided them in making changes to their attitude and behaviour.

All the participants indicated that the interventions helped to change their attitude towards the QMS. Again, the participants indicated that behaviours prior to the application of the interventions were mixed with some being positive and others negative. But after the application of the interventions, they noticed a shift in their attitude and behaviour in the positive direction.

Accordingly, the application of the interventions made difference in the attitude and behaviour of the staff in the department. The CLUES framework and the interventions drawn from the change drivers aided the positive change in the behaviour of the subjects

6.5 Chapter Summary

This chapter demonstrated how the interventions from the CLUES framework were applied in the department. As such, random selection of interventions was applied to the chosen pilot department in the blood establishment over a period of three months and data was collected. Data analysis showed that staff attitude and behaviour were changed due to the application of the interventions. Moreover, this chapter served as means to assess the improvement realised from the development and implementation of the CLUES framework. It demonstrated that the framework influenced the compliance behaviour of the subjects. The chapter addressed objectives six and seven of the research.

Chapter 7
Evaluation of Research

7.1 Overview

In line with the objectives of the research, this chapter evaluates the outcome of the design of the artefacts and application of the interventions to solve the research problem. Accordingly, this chapter presents an evaluation of the design process. It highlights on the processes used for the entire research and identifies the impact and contributions made by the study. It also considers the design science assessment and discusses the knowledge output and business contribution of the research. It further considers the implications of the research and the limitations identified.

7.2 Design Science Assessment

As design science is integrally a problem-solving process, the understanding of a design problem and the application of the acquired knowledge in the building and application of an artefact to a problem is an important requirement (Hevner et al, 2004). As such, having designed the purposeful artefact to address the problem of understanding the reasons for non-compliance behaviour, the process is completed with an artefact to improve compliance behaviour. However, there is the need to evaluate and assess the artefacts as means to add to knowledge base and increase the relevance in the appropriate business environment. Subsequently, Hevner et al (2004) proposed a set of guidelines that can be used in evaluating a design science research and this is employed for this research. We propose that the use of the guidelines allows for a systematic approach to be followed in assessing the designed artefact evaluation. The guidelines are used in this research to allow for a coherent approach to be applied to the discussion.

7.2.1 Design as an Artefact

The guideline indicated that design-science research must result in a viable artefact which may be in th form of a construct, a model, a method, or an instantiation. This may not be a fully established information system that is used in practice but be an innovation that promotes ideas and analysis to solve problems. Two major artefacts (CAM model and CLUES Framework) were developed from this research as already discussed in the previous chapters. Both artefacts were created to complement each other with the CAM model assessing the initial problem and the CLUES framework improving on the behaviour. Moreover, the CLUES framework led to the creation of interventions that helped to addressed attitude and behaviour of the subjects. This generic interventions on

compliance may serve as means for application in not only the health sector but in other non – health organisations.

7.2.2 Problem Relevance

As one of the purposes of design-science research is to develop technology-based solutions to address important and relevant business problems, this purpose was achieved with the artefacts that were developed. As already indicated, there was business need to understand the reasons behind the non-compliance behaviours as observed. Moreover, the literature review showed that although there is indication that non-compliance exists within the organisations, there was no available model for assessment of the reasons behind the non-compliance behaviour.

Fundamentally, as the Technology Acceptance Model provides a theory that explains and predicts the acceptance of information technologies within organizations (Venkatesh 2000), the CAM model provided assessment of the problem and addressed the gap in the available tool for assessment of non-compliance concern. This initial assessment using the CAM model does not only provide data to address the concern but also created the opportunity for further improvement to be applied by use of other behaviour change models, in this case the CLUES framework.

Although the CAM model and the CLUES framework does not provide universal and holistic approach to manage assessment of non-compliance and improve behaviour change, We submit that they still provide a means for systematic and coherent approach to be followed in assessment and evaluation of non-compliance behaviour.

7.2.3 Design Evaluation

Because design is naturally an iterative and incremental activity, the evaluation phase provides crucial feedback that allows for the assessment of the quality of the design and the product under construction (Hevner et al., 2004). As such, effective and appropriate evaluation method must be applied to assess the quality and the efficacy of the designed artefact. The choice of the evaluation method in this research was relevant in the assessment of the performance, reliability, usability, completeness of the artefact and fit with the organisation.

The initial evaluation of the CAM model was performed by use of a descriptive approach; use of information from the knowledge of literature review to build the model. Here, the knowledge available about acceptance of technology and its use, informed the design. This enabled the evaluation of the usability of the model as TAM has been used in many information systems research with meaningful outcome. Besides this, the knowledge of the

use of TAM allowed for the CAM to be applied in the health sector as the model fits with the organisation.

Further to this, the model was evaluated for reliability and performance when the data was collected from participants that use the QMS on routine basis. This was done by interviewing the participants who use the QMS to assess the reliability and performance to achieve the goal. The data collected from the assessment allowed for the completeness of the model to be ascertained as an updated model was developed based on the feedback from the participants. The evaluation enabled the improvement of the model and gap analysis to be performed which helped in dealing with the non-compliance behaviour.

For the CLUES Framework, evaluation was conducted by assessing the needs identified from the outcome of the analysis of the updated CAM model. This furnished the study with data that suggested the gaps that needs addressing, reliable data for the development of the framework. To evaluate the reliability and performance of the framework, interventions were generated from the change drivers. The interventions were applied in the blood establishment which provided data for analysis.

Although the approach taken for this research allowed for the model and framework to be evaluated, we acknowledge that different approach like quantitative, may have been used to evaluate these artefacts.

7.2.4 Research Contributions

As research mainly aim to address a research question, there must be a contribution from the research. According to (Hevner et al., 2004) clear and verifiable contributions in the form of design artefact, design foundations, or design methodologies must be provided in effective design-science research. For this research, the clear contributions are the CAM model, the CLUES Framework and the generic compliance interventions. These artefacts enabled the analysis and resolution of the research problem and aided in extending existing knowledge in a new and innovative way. They presented new design implications in assessment and acceptance of information system and persuasive framework that are novel and form a foundation for further studies and theory development in the field of information systems.

The CAM model asserts the need to assess intention of users to accept and compliantly use the information system which in this case was the QMS. This also suggested the assessment of ongoing use of the QMS to provide means to address the observed behaviour, serving as evaluative tool for existing systems. Essentially, the CAM provided the means for assessment of the available resources, allowing clear roles to be defined for all

stakeholders, and enable useful KPI's to be set that supports the behaviour. in effect, CAM model presents means to predict and explain the compliance behaviour of the subjects.

The CLUES model suggests ways to improve compliance behaviour through the application of the change drivers. It also supports evaluative methods in persuasive systems with means to change behaviour. Furthermore, it enables the formulation of interventions from the change drivers which aids in addressing improvement of compliance behaviour.

Finally, the model and framework provide contributions to information systems research in general. This includes expansion of literature in the field, empirical evidence to support lack of appropriate methods in assessment of non-compliance behaviour and provision of generic interventions for persuasive compliance behaviour.

7.2.5 Research Rigor

Rigor as the state of being very exact with strict precision or the quality of being thorough and accurate is important as it addresses the way in which research is conducted. According to Purao, (2013), design science approach to research lacks the ability to demonstrate enough and convincing rigor in its methods. However, other researchers have proposed that design science research applies rigorous methods in both the construction and evaluation of the designed artefact (Avison and Elliot, 2006, Hevner, 2007).

For this research, rigor was derived from the effective use of the knowledge base theoretical foundations and research methodologies. To do this, the basis for the development of the artefacts were drawn from existing knowledgebase which are well-established and tested from various fields including information systems. Here, literature review on available models and theories was used to develop the artefact for the assessment of non- compliance behaviour and improvement of compliance behaviour.

Moreover, the artefacts were evaluated through a systematic and coherent methodology with the application of design science methodology as proposed by Hevner et al. (2004) which provided rigor. The principal aim was to determine how well the artefacts worked and not to theorize about the artefacts. The understanding of why an artefact works or does not work is to enable new artefacts to be constructed that exploit the former. All these activities ensured rigor in the research.

7.2.6 Design as a Search Process

The importance of design as a search process utilizes available means to reach desired ends while satisfying existing laws in the environment (Simon 1996). The iterative aspect of design science process searches for the best or optimal design to address the problem.

Design science acts basically as a search process to discover effective means to address a problem (Hevner et al. 2004). Here, the problem is decomposed into simpler subproblems by explicitly representing only a subset of the relevant means, ends, and laws in the environment. This involves the creation, utilization, and assessment to solve the problems and make judgments quickly and efficiently. Thus, constructing an artefact that works well to address the identified problem.

For this research, the non-compliance behaviour within the health service environment demanded means to understand the reasons behind the observed non-compliance behaviour with the view to improve compliance behaviour. Based on the available knowledge base and methodologies, the approach in this research was to develop simpler artefacts to address the problem. This started by use and extension of existing artefacts (TAM and Activity Theory). The research provided means of improving on the existing artefacts to create CAM model and subsequently CLUES framework to address the problem in the organisation. The creation of the simplified artefacts provided a cycle of review and evaluation of the generated artefacts to create alternatives to approach the problem.

Although this study provides means for resolution of the problem, we acknowledge that there may be other means to achieve the optimal solution that may not have been considered in this research. Despite this draw back, we propose that the evaluation of the artefacts by performance testing provides novel contributions to the process of finding means to address the problem and addresses some of the limitations encountered.

7.2.7 Communication of Research

For research to have effective outcome, the audience need to be established and communicated to. As such, design-science research must have the same approach by effectively presenting both to technology-oriented as well as management-oriented audiences. This ensures that the technology is made available whilst addressing the management problems that the business need may have presented.

For this research, the model and the framework were shared with the academic audience to present the highlights and the contributions to the academic discourse. Moreover, the review and critique of literature provided the means of adding to the knowledgebase in the field of research. The emphasis has been laid on the problem and how knowledge have been used to address this, thus providing empirical data for the research community.

In the industry, this study was motivated by providing means to address a problem that existed in the blood establishment in healthcare. The findings from the artefact created have been shared with the business community and evaluated to seek their feedback. This has

been used as a feedback loop to improve on the artefact to help address the problem. From the data analysis, there is indication that the artefacts and the interventions have aided in addressing the problem identified. Essentially, the communication of the research has been efficient and further avenues will be sought to share with wider audience.

7.3 Implications of the Research

As the research aimed to develop model and a framework to influence compliance to QMS, it is believed that there are many implications of this research in regulated and non-regulated organisations. The research provided means for the assessment of non-compliance in a blood establishment in healthcare sector. It provided a tool that may be used for the assessment of initial implementation of QMS and ongoing assessment in routine use of the QMS. Here, it is believed that the model may be used in assessment of systems and processes that needs implementing. Further to this, the model may aid in continuous assessment of the processes to provide actions that helps to resolve errors and violations. The approach also enabled the development of a framework for improvement of compliance. The change drivers and the interventions from the framework provides generic persuasive approach to influence behaviour.

As the model and framework have been shown address the research problem, it is proposed that similar approach can be applied in different regulated organisations to the same effect. Moreover, the approach may be applied in non-regulated organisations as the constructs and variables in the model and framework are easily transferable. It is also suggested that similar problems in other sectors may be addressed using similar approach as in this research.

7.4 Limitations

Although the research provided contributions in theory and practice, as in all research there were some limitations. This section outlines the limitations associated with this research as outlined below.

7.4.1 Limitation of Compliance Assessment Model - CAM

As selection of participants was purposefully done by use of subjects who interact with the QMS, it limits the extension of the outcome. This is because, data analysis was made on the assumption that data from participants who routinely use the QMS can be extended to the rest of the organisation. However, there may be staff in the organisation who do not routinely use the QMS and as such may fail to understand what is required. The random selection of participants may have given different outcome as participants may have

varying understanding of the QMS requirements and as such give different view to the problem analysis and resolution.

Also, the participants reported their understanding and use of the QMS as opposed to the objective measured usage through observation over a period. This Self-reported adoption rates, as opposed to objectively measured usage, is a controversial issue in IS research (Venkatesh and Davis, 2000). This may lead to bias on the part of the participants as they share their adoption of the system. This may be the case in this research; bias on the part of the participants who used the QMS as they share what they think the outcome of their use of QMS. This may not be the objective view and can influence the generalisability of the outcome.

Moreover, as TAM and Activity theory have been used in IS research, it was assumed that the relationship in CAM model is appropriate without testing the relationships between variables and constructs using structural equation modelling and other quantitative means. This may have influenced the outcome achieved as the CAM model development was based on assumption.

Finally, there was a small sample size which limits the generalisability of the outcome of the research. More participants in the interview process with mixture of routine users and non -users would have given varying data for analysis and assessment of non-compliance behaviour. Also, as some aspects of the model relies on the intension of the subject to make assessment of non-compliance outcome, there is limitation that the intension of the subject may not lead to the outcome which may affect the final analysis.

7.4.2 Limitation of Behaviour Change Theories - CLUES

This research was based on the assumptions in the behaviour change that what is applied effected the observed outcome; this presents inherent limitation. This is because researchers understanding of factors that lead to human behaviour change is poorly understood. In addition, there are some inconsistencies as some theories are formulated as guides to understand behaviour while others are designed as frameworks for behavioural interventions. Behaviour change interventions are usually complex, comprising many interacting components (Craig et al., 2008). As such most of the existing theories of persuasion rely on behaviour change analysis which is based on several assumptions. The research was based on assumption and analysis of the interventions to improve compliance behaviour. However, this process is complex and involves many interacting components that may not be possible to assess during this research.

Moreover, the research used data from participants who routinely use QMS to perform their task so the outcome of the behaviour change from their perspective may not represent others in different departments who do not routinely use QMS. This has the potential to skew the findings toward a more favourable view of those who compliantly perform the behaviour and indicated change in compliance after application of interventions. Such group may see the behaviour to be easy to perform as they have perfected the behaviour over the years. This improvement in compliance may not be extended to staff that do not routinely use the QMS as the outcome of this research may not be applicable to them.

Furthermore, the sample size is small and limited to one department in the blood establishment; thus, it is not known how these findings generalize to other departments within the establishment. However, broad generalizability was not the purpose of this study as the purpose was to develop a framework which can improve compliance behaviour which has been shown to have been achieved. Also, as in the case of most existing persuasion models, the aim is not to model actual behaviour change but to provide a method that can influence behaviour.

7.4.3 Limitation of Research Approach

Although design science has been shown to contribute to IS research by facilitating its application to better address the kinds of problems faced by IS practitioners (March and Smith, 1995), one of the main limitations have been rigor. Some have submitted that the results of natural science research follow a stereotypical pattern which makes it easier to recognize and evaluate than design science.

According to Purao, (2013), design science approach to research lacks the ability to demonstrate enough and convincing rigor in its methods. However, other researchers have proposed that design science research produces artefacts that are relevant to industries in solving problems (Avison and Elliot, 2006). Although limitations have been cited, this is compensated in the relevance of the artefact produced that is useful in addressing business problems.

The research approach taken may have limitations as alternate approach may have yielded different results. This is because in this research, the CAM model was developed from literature and updated from outcome of assessment by interviewing participants. This then led to the development of the CLUES framework to improve the compliance behaviour. However, alternate approach could have been used. Firstly, by persuading staff to change their behaviour to compliance behaviour before assessing the reasons for their non-compliance behaviour.

Also, quantitative approach could have been used in data gathering for assessment of non-compliance behaviour and subsequent application of interventions to improve compliance behaviour. But qualitative approach was used in both the initial assessment of non-compliance behaviour and behaviour change using the CLUES framework.

7.4.4 Limitation on Evaluation of Artefacts

The validation of the model and framework involved application in the blood establishment. Because of time limitation and the reduced number of participants in the study, it limits the substantive claim of the research. However, the appropriate evaluation methodology was followed as indicated in the previous sections. As the aim of the study is to develop a model and framework to improve compliance, the evaluation of CAM served the purpose by identifying the reasons and presenting the gaps that needed addressing. Moreover, the CLUES framework developed was aimed at improving compliance behaviour and as such, the indication from the evaluation that this outcome was achieved meets the requirement. Furthermore, the four participants that were interviewed as part of evaluation of CLUES framework were aware of the interventions before the interview. This may make their answers not sufficiently objective. A control group should have been set up that have not been exposed to the interventions. This will enable better comparison of the outcome of application of the intervention but that was not included in this study.

Although the framework improved behaviour, it was not assessed whether it maintained the improved behaviour. This may need further study that is performed over a prolong period to demonstrate that this can be achieved. Furthermore, there may be limitation in the way the interventions were applied within the department. Most design principles are applied through software where participants interact with the intervention without involvement from others. But in this study the interventions were not applied by software. It relied on the researcher to explain the interventions to the participants and this may influence the way they accepted and interventions. There may be researcher bias in explaining the interventions to the participants.

7.5 Chapter Summary

This chapter evaluated the research by considering the design science approach. It had been demonstrated that the research provided means to the assessment of the non-compliance and improved compliance using the CAM model and the CLUES framework. By use of the design science guidelines, a coherent approach was followed to evaluate the whole research. This chapter has also considered the implications of this research in the blood establishment and possible extension to other regulated and non-regulated organisations.

Although appropriate approach was followed, the chapter reflected on the limitations of the research which provides a vehicle for analysis of future work. This chapter addressed objective eight of the research.

Chapter 8
Conclusion

8.1 Overview

This chapter concludes the thesis and seek to summarise the whole activities performed in the study. To do this, the conclusion is approached as follows: starts by evaluation and analysis of the research aims and objectives, which will be followed by the analysis of the deliverables or the contribution from the research and concludes with future work.

8.2 Conclusion

As compliance has been shown to be important in organisation's quest to meet customer needs and to ensure that regulatory requirements, rules, and standards are met, the research sought to address the compliance needs. The research was designed to address the research questions to understand the reasons behind non-compliance behaviours. After establishing the reasons behind the non-compliance behaviours to improve compliance behaviour. It started by reviewing literature on compliance activities and the observed non-compliance within a blood establishment to develop the research questions. In line with this, the aim of the research was set out to develop a model and framework to understand and improve compliance to QMS. Based on the aim, objectives were set for a systematic approach to the research. The conclusion is approached by analysing and evaluating the objectives.

Objective One was to explore literature on compliance and how they are applied in businesses and organisations. Accordingly, the literature review investigated compliance activities in organisations with some emphasis on the health care sector. The review also considered compliance culture that exists within organisations and how they affect the attitude and behaviour. The literature review indicated that although there is understanding that culture variety in organisations influences the behaviour of subjects, there were limited means in assessing compliance. Also, there were limited models and theories that allowed for assessment of non-compliance behaviour. This showed the need to further investigate and develop approach to aid in non-compliance assessment. This objective was achieved as the research progressed into the next phase of the design to explore existing models and theories for compliance assessment in information systems.

Objective Two was to explore existing models and theories that have been used in the study of compliance activities. Here, the review focused on existing models and theories that were involved in assessing acceptance of information systems, routine activities of subjects and understanding of how signs and other factors influenced their decisions. It was noticed that, although the models have been applied in information systems with varying

success, there was no available model for non-compliance assessment. It was therefore established that to aid better understanding of non-compliance behaviour, a compliance assessment model was needed. There was further consideration on how to improve compliance behaviour after identifying the reasons of non-compliance. As such, Behaviour Change Models and Cognitive Dissonance theory was reviewed to ascertain the differences in attitude and behaviour and how that impacts on the subjects. This objective was accomplished as a model was developed to assess non- compliance behaviour and to provide further data for subsequent development.

Objective Three was to identify appropriate research methods and techniques that can be used for the investigation. This objective allowed for research methods to be reviewed and design science research approach was selected as appropriate for the study. This is because, design science culminates in the design of artefacts; this research aimed to develop model and framework to improve compliance. As part of the awareness of the problem, critical realism was used to assess what was behind the observed behaviour. Moreover, although TAM is a quantitative model, the resulting CAM model from synthesis of TAM and Activity Theory applied qualitative approach for assessment of non-compliance. This is because, although TAM is a quantitative model what it demonstrates is an influenced relationship between the factors. As such, it was appropriate to use it in the qualitative model to assess the relationships and their impact on non-compliance. This objective was achieved as the design science aided the development of the model and the framework.

Objective Four was to develop a conceptual model based on the literature review to be used in understanding the reasons behind non-compliance. This was linked to objective one and two as both established that there was need to develop a model to aid in non-compliance assessment. In the study, Technology Acceptance Model (TAM) and Activity Theory was extended to develop Compliance Assessment Model (CAM) for analysis of reasons behind non-compliance. These models and theories allowed for the development of the artefact to be used for the assessment. This objective was achieved as CAM model was developed and used in the assessment of non-compliance.

Objective Five was to evaluate the model by use of appropriate research tool. Here, the Compliance Assessment Model that was developed from the outcome of the literature review was evaluated by qualitative approach using purposive sampling of participants that used the QMS. Interviews were conducted and data analysis performed to understand the observed trend. Based on the analysis, the CAM model was updated to incorporate the outcome of the analysis. This objective aided the gathering of data to update CAM model for assessment of non-compliance behaviour.

Objective six was to develop a persuasive framework based on the identified gaps from the initial assessment of non-compliance. The discussion of the data gathered from the evaluation of the CAM model identified some gaps that needed to be addressed to improve behaviour. This led to the application of behaviour change models to develop a framework from the change drivers that were identified from the gaps in the initial assessment of CAM. The CLUES framework that incorporated change drivers like Community Influence, Leadership style, Usefulness, Ease of use and Stakeholder Behaviour. This objective was achieved as a CLUES framework was developed.

Objective Seven was to develop interventions based on the outcome of the persuasive framework. With the CLUES framework developed, interventions were developed from the change drivers for application in the blood establishment. This was achieved by using the design principles for software design from the Persuasive System Design (PSD). This allowed for interventions to be categorised based on the change drivers of the CLUES Persuasive framework. The framework and the interventions provided means to address the gaps identified from the initial work to improve the compliance behaviour of the subjects. This objective was achieved through as interventions were developed from the CLUES framework.

Objective Eight was to evaluate the interventions by use of chosen research group. Here, selected interventions from the CLUES framework were applied within the pilot group over a period of three months and data gathering was performed using interviews. The data showed that the interventions improved the compliance behaviour of the participants.

In conclusion, the analysis of the objectives showed that the study addressed the aims and the objectives by developing a CAM model to understand the reasons behind the non-compliance behaviour and a CLUES framework to improve behaviour by addressing the gaps identified.

The research clearly showed that the CAM model provided an appropriate tool for the assessment of non-compliance behaviour. The model showed that many factors affect the compliance behaviour of the subjects and by understanding these factors, behavioural changes can be made. Moreover, the CLUES model allowed for the development of generic interventions that are beneficial in behaviour change. In all, the research has shown that, the need to maintain a compliance behaviour in a regulated environment can be achieved with the use of the Compliance assessment model and the CLUES persuasive framework.

8.3 Research Contributions

Some contributions have been made from this research with provision of Compliance Assessment Model (CAM) and CLUES Persuasive Framework. These contributions from the research provide outcomes in the form of practical and theoretical which are discussed below

8.3.1 Practical

As a result of this research, some artefacts have been developed that have practical application. The aim of the research being to develop model to understand the non-compliance behaviour and improve the behaviour has led to the design of CAM model and CLUES persuasive framework. The CAM model can be used by project managers and leaders within organisations as part of stakeholder analysis so assess the initial installation of IS in this case QMS. This is because this model incorporates TAM model and Activity Theory which allows for assessment of non-compliance, during implementation and routine use. The research provides an innovative approach to how regulated organizations can support their implementations of Quality Management Systems (QMS) through the identification of subject's intension to compliantly use the system. The research provides novel and original means to assess non-compliance for implementation and ongoing use of the tool.

Moreover, the model may also be used for the assessment of non-compliance behaviour for ongoing use of the tools and systems in place. This novel approach can easily be put into practice as evidenced in application of the model in the blood establishment.

In addition, the CLUES framework which was designed to improve compliance behaviour aided to achieve the goal. This will allow persuasive designers to use this framework when designing persuasive systems in a more systematic approach. The change drivers in the framework shows areas that persuasion should be targeted to achieve the required behaviour change. The framework allowed for the generation of design interventions that support changing needs of users. Also, the generic compliance interventions that were realised from this research may be used across different organisations and environments to improve compliance behaviour of subjects.

In practice, both the CAM model and the CLUES framework have been applied in the blood establishment with successful outcome.

8.3.2 Theoretical

This research was new and innovative in that there has been very little work integrating Technology Acceptance Model and Activity Theory for assessment of non-compliance behaviour. It provides a systematic approach for the assessment of non-compliance behaviour and improvement of compliance behaviour. The extension of TAM and Activity Model strengthens understanding of non-compliance behaviour and added to the theory of both TAM and Activity Theory. The application of the CAM model in the Blood Establishment added understanding of non-compliance behaviour and depth to technology acceptance and Activity Theory research. The knowledge base is extended by application of CAM model to understand the reasons behind the non-compliance behaviour.

The Compliance assessment Model developed by extension of TAM and Activity Theory provides approach for researchers to assess non-compliance behaviour of subjects. The model suggested different constructs and variables that are relevant to the compliance behaviour of the subjects. This helps to expand the knowledge base in compliance and provide systematic approach in compliance assessment. The CAM model adds to the existing methods for the analysis and evaluation of subject's intention to use information system or the tool in place. The CAM model provides application for monitoring progress in behaviour change in addition to the provision of method for assessment of the non-compliance behaviour. It simplifies the assessment process and provides capability of assessing the intentions of user's to compliantly use the systems in place.

Moreover, the studies provided extended knowledge base in behaviour change theories through the application of the CLUES framework. The CLUES framework is a novel framework that may be used for persuasion of the subjects to improve compliance behaviour. This provides further method in addition to existing methods in persuasion. Furthermore, the interventions that were developed from the CLUES framework also provided extended knowledge base in the persuasive system design. The generic compliance interventions from the framework provides a process for stakeholders to change their behaviour.

In general, CAM model and CLUES framework provides a methodological process for assessment of non-compliance behaviour and improvement of compliance behaviour.

8.4 Future work

The use of CAM model to support assessment of non- compliance behaviour and CLUES framework to improve compliance behaviour is an exciting research area and is ripe for future study. The interesting findings from this research gives credibility to the need for

further research. Following the limitations outlined in the previous chapter, the following future studies is proposed.

8.4.1 Compliance Assessment Model

As CAM model relies on the prediction of intention of the subjects, there is the need to assess the relationship of the variables and constructs using structural equation model. This provides confirmation for the relationships between the constructs and variables in the CAM model to provide the needed outcome. Moreover, quantitative approach may be applied to test the hypothesis, with statistical significance that the CAM model provide means to assess non-compliance. This will provide needed data for further use of the model to assess non-compliance. Furthermore, research should be performed with larger samples. Studies with larger samples would provide more accurate statistical analysis and ability to study the in-depth relationship between the model constructs and the assessment of non-compliance behaviour. Longitudinal research would provide a better window into causal relationships as well as the impact of interventions on behavioural intention. It would also provide better information into the relationship between intent to comply and actual compliance.

8.4.2 Behaviour Change Prediction - CLUES

As CLUES aims to improve compliance, it is proposed that future work should be performed using larger sample size and different departments. Moreover, the selection criteria of participants for the study should be considered to allow for data from different background and perspective on the subject. It would also be interesting to compare the results of the qualitative approach with a survey that was administered a few months after applying the CLUES framework to assess the influence of the persuasive framework.

8.4.3 Research approach

As mentioned earlier, due to the complex nature of human behaviour, validation should be conducted over a long period of time to determine how users of a persuasive application will change the behaviour of the users. It is recommended that future research should be validated with large participants from different background to make the outcome more generalisable. Moreover, the research should be performed in different organisational setting to ascertain whether the outcome of the research in the blood establishment can be replicated in other regulated and non-regulated organisations. Furthermore, different assessment model should be applied to assess the reasons behind the non-compliance behaviour and compare the outcome with this research.

8.4.4 Evaluation of research

The evaluation for CAM model was performed using participants from different departments in the same blood establishment. There is the need for further evaluation using bigger sample size and from different organisation. This will allow for data to be gathered to show that the model can be applied in different environment. Moreover, the CLUES framework should also be applied with larger sample size. This may also need further study that is performed over a prolong period to demonstrate that the behaviour change can be achieved using the framework. Furthermore, the four participants that were interviewed as part of evaluation of CLUES framework were aware of the interventions before the interview. This may make their answers not sufficiently objective. Further study should be carried out where a control group is set up to compare the results. The control group will not be exposed to any interventions to compare the outcome of the interventions on the group that had interventions applied. This will allow for better assessment of the intervention to ascertain whether it influenced the observed outcome.

Reference

Abdullah, N.S., Indulska, M. and Sadiq, S. (2016). Compliance management ontology – a shared conceptualization for research and practice in compliance management. Inf Syst Front 18, 995–1020 https://doi.org/10.1007/s10796-016-9631-4

Abdullah, S. N., Sadiq S., and Indulska M. (2010) Emerging Challenges in Information Systems Research for Regulatory Compliance Management. In: Pernici B. (eds) Advanced Information Systems Engineering. CAiSE 2010. Lecture Notes in Computer Science, vol 6051. Springer, Berlin, Heidelberg

Abdullah, Z., (2014). Activity Theory as Analytical Tool: A Case Study of Developing Student Teachers' Creativity in Design. *Procedia - Social and Behavioral Sciences*, 131(2010), pp.70–84. Available at: http://www.sciencedirect.com/science/article/pii/S1877042814029929.

Aguinis, H. and Kraiger, K. (2009). Benefits of Training and Development for Individuals and Teams, Organizations, and Society, Annual Review of Psychology 60:1, 451-474

Alberto, C., Simoni, C. & Baranauskas, M.C.C., (2004). The Practice of Software Development and the Organisational Semiotics Approach : A Case Study in Business Organizations.

Aronson, E. (1969). The theory of cognitive dissonance: A current perspective. Advances in experimental social psychology, 4, 1-34.

Aronson, E., & Mills, J. (1959). The effect of severity of initiation on liking for a group. Journal of Abnormal and Social Psychology, 59: 177-181.

Avison, D. & Elliot, S. (2006). Scoping the discipline of information systems. Information Systems: The State of the Field, 3-18.

Badino, M. (2015), In the theoretician's workshop: Notes for a historical and philosophical analysis of theories,The Bumpy Road, Springer, Cham., pp. 1–28

Baskerville, R., Pries-Heje, J. and Venable, J. (2009). "Soft Design Science Methodology." In Proceedings of Design Science Research in Information Systems and Technology (DESRIST), Vaishnavi, V. and Purao, S. (Eds.), ACM, Philadelphia, PA.

Bellamy, R., Erickson, T., Fuller, B., Kellogg, W., Rosenbaum, R., Thomas, J., & Vetting Wolf, T. (2007). Seeing is believing: Designing visualizations for managing risk and compliance. IBM Systems Journal, 46(2), 205-218.

Benbasat, I. and Barki, H. (2007) Quo Vadis, TAM? Journal of the Association for Information Systems, 4, 211-218.

Birse, M. & Inspectorate, G.M., (2015). N E W S L E T T E R , M A R C H 2 0 1 5.

Carlsson, S.A. (2006). "Towards an Information Systems Design Research Framework: A Critical Realist Perspective," In Proceedings of the First International Conference on Design Science in Information Systems and Technology, Claremont, 192-212.

Caron,F., Vanthienen, J., and Baesens, B.(2013). Comprehensive rule-based compliance checking and risk management with process mining Decis. Support Syst., 54 (3), pp. 1357-1369

Churchward, D (2019), Quality Culture: Learning from History. MHRA Inspectorate https://mhrainspectorate.blog.gov.uk/2019/02/28/quality-culture-learning-from-history/

Chuttur, M.Y. (2009). Overview of the Technology Acceptance Model: Origins, Developments and Future Directions, Indiana University, USA, Sprouts: Working Papers on Information Systems

Cialdini, R. B.,. Petty R. E, and Cacioppo. J. T. (1981). “Attitude and Attitude Change,” Annual Reviews in Psychology (32), pp. 357-404.

Cooper, J. (2012). Cognitive dissonance theory. In P. A. M. Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), Handbook of theories of social psychology: 377-397. Thousand Oaks, CA: Sage.

Craig, P., Dieppe, P.A., Macintyre, S., Michie, S., Nazareth, I. and Petticrew, M. (2008). Developing and evaluating complex interventions: The new Medical Research Council guidance. British Medical Journal, 337: 979–983.

Cramer, J.A.,Roy,A., Burrell, A., Fairchild, C.J., Fuldeore, M.J., Ollendorf, D.A., Wong, P.K (2008). Medication compliance and persistence: terminology and definitions. *Value in health : the journal of the International Society for Pharmacoeconomics and Outcomes Research*, 11(1), pp.44–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18237359.

Dankwa, K. D. (2020). Deciphering the Myth About Non-Compliance and Its Impact on Cyber Security and Safety. In Yaokumah, W., Rajarajan, M., Abdulai, J., Wiafe, I., & Katsriku, F. A. (Eds.), Modern Theories and Practices for Cyber Ethics and Security Compliance (pp. 59-72). IGI Global. http://doi:10.4018/978-1-7998-3149-5.ch004

Dankwa K., & Nakata K. (2018). Getting it right: A model for compliance assessment. In: Liu K., Nakata K., Li W., Baranauskas C. (eds) Digitalisation, Innovation, and Transformation. ICISO. *IFIP Advances in Information and Communication Technology, 527.* Springer, Cham.

Dankwa K., Nakata K. (2016). Making Sense of Non-compliance: A Semiotic Approach. In: Baranauskas M., Liu K., Sun L., Neris V., Bonacin R., Nakata K. (eds) Socially Aware Organisations and Technologies. Impact and Challenges. ICISO 2016. IFIP Advances in Information and Communication Technology, vol 477. Springer, Cham

Darnton, A. (2008). Reference Report: An Overview of Behavioural Change Models and their Uses. Government Social Research (GSR) Behaviour Change Knowledge Review.

D'Arcy, J., Hovav, A and Galletta, D. (2009). User Awareness of Security Countermeasures and Its Impact on Information Systems Misuse: A Deterrence Approach. Information Systems Research. 20(1):1-157. https://doi.org/10.1287/isre.1070.0160

Daud, S. et al., (2011). Compliance to thesis examination procedure in the ISO quality management system for teaching and learning. *Procedia - Social and Behavioral Sciences*, 18, pp.18–23. Available at: http://dx.doi.org.idpproxy.reading.ac.uk/10.1016/j.sbspro.2011.05.004.

Davis, F. D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", MIS Quarterly, 13 (3): 319–340

Davis, F., Bagozzi, R. and Warshaw, P. (1989). User Acceptance of Computer Technology: A comparison of two Theoretical Model, Management Science 35(8):982-1003

Dey, I. (1995), “Reducing fragmentation in qualitative research”, Computer-Aided Qualitative Data Analysis:Theory, Methods and Practice, London, Sage.

Dietrich, C. (2010). "Decision Making: Factors that Influence Decision Making, Heuristics Used, and Decision Outcomes." Inquiries Journal/Student Pulse, 2(02). Retrieved from http://www.inquiriesjournal.com/a?id=180

Dillon, A. (2001). User acceptance of information technology 2001, :(10) Encyclopedia of Human Factors and Ergonomics. http://hdl.handle.net/10150/105880

Dillon, A. & Morris, M.G. (1996). User acceptance of new information technology: theories and models. , 31, pp.3–32.

Dohnke, B., Weiss-Gerlach, E. and Spies, C.D. (2011)'Social Influncess on the motivation to quit smoking: Main and moerating effects of social norms', Additive Behaviours, vol.26, no 4, pp 286-293

Engeström, Y. (1991): Activity Theory and Individual and Social Transformation. Activity Theory, vol. 7, no. 8, pp. 6–17.

Engestrom, Y. (1987). Learning by expanding: An activity –theoretical approach to developmental research (Helsinki, Orienta – Konsultit).

Etchells, E., Juurlink, D. and Levinson, W. (2008). Medication errors: the human factor. CMAJ 178 (1) 63-64; DOI: https://doi.org/10.1503/cmaj.071658

Fjeld, M., Lauche, K., Bichsel, M., Voorhorst, F., Krueger, H., Rauterberg, M. (2002): Physical and Virtual Tools: Activity Theory Applied to the Design of Groupware. In B. A. Nardi & D. F. Redmiles (eds.) A Special Issue of Computer Supported Cooperative Work (CSCW): Activity Theory and the Practice of Design, Volume 11 (1–2), pp. 153–180.

Festinger, L. (1957). A Theory of Cognitive Dissonance. California: Stanford University Press.

Fogg, B. (2009a) Creating persuasive technologies: an eight-step design process. 4th international conference on persuasive technology, ACM New York, NY, USA.

Fogg, B. (2009b), A behavior model for persuasive design. 4th International Conference on Persuasive Technology, Claremont, California. ACM New York, NY, USA

Fogg, B. J. (1998). “Persuasive Computers: Perspectives and Research Directions” in Proceedings of the CHI 98 Conference on Human Factors in Computing Systems. Los Angeles: ACM Press/Addison-Wesley Publishing Co, pp. 225-232.

Friedkin, N.E. (2001). Norm formation in social influence networks, Social Networks; Volume 23, Issue 3, Pages 167-189, ISSN 0378-8733, https://doi.org/10.1016/S0378-8733(01)00036-3.

Friedman, B. (1996). Value-Sensitive Design. Interactions, 3 (6), 16–23

Gao, L. & Kling, G. (2012). The impact of corporate governance and external audit on compliance to mandatory disclosure requirements in China. *Journal of International Accounting, Auditing and Taxation*, 21(1), pp.17–31. Available at: http://dx.doi.org.idpproxy.reading.ac.uk/10.1016/j.intaccaudtax.2012.01.002.

Ghanavati S., Amyot D., Peyton L. (2007) Towards a Framework for Tracking Legal Compliance in Healthcare. In: Krogstie J., Opdahl A., Sindre G. (eds) Advanced Information Systems Engineering. CAiSE 2007. Lecture Notes in Computer Science, vol 4495. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-540-72988-4_16

Giere, R.N. (2000), Theories. A companion to the philosophy of science, pp. 515–524.

Goldstein, I.L. and Ford, J.K. (2002). Training in Organizations. Belmont, CA: Wadsworth. 4th ed.

Governatori, G. (2014). ICT Support for Regulatory Compliance of Business Processes. , pp.21–22. Available at: http://arxiv.org/abs/1403.6865.

Griffin, E. and Mcclish, G. (1991). A first look at communication theory, McGraw-Hill New York.

Harmon-Jones, E. and Harmon-Jones, C. (2007). Cognitive dissonance theory after 50 years of development. *In* Journal of Social Psychology, 38**,** 7-16.

Harjumaa, M. and Muuraiskangas, S. (2014) "Building Persuasiveness into Information Systems" The Electronic Journal Information Systems Evaluation Volume 17 Issue 1 2014, (023-035), available online at www.ejise.com

Harjumaa, M., Segerståhl, K. and Oinas-Kukkonen, H (2009). Understanding persuasive software functionality in practice: a field trial of polar FT60. Persuasive '09: Proceedings of the 4th International Conference on Persuasive Technology, No.: 2 Pages 1–9 https://doi.org/10.1145/1541948.1541952

Hamre, L.J., (2008). Exploring the use of social capital to support technology adoption and implementation University of Bath.

Haselhuhn, M. P., Pope, D. G., Schweitzer, M. E., & Fishman, P. (2012). The Impact of Personal Experience on Behavior: Evidence From Video-Rental Fines. Management Science, 58 (1), 52-61. http://dx.doi.org/10.1287/mnsc.1110.1367

Herath, T. and Rao, H.R. (2009), "Protection motivation and deterrence: a framework for security policy complianceinorganisations", EuropeanJournalofInformationSystems,Vol.18No.2,pp.106-125.

Herrmann, D.S. (2006), Complete Guide to Security and Privacy Metrics (ISBN 0-8493-5402-1), CRC Press, Boca Raton, FL.

Hevner, A. R. (2007). The three cycle view of design science research. Scandinavian Journal of Information Systems, 19, 87

Hevner, A., March, S., Park, J. and Ram, S. (2004). "Design Science in Information Systems Research." MIS Quarterly 28(1): 75-105.

Hillson, D., Murray-webster, R. & Doctor, R. (2004). Understanding and Managing Risk Attitude. , pp.1–6.

Hirschauer, N; Bavorova, M. & Martino, G. (2012). An analytical framework for a behavioural analysis of non-compliance in food supply chains. *British Food Journal*, 114(9), pp.1212–1227.

Hirschheim, R. & Klein, H. K. (1994). Realizing emancipatory principles in information systems development: the case for ETHICS. MIS quarterly, 83-109.

Hofstede, G. (2011). Dimensionalizing Cultures: The Hofstede Model in Context. Online Readings in Psychology and Culture, 2(1). https://doi.org/10.9707/2307-0919.1014

Hofstede, G., Hofstede, G. J. & Minkov, M. (2010). Cultures and Organizations: Soware of the Mind, Third Edition. New York, NY: McGraw-Hill Professional

Hofstede, G. (2001). Culture's Consequences: Comparing Values, Behaviours, Institutions, and organizations across nations (2nd edition). Thousand Oaks, California: Sage Publications, Inc.

Horvath, I. (2019). Combining Unmergeables: A Methodological Framework for Axiomatic Fusion of Qualitative Design Theories. Proceedings of the Design Society: International Conference on Engineering Design, 1(1), 3591-3600. doi:10.1017/dsi.2019.366

Hu, Q., Xu, Z., Dinev, T. and Ling, H. (2011)"Does deterrence work in reducing information security policy abuse by employees?" Communication of the ACM, Vol.54 No.6, pp 54-60

Hollnagel E. (1993) Reliability of cognition: foundations of human reliability analysis. London: Academic Press.

Hwang, I., Kim, D., Kim, T. and Kim, S. (2017), "Why not comply with information security? An empirical approach for the causes of non-compliance", Online Information Review, Vol. 41 No. 1, pp. 2-18. https://doi.org/10.1108/OIR-11-2015-0358

Interligi, L. (2010). Compliance culture: A conceptual framework. Journal of Management & Organization, 16(2), 235-249. doi:10.1017/S1833367200002157

Iscenko, Z., Pickard, C., Smart, L., and Vasas, Z (2016). Encouraging debate among academics, practitioners, and policymakers in all aspects of financial regulation; FCA occasional papers in financial regulation; Paper 24. Behaviour and Compliance in Organisations. www.fca.org.uk

Jenkinson, D. (1996). Compliance Culture. *Journal of Financial Regulation and Compliance*, 4(1), pp.41–46.

Kaptelinin, V. (2014). Activity Theory. In: Soegaard, Mads and Dam, Rikke Friis (eds.). "The Encyclopedia of Human-Computer Interaction, 2nd Ed." Aarhus, Denmark: The Interaction Design Foundation

Kaptelinin, V., & Nardi, B. A. (2006). Acting with technology: Activity theory and interaction design. Cambridge, MA: MIT Press.

Kelders, S.M, Kok, R.N, Ossebaard, H.C, Van Gemert-Pijnen, J.E (2012) Persuasive System Design Does Matter: A Systematic Review of Adherence to Web-Based Interventions., J Med Internet Res;14(6):e152

Kharbili, M.E., Stein,S., Markovic,I., and Pulvermüller, E. (2008). Towards a framework for semantic business process compliance management, in: International Workshop on

Governance, Risk and Compliance—Applications in Information Systems (GRCIS08′), pp. 1–15

Lai, P. C. (2017). The literature review of technology adoption models and theories for the novelty technology. Journal of Information Systems and Technology Management, 14(1), 21–38. doi:10.4301/ S1807-17752017000100002

Legris, P., Ingham, J. & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*, 40(3), pp.191–204. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0378720601001434.

Lehman, K. (2008). Research methodology. , pp.97–120. Available at: http://eprints.utas.edu.au/8527/.

Lehto, T. and Oinas-Kukkonen, H. (2013)'Explaining and Predicting Percieved Effectiveness and Use Continuance Intention of a Behaviour Change Support System for Weights Loss', Behaviour and Information Technology, DOI:10.1080/0144929X.2013.866162

Leont'ev, A.N. (1981): Problems of the Development of Mind. Moscow: Progress.

Lerbinger, O. (1972). Designs for Persuasive Communication. New Jersey: Englewood Cliffs.

Liu, K., (2000). Semiotics in Information Systems Engineering. Available at: http://ebooks.cambridge.org/ref/id/CBO9780511543364.

Locke, E.A. and Latham, G.P (2002), Building a practically useful theory of goal setting and task motivation. American Psychologist, 59(7), 705-717.

Lu, R H.Y. and Mande, V. (2014). Factors influencing non-compliance with ASU 2010-06 in the banking industry. *Managerial Auditing Journal*, 29(6), pp.548–574. Available at: http://www.emeraldinsight.com/doi/abs/10.1108/MAJ-08-2013-0928.

Lyons EJ, Hatkevich C. (2013). Prevalence of behavior changing strategies in fitness video games: theory-based content analysis. J Med Internet Res.;15(5):e81. doi: 10.2196/jmir.2403. http://www.jmir.org/2013/5/e81/ [PMCID: PMC3650924] [PubMed: 23651701] [CrossRef: 10.2196/jmir.2403]

March, S.T., Smith, G.F. (1995). Design and natural science research on information technology.

Martins, C.E. and Meyer, W.H (2012). Organizational and behavioural factors that influence knowledge retention. *Journal of Knowledge Management. 16.* 77-96. 10.1108/13673271211198954.

Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. Information Systems Research, vol. 2, issue 3, 173-19. https://doi.org/10.1287/isre.2.3.173

McCarthy, J. (1980). "Circumscription—A Form of Non-Monotonic Reasoning." Artificial Intelligence 13: 27-39. Decision Support Systems .15 (4), pp. 251–266.

McGuire, W. J. (1973). "Persuasion" in G. A. Miller (ed.) Communication, Language, and Meaning Psychological Perspectives, New York: Basic Books, pp. 242-255

Mingers, J., 2004. Real-izing information systems: critical realism as an underpinning philosophy for information systems. *Information and Organization*, 14(2), pp.87–103. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1471772704000168.

Mingers, J. (2001). "Combining IS Research Methods: Towards a Pluralist Methodology." Information Systems Research 12(3): 240-259.

Mohr, D.C., Schueller, S.M., Montague, E., Burns, M.N., PhD,1 and Rashidi, (2014). The Behavioral Intervention Technology Model: An Integrated Conceptual and Technological Framework for eHealth and mHealth Interventions., J Med Internet Res. 2014 Jun; 16(6): e146.

Myers, M., and Venable, J. (2014). "A set of Ethical Principles for Design Science Research in Information Systems." Information and Management 51(6): 801-809.

Murphy, G. D. and Chang, A. (2002) Enterprise Systems and Social Networks: Extending User Acceptance Theory. Eighth Americas Conference on Information Systems.

Niehaves, B. (2007). "On Epistemological Diversity in Design Science—New Vistas for a Design-Oriented IS Research." In Proceedings of ICIS 2007, Montreal, Quebec, Canada.

Nisbett, R.E. and Ross, L. (1980). Human Inference: Strategies and Shortcomings of Social Judgment. Englewood Cliffs, NJ: Prentice-Hall.

Oinas-Kukkonen, H. (2012) ‘A Foundation for the Study of Behavior Change Support Systems’, Personal and Ubiquitous Computing, vol. 17, no. 6, pp. 1223-1235.

Oinas-Kukkonen, H., (2010a). Behavior change support systems: The next frontier for web science.

Oinas-Kukkonen, H. (2010b) Behavior Change Support Systems: A Research Model and Agenda. Persuasive Technology, Springer, 4-14.

Oinas-Kukkonen, H and Harjumaa, M (2009) "Persuasive Systems Design: Key Issues, Process Model, and System Features," Communications of the Association for Information Systems: Vol. 24, Article 28. Available at: http://aisel.aisnet.org/cais/vol24/iss1/28

Oinas-Kukkonen, H. and M. Harjumaa. (2008). “Towards Deeper Understanding of Persuasion in Software and Information Systems“ in Proceedings of The First International Conference on Advances in Human-Computer Interaction (ACHI 2008), electronic publication, ISBN 978-0-7695-3086-4, pp. 200-205

O’Neill, A., (2014). An action framework for compliance and governance. *Clinical Governance: An International Journal*, 19(4), pp.342–359. Available at: http://www.emeraldinsight.com/doi/abs/10.1108/CGIJ-07-2014-0022.

Orji, R. and Moffatt K. (2018). Persuasive technology for health and wellness: State-of-the-art and emerging trends. Health Informatics Journal. 24(1):66-91. doi:10.1177/1460458216650979

Orlikowski, W. J. and. Baroudi, J. J. (1991). Studying information technology in organisations: Research approaches and assumptions." Information systems research. 2 (1), pp. 1-28.

Oshlyansky, L and Thimbleby, H. (2007). Validating the Unified Theory of Acceptance and Use of Technology (UTAUT) tool cross-culturally. 10.14236/ewic/HCI2007.67.

Park, J. & Jung, W., (2003). The operators’ non-compliance behavior to conduct emergency operating procedures - Comparing with the work experience and the complexity of procedural steps. *Reliability Engineering and System Safety*, 82(2), pp.115–131.

Peffers, K., Tuunanen, T., Rothenberger. M.A., Chatterjee., S. (2007). A Design Science Research Methodology for Information Systems Research, Journal of Management

Information Systems, 24:3, 45-77, DOI: 10.2753/MIS0742-1222240302. https://doi.org/10.2753/MIS0742-1222240302

Peirce, C.S.(1958). Collected Papers of Charles Sanders Peirce, 8 vols. Edited by Charles Hartshorne, Paul Weiss, and Arthur W. Burks (Harvard University Press, Cambridge, Massachusetts, 1931–1958; vols. 1–6 edited by Charles Harteshorne and Paul Weiss, 1931–1935; vols. 7–8 edited by Arthur W. Burks, 1958).

Petty, R. E. and Cacioppo. J. T. (1986). Communication and Persuasion: Central and Peripheral Routes to Attitude Change, New York: Springer-Verlag.

Pinsker, R. & Dominion, O. (2008). An Empirical Examination of Competing Theories to Explain Continuous Disclosure Technology Adoption Intentions Using XBRL as the Example Technology. , 8(July), pp.81–96.

Pereira, R., Baranauskas, M. and Liu, K. (2015). On the Relationships between Norms, Values and Culture: Preliminary Thoughts in HCI. IFIP Advances in Information and Communication Technology. 449. 30-40. 10.1007/978-3-319-16274-4_4.

Punch, K.F. (1998) Introduction to Social Research: Quantitative and Qualitative Approaches. Sage, London

Purao, S. (2013). “Truth or Dare: The Ontology Question in Design Science Research.” Journal of Database Management 24(3): 51-66

Read, A.D., West, R.J. & Kelaher, B.P., (2015). Using compliance data to improve marine protected area management. *Marine Policy*, 60, pp.119–127. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0308597X15001670.

Reason, J (1995). Understanding adverse events: human factors. Quality in Health Care;4:80-89.

Redfern, J., Santo, K., Coorey, G., Thakkar, J., Hackett, M., Thiagalingam, A., & Chow, C. K. (2016). Factors influencing engagement, perceived usefulness and behavioral mechanisms associated with a text message support program. PLoS One, 11(10) doi:http://dx.doi.org/10.1371/journal.pone.0163929

Reimers, K., Andersson, D. (2017). Post-secondary education network security: the end user challenge and evolving threats, iceri Proceedings, 1787-1796.

Sadiq, S., Governatori, G., and Naimiri, K. (2007). Modeling control objectives for business process compliance, in: International Conference on Business Process Management, pp. 149–164.

Salter, A. & Liu, K., (1985). USING SEMANTIC ANALYSIS AND NORM ANALYSIS TO MODEL ORGANISATIONS.

Sang Soo Kim and Yong Jin Kim, (2017) "The effect of compliance knowledge and compliance support systems on information security compliance behavior", Journal of Knowledge Management, Vol. 21 Issue: 4, pp.986-1010, https://doi.org/10.1108/ JKM-08-2016-0353

Saunders, M., Lewis, P. and Thornhill, A. (2009). Understanding research philosophies and approaches. Research Methods for Business Students. 4. 106-135.

Schnipper, J.L., Kirwin, J.L. and Cotugno, M. C. (2006). Role of pharmacist counseling in preventing adverse drug events after hospitalization. Arch Intern Med.; 166:565-71

Scott, D. (Ed.), Usher, R. (Ed.). (1996). Understanding Educational Research. London: Routledge, https://doi.org/10.4324/9780203131923

Shah, N., Castro-Sánchez, E., Charani, E., Drumright, 1. L., and Holmes, A. H. (2015). Towards changing healthcare workers' behaviour: a qualitative study exploring non-compliance through appraisals of infection prevention and control practices. *Journal of Hospital Infection*, 90, pp.126–134. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0195670115000791.

Silva, M, E., Graham, F., Levack, W., & Hay-Smith, E.J.C. (2019). Persuasive technology and behaviour change in parent-focused eHealth interventions supporting child health: A scoping review protocol. New Zealand Journal of Physiotherapy, 47(1), 36-48. https://doi.org/10.15619/NZJP/47.1.05

Silveira, P.; Rodriguez, C.; Birukou, A.; Casati, F.; Daniel, F.; D'Andrea, V.; Worledge, C.; Zouhair, T. (2012), Aiding Compliance Governance in Service-Based Business Processes, IGI Global, pp. 524–548

Simon, H. A. (1996). The Sciences of the Artificial (3rd ed.), MIT Press, Cambridge, MA.

Sohn, M. and Lee, J.(2007). "UP Health: Unbiquitously Persuasive Health Promotion with an Instant Messaging System" in Proceedings of ACM CHI 2007 Conference Extended

Abstracts on Human Factors in Computing Systems, New York: ACM Press, pp.2663-2668.

Solomon, J.N., Gavin, M.C. & Gore, M.L., (2015). Detecting and understanding non-compliance with conservation rules. *Biological Conservation*, 6, pp.2013–2016. Available at: http://dx.doi.org/10.1016/j.biocon.2015.04.028.

Stamper, R. K. (1992). Language and computer in organised behaviour. In Riet R. and Meersman, R. (eds), Linguistic Instruments in Knowledge Engineering, Elsevier Science, pp. 143-163

Stamper, R. and Liu, K. (2000). Understanding the Roles of Signs and Norms in Organisations. , 19, pp.15–27.

Stamper, R., Liu, K., Hafkamp, M., Ades, Y., (2000) Understanding the Role of Signs and Norms in Organisations – a semiotic approach to information systems design, Journal of Behaviour and Information Technology, 19 (1), 15-27.

Tam, V.C., Knowles, S.R. and Cornish, P.L. (2005). Frequency, type and clinical importance of medication history errors at admission to hospital: a systematic review. CMAJ;173:510-5.

Thompson, R.L., Higgins, C.A. and Howell, J.M. (1994), "Influence of experience on personal computer utilization: testing a conceptual model", Journal of Management Information Systems, Vol. 11 No. 1, pp. 167-187

Torning, K and Oinas-Kukkonen, H. (2009). Persuasive system design : State of the art and future directions. 350. 30. 10.1145/1541948.1541989.

Vaishnavi, V., and Kuechler, B. (2004). Design Research in Information Systems. January 20, 2004 ed.: AIS.

van der Linden, S. (2013). "A Response to Dolan. In A. Oliver (Ed.)" . pp. 209–2015.

Vanhée, L. and Dignum, F., (2018) 'Explaining the Emerging Influence of Culture, from Individual Influences to Collective Phenomena' Journal of Artificial Societies and Social Simulation 21 (4) 11 <http://jasss.soc.surrey.ac.uk/21/4/11.html>. doi: 10.18564/jasss.3881

Venable, J.R., and Baskerville, R. (2012). Eating our own cooking: toward a more rigorous design science of research methods. Electronic Journal of Business Research Methods. 10 (2), pp. 141– 153.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", MIS Quarterly, Vol. 27 No. 3, pp. 425-478.

Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. Information Systems Research, 11(4), 342-365. Retrieved July 29, 2020, from www.jstor.org/stable/23011042

Venkatesh, V. & Davis, F. D. (2000) A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46, 186(19)

Walls, J., Widmeyer, G., and El Sawy, O. (1992). "Building an Information System Design Theory for Vigilant EIS." Information Systems Research 3(1): 36-59.

Wang, S.-L. and Wu, P.-Y., 2008. The role of feedback and self-efficacy on web-based learning: The social cognitive perspective. *Computers & Education*, 51(4), pp.1589–1598. Available at: http://www.sciencedirect.com/science/article/pii/S036013150800050X.

Webb TL, Joseph J, Yardley L, Michie S. (2010). Using the internet to promote health behavior change: a systematic review and meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. J Med Internet Res.;12(1): e4. doi: 10.2196/jmir.1376. http://www.jmir.org/2010/1/e4/ [PMCID: PMC2836773] [PubMed: 20164043] [CrossRef: 10.2196/jmir.1376]

Weber, S. (2010). Design Science Research: Paradigm or Approach? Lima, Peru, August. AMCIS Proceeding. Available from: http://aisel.aisnet.org/cgi/viewcontent.cgi?article=1216&context=amcis2010. [Accessed 18/11/19]

West, R. (2008), "The psychology of security", Communications of the ACM, Vol. 51 No. 4, pp. 34-40.

Wiafe, I. and Nakata, K., (2012) Bibliographic Analysis of Persuasive Systems: Techniques, Methods and Domains of Application. 7th International Conference on Persuasive Technology, Linkoping Sweden. 61.

Wiafe, I., Alhammad, M. M., Nakata, K. & Gulliver, S. R. (2012) Analyzing the Persuasion Context of the Persuasive Systems Design Model with the 3D-RAB Model. 7th International Conference on Persuasive Technology, Linkoping Sweden. LNCS.

Yechiam, E., Barron, G. and Erev, I. (2005). The role of personal experience in contributing to different patterns of response to rare terrorist attacks. Journal of Conflict Resolution, 49, 430-439.

Yeo, A., Rahim, M. and Ren, Y. (2009). Use of Persuasive Technology to Change EndUsers' IT Security Aware Behaviour: A Pilot Study. International Journal of Behavioral, Cognitive, Educational and Psychological Sciences 48 -54.

Yi, M. Y., Jackson, J. D., Park, J. S. & Probst, J. C. (2006). Understanding Information Technology Acceptance by Individual Professionals: Toward an Integrative View. Information & Management, 43, 350-363.

Appendices

Appendix 3.4.2

Questions for interview – CAM Model

Constructs / variables	**Relevance / Importance of construct**	**Questions to ask**
Mediation or instrument	This will allow for better projection of the QMS if clear understand is achieved. It will allow to assess the perception of staff on QMS.	How do you characterise QMS within your department and organisation? What does the QMS mean to you? Have you ever had to get someone to explain some aspects of the QMS that is not clear although you are trained? How did you feel?
Subject attitude	The attitude of the subject may drive the final outcome. Understanding this will help in making inform decision. This is the feeling or opinion about something. - Is the individual's evaluation of an object and defined "belief" as a link between an object and some attribute and defined "behaviour" as a result or intention (Fishbien and Ajzen 1975).	What is your attitude towards the QMS Does your attitude to QMS affect the way you follow the QMS?
Community	Each staff operates within a structure that is set in the department. Understanding the way, the departments operate and perceives the QMS will be useful. This may be linked to the culture of the department and the organisation	What is attitude of your colleagues QMS? Department QMS? Organisation to the QMS?
Division of labour	To understand the effect of the supervisors, management and entire leadership within the department have on the day to day activities. The effect of the structure (sections, work streams etc.) on the operations. This can also be applicable to the other departments that feeds into the operations	Do you think the setup of your department (hierarchy- management /Leadership team) and their approach or relation to the QMS influence how you relate to the QMS? Do the activities in other departments in the organisation influence the way you relate to the QMS in your department? (this is within the centre and across centres in the organisation) If so how?
Perceived usefulness	By understanding Efficiency and effectiveness the behind following QMS. Will allow for assessment of why QMS is followed.	How useful do you perceive the QMS to your routine activities Do you perceive the QMS to be a hindrance to the performance of your routine process? What about emergency situations?
Perceived ease of use	By understanding the ease by which they can follow QMS.	How easy do you perceive the QMS to your work? how difficult to follow *What about the emergency situation?*
Behavioural Intention	Understanding of this will allow the actual compliance to be assessed. This construct gives the actual	Do you intend to comply with the QMS on most cases?

	outcome of the other constructs. This relates to the way in which one acts or conducts oneself, especially towards others and things. the subjective probability that an individual will perform a specified behaviour (Fishbein and Ajzen 1975)	
Actual behaviour		Do you generally comply with the QMS? WHY?

Appendix 4.4

Interview notes from participants

Staff A

Instrument/mediation

I see them as tools and programmes we have to use to regularly get information to look up things (mainly talking about Q pulse). If they were not available there will be negative impact on work.

1. **Subject Attitude**

   Is good and am open to the use of QMS even though have occasions where I don't want to face using it. I don't have problem with QMS but some aspects of the system like Document control is tedious than used to be. Again, the IT network does not support the QMS system as it should be so makes using the QMS tedious (uploading a document in Q pulse). This gives the negative connotation to the QMS.

2. **Community**

   The staff in my dept. attitude to QMS is good. We have new staffs that have been trained from the initial stages so their attitude to it is better. The older staff are more compliant now done they used to be due the support of the QA person who is good and has managed to get them on board. This was initially missing. Organisation wide – There seem to be push to follow QMS (Run down your throat) but don't really support you, official training is lacking.

3. **Division of Labour**

   My staffs in the department are influenced by me and take the QMS seriously. Senior management team do not influence me positively. They lay more emphasis on targets done what you really have to do. No time actually given to actually do the work but you are expected to do it; only interested in statistics and not the actual process been done

effectively. Other stakeholders like TAS take QMS more seriously (From the leadership team) so is easy to get things resolved with them than other departments like HS who don't really follow QMS as they should.

4. **Perceived Usefulness**

   I see the actual tools and system to be quite clunky, but I have no problem with the principles of QMS. I have issues with the way the system is developed e.g. The Doc control system which requires author to send email to the doc manager who then forwards the email and prolongs the whole process – complicated process. This was previously fine. Again, the change control process is too clunky and makes following process difficult. On a scale of 1-5 with 1 being the lowest, I will rate the QMS as 3.5

5. **Perceived Ease of use**

   It is clunky and makes following difficult. I am more likely to follow the QMS in emergency situation than in less little things. If I have to change a document and is not very important because of the process I have to go through to make the changes, I will prefer not to make the change. On a scale of 1-5 with 1 being the lowest, I will rate the QMS as 2

6. **Behavioural Intent**

   Yes my intention is to always follow the QMS

7. **Actual Behaviour**

   Yes I actually follow. Because I think is important demonstration of working to certain standards and I know is linked to license and accreditation.

Staff B

1. **Instrument/mediation**

   I see it as a fundamental part of the provision of healthcare services and products. It controls change and guarantees the products / services meet safety and quality requirements. The purpose is important but my concern is why I see some of that being rolled out. The mechanism of QA physical working within operations may be seen as potential for over work / hindrance.

2. **Subject Attitude**

   Appreciation is good but personally I feel there is disconnection between the works imposed on the lab for purposes of QA. It is at times a hindrance to the work we do in the lab. Workload of the lab is not appreciated when the QA systems are put together although QMS is for safety it seems difficult and convoluted and limits the resource available to do it leading to cutting corners. In this case, I see it more as a negative tool than a positive one.

My attitude towards it is only vocal and does not result in me being non-compliant out of principle. Attitude is that at times I don't feel I have time to do what is ask of me by the QMS which may delay the process.

3. **Community**

   General shared frustration in terms of time frame and resources which seem negative to QMS and what is done. Vocalised few times that the level of quality control by QA takes away the specialisation from the staff. The controls in regular intervals during processing tends to reduce the specialisation and makes the staff feel devalued in their area of speciality.

4. **Division of Labour**

   Yes the set up in the department do have an impact and influences the staff in the department. The attitude is negative, but my compliance is not affected in any way. Everyone has target and KPIs against QMS and this is appreciated and seen in the shop floor. However, the resource is not available but the KPIs are required to be met. QMS is at times seen to be in friction with the workload that is available. QMS seem to be in the way of meeting the KPIs at times. Moreover, the KPIs can at times prevent people from raising incidents (QIs) etc on the grounds that is producing more work on top of the workload and this will impact on the KPI. Some of the KPI's are to reduce number of QIS and as such staff will prefer not to raise a lot to meet the KPI rather than having a KPI that looks at timely and effective resolution of QIs. There should be a positive look at the QMS and not a negative one. The stakeholder's reaction and use of the QMS also influences the way we operate. The department is like a hub so other departments not conforming will have an impact on our services as we can't be reliant on their report /results. This will create more workload as we have to double check their results and convince ourselves that is correct etc.

5. **Perceived Usefulness**

   I see the QMS as important especially the daily controls for machines and equipment service etc. However, I feel what comes outside of that like the training plans and additional levels of maintaining of equipment is not useful. On a scale of 1-5 I will rate it 3 but the daily controls part I will say 5 and the others 2. This is because, I think having the training plan does not affect the way I will train staff and how staff will perform the task. Training plan is just documentation which is more of a tick box exercise rather than serving the real purpose. At times, the QMS is seen as a hindrance to the work. The level of control of the QMS is not proportional to the change you want to make, and this makes it more of a hindrance.

6. **Perceived Ease of use**

   The QMS can be seen as long winded and waste of time e.g. discard of equipment, creation of training plan which seem not to be adding any value to the process. Trying to fit it in with the allowance and resource in place does not make it easy to follow. Targets are in place to be met and QMS at times seem to be getting in the way and not easy to follow. On scale of 1-5 I will rate it as 3 for ease of use.

7. **Behavioural Intent**

   I intend to comply in all cases but may not be happy doing that.

8. **Actual Behaviour**

   I generally do but the timing may be the main non-compliance. This is because I know is important and required for the output of our process but following sequential process of the QMS may be difficult.

Staff C

1. **Instrument/mediation**

   The QMS ensure we work under the standards and guidelines we are meant to follow

2. **Subject Attitude**

   I find it useful at times when making decisions but at times I find it too picky as things that might not be as important in most cases. The QA team that ensures QMS is adhered seem to be too detached from the process and at times I don't think they know enough of what goes on in the lab.

3. **Community**

   Most colleagues see the QMS to be useless, especially with the role of QA in it. They see QA as overpaid people sitting in an office that comes around to look for dates and get people in trouble. Within PTI I think the attitude is the same across board; they see the QMS and QA as far removed from reality and the coal face operations as the activities do not align with what they do on most of the times (QMS overdo things)

4. **Division of Labour**

   Managers in the department tend to see QA and the QMS as police or alien to them and this notion is transferred across to the rest of the department. They tell people to act differently when QA is around rather than ensuring that people are doing what they are meant to do at all time. Also, they fail to tell people the 'WHY' behind what they are asking the staff to do but just tell them that QA says we should do it this way, so we have to. This sends negative feeling and sentiments across the department as the staff see QA and the

QMS as an imposition rather than helping their cause. The other stakeholders in other departments also influence the way we react to the QMS. Often time's departments / stakeholders fail to do what is required of them and this means we have to complete their task for them. With time, we stop doing it because we don't see the need for us to complete their task for them which then leads to non-compliances. Example collection teams not completing the forms or using the correct tubes for their samples.

5. **Perceived Usefulness**

   My perception is that, I don't think we need QMS to do our routine processes as most of what we do is straight forward. The QMS at times can be a hindrance to our work. The QMS ask for extra processes to be completed which add more time to our processes e.g. writing dates on tubes to be thrown into the bin. On a scale of 1-5 I will say is 2 but, in the organisation, I will say 4.

6. **Perceived Ease of use**

   The QMS is quite clear and we know what to do with it. On a scale of 1-5, I will say 4 because is easy to follow.

7. **Behavioural Intent**

   Yes, I intend to comply with the QMS. I see the need of following the QMS but still have reservation on the approach and set up of management of the QMS in the department and organisation

8. **Actual Behaviour**

   I think I do; I don't do anything dodgy. Usually I try to follow at all times. Why? Because I care about my job knowing that there are patients at the end. Also, I am perfectionist and will always try to do what is required of me.

Staff D

1. **Instrument/mediation**

   I believe that is a legal requirement and needed for the safety and quality of products but at times we are too caught up in small things like type of pen you use etc. which infuriates staff.

2. **Subject Attitude**

   My attitude towards the QMS is that is something I have to follow but at times it can be seen as unnecessary evil which gets in the way.

3. **Community**

People see it to be a waste of time and a tick box exercised with no benefit to the work at hand. In the organisation, it is a high value, high profile tool from above but on the ground floor people see it as extra work for little gain.

4. **Division of Labour**

   The setup of the department and the organisation do have an effect. People high up tends to do the QIS and actions etc, lower down don't get involve but they are meant to follow. They therefore do not see any benefit in following something they are not part off. Also, the lower floor team see QA in and point out issues then managers come around to deal with it; they see no value, only fault-finding exercise. Between stakeholders, there is not enough communication, so an action in another department ends up affecting others. The trust in the other department to do what they are supposed to be doing in line with the QMS also affect how the other departments respond to the QMS.

5. **Perceived Usefulness**

   Generally, I think I understand its value and use of it because I tend to interact with it more, but I don't think other managers and staff do. Most of the managers in my department and the staff do not feel comfortable with the QMS on routine processes. They see QA only coming to visit when something goes wrong. The interaction of people with the QMS can affect compliance. They see the usefulness of the QMS but not keen on following it at all times. On scale of 1-5 – rates it 3.

6. **Perceived Ease of use**

   I see it very easy to follow and use because of my interaction with it. What makes it difficult is that everyone uses or follows the QMS differently and as such makes the output different and difficult across board. Scale of 1-5 – rates it 3

7. **Behavioural Intent**

   Yes my intention is to follow the QMS at all times.

8. **Actual Behaviour**

   Yes, because is my job to follow, is a requirement of my job. There may be instances where I fail to follow the QMS but can't really explain why.

Staff E

1. **Instrument/mediation**

   QMS is critical to the process and used to manage the quality of the products in the organisation. It has contributed to increasing the quality of patient output. It has help to

improve patient engraftment outcome and failed engraftment is now very rare. It is valuable to increase the quality.

2. **Subject Attitude**

   Positive attitude to the QMS but it can be very cumbersome and inadequately resourced. The organisation has not put enough resource in place and is not focused appropriately. We should be benchmarking clinical outcomes between centres e.g. benchmarking cryopreservation across centres to ascertain differences and establish best practice. This can be in the form of internal 'NEQAS' but the current set up is missing out on the approach to react to the differences between centres. The procedures are national but the practices across centres may be different when impacts on outcome. This has a knock-on effect on patient treatment as the longer the patient stays in the hospital, more resource is spent which also deprives another patient of a bed. I think the QMS should be addressing ways to improve these differences across centres rather than concentrating on the number of QIs and overdue events etc.

3. **Community**

   I believe my staff are wholly appreciative of the QMS, but they can see it as a chore at times. QA and the QMS is seen as a barrier to what the staff will like to achieve in the lab. The collective believe is that they can't see the value in doing all the things they are required to do by the QMS. As an organisation, I think we are getting better as previously people were not willing to report issues due to the amount of paperwork involved. It can be seen as a burdensome process in the lab as is seen as focusing on perceived risk rather than the genuine risk. Most of the things required by the QMS are more obvious and should not be required like some of the risk assessment of change control. The KPI in place at times put people off from dealing with issues that needs addressing. There appear to be competition between the workload and the QMS instead of complimentary it.

4. **Division of Labour**

   Frontline people think that they are doing QA work as people in production will expect QA to be raising Qis and not them. They think their part in the QMS is to report the issue to QA who will raise the QI and deal with it with the help of the production manager. This is because, they think they are always rushing off their feet (very busy) which led to the mistake and to ask them to then complete QI and all related QMS paperwork, they will prefer not to report it. I think each department should have at least 1 QA person based in the lab that deals with QMS issues. Staff are reluctant to report because it is not in their interest to do so. QA should take total responsibility, and this will improve staff attitude to QMS if this is the case. Other stakeholders can have an effect on our department. Shared

procedures across departments can lead to non-compliance behaviour as the procedure often does not suit all the departments. In effect, the procedures are not followed as required and can lead to non- compliance.

5. **Perceived Usefulness**

   I see this to be useful and on the scale of 1-5, I will rate it as 3.5. Its value does not much with the work involved, the available resource is not enough. Most of the QMS do not add value to what we do. It can be seen as a system of logging problems rather than improving patient quality. Most of it are seen as a 'worthless paperwork exercise' which does not add to the quality of the product. Assessment of QI raised should not be used as standard for assessment of compliance but rather patient treatment and outcome. System in place is not user friendly and this is seen in the way people comply with the QMS (Staff do not see the benefit of following QMS). I see it as more emphasis of doing things for the sake of it rather than the actual benefit to be had. More of the perceived risk than assessing the actual risk e.g. staff having to stop work to complete paperwork because the store room temp is gone out of spec. having to call all the suppliers etc which adds no value to the work at hand as most of the items are transported to the lab with no temp monitoring anyway.

6. **Perceived Ease of use**

   QMS not easy to follow, on scale of 1-5 I will say 2. Very cumbersome and not aligned to our work. The QMS is mainly built for the blood supply (BSQR) and not for the HTA (TQSR) activities so there seem to be a conflict of interest that exist. Q pulse is also a nightmare to the QMS system. There also seem to be duplication of effort with some of the process/assigned responsibilities which tends to be shifted more to QA than the specialist/ scientist in the Lab. There is tendency for the specialist to neglect their role as QA seem to review and validate everything although they are not the experts – can lead to shift of blame if error identified.

7. **Behavioural Intent**

   Yes I always intend to comply with the QMS and this goes for all my staff. We will not deliberately fail to follow the QMS. The only issue is the time factor which might impact negatively on people intending to follow the QMS.

8. **Actual Behaviour**

   Yes I do follow the QMS because it is part of my job. I think it is important although the focus is misplaced at times. It is not an efficient system, but I always do my best to follow it.

Staff F

1. **Instrument/mediation**

   QMS are activities that needs doing from A-Z to help in the quality of the products. It comprises processes from supplier through to the user and ensures quality is maintained. This is informed by regulations and standards from regulators.

2. **Subject Attitude**

   Needs to be embedded in the culture. The attitude in the lab is that the QMS comes second to the lab work. There is the need to complete routine processes before dealing with QMS related issues e.g. staff will think of processing before thinking of outstanding audit actions in the lab. The attitude of staff may be based on the grade, with awareness of QMS increasing the higher you go in the organisation. Quality culture improvements may help appreciation of the value of QMS within the organisation.

3. **Community**

   This may have influence on the output. The attitude of the people within the department affects the way I relate to the QMS. This relates even to the QA staff who are supposed to be the custodians of the QMS. If there is the tendency for QA staff to do a careless job, then there is the occasion where even strong-willed people can be swayed to follow the masses. Organisation wide, the activities of the people at the top may affect the bottom / staff on shop floor in their relation to the QMS.

4. **Division of Labour**

   Yes, this can have an impact if the leadership/ management or supervisors fail to follow the QMS. The way the leadership relates to the QMS can impact on the way the shop floor staff relates to it. Departmental differences can impact on the overall target for the organisation. People can try to comply with the QMS without doing it properly. Qis are closed early to ensure KPI's are met but CAPA not effective. This can even be seen in the QA department where staff try to close Qis to meet KPIs without following up on CAPA to ensure that they are effective.

5. **Perceived Usefulness**

   Yes, if it is perceived as useful tool then people will appreciate it better. If audit process is seen as a useful tool, then people will accept it better and be willing to embrace it.

6. **Perceived Ease of use**

Yes. If it is perceived as easy to follow, then people will follow it. Example, Q pulse which is one of the tools to manage QMS is not liked by people so they will try as much as possible not to interact with it.

7. **Behavioural Intent**

   Yes. I see it as part of my day to day stuff, I see QMS as part of the process and so the intention is to use it.

8. **Actual Behaviour**

   Yes. I do follow it. People might follow it depending on the tools and resources available

Staff G

1. **Instrument/mediation**

   Is essential particularly with the kind of products we produce – to save lives. The QMS guarantees safety and quality of our products as can't rely on recall like car manufacturers. But does it work? The system is good but is the way we use and manage it. It relies on staff that use it to self-monitor and supervised but often times QMS is sacrifice for sake of expediency. Example – training in pulse use is done on live system instead of waiting to get the appropriate log in for trainees. The system should be 'God' or 'Rule' if we really want it to work. If is to be breached, then we have to stop the work. QMS need to be flexible to allow for use. We have a system that can work but the 'policing' or managing if not efficient.

2. **Subject Attitude**

   QMS is first to my work as it provides me with the confidence for the product to be released. I don't see why we should be deviating from it.

3. **Community**

   The department as a whole does not hold the QMS in high esteem as it should. If following will make their work harder, there is the tendency for people to go around it. Human nature is to try and get around. I don't think anyone comes into to work to sabotage the products buy there are small things that people knowingly will allow things to go without worrying about. Failure of management structure in line with KPIs etc have also contributed to the failures in QMS. Example: training people on the 'live pulse' system when not allowed. Managers should say no but they take the easy way out. Target pressures given more weight than the QMS requirements. Education not sufficient especially the lower bands – impact on products not well explained to them. Organisation wide, there is less than enough

communication, can be guilty of compartmentalising things and people not around to check. Local managers may not be reporting things they should be reporting to the senior managers and as such may feel things are ok. This impacts on decision making/ policies as they think on the ground all is well. Communication across should be improved to know what the shop floor thinks. There should be more regular audits. The organisation means well but not convinced that the board are fully aware of how often we break/breach the rules ourselves.

4. **Division of Labour**

This can influence the way QMS is followed. The geographical spread of the organisation can impact on compliance to QMS as the senior management team can't be on site at all times. A lot of layers across departments can also cause barriers to dissemination of information. Example; 1 donation or sample can be handled by different department's i.e. collection, testing, donor records, adding huge level of complexity inn the QMS as records needs to be tracked across all the departments. The layers of people with different level of training and experience adds to this complexity. Thus, the QMS is vulnerable for people to devise a work around. All staff should know the implications of breaking the QMS, but the management is soft when it comes to addressing these issues. Stakeholders/ between departments, the behaviour across impacts on the other departments. Example: session team not hot on QMS with all data. If the team fail to deal with the issues in the Forms when forwarded to the supervisors and nothing happens then with time it can impact on the other department. This leads to slippage in the other department and with time they don't event report the issues as they see it as no issue – failure/ breach of QMS becomes accepted norm. No 'blame culture' may be misunderstood to be 'no responsibility culture' which leads to people not doing what they are supposed to do. The HR and other policies in place can also prevent people from being addressed as required. People might not know is wrong and as such they may require constant reminders to ensure good practice is in place. High turnaround time in staff also lead to depletion of knowledge and experience.

5. **Perceived Usefulness**

As an individual it may not be useful if I see it as am working for the money. QMS tends to slow down the process at times and makes it harder to meet productivity targets. Some of the requirements are useful and gives you the training, knowledge and confidence in your process because of the completion of forms in place etc. In order to get people to engage with in the use of the QMS, people should be trained to appreciate it. KPI's vs. QMS. Re-educate staff to take a holistic view of then process from start to finish to put things in context. The chain of events that needs doing' I understand it to be useful'. At

times it may be seen as hindrance to the routine process, Example; blue light request in Hospital services needs to follow the QMS but there are tendencies for people to cut corners which leads to more mistakes. Education, communication is paramount to follow QMS. As an individual I say on scale of 1-5 I will say 4 and as department I will say 3.

6. **Perceived Ease of use**

   If QMS is simple, accessible, easy to learn and readily available then it will be followed. Vast number of people will like to take the easy way out because the QMS is not seen as easy due to the complexity of our work. Generally, the shop floor staff e.g. HTO will find will struggle to find anything about the QMS – validation, calibration, maintenance etc. They will not know much of the issues. Also, Q pulse is not accessible to all staff. Update of Q pulse/ data entry errors which can also impact in all the other aspects of the QMS. In the process of methylene blue, there are complicated aspects that needs following – machines, SOPs for housekeeping, process, pulse process etc. There is a lot of rules governing what we do therefore 'Ease is put over rules. Get people on board, get them to care or make it easy. Take away no blame culture. Nothing will happen even if I don't do it. Hard to get rid of people in NHSBT. On scale of 1-5 I will say 2.

7. **Behavioural Intent**

   My intention is to follow QMS in all cases. Department staff come in 100% intention to follow the QMS

8. **Actual Behaviour**

   No, I don't follow QMS 100%. Why? Is due to time pressure, target, tiredness, not easy to follow. Repetition of task which can lead to mind wondering about which can lead to non-compliance at times. Routine process so gets into a 'pilot mode, which lead to errors. Human factors should be factored into the QMS to help improve compliance.

Appendix 6.2

Questions for follow up after application of intervention from CLUES Framework

- What is your attitude towards compliance to the QMS? *This was to enable data to be obtained about the stakeholder's attitude compliance to QMS pre application of the intervention. This was to enable gathering of base line data to allow for comparison of attitude post application of intervention.*
- What is your behaviour to compliance to QMS? *This will enable data to be gathered to understand the stakeholder's behaviour pre application of the intervention. Again, this*

allow for the baseline behaviour to be established to allow for comparison post application of the interventions.

- Have the interventions improved your attitude towards compliance to the QMS? why? *This is mainly to measure the actual changes observed and why they have made changes to their attitude after the application of the intervention.*
- Have the interventions improved your compliance behaviour? why? *This is mainly to measure the actual changes observed and why they have made changes to their behaviour after the application of the intervention. This is to ascertain whether the assess the intervention to have made changes to their behaviour or not.*

Having asked the above questions, the following questions were used as prompts and means to gathered further data for analysis.

- How did you find the interventions that were put in place?
- Are there any limitations of the interventions to your attitude and behaviour?
- What can be done to further improve these interventions?

Appendix 6.3

Data collection from the interview after application of interventions

Participant 1

Initial attitude and behaviour towards QMS

It is difficult to explain as the QMS is meshed in the routine processes in the lab and seem like it is embedded in everything we do. It is inherent in what we do and seem part of all the things so difficult to really state my initial attitude to the QMS. However, I will say that at times the QMS does not fit naturally and feels like it opposes the processes we have in place and may become obstacle in the workplace. Coupled with my feeling, I think at times there is opposition towards the QMS which may be fine but at times not good enough as this can affect decision making. Moreover, I think the attitude of the department is that at times they are proactive but not all the times. They may see the QMS to be useful but may always not follow as they deem it to be in opposition to what they are required to do or want to do.

I think the behaviour is complicated, at times I comply with the QMS although I may not have the feeling and desire to do it. At times I comply with the QMS because I feel like doing it but at times despite that I feel like complying I end up not complying.
People do stuff because they know they must do it but don't do because they see it to be in the way of what they hope to attain. I think is human nature to do things differently daily, the human factors that gets in the way influences the way I approach the QMS.

The 'herd behaviour' that exist in the department also being a factor that staff tend to do things that they know are not right to do but still do because they are just following others. This is what happens to me at times where I do things that I feel is not right.

Attitude and Behaviour after the implementation of Interventions

I think the implemented intervention helps in a way. The current system is overly simplistic but the current approach with the interventions looking at the community, the leadership and the other constructs is very useful as it helps in the day to day operation.
The application of the interventions has improved the way I perceive the QMS as I see it as the only way out to achieve the required outcome. The interventions made the right thing to do the easy way and this really is useful in me following the QMS.

Also, it changed the way the people in the department see the QMS as they now have a wholistic view of the QMS in line with the interventions that were implemented. It has helped the way I relate or extend the application of the QMS to the staff as I have found a way of getting them to do the right thing in an easy way. Making the right thing very easy to do also allowed the staff to use less time and they enjoyed doing their work in line with the QMS without complaining and seeing it as a 'chore'.

Community influence outcome

By sharing the trends across board allowed me to better understand the compliance activities of other sections in the department which acted as standardisation activity for me. Standardising the work across board as a result of the intervention helped me and the other staff to follow a simple process at all times, making compliance behaviour easy to perform.

Moreover, the intervention also made it clear that the standardisation should be personalised for staff, so they see the QMS as tailored to their need and as such do the work

without even knowing that they are complying with the QMS. I think the community aspect of the intervention is useful as the activities by other staff influences others. As such, the observed compliance by others influenced the way I acted and helped other staff in the department.

Leadership Style outcome

The Intervention enabled me to understand the importance of leading by example and ensuring that the systems in place are suitable and convenient for the staff to do their work. As a manager, the intervention demonstrated the need to have a system that rewards good behaviour and at the same time motivate and help staff to do the right thing without making them feel victimised when they deviate from the standard approach.

The intervention also enabled me to realise the importance of getting people involved in designing the processes in the lab – the procedure, the setup of the process and the flow of things in the lab. This I thought will encourage and motivate the staff to own the processes and behave positively towards the requirements of the QMS. Getting people to understand why they do things and not just doing it blindly.

For example: before installation of a new equipment, I think we have to look at all the aspects of the CLUES framework; what are the leadership aspects required, the community where this will be implemented and used, the ease of use of the equipment, the usefulness to what is to be achieved and the stakeholders that will be using it. I think these interventions are useful and have wholistic approach that will persuade staff to comply with the use of the equipment in question.

Usefulness

Because the usefulness and purpose of the QMS was explained, it helped to motivate me to comply with the QMS. Moreover, by dispelling perceived concerns and negative attitudes about the use of the QMS, I saw the positive reasons why I should compliantly use the QMS and this really helped. By sharing the usefulness of the QMS with me, it allowed me to get the buy in and understand what is really required of me and why the use of the QMS is important to achieve the set goals.

Moreover, I realised that by getting the buy in of all staff, to understand the usefulness of the process before the processes are even implemented persuaded them to compliantly follow the QMS. Getting the staff to own the process and understand the usefulness of the

QMS activities in the lab helped the staff to follow the QMS without complaining and seeing it as something extra that needs doing.

Ease of use outcome

The implementation of the interventions indicated the need to make the processes easy and simple for staff to follow. By personalising the QMS, it explained what is really required of me while making it easy to do what is required, compliance was easy. It felt like the QMS is truly part of what I am supposed to do as it was personalised to my need; and I felt like I own it. I also noticed that it made it easy for staff to do the right thing as although they were aware of the bigger picture. I was convinced that if the QMS is not simple for staff to perform their task easily, it will affect their attitude and behaviour.

Stakeholder behaviour outcome

Using the interventions, it helped to address day to day QMS issues and improve compliance behaviour by the stakeholders. I think because the intervention enabled shadowing and interacting with other stakeholders who were compliantly following the QMS, it motivated and encouraged me to change my attitude and behaviour towards the QMS. Again, the intervention enabled me to look at the bigger picture of the QMS and how it is woven into all that is done in the department and the organisation.

Possible Limitations of implementing the interventions

Anything that requires to go through various steps may also put hindrance in the way. As such the implementation of the interventions may be seen as another layer the staff have to think of which may have impact on their attitude and behaviour. However, by acknowledging that people may have opinion and get them involved right from the unset may help the process. This may enable them to see the interventions as their own and not something that is done to them.

Participant *2*

Initial attitude and behaviour towards QMS

Initially my QMS use was not effective due to my training and understanding of the QMS. I think my job role didn't allow me to use it as required but with time I got the hang of it. My attitude changed the more I used the QMS or got involved in the use of the QMS more often. I think the training was not effective in the initial stages as my job role only required me to do few things that involves interacting with the QMS.

This I think is not peculiar to me as I have seen staff struggle in the same way due to not understanding what is required of them because their job role didn't require them to do certain aspects like completing change control, validating a new equipment or even dealing with a quality incident. Unless you know what is required of you in using the QMS management tool (Q pulse), there is the struggle to understand what to do and how to do it which affects the way people will like to interact with the QMS. This therefore affects their attitude towards the use of the QMS.

Also, the QMS management tool is not easy to use and tends to prevent people from doing what is required of them. The system does not align itself for easy correction of mistakes by staff which then affects the way they will like to interact with it.

I don't think my behaviour was affected although my attitude to it was not positive. This is because I knew the importance of the QMS and as such my behaviour towards the use was not affected. It was not easy to use but because of the usefulness of the QMS to the product and services that we produce, I was willing to do what is required.

Attitude and Behaviour after the implementation of Interventions

Community Influence

I think the attitude of staff is improved by watching other staff that are compliantly using the QMS to perform their task daily and this helped me. Again, by sharing compliant trends of other sections and departments, it motivated and encouraged me to strive to attain the achievement I have seen.

This I think is the same with the rest of staff as they are more likely to compliantly use the QMS if they are to observe the positive trends from other sections of the department or from other departments in the organisation. The behaviour is also improved as they see the staff performing compliantly to the QMS and achieving the set goals.

However, if staff notice that others allowed to perform their role with no training records and not following procedure with no consequence, then attitude towards the same activities

is negative. Overall, my attitude and behaviour are improved just by going through the interventions and applying them to the work we do.

Leadership style

I think my attitude and behaviour towards the QMS improved by seeing the effort from the leadership team to recognise and reward my activities. As a manager, the recognition of staff by the leadership team influenced the way they interacted with the QMS. I think it depended on how it is presented to the staff though. How the recognition and reward is done is vital as there may be possibility of staff not feeling empowered as a result of this.

For example, there is weekly meeting that review quality incident with the departments and as such, I try as much as possible to ensure that all my quality incidents and change controls are managed effectively and up to date. There has not been any time when my manager had come back from the meeting and recognised the effort, I put in to ensure that there were no overdue actions. The only time I hear from them is when something is wrong or not done on time. I see this to be very negative and does not motivate me although I do it because I know I must get things up to date for the meeting. As such my attitude towards this activity is negative.

But with the recognition and the praise from my manager, this persuade me to have a positive attitude and behaviour. I believe that the reward for completing actions on time is useful, but I have also noticed that at times there is the believe that it is my work anyway. Therefore, the praise and recognition should be put in context so that staff don't feel marginalised or victimised for being recognised.

Again, there are instances where quality incident may have been raised for an error in the lab and as such, we feel bad to recognise the effort the staff may have put in to get the actions completed and prevent repeat of the incident. This is because we think that they should not have made the error in the first instance and dealing with the actions is their responsibility.

But from the interventions, we have now taken the view that if quality incidents are raised, the effort put in to address the problem should be positive and recognised as it gives us the opportunity to improve our systems. We have also taken the stance that this in a way will help in addressing issues rather than only looking for the negative part of the error – opportunity to get it right and maintain compliance.

Because we recognise the need to address this in a positive way, we involve the staff because they are encouraged to help with the solution, and this helps them to know that this

is important to prevent repeat of the mistake and also help them to appreciate the importance of getting it right the first time.

Again, because they are part of the team in dealing with the problem, it allows staff to see the solution as coming from them and not something that is 'done to them'. This recognition of the effort from staff in dealing with the problem allows for a positive workforce that is happy to trouble shoot to deal with problems and have confidence in the work they do.

Usefulness

This really changed my attitude about the use of the QMS. This is because as the information about the usefulness of the QMS was shared and dispelled the notion that the QMS is not useful and gets in the way, I engaged with it more and willing to encourage others to also use it. Because the usefulness involves explaining why the QMS should be used, I think it motivated me to use it as required to achieve the target. I see the QMS to be more useful to achieve the required outcome, so I am more willing to use it compliantly.

There is the belief that the QMS and the management tool is difficult to use and gets in the way but with the intervention explaining and dispelling that belief, it helped me to better embrace and use the QMS as required. As a manager, I am willing to share the usefulness of the QMS with my staff to persuade and encourage them to also use the QMS compliantly.

Ease of use

I think the intervention of personalising the QMS for individual use helped me in achieving what is required. Because when things are the way you want them, then the attitude towards using it is positive. Because it is more tailored to my personal need, I was more willing to use the QMS as required.

Moreover, because the QMS is personalised and I understand what is really required of me by just looking at the setup, my attitude towards the use of the QMS is positive. This is more of setting up the QMS management tool to address my need and ensure that I can interact with it easily without having to contact the QA team or other experts to help.

My behaviour towards it is also positive because I know interacting with it will not be difficult and I am able to achieve what I am required to do. The emails and data that is generated from the QMS management tool can be difficult to understand what is required

but because it is personalised, I know what is needed and as such my attitude and behaviour towards the use of the QMS improved.

For example, I am currently involved in writing procedures and I have decided to write the process in simple steps with clear diagram to help the staff in following the process. From the discussions I have had with staff, they see that to be a good approach and they have indicated that they are more likely to follow the procedure as required because is simple and has diagrams to illustrate the process.

Stakeholder behaviour

I think by shadowing someone in the use of the QMS, I was able to learn more about the use of the QMS and I am more willing to use it as required. This is because by watching someone compliantly perform the process, it encouraged and motivated me to perform the same behaviour.

For example - performing temperature mapping in the department. Although the training was good, it was more theory based with no practical aspect to the training. It was therefore difficult to perform the task compliantly on my own. But by shadowing someone who has been trained and performing the activity compliantly, I was able to also perform the task on my own. This therefore helped to build my confidence and improved my attitude towards the temperature mapping process.

My behaviour towards the QMS improved because I know how to perform the task required and was confident in my ability to perform the task so more willing to perform it. I think this is the same for other staff within the department who may have been trained but not confident because of the practical aspect lacking from the training. But by shadowing someone performing the behaviour, I think the attitude and behaviour is improved.

Limitation

- If the implementation of the interventions is not done appropriately, then the use of the intervention may be affected. All the staff should be agreeing and accepting the interventions and seeing it as tools that will improve compliance and not as hindrance to their work.
- People are creatures of habit and don't like change. This is therefore the limitation to the interventions. Getting people on board to follow the interventions as required is a hurdle that need to be addressed for people to follow it as required.

Participant *3*

Initial attitude and behaviour towards QMS

Before the intervention, I think my attitude has been between compliant and non-compliant. I think the reason is that my initial work did not require me to do much with the QMS activities as is seen more like something for the managers. I also think the training received was too generic and did not relate much to what I was doing in the lab. As such, it felt like the QMS was different from my routine processes but at times they are joined. This meant that I had a double standard approach in terms of my attitude to the QMS.

Despite this, my behaviour was always positive as I see the importance of the QMS to what we do as a department.

Attitude and Behaviour after the implementation of Interventions

Community influence

I think the sharing of trends and understanding of the positive behaviour from other sections is useful and impacted on my approach and work. It will be useful for staff to shadow other sections in the department that are performing the compliance behaviour. By sharing the knowledge and shadowing other sections that are compliant, that helped the non-compliant sections to improve their behaviour.

Getting staff from different sections to explain and work with the other sections was useful and helped the others to also ask questions and to focus on what is required. But I think this should be done in meetings to have time to discuss the compliance behaviour so that people can ask questions and reflect on the behaviour so that they can also put it into practice.

I think if these are discussed in meeting you've got the time to discuss things as you're outside of your busy working environment. Taking the step away from the work setting and discussing, thinking and planning what you want to do will help in considering the importance of what we hope to achieve.

Moreover, I see this to be also across different departments and not just as sections within departments. By sharing and shadowing across departments, there will be improvement of the behaviour and people are more likely to perform the behaviour as the best practice is shared.

Leadership style

I think this had a two-way feeling for me as I see the positive aspect of it but also think it may negatively impact attitude and behaviour. I am worried about recognition and reward of staff who are compliantly performing the behaviour. But this is more of the reward coming from outside the laboratory, like from the director level or other senior management team.

This is because, that may have the potential of causing consternation among staff rather than helping to motivate and encourage staff to constantly perform the compliant behaviour. I think a set of staff may think that they are not good enough and their efforts are not recognised by the senior management team whilst others are being praised for what they do.

However, if the recognition and praise is done in house by the management team within the department, I think that will be useful. This can be done for sections and individuals within the department which may promote friendly competition within and between sections which can spur them on to perform the compliance behaviour. I think this was seen when the intervention was introduced as each section head wanted the best outcome for their team, so they motivated and encouraged them to perform the compliance behaviour.

For example, an incident that was raised within the department where a lot of staff got on board to address the issue and to put actions in place to prevent repeat of the incident. Although the initial suggestion was that, if staff were performing their behaviour compliantly this would not have happened, because their behaviour after the incident was seen to be positive and supportive, the behaviour was recognised, and staff were praised. This has helped the staff to see the importance of performing the behaviour compliantly and there have not been repeat of this incident.

In effect, I think the recognition and praising of staff for performing the behaviour is important as there is indication that it has helped staff to continue with the compliance behaviour but if not well managed, this can also lead to strife within the team.

Usefulness

Having a system that tries to dispel or engage in part to explain to staff the benefits of Q pulse Will improve their attitude and behaviour. I think everyone is trained in the use of the QMS and the management tool (Q pulse), but people still see it as daunting and difficult

to use. People therefore don't want to use it because they think is confusing and may not help them to achieve what they hope to accomplish. But by getting people to explain to you the importance and usefulness of using the Q pulse really helped to dispel the negative thoughts I had towards it.

Because I have taken time to explain the importance of QMS and the management tool, people became interested in the whole process and they therefore engaged more with it. I noticed that because people did not really see the importance of the QMS that is why they were not willing to engage with it but when I explained and dispelled the negative notion about the QMS, the behaviour improved.

Again, there is indication that only management team are required to engage with the QMS, especially using the Q pulse management system. This means that other staff in the lower band are reluctant to use the QMS as required as they don't see it as their role. The attitude to the QMS is then negatively influenced and this affects their behaviour. I experienced the same thing as I stated as my initial interaction with the QMS before the application of the interventions.

Moreover, I feel that as you move up in the department, although you are trained to the QMS and you have access to some models in the Q pulse management tool, you are left on your own devices to source how to use it. Assumption is made that once you get to certain level in the organisation, then you should be aware of the requirements and perform the behaviour compliantly. However, the initial training may not have been the best and instead of assessing the training needs and ensuring that you are fully trained to perform the required behaviour, you are left to work it out yourself. Consequently, as a manager, you may be struggling to understand certain aspects of the QMS but not willing to ask as you may be regarded as not equipped for your work.

This may lead to not performing the compliant behaviour at all or not compliantly performing the behaviour when you are required to do so. At the same time, your actions may influence the behaviour of the staff as they look up to you. Essentially, by failing to equip the manager and ensuring that the usefulness of the QMS is explained, they fail to perform the compliant behaviour and as such fail to empower their staff to also do so.

Ease of use

I think by personalising the QMS helped to improve my attitude and behaviour. Because the QMS is personalised for my use, then I feel more inclined to use it as required. I think it gets over the intimidation as you see it as your system and adapt it to do what you are

required to do. By seeing the QMS management tool as your simple system that is designed specifically for you to do your work, then you are more inclined to perform the task compliantly.

Although the QMS and the Q pulse management tool are standard across the organisation, the local feel of personalising the way it is set up and how it is implemented for my routine processes help in boosting my attitude and behaviour.

An example is how the searches in Q pulse tool are done to help staff in assessing incidents, Equipment management and change controls. Although is standard management tool (Q pulse) for all, the way the searches are set up can have a personal feel to it which will help in feeling empowered to perform the behaviour. It removes the perceived intimidation of engaging with the QMS and allows staff to easily comply. My experience is that, because I was able to have simple steps personalised for my use, I was more inclined to perform the behaviour.

Stakeholder behaviour

I think the effect of getting someone to shadow another person who is compliantly performing the behaviour is positive and motivated me to also perform the compliance behaviour. However, I think the relationship between the two people will determine how the behaviour is learnt. The main concern is around the fact that the person who is shadowing may feel like being told to perform the task in a certain way with no input.

They might think that they are not good enough and as such just following what they are told. This might bring disgruntlement for the person who is shadowing. As such, the pairing should be done with people who get along very well rather than just asking people to shadow.

Moreover, there may be the possibility that the person who is seen as performing compliantly to the QMS may see themselves as the ‘shining star’ and possibly beyond reproach rather than just working alongside their colleague.

Having champions within the department was useful as is seen as a team of people that can act as support for others who may be struggling to perform the behaviour and not just having one person. I think the champions should be selected by asking staff who are willing to volunteer to do it rather than having the managers selecting them.

If the selection is seen as staff driven and not management driven, I see it to be more positive and will encourage staff to get on board. This is because if the managers select the

people, those who are not selected may think that their behaviour to the QMS is not complaint that is why they were not selected. Consequently, if the management choose the campions it may have the potential to cause resentment within staff and may lead to negative attitude and behaviour.

Limitation

I can't think of any limitations to the implementation of the interventions. I think if the listed interventions are carefully implemented and monitored, it will aid in persuading staff to use the QMS compliantly

Participant *4*

Initial attitude and behaviour towards QMS

I started off my career in the pathology lab when there were a few rules, procedures and forms in place to capture what is done. I have watched this grow over the years and is fantastic now that we are starting to standardise things within the pathology labs.

In the Pathology lab, people did process and had the procedures written on note pads in their pockets; you do what you are thought but there were no clear written procedures in place for people to follow. I like to do things the right way and that has been part of me right from the onset in the pathology laboratory. I am therefore a fan of the Quality Management System (QMS), I like how is used and I am willing to work with it. I always see it to be my responsibility to follow best practice as I see the need to provide safe and quality practice. I see the QMS to be a way of championing what we do, standardising the process to ensure that things are done in the same way all the time to ensure we meet the needs of the patients.

I know some people see the quality system and the quality team as 'traffic wardens' who are just there to pick faults and not to work with them to resolve issues. I spent three months in quality Assurance as part of my development and this also helped me to understand what is really required of me. This has also helped me to engage my brain in the right frame to follow best practice.

Sometimes when you think that it is a flawed system, you think, is this what I am meant to do? This impacted on my behaviours at times although the behaviour had always been to do the right thing. I believe that if I followed all the steps and it didn't work then it is not me but the system and this helps to address the flaws in the system and not trying to cut corners.

I believe that the standard operating procedures have been put in place to help and have been reviewed by experts, so I always try to follow it and not my own way. As such, my attitude and behaviour have always been positive.

Attitude and Behaviour after the implementation of Interventions

Community influence

I think getting people to think in the same way may help the target behaviour to be performed. As sections within the department, they all do things differently under the QMS but if we work collaboratively, we can learn from each other and achieve a lot. I think by changing the mindset of the people that we are not trying to prevent errors and mistakes from happening again, but rather as an improvement session.

This helps the staff to want to improve the way they do things, and this helps them to perform the best practice. I think by looking at things from different perspective, we can make changes to what we routinely do.

Again, when we resolve incidents in one section, we should share with the other sections; see it as a community way of dealing with the problem. This has really helped in the lab having discussed trends from other sections and worked with others to find solutions to problems.

Leadership style

Really difficult one because I think is our job to do what we are paid to do so I don't see the need to reward staff for doing their work. Reward is nice but it should be put in perspective as if not well structured, it will lose its value. The reward should be part of your pay and at times when you say thanks you to people, they say that is my job so no need to thank me.

However, I think although it is their job, we should still recognise them when they do what is required. I think people see the QMS to be discussed only when things don't go the way we want so that puts them off but if the praising and recognition is done as part of following the QMS then it helps.

People might think that the QMS (mainly the quality incident against other departments) is a weapon which people use against other departments and so they see it negatively. I tend to add praise to the actions taken to prevent repeat especially when the staff come out with

ideas. I praise them for that, and this really help them to want to do more. Essentially, I think the reward and recognition from the leadership team may persuade staff to perform the target behaviour.

Usefulness.

The usefulness of the QMS is mainly shared by the Quality Assurance team and this is not working. This is because, the Quality Assurance team are seen as always saying that they are here to help but they are not on the shop floor working with the team. People see them as being there to pick fault and not selling the usefulness of the QMS.

But by having a system that shows that the QMS is useful and is there to make life easy, it helps. The staff mainly have the knowledge of the usefulness of the QMS but at times they see it as something that is performed by the managers, but if they get the explanation that what they do on daily basis is the QMS, it helps them to do it.

With the system explaining to the staff that the QMS is not just procedures and what to do in an event of an incident, but rather what they do daily like the cleaning, the equipment checks before and after use, the records that are done are the QMS. Because they know and understand the usefulness of these daily activities, they embraced the behaviour much better.

If the QMS is truly understood and the usefulness is clearly laid out as this intervention indicated, it makes people happy, and happy people make things better. Also, this goes beyond just having the knowledge about the QMS but getting the staff to help in writing the procedures and getting the buy in into the sharing of the usefulness of the QMS. I think with the system explaining the usefulness of the QMS and getting the team involved in the routine use of the QMS, they embrace it better than someone coming in to tell them what to do.

Ease of use

I think the personalisation of the QMS encouraged and motivated me to the use of the system. I think by personalising the QMS, it empowers the staff to own the QMS activities that they perform daily, and this encouraged them to perform their job as required by the QMS. By personalising the QMS in a way that helps them to perform their work, they do the work without feeling that they are forced to do so.

Again, by explaining the QMS to the understanding of the staff, and tailoring the requirements to their use, they understand why they are doing things, and this helps them to follow the QMS as required. By making the QMS less scary but easy to follow, it helps staff to embrace it and do what is required. Moreover, as the QMS is made more user friendly and a partnership for the users, they will be more inclined to use the QMS as required.

Stakeholder behaviour

I think by shadowing people who are performing the target behaviour, I was more inclined to perform the behaviour. As a manager, I think it is a good idea to get the staff to shadow those who are performing the target behaviour, but I think you must make sure they have bought into it before they go shadowing others.

They must go with the right attitude to want to shadow someone so that we can bring the best out of them. By getting staff to shadow their colleagues, they see the QA team through the eyes of their colleagues and that helps to solve the problem of them seeing QA as part of their team.

The QMS is there to make outcome right and how we get there should be a team effort so by shadowing colleagues who are performing the target behaviour, we learn to also change our behaviour. The route to getting to understand the requirements may be different but we must empower stakeholders to perform the behaviour and this can be achieved by watching others perform the behaviour.

Limitations

We need people to understand the reasons for the interventions and not see it as another layer of things to do. Get people to understand that they are already doing things better, but the interventions are just there to improve and sustain the behaviour.

Having collected the data from the interviews, the next section considers evaluation of the data collected from the application of the interventions.