MSc Digital Transformation

for the Health and Care Professions

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Evaluate and analyse the Welsh Community Care Information System implementation within the NHS and Local Authorities in Wales

Dissertation submitted in partial fulfilment of the award of

Master of Science in Digital Transformation for the Health and Care Professions

Peter William Cumpstone

2110532

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Declaration

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed: P Cumpstone

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Chapter 1 Introduction

1.1 Context

The rise of digital transformation across the world is well documented in the rise of mega companies, such as Epic and Cerner. Digital transformation across Health and Social Care costs millions of pounds, and yet there is still an exceptionally high failure rate (Dahlström, Desmet and Singer, 2017). This is something which needs to be addressed as a matter of urgency. With a significant cost of living crisis, it is imperative that public money is spent prudently.

There is a whole new level of executive in Wales, called the Directors of Digital, whose job involves prioritising and steering the wholesale move to digital for all Health Boards. The recently released NHS in 10 years document (NHS England, 2019) has many references to the role digital transformation will play in delivering a healthcare service fit for the future. Across the world digital transformations are being led by project managers and programme directors as millions of pounds rest upon decisions made. The question this paper is seeking to answer is, do the end users (clinicians) have a seat at the decision-making table? Are they involved in the project initiation stage or are they only brought in for training before implementation, when it is too late to make suggestions regarding the workflows and the user interface/experience?

Three options have been submitted to Welsh Government (Bridgend County Borough Council, 2024) which offers three distinct choices regarding the future of the Welsh Community Care Information System (WCCIS) programme digital solution CareDirector. The Welsh Government has confirmed procurement of a new solution as the preferred option. This project is needed to support the decision-making process primarily, but to also identify why the WCCIS implementation and adoption failed and what can be done to reduce the likelihood of repetition.

1.2 Aim and objectives

This project aims to evaluate and analyse the implementation of WCCIS within the NHS and local authorities in Wales. The project intends to establish not only what the reoccurring themes are but to be able to group them into thematic subgroups to

establish what ideas, solutions and mitigations need to be put in place to reduce the likelihood of repeated failures occurring.

The objectives are:

- To explore existing implementations related to the WCCIS.
- To collect quantitative and qualitative data from AHP staff within the NHS and local authorities.
- To analyse the primary and secondary data using a mixed methods approach to review and identify patterns.
- To evaluate the findings against the study objectives.
- To recommend the potential solution to the identified themes.

By aiming to review the programme journey, the project will seek to make recommendations on how the NHS in Wales could mitigate any risks and ensure the likelihood of success is greater than 20% (Dahlström, Desmet and Singer, 2017). There is a need to establish reoccurring themes in failed digital transformation, as only by identifying and analysing the causative factors and their impact, can future digital transformation programmes begin to mitigate these factors to improve the likelihood of success.

1.3 Scope

The scope of the project was constrained to WCCIS. There should be well-documented programme plans, with available documentation that will document decisions throughout the project's life cycle. This project sought to consider those decisions and make recommendations to deliver successful digital transformations within Health and local authorities in Wales.

1.4 Research questions

The following research questions were addressed in this study.

> RQ1: Does having funded Allied Health Professional (AHP) leadership impact the implementation of an electronic patient record?

RQ2: How can utilising a user-centred design approach affect the successful implementation of an electronic patient record?

1.5 Soft systems methodology

Healthcare systems worldwide, but certainly in Wales, are changing rapidly (Jirawattanapisal *et al.*, 2009). Technological advancements, pharmaceutical developments, surgical techniques, and patient-centred approaches are changing the face of the NHS, the delivery of care, and the expectations of citizens, including those here in Wales. The NHS is complex (Mckee, Pagel and Gurdasani., 2021) and, as such, needs to be considered using a Soft Systems Methodology (SSM). SSM was first described by Checkland (1981) and was created as a framework to navigate the complexity of systems, which are inherently complex, through a mix of qualitative assessment and systems thinking.

SSM offers a robust framework to consider systems, such as the NHS, which are inherently complex and have a wide range of actors. If followed and used correctly, SSM allows users to create co-produced and sustainable solutions to complex problems that improve the delivery and quality of healthcare.

1.6 CATWOE

Table 1.1 describes the SSM framework for WCCIS, indicating those involved and their roles and responsibilities. It acts a framework to illicit the root definition, ensuring that the SSM considers all the potential complexity of a system.

Table 1.1 Description of CATWOE for WCCIS

Root	**Elements in this study**	**Description**
Customers	Primary and Secondary beneficiaries of WCCIS	Patients, healthcare professionals, health boards, local authorities and administrators
Actors	Key people involved in WCCIS operation and implementation	Healthcare professionals, IT professionals, policymakers, patients and vendors
Transformation Process	The main process WCCIS will transform.	The siloed, often paper-based recording of

		healthcare delivery and social work interaction
Weltanschauung	Worldview – core beliefs, values and perspectives that shape how WCCIS should work	Improved efficiency. Better sharing of information. Improving data quality and information governance – all leading to improved patient outcomes
Owners	Responsible for WCCIS implementation and success	Welsh Government, Health Boards and Local Authorities
Environmental Constraints	External factors that might influence the implementation of WCCIS	Finance, skills of individuals, regulations, IT Infrastructure and governance

1.7 Root definition

A root definition is a concise statement that encapsulates the essential purpose and function of a system, process or concept within the context of SSM. It acts as the cornerstone when using SSM to understand and to allow the analysis of complex problems. The definition should aim to provide clarity and focus, identifying the system's boundaries. As a result, more effective solutions to complex problems can be theorised and designed.

For this study, the root definition of WCCIS would be:

To implement WCCIS into all community care settings, including all allied health professionals, mental health practitioners and local authority services providing care in Wales, to have a 'Once for Wales' approach to a single system for improved patient outcomes and experience. Governed by Welsh Government, the WCCIS Project Board and constrained by funding, legal and regulatory compliance, and infrastructure.

1.8 Rich picture

Following on from SSM, a rich picture is a visual representation of the problem one is seeking to address. The WCCIS rich picture (Figure 1.1) seeks to highlight the disparity between those individuals being engaged within the health and care service in Wales. A large amount of effort was put into the technical and financial aspects of the procurement and less into the end AHP users.

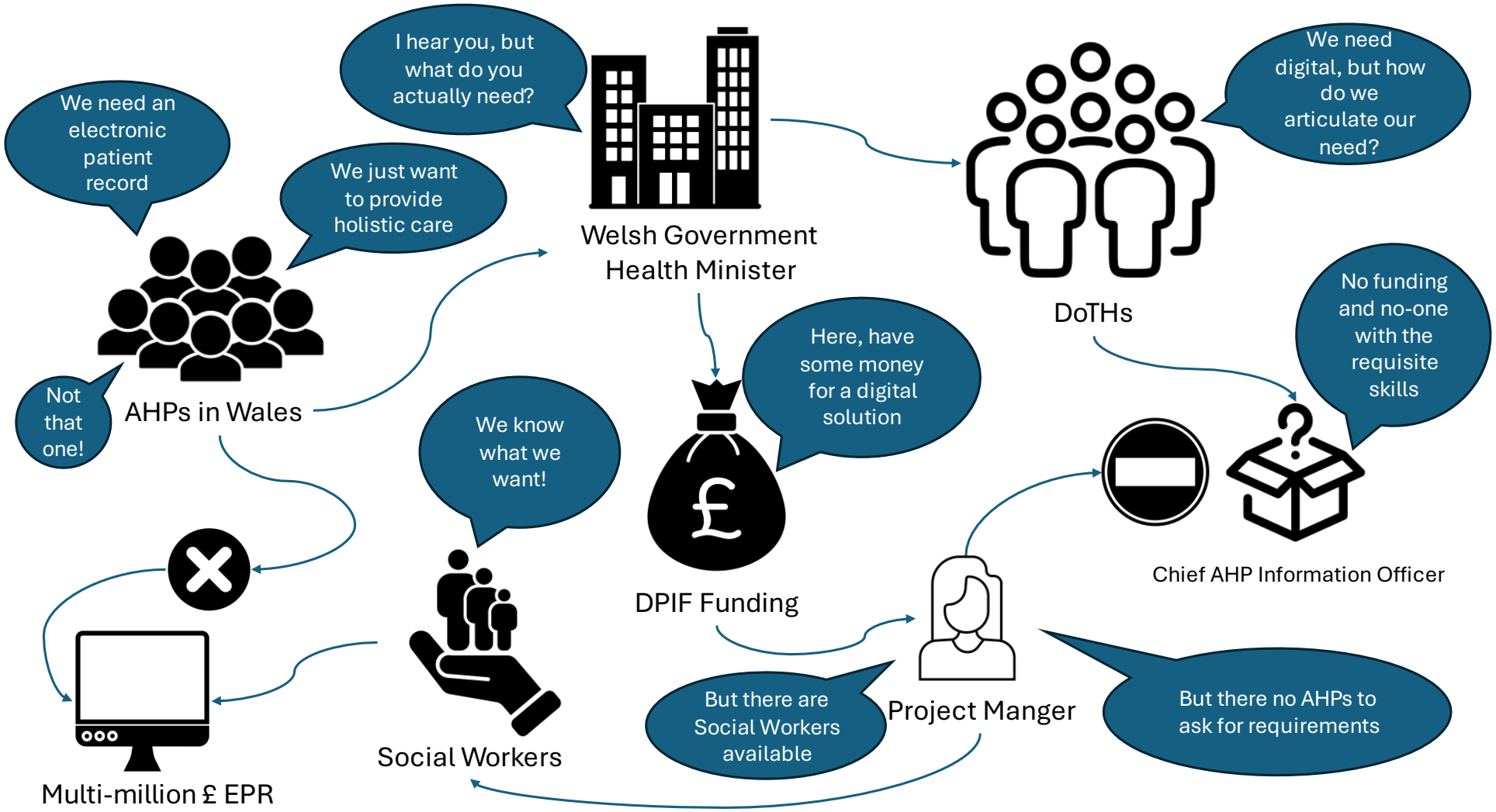

Figure 1.1 Rich Picture demonstrating AHP leadership challenges (Noun Project: Free Icons & Stock Photos for Everything, 2024)

This rich picture highlights the vast amount of funding from Welsh Government, but the lack of AHP digital leadership and absence of digital on agendas means that the maze cannot be navigated successfully and results in a poor digital solution.

1.9 Conclusion

This study will consider the involvement of AHPs and, in particular, AHP digital leaders in the requirements gathering and pre/post-implementation stages of WCCIS and whether there was any discernible impact due to the absence of roles. The proposed implications of the study are regarding the management of any future digital developments having AHP digital leadership as a named and essential part of the programme boards and assurance groups.

Chapter 2 Literature Review

2.1 Introduction

The topic this research project is seeking to address is the implementation of WCCIS across Health and Social Care in Wales and, more specifically, whether there was sufficient AHP leadership throughout the project's journey. Electronic patient records have been in use since the 1980s (NHS England, 2018), primarily within primary care, but with the explosion in technology (Mainstay Technologies, 2023) who state, "we are accomplishing in one year what took centuries in ancient history", the availability of digital systems across all settings is something which is now an expectation rather than a luxury.

Health care and social care can be viewed as complex and often interwoven entities across the world, but within Wales, this is especially true. There are 7 Health Boards, 2 Health Trusts, 2 Strategic Health Authorities and 22 Local Authorities. The Welsh Government (GOV.WALES, 2023) stated that local health boards are responsible for planning and delivering NHS services in their areas, including improving physical and mental health outcomes and promoting well-being. The NHS Trusts in Wales are highlighted individually as their offerings are different and more population-based, such as public health and ambulance services. Funding for health boards and local authorities comes from the Welsh Government directly.

Local authorities are not funded using the same model as the NHS in Wales, and they are also not governed in the same way. They are composed of elected officials who then make up a council in order to deliver services to residents within their boundaries. They are responsible for delivering a wide range of public services, such as social services, housing and waste management, to name a few (WLGA, 2023). There has been an increasing number of local authorities being declared bankrupt due to the increasing financial constraints and the lack of funding from central government or local taxation (The Guardian, 2023).

It is due to this ever-increasing financial constriction that local authorities and the NHS in Wales have a duty to spend their money in an appropriate and prudent manner. The Welsh Government Public Accounts and Public Administration Committee, established

in 2021 oversee the “efficiency and effectiveness with resources employed in the discharge of public functions in Wales” (Welsh Parliament, 2021). The Auditor General for Wales has produced a report regarding the Welsh Community Care Information System (A. G. F. W. Wales, 2020), and it highlights the delay in the rollout of the system and the increasing costs associated with the programme. The report reviewed the entire implementation of WCCIS. A major theme was the lack of clinical engagement and user research. The report highlighted that this lack of engagement had a direct impact on the efficacy of the system to meet the needs and requirements of clinicians and users across Wales. This document is now part of the vernacular to describe the failures in engagement and implementation of WCCIS in Wales.

Due to the current financial situation, the use of public money for services such as health and social care is coming under ever-increasing scrutiny. This means that if Digital Health and Care Wales (DHCW) is to avoid repeating the mistakes of the recent past, they must learn from them and put measures in place to avoid repetition.

This research project focuses on a small part of the overall findings from the Audit Wales review, the role of Allied Health Professionals, and the need for user-centred design in the successful implementation of electronic patient records.

During discussions regarding the current system, there has been feedback shared that the system is too difficult to navigate and there is nothing intuitive about the workflow in the system. This has led to frustrations and an increased workload for clinicians and support staff as they have to fight their way around a system which was brought in to try and make their lives and those they care for easier.

This project has identified two research questions, the literature review will seek to explore existing thinking and research and begin to offer up recommendations to enable a more successful outcome in any future endeavours.

This literature review needs to consider how it will evidence the current and historical thinking and aim to identify the gaps that currently exist in academia that this project can begin to answer.

2.2 Methodology

2.2.1 Research question one

The question, ‘Does having funded Allied Health Professional leadership impact the implementation of an electronic patient record?’ was considered first.

Search Criteria:

The terms used to find papers and articles when considering research question 1 were:

1. Allied Health Professional
2. Impact
3. Implementation
4. Electronic Patient Record

Four databases were utilised during this search:

1. PubMed
2. Cinahl
3. UWTSD Library
4. ProQuest Central

Due to the need for the research to be relevant, exclusion criteria were applied to the searches, and these were:

1. Published date after 2010
2. Peer Reviewed
3. Main Language – English
4. Full Text Available

During the search for this question, it was evident that there was a sparsity of peer-reviewed evidence regarding the impact of AHP leadership on the implementation of electronic patient records, so a change of databases was required and Cinahl results were removed, and the ProQuest Central database was added, as this has a more

technological aspect, moving away from the pure health and social care type databases originally selected.

During the search phase, the references for each of the selected articles were reviewed and provided a number of new and previously unknown articles which were more relevant to the research question. The exclusion criteria were adapted to allow these to be considered, as some were pre-2013.

Figure 2.1 utilises the Prisma model (Page *et al.*, 2020) to illustrate the search for the research questions.

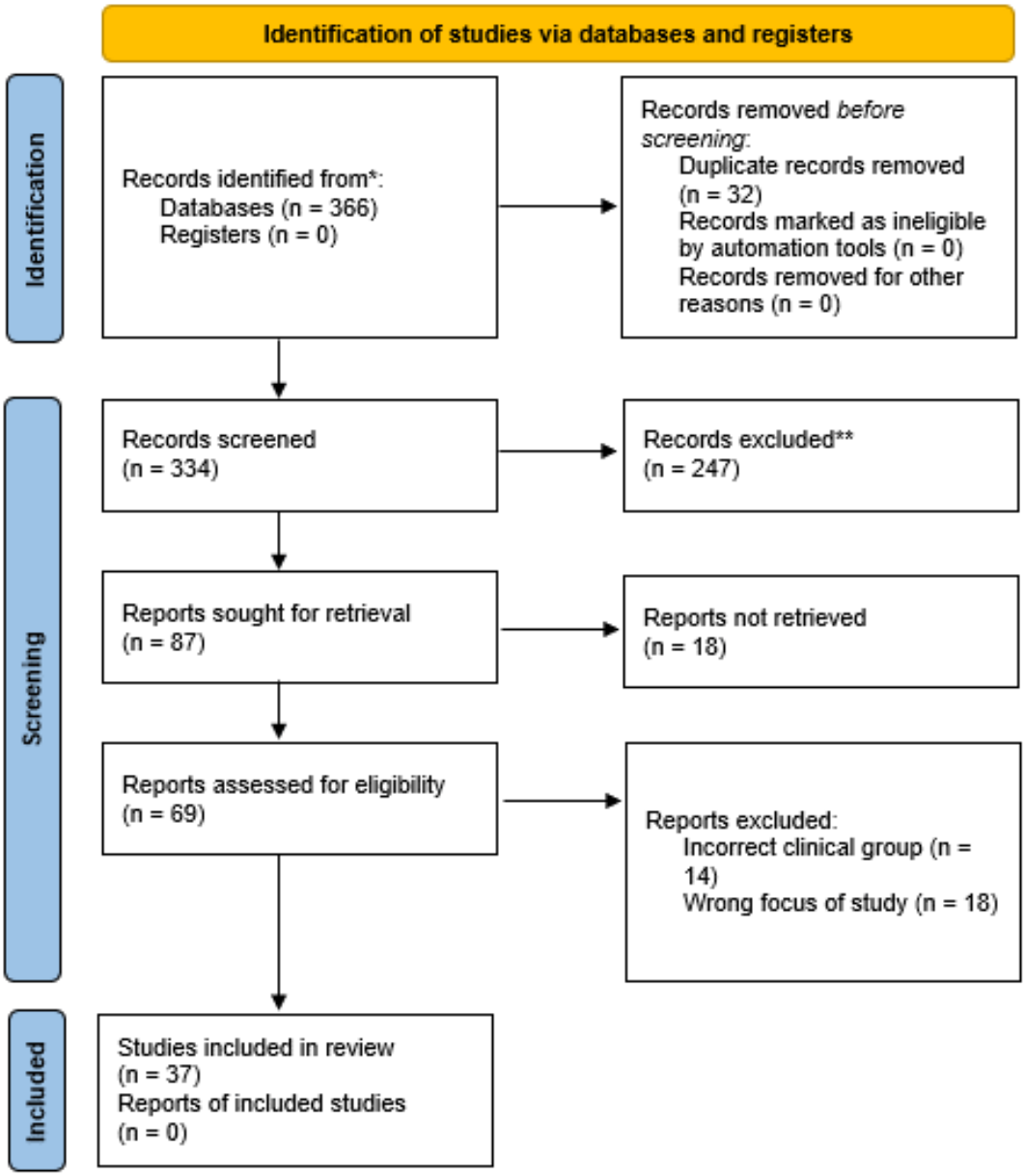

Figure 2.1 Prisma model for research questions

The Prisma model is a method by which a literature review can be managed in a clear and coherent way.

The evidence collected via searches must then be considered for its quality in terms of the evidence it provides when considering research question 1. In Table 2.1, the GRADE approach (Cochrane, 2023) has been used to demonstrate the quality of the evidence found.

Table 2.1 Analysis of RQ1 Literature Utilising GRADE approach

Article	RCT	Observational study	Lower certainty	Higher certainty	High	Moderate	Low	Very low
Schwarz		x		x	x			
Brooks		x		x	x			
Boonstra		x		x	x			
Joan Ash (1)		x		x	x			
Hailey david		x	x			x		
Vreeman Daniel		x		x	x			
Joan Ash (2)		x		x	x			
William Thygeson		x	x				x	
Madeeha Malik		x	x				x	
Maha Alnashmi		x	x				x	
Veenstra Gepke		x		x		x		
Feely Kath		x		x	x			
Soomro Zahoor		x		x	x			

Discussion

The first of the research questions seeks to examine whether having involved at the earliest stages of implementation has an impact on the likelihood of successful adoption of an electronic health record (HER), in this instance, WCCIS.

The research available regarding the exact topic was very sparse and highlights the lack of understanding around the topic of AHPs being involved in the design and implementation of EPRs globally (Boonstra, Versluis and Vos, 2014). This systematic review of implementing electronic health records in hospitals sought to understand the amount and quality of evidence surrounding this topic. However, there was limited evidence, and the study only included 19 in the review. The paper then grouped each

of the studies by three interacting dimensions: 1 – EHR context, 2 – EHR content and 3 – EHR implementation. However, this review strongly supported the need for supportive leadership combined with strong and active management. This is particularly important in this paper's context as the need for management was considered essential to reduce the impact of physicians' medical dominance in the world of EHRs.

This idea is supported by (Schwarz et al., 2020) in their paper regarding the perceptions of AHPs in the implementation of an integrated EHR. The paper reports minimal levels of anxiety in the AHP community prior to launch, during implementation and post-implementation and attributes this to the involvement of senior AHP leaders in the design and implementation of the EHR. Interestingly, however, Schwarz et al. do highlight that the introduction of an EHR demonstrated no overall improvements in patient care, speed or efficiency, which is a common benefit highlighted by those seeking to promote EHRs (Wales, 2020).

A paper by Brooks and Grotz, (2010) presents the thinking that in the creation and implementation of any EHR, foundations are imperative, and healthcare organisations need the buy-in of those in frontline positions as early as possible in the process. This is also evident in many other papers, such as (Ash et al., 2003 Vreeman et al., 2006 Boonstra, Versluis and Vos, 2014). There is quality evidence, and the message is clear in all of these papers, whose authors categorically state that early involvement of clinicians, including AHPs, is essential.

However, there was not complete agreement in all areas surrounding the early involvement of AHPs in the development of EHR or digital systems. In the paper by Hailey, Yu and Munyisia, (2014), the participants were all end users, and all were satisfied with the delivery and implementation of their digital system despite there being no AHP involvement mentioned throughout the article. Now, this may be an oversight, and the AHPs were employed directly by the supplier, or during the development, the supplier employed business analysts to shadow AHPs in clinics and hospitals in order to provide the necessary understanding of workflow and user requirements. The paper aimed more at clinic management software as opposed to a

large-scale multidisciplinary type of EHR, so there is potential for the requirements to be less complex. (Brooks and Grotz, 2010) State in their paper that healthcare settings in the United Kingdom, where one can safely presume globally, demonstrate an unprecedented level of complexity. They also go on to suggest that Big Bang implementations are less likely to be successful and that starting small and building incrementally is a wiser and more prudent choice.

Two papers authored by Joan Ash (Ash *et al.*, 2003; Ash, Berg and Coiera, 2004) both focus on the organisational requirements of implementation. One study found that the process of local development with broad involvement of clinicians is necessary for the organisation as a whole, and a second paper states the need for experienced clinicians who truly know what work should be involved in the design of systems. This organisational maturity is a vital piece of understanding for any board or any supplier, as attempting to implement a system-wide digital transformation project is unlikely to succeed if the organisation as a whole is immature. This can be measured by the use of (HIMSS, 2023), who offer a rating scale from 1 to 7 of digital maturity based upon a number of factors, including organisational maturity. Across Wales, Health Boards are reportedly scoring very low in their HIMSS assessments and require substantial investment in resources, both in terms of people and in terms of infrastructure. However, given the current financial climate, this is far from certain. HIMSS, state the more mature an organisation, the more likely implementation will be successful, and those who are rated lowest are potentially at risk of repeated and costly failures. This is a point also of note in the paper by Alnashmi et al., (2022), who recommend the establishment and adherence to strict guidelines and policies.

Leading on from organisational maturity, the paper by Feely et al., (2023) states that the impact of the Chief Allied Health Information Officer (CAHIO) and a project team engaging in extensive change management strategy may have contributed to the positive outcomes during their research into AHPs experience of a big bang implementation. However, this is not supported by all when it comes to implementation strategies as recommended by Brooks and Grotz, (2010) who suggested small, incremental transformation has a higher chance of successful adoption.

These two approaches, although at either end of the spectrum, both require several core components, strong and visible clinical leadership and a robust, working relationship with the supplier. It has already been stated that healthcare is unprecedented in its complexity and can be a source of contractual compliance as changes are needed for the safe and effective adoption of a digital solution.

With the governance in place and digital maturity improving with significant investment in personnel and infrastructure, the use of CAHIO and clinical engagement, there is opportunity for digital transformations to be implemented, but several of the papers undertook studies into the post-implementation experiences of AHPs. The papers came from a variety of countries across the world, but all were relevant and comparable to the Welsh AHP system, so they remain pertinent in the consideration of Wales' own journey. Thygeson and Dwyer (2006) undertook a study into nursing and AHP job satisfaction and their intention to remain, and reported there was a balance to be found between having too much or too little work. Too much work was frequently reported as being a negative factor as AHPs felt unable to deliver care to their own and/or patients' expectations. Too little work was also reported as a negative factor, as AHPs reported not feeling satisfied or that their skills were not fully utilised. This thinking is also supported by later work by Veenstra et al., (2022), who stated that EHP implementation could impact the supposed autonomy of AHPs and decrease the interdependence on colleagues as the system prevented the normal face-to-face contact associated with providing high-level healthcare.

Veenstra et al. (2022) undertook a mixed methodology study into the impact of the introduction of an EPR on AHPs autonomy and interdependence in the Netherlands. One of the main findings was the impact of less interaction between clinicians of all types and the issues surrounding differences of opinions but not being able to have wider discussions outside of the EPR. Comparatively, Feely et al., (2023) raised an interesting point within their paper that AHPs who historically write long narratives were more likely to feel less happy regarding the introduction of an EPR where short, coded data was more prevalent. The requirements of different user types are often overlooked, and due to the nature of monolithic software suppliers, bespoke developments are often not possible. This led to a finding of increased time spent

recording information within the system, although the paper does say that this could be either clinicians recording more information or finding the workflow more difficult.

Justinia (2017), in their paper, considering the reasons that the National Programme for IT was discontinued and dismantled, states that there was significant disillusionment in clinicians across the NHS in England as they were not engaged during any of the processes and all decisions were top down. This was not about lack of financial support as £6.2 billion was given at the start and, according to reports, increased to a massive £11.4 billion by the end of its lifespan. The paper also references substantial evidence that end-user engagement is imperative in the development and implementation of EPRs in the NHS.

2.2.2 Research question two

When considering research question 2, how can utilising a user-centred design approach affect the successful implementation of an electronic patient record, a very similar approach was taken with regards to the inclusion and exclusion criteria.

The terms used to find papers and articles when considering research question 2 were:

1. User-Centred Design
2. Impact
3. Implementation
4. Electronic Patient Record

Four databases were utilised during this search:

1. PubMed
2. Cinahl
3. UWTSD Library
4. ProQuest Central

Due to the need for the research to be relevant, exclusion criterion were applied to the searches, and these were:

1. Published date after 2010
2. Peer Reviewed
3. Main Language – English
4. Full Text Available

Table 2.2. highlights the GRADE assessment for the literature reviewed in RQ2.

Table 2.2 Assessment of RQ2 Literature utilising GRADE approach

Article	RCT	Observational study	Lower certainty	Higher certainty	High	Moderate	Low	Very low
Antonacci		x		x	x			
Bouayad		x		x	x			
Caine		x		x	x			
Citron		x		x	x			
Clarke		x	x			x		
Desai		x	x			x		
Enticott		x		x	x			
Ewing		x		x	x			
Fiander		x		x	x			
Fisher		x	x			x		
Heijsters		x		x	x			
Iacono		x		x	x			
Jarva		x		x	x			
Junior		x		x	x			
Keogh		x	x			x		
Konstantinidis		x		x	x			
Li		x		x	x			
Longhini		x		x	x			
Muinga		x	x			x		
Pit		x		x	x			
Rahimi		x		x	x			
Schwarz		x		x	x			
Ting		x		x	x			
Yoo		x		x	x			

Discussion

What is user centred design?

User Centred Design (UCD) is defined as an iterative design process in which developers concentrate on the users of the system and their needs throughout the design process (IxDF, 2023).

The purpose of this paper is to examine the involvement of users, in particular allied health professionals (AHPs) in the design, development and implementation of the

WCCIS. In this instance, the end users can be considered to be the AHPs, their management, the data/information teams and information governance of the health boards. A literature review was undertaken to consider the current thinking regarding the use of UCD and its impact on the implementation of electronic patient records across health and social care.

User-centred design and its impact on implementation.

There were many papers discussing UCD and its impact on EPR implementation, (Ewing and Cusick, 2004; Fisher *et al.*, 2018; Desai *et al.*, 2021) all talk about the benefits of UCD in the development and design of any digital system used in healthcare settings. Ewing and Cusick, (2004) reports that achieving effective implementation of an EHR starts long before the system is selected or installed. The paper focussed on the achieving of improved outcomes rather than the normal return on investment conversation that normally follows any new implementation or purchase of an electronic patient record. This can be considered the new way of approaching digital transformation as we seek to improve staff satisfaction and adherence, rather than simply buying and deploying the cheapest electronic patient record or digital system.

The systematic review by Antonacci et al., (2021) focussed on the role of process mapping within the health and care system. Although not fully regarding the implementation of an electronic health record, the principle is extremely pertinent to user centred design of systems. If the process is not mapped completely then any system which follows will always be lacking certain elements of users needs and this in turn leads to dissatisfaction and failure. According to the review only 10% of the health information technologies studied reported process mapping and when considered against (Brooks and Grotz, 2010) who noted that healthcare systems are facing unprecedented levels of uncertainty, then it is a worrying statement indeed.

This is also supported by Bouayad, Ialynytchev and Padmanabhan, (2017) who undertook a literature review into patient health records system scope and functionalities and reported that undertaking a chronological assessment of electronic health records and the data held within, with the oversight of clinicians, can lead to an

improvement in the quality of data and the availability of functionality of the system. They also stated that the need for user requirements gathering was essential in order to meet their needs in the product delivered. This was also supported by (Caine *et al.*, 2015) who performed a study on clinicians looking at the identification of user requirements, data capture and the use of that data. Through the interviews it was concluded that user centred design and implementation of an electronic health record is vital in the capture, control and use of the patient data captured during assessments. Caine *et al.*, (2015) also went further than just clinician voices and spoke to patients, those whose data was being captured and they stated they did not know what information was captured by clinicians, who had access and for what reason their record would be accessed. So, there is a need to consider user centred design outside of the clinical world and into the patients and the public.

The recent launch of the NHS App in England was met with significant resistance, as individuals objected to the amount of data kept and the seeming lack of control over who was accessing and why (Davies, 2021).

This feels like a significant moment in the development of electronic health records, as clinicians and health information systems are able to capture, reuse and share ever more information held about a patient, there comes an existential question as to just because we can, does not mean we should.

A clinician requires the right information, delivered in the correct format, in a timely manner and electronic patient records allow for this, but this comes at a risk of oversharing or accessing information not relevant to the matter at hand. Careful auditing of systems should be introduced into any new transformational project, such as the National Intelligent Integrated Audit Solution (NIIAS) in Wales, (NIIAS - Digital Health and Care Wales, 2023). This system uses an intelligent algorithm to review access based upon user identification and what they visit during each session.

Desai et al., (2021) in their paper discussing the importance of patient values in an electronic health record talks about co-production with the clinicians being important and the obligation of system developers to enrich the record with information about the patient as a person. They go on to discuss the need to engage with clinical leaders,

users, patients and families to achieve solutions that are principle and practical. It is this practical statement that is interesting in this context as simply having pages and pages of narrative, may be useful in some circumstances, particularly for the arts therapy's and psychology, but in the main, information should be displayed in a standardised format.

Systems acting as a burden

Clarke and Ghersi, (2022) in their paper looking at the introduction of electronic health records in biomedical informatics courses state that it is imperative that practitioners be acquainted with fundamental usability issues. If a system does not enhance a clinician's ability to undertake their role or actually hinders, then this can have a negative impact on the experience and satisfaction of the clinician.

Further to this opinion, Jarva et al., (2022) reported on AHPs opinion of the introduction of electronic health systems in rural Australia and despite there being clear evidence that the tasks being undertaken manually could be delivered easily by a digital solution, there was a perceived idea that digital systems could not deliver and that the individuals lacked the digital competency to engage meaningfully with the design and implementation of a system. (Júnior *et al.*, 2018) reported in a similar vein that clinicians lacked confidence in the local healthcare networks and that there was significant knowledge gaps in the digital community of practice. This perceived lack of information or knowledge led to a resistance to implementation.

Li et al., (2023) in their paper looking at the perceptions of Chief Clinical Information Officers in NHS England regarding interoperability reported wide-ranging findings but importantly that if the vision for health and social care is to be met across the NHS, then a renewed focus and mandate regarding data standards, user-centred design, patient involvement and encouraging organisations to work together. There was evidence produced in the study that indicated blockers and burdens placed upon clinicians are not technological but institutional. This must be considered as unacceptable in a modern society seeking to improve the outcomes of patients and the satisfaction of staff.

However, if we consider that digital systems act as a burden, we must consider that the digital competencies of the users may be the problem and not the system itself.

A paper by Longhini, Rossettini and Palese, (2022) set out to review the current thinking regarding digital competencies amongst healthcare practitioners. The main finding of the review suggested that digital transformational opportunities were not being fully realised due to clinicians' lack of digital competencies. They did state however, that there has been a rapid increase in the tools available to assess digital competencies and the opportunity for more targeted training and development as a result. They did highlight that these tools lack validity due to their recent creation and further trials must be undertaken to establish validity in these assessments. In spite of the lack of validation, it did highlight a significant issue of clinical digital competencies not being at a point, across the system, that allowed for rapid implementation and adoption of digital systems. There is a need to build digital competencies into educational courses and post-graduate courses in order to upskill clinicians and individuals involved in the design and development of digital technology.

How can user-centred design help?

Konstantinidis et al., (2012) undertook a study into user-centred design for the creation of a health information system. The main objectives of the paper included collecting perspectives on healthcare design and lessons learned from previous experiences of clinicians. This led to the conclusion that for the creation of a health information system to be successful it is paramount that there is deep user involvement throughout the life cycle of the programme. The developers must be aware of the complexity of the system they are building for and integrate usability principles into all design aspects, undertaking regular reviews and iterating wherever necessary in order to achieve the main design aims. This is fully supported by Rahimi, Vimarlund and Timpka, (2009) who undertook a qualitative meta-analysis of health information systems and concluded that there must be a clear set of priorities and include the participation and collaboration of users across all potential groups, including clinicians. They noted that in many of the studies there appeared to be two sides formed in the design authority, system developers and management on one side and clinical teams on the other. They suggested that any perceived failures can result in the loss of confidence of clinicians,

especially those who are not well-versed in digital transformation requirements and methodology.

This is further supported by Ting, Garnett and Donelle, (2021) who reported in their study that poor training impacts implementation. Training is often a scatter-gun approach and recommend that any training and engagement be targeted and specific to the user requirements, which would be identified through a comprehensive process map.

In a recent paper by (Yoo *et al.*, 2015) they undertook a double diamond design process in order to fully utilise a user centred design approach to the development of a healthcare system which truly meets the unmet needs of the clinician. The developer introduced a user experience design methodology in order to take the clinicians through the process and this engagement and support allowed for a far more robust and controlled approach. A valuable point raised in this paper was the need for ongoing user feedback of any newly implemented digital solutions and for issues to be rectified and further developed expediently.

2.3 Themes

Throughout this literature review there have been a number of standout themes identified. These themes were expected at the outset; however, the weight of the evidence was greater than anticipated and the following table will seek to summarise each of the main themes.

Table 2.3 List of Identified Themes

Themes	**Description**
Engagement	There must be significant and whole system engagement from the very earliest opportunity if any digital transformation project wishes to be successful.
User-centred Design	Following on from the engagement theme, there must be opportunity for users to be involved in the design, configuration and user acceptance testing process if the system is going to meet their requirements and

	processes in a way which enables adoption and does not hinder care delivery.
Governance	There must be clearly articulated and documented governance for all aspects of programme delivery. These areas include, clinical assurance, patient safety, user acceptance testing, data standards and more. There should be a single point of sign-off established, but there must be a robust sub-structure in order to undertake the work and give complete assurance than the users are happy with the design and that patients will not come to harm as a result of the implementation of any digital transformation project.
Interoperability	A more focussed theme than the others, but one which is heavily evidenced, is the need for information to be available to clinicians and staff in any system they choose to use in the course of their daily work. The requirement to have multiple windows and programmes open is a patient safety risk and causes increased stress on the user. Interoperability is a key theme which must be considered throughout the process and should be evident to the programme board governance structure if true engagement and user-centred design processes are followed.

2.4 Identified gaps

Throughout all the research of the available literature, the aim was to focus on AHPs in particular, however, there was limited availability of strictly AHP research. This is often due to the numbers of researchers in the field of AHPs but does not represent the impact AHPs are facing from poorly designed and implemented solutions in the health and social care space.

This research will therefore seek to look at the identified gaps and answer the following:

Table 2.4 Identified Gaps in Literature

1	The presence of senior AHP digital leaders in Wales and across the world is varied and not consistent. This leads to a varied approach to AHP involvement in digital transformation and the implementation of solutions that are not fit for purpose for AHPs processes.
2	Clear AHP governance routes, with well-articulated roles and responsibilities. The model is often self-governed by those with an interest but without the authority to action or be responsible for the decisions made. This creates a disconnect between the programme board and the Directors of Therapies and Health Care Sciences.
3	Digital Competence – there is a distinct lack of digital competence across the AHP workforce in Wales and although we have tools to identify competence levels, although this is rarely used, there is a lack of educational opportunities, training programmes etc that specifically address digital competency issues and as such there is a lack of AHPs willing to put themselves forward for involvement in digital transformation programmes, thus making the user-centred design issues worse, as there has not been a recognised workforce to consult with efficiently.

2.5 Conclusion

The evidence for user-centred design in the development of an electronic health record is clear. The available evidence is also relevant due to the recent rapid expansion of electronic health records. The literature review failed to support the paper's main objective to review the impact of allied health professionals' involvement in the development of such systems. Most papers referred to users as healthcare professionals and only on some occasions were their actual professions referred to. This is due to the overwhelming similarity of providing effective, patient-centred health care. This does fail to account for those differences which are pertinent to this paper,

such as the ways allied health professionals work and their need to traverse multiple healthcare settings, from primary care to community care and back again.

After reviewing the available literature regarding allied health professionals' impact on electronic health records design and the impact of user-centred design, it is this author's understanding that there is justification for this novel study into the impact of allied health professional involvement in the development of WCCIS in Wales.

Chapter 3 Research Methods

3.1 Research philosophy

For any research study there must be a research philosophy. A research philosophy refers to a set of beliefs, assumptions and principles that underpin the research. Whichever particular philosophy is selected provides the foundation for the study including the choice of research methodologies, design and finally the analysis of the collected data. The researcher will come at any study they undertake with a particular view, shaped by experience which will affect the way they view knowledge. According to Dudovskiy, (2020) in his article regarding research philosophy, there are four types of philosophy to choose from:

Table 3.1 Research Philosophy

Title	Description
Pragmatism	Favours a mixed or multiple method design, both quantitative and qualitative. Emphasises a flexible approach and a problem focused approach.
Positivism	Highly structured with large samples and normally quantitative. This approach believes in a single, objective truth that can be discovered through empirical observation and measurement.
Realism	Methods must fit the subject matter.
Interpretivism	Small sample size, in-depth investigations and normally qualitative. More likely to consider the context of the data through

	interviews or focus groups. Considers the probability of multiple subjective realities.

Each of these approaches has its strengths and limitations and so must align with the nature of the research questions and the worldview of the researcher. Research studies will also be seeking to elicit a certain type of data for analysis and so selecting a philosophy which allows the researchers to reach this ending is imperative.

For the purpose of this study, the pragmatic philosophical approach was utilised. When the research questions are considered, there is a clear qualitative and quantitative nature to the data that is required to answer the questions and following a mixed methodology aligns to pragmatism. The objectives of the study are also aligned with this approach as they seek to assess both the experiences of participants but also the more fixed data of a system usability survey.

The strengths of a pragmatic approach in this particular study are that the data can be easily described and reported on. It helps to generalise data and can be useful when unexpected results arise from previously undertaken studies. It allows the researcher to develop a more wholistic analysis and consider a number of relevant factors into the study.

The weakness of a pragmatic approach however is the outlay of time in preparing and conducting the studies compared to more traditional philosophies. Differences between the two data types may prove challenging to analysis and interpret. It can prove challenging to participants and the researcher with regards to switching between the two data collection types and can they be done concurrently or should they be undertaken consecutively.

3.2 Research approach

This study utilised the mixed-methods approach to data collection. A mixed-methods research approach involves the combining of both quantitative and qualitative research methods within a single study. The rationale behind this decision is that this approach allows the researcher to reach a more robust answer to the research

questions by utilising the strengths of both methods. This approach, following the pragmatic philosophy, will inform the design, data collection and data analysis stages.

Considering the rationale for utilising the mixed methods approach, it is clear that by selecting the strengths of each approach will allow for the integration of the results from each section. This is known as ‘Triangulation’ and is described in a paper by (Noble and Heale, 2019) who explain that by combining methods in a research study, fundamental biases can be overcome and can also help to explore complex human behaviour and offers more balance. It can enrich research.

Complementarity in research is uniquely defined by Ellis, (2015) who states, “complementarity refers to how two different approaches to conducting a research synthesis can in combination provide a more complete explanation of a phenomenon than either approach by itself”. When this statement is considered in context of a mixed-methodological approach to this study, it allows the potential for both methods to bring their unique strengths to the analysis of the data.

Development in mixed-methodology studies is available when the design is sequential and the results from one method inform the development of the subsequent method, (Halcomb, Massey and Gunowa, 2023)

The final consideration for a mixed-methodological approach is initiation and this is described by Halcomb, Massey and Gunowa, (2023) and allows for one method to highlight the potential contradictions in the data from the opposing methodology.

Halcomb, Massey and Gunowa, (2023) in their book also discussed the integration of qualitative and quantitative research and defines it as the point a researcher mixes the two datasets. It is imperative that the researcher considers the point at which the two datasets are brought together. The reason for the careful consideration is the need to maximise the benefit of the approach, whilst minimising their weaknesses.

For the purpose of this study and to be able to answer the proposed research questions fully and with maximum confidence, the mixed methodology was selected. There needs to be empirical evidence of the lack of user centred design and failure to implement a useful, intuitive electronic patient record. There must be opportunity for

participants to be able to explain in detail their feelings about the way the design process and implementation strategy was managed by the National Programme Team in Digital Health and Care Wales.

By utilising the mixed-methods approach, this paper will seek to highlight the impact of leadership on the usability of WCCIS for practitioners in Wales. The point of integration will aim to be delivered by analysing and displaying statistical findings, supported by participant quotations.

Dawadi, Shrestha and Giri, (2021) sought to bring together the latest thinking regarding the use of mixed methodology in research and highlighted the challenges potentially arising from its use. Data collection and analysis may be a long process, but this paper will mitigate this risk by having a small population from which to select a sample to be statistically significant. There is poor guidance in literature regarding the method by which data can and should be integrated. This paper will seek to integrate the two data points once both have been collected to act as a comparison and look for any contradictions in the responses. There is a risk that the research paradigm is so juxtaposed that comparing the data directly may lead to inconsistencies and there is a need for interpretivism as well as pragmatism. For this research, the qualitative data will provide the richest picture regarding the research question the study has set out to answer and the quantitative data will provide supplementary or supporting evidence.

A frequently discussed criticism of the mixed-methods approach to research is that the two methods require a completely different approach and so cannot be aligned without significant compromise. This paper will address these thoughts by giving more weight to the qualitative approach, both methods have value.

3.3 Study Design

3.3.1 Timing of phases

Due to the nature of the study being a mixed-methods approach, there was a requirement to gather both types of data simultaneously as there was no requirement for a developmental approach. Both aspects of the data collection are able to be

measured in isolation and it is in the integration piece that will consider the complementarity.

3.3.2 Priority of methods

There is significant evidence already regarding user satisfaction of WCCIS, but this study focussed upon the qualitative arm.

3.4 Data Collection Methods

3.4.1 Qualitative data collection

The primary data for this section was collected via Microsoft Teams individual interviews; see Appendix A for an information sheet and consent form examples.

The participants were selected via voluntary responses to emails, Teams channels request for support or direct knowledge of individuals using the system.

A 5-question plan was created to cover the two research questions and allowed the individuals to talk about focussed areas of the system and AHP leadership in the time given without spending excessive time on one particular area that was important to them.

Each interview was transcribed automatically with Microsoft Teams' inbuilt transcription software and post-interview; the transcript was downloaded and formatted to remove incorrect words and erroneous speech words, for example, um, great, etc.

The results were then imported to Nvivo14 coding software, and codes created as the transcripts are reviewed. As the review continues, codes were refined to reflect the responses given.

3.4.2 Quantitative data collection

This study used a common tool found in the world of digital system analysis and this was a System Usability Scale (SUS). According to Brooke, (1995) who developed the original SUS, there is no such thing as usability in the absolute sense. Usability

depends on a number of competing priorities and world views. However, a SUS does indicate on a more general basis whether a particular tool is useful in a range of contexts. As a general rule, a SUS will consider the effectiveness, the efficiency and the satisfaction of the user. Therefore, to consider the research questions for this study, a SUS was undertaken to consider how WCCIS fits into the workflow of AHPs in Wales, in both Health and Social Care.

3.4.3 Bias

It is important to note that bias may have played a significant role in those who responded and those who did not. People with negative experiences are more likely to be vocal when providing feedback, especially when they are approached directly. Being cognisant of this allowed the researcher to ensure that conversations were controlled and managed well to remain within the boundaries required for the research.

It was also evident that the researcher's role within DHCW and the implementation of WCCIS may have had an effect on participants as they may have perceived a potential for hostility. The researcher addressed this directly in the interviews and stated that there was no issue with anything reported in the interviews.

3.5 Data Analysis

3.5.1 Qualitative data analysis

The output from the qualitative data collection work, structured interviews, was analysed via the use of coding and coding software, NVivo 14, which will highlight emergent themes. The interviews were recorded, transcribed and imported into NVivo and using the software, themes were identified and categorised.

3.5.2 Quantitative data analysis

SUS, according to Brooke (1995), presents the researcher with a single figure that denotes the aggregate measure of the overall usability of WCCIS. Each answer, if viewed in isolation, is meaningless, but when combined together, have meaning.

SUS is a ten statement questionnaire, that users select an option they feel fits the question when considering WCCIS. At the lowest end of the scale is one and a phrase ‘Strongly Disagree’, which then moves through two, three and four, and finally five and ‘Strongly Agree’. Each of the ten questions asks the participants to rank their feelings regarding WCCIS from one to five. Once all of the participants have completed the SUS, the data will be inputted into an excel spreadsheet and formulae used to attribute the required analysis of the raw data.

For questions one, three, five, seven and nine the score is scale position minus one. For questions two, four, six, eight and ten the score is five minus the scale position. Once this has been done the sum of the scores should be multiplied by 2.5 to calculate the overall value of the system usability. SUS scores have a range of 0 to 100. According to (Will, 2024) the average SUS score is 68 and so a score of 68 is considered to be the 50th percentile and simply scoring average for each question will put you below the 50th percentile and therefore is not an affective measure of usability. The figure demonstrates the rating for scores achieved through the SUS.

Table 3.2 Scoring Chart for System Usability Scale

SUS Score	Grade	Adjective Rating
> 80.3	A	Excellent
69 - 80.3	B	Good
68	C	Okay
51 – 67	D	Poor
< 51	F	Awful

The quantitative dataset was analysed using descriptive statistics. This data was from a sample of the population but as it is a single time study there can be no comparison work as there was only one group.

The results were interpreted by considering the scoring of each aspect of the SUS comparing how participants considered the system to meet their needs and the difficulty in making it fit for purpose.

3.5.3 Integration of results

The combining of the two phases occurred once each phase had been analysed individually. The qualitative data acted as the main priority when considering the research questions. The responses to the interview questions will be supported by the overall scores from the SUS or act as contrary data if the two do not align.

However, if the datasets do align, through the use of an interpretation philosophy, the study aimed to use the qualitative and quantitative datasets to support each other and build the case for the conclusion of the study sample. This allows for a more holistic approach to the research question as supported by the mixed methodological approach.

3.5.4 Validation and Trustworthiness

3.5.4.1 Quality criteria

To ensure that the study is valid and the outputs trustworthy it is vital that both the quantitative and qualitative approaches have a quality criterion applied to them to ensure proper rigor and reliability.

The interview questions were standardised and scripted for each of the participants, allowing them the opportunity to answer with open-ended answers. The questions were not leading, but directed to allow the participants to answer in a way which provides the study with details regarding the research questions it is seeking to answer.

3.5.4.2 Triangulation

The purpose of this study was to examine the impact of AHP leadership on the implementation of WCCIS. Having a dual approach of a quantitative SUS and a qualitative structured interview was designed to show empirical evidence regarding

the system itself and for it to be supported or refuted by the qualitative findings. The idea of triangulation in this context is the use of several datasets to explain differing aspects of a phenomenon of interest (Noble and Heale, 2019).

3.6 Ethical Considerations

As set out in this study's ethical approval form, which will be applied consistently across both qualitative and quantitative components, the aim was to gather evidence in relation to the research question regarding AHP leadership and user-centred design impacting the implementation of WCCIS in Wales. All participants were given a consent form to sign, which will be stored securely and gives the participant the right to remove consent at any point during the study. The data was held in the University of Wales Trinity St Davids cloud for the duration of the study and no personal copies will exist. All data collected related to the study will be held for the agreed amount of time and then destroyed in line with best practice. All participants will also be anonymised at source in order to make identification impossible for the researcher or for any future reader of the study. This process will ensure that participants are able to answer freely without fear of repercussion should their answers be considered inflammatory or critical of organisational decision-making. Ethical approval was obtained for this study in November 2023. The ethical review process was based on the guidelines from the University of Wales Trinity St Davids Ethical Board.

3.7 Sampling Strategy

3.7.1 Selection criteria

A paper by Martínez-Mesa et al., (2016) describes and promotes a robust method for selecting participants to a health research study.

Any study must consider who its participants are and how those participants will be selected.

Due to this study being a mixed-methods approach, it is crucial that the sampling strategy allows for both qualitative and quantitative datasets to be meaningful and impactful.

3.7.2 Define the population

For this study, the population is Allied Health Professionals in Welsh Health Boards and Local Authorities. However, this study also included those that support the delivery of healthcare, such as, physiotherapy assistants, dietetics assistants, administrators and clerical staff. WCCIS was established as a single system capable of doing all the tasks required to deliver a functioning health and social care system and should be measured against this original intent.

Across Wales, the exact number of AHPs and support staff cannot be accurately stated, but a recent request to Health Education and Improvement Wales returned the data displayed in table 3.3 for registered professionals in each profession, but only for Health boards as they do not capture those registered professionals employed directly by local authority.

Table 3.3 List of AHP numbers in Wales

Profession	Indicative Workforce Numbers (HEIW)
Art / Music / Dramatherapy	16
Chiropody / Podiatry	227
Dietetics	527
Occupational Therapy	1470
Operating Theatres	637
Orthoptics / Optics	51
Physiotherapy	1685
Prosthetics and Orthotics	26

Radiography (diagnostic)	1267
Radiography (therapeutic)	210
Speech & Language Therapy	613

The study was only seeking completion of both arms of the study by current users of the system or those with direct knowledge of the system, and this was made explicit in the accompanying information given to the participants in their information and consent packs.

The inclusion criteria included members of the NHS or Local Authority's in Wales who are either registered AHPs as highlighted in table 3.4 or members of the team delivering care, such as support workers or administration staff. They must have the ability to undertake the SUS via appropriate hardware and to have sufficient internet bandwidth in order to participate. For the qualitative arm of the study, the participants must have Teams installed, an appropriate microphone that allows for clear transcription of their answers. They must be able to understand and respond in English.

The exclusion criteria for the sample selection will be non-users of WCCIS or those without a working knowledge of the system.

3.7.3 Sampling frame

As discussed earlier, the sample came from those working in the NHS and Local Authority in Wales and who are registered AHPs or assist in the delivery of AHP services.

3.7.4 Quantitative sampling

The sampling method utilised the current AHP digital interest network available within Wales to seek volunteers to complete the SUS. The author also targeted health boards that have WCCIS as their main digital system for AHPs directly and aim to increase numbers of participants completing the SUS.

The number of AHP users of WCCIS according to the National Programme Team is approximately 340 and so this would be the population.

Table 3.4 AHP Users of WCCIS

Row Labels	Count of (Do Not Modify) User
⊞Dietician	10
⊞Occupational Therapist	101
⊞Occupational Therapist Assistant	1
⊞Occupational Therapist Community	38
⊞Occupational Therapist Health	30
⊞Occupational Therapist Student	5
⊞Occupational Therapy Assistant	17
⊞Occupational Therapy Student	3
⊞Ot Assistant	1
⊞Physiotherapist	66
⊞Psychiatrist	8
⊞Specialist Speech and Language Therapist	1
⊞Speech & Language Therapist	19
⊞Therapist	7
⊞Torfaen - Occupational Therapist	33
Grand Total	340

According to (Sample Size Calculator, 2024) and as demonstrated in the figure 3.1, the number of SUS participants required to have a confidence level of 95% within -/+5% is 181.

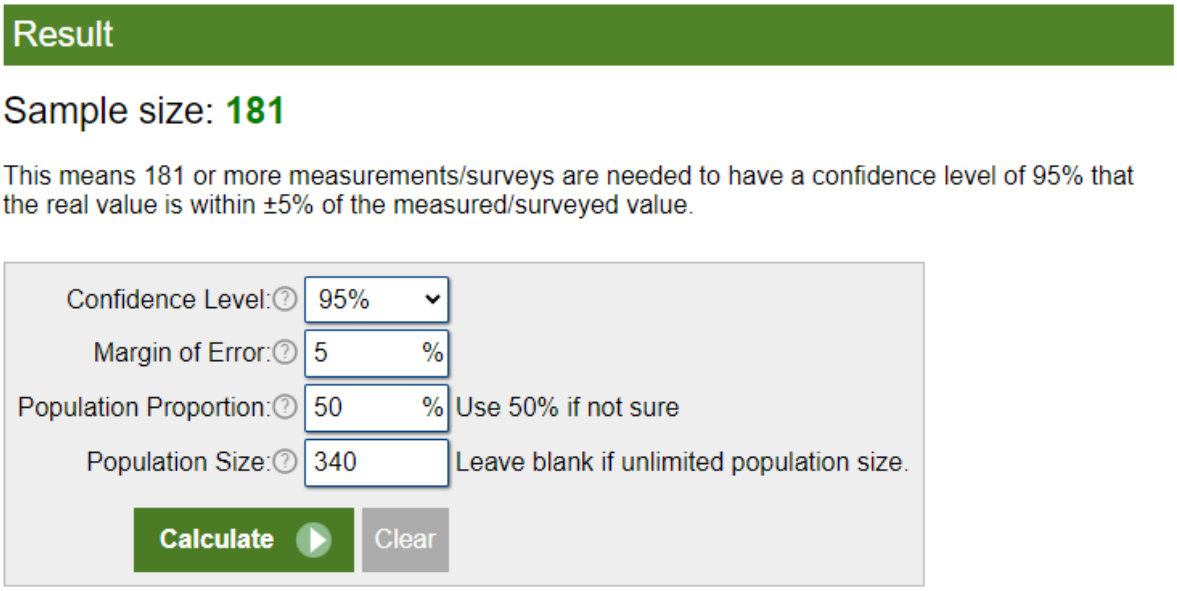

Figure 3.1 Sample Size Calculator Output

3.7.5 Qualitative sampling

The idea of sampling with qualitative research is to discover meaning through the investigation of human experience. Any sample selected must be non-random, as identified in a paper by Gill, (2020) who states that researchers only interview participants that can further deepen the understanding of the phenomenon being studied. Participants must also be to spend the time sharing their experiences and in the case of this study, answering questions via Teams in a structured interview.

The paper by Gill, (2020) identifies four sampling methods. These are:

Table 3.5 Sampling Methods

Sampling Method	Description
Volunteer Sampling	Participants volunteer to participate in the study
Chain Sampling	Current participants nominate or suggest other individuals who may be able to help with the study
Purposeful Sampling	The researcher selects the participants for their knowledge of the subject and so can select a wide range of individuals and outliers – those with more extreme views
Theoretical Sampling	The researcher samples in generate and develop the theory being studied.

The plan for this study was to use purposeful sampling. The justification for this is that the researcher can select the most appropriate individuals with a higher-than-normal level of experience of the system and the implementation. This meant a more targeted and prudent use of the researchers' time and the time of the participants. It was more cost effective and was able to benefit from the chain sampling approach where other experienced users can be nominated and approached to support the study.

The aim of the sample was to target a variety of professionals and at a variety of levels to gain the most rounded approach to the research questions.

The aim of qualitative research is to examine a phenomenon in more depth, as opposed to quantitative which relies on higher numbers and then analysis. For that reason, this study aimed to invite ten individuals to participate in the formal structured interview.

3.7.6 Integration of samples

The participants will be able to be a part in both aspects of the methodology and so have a say in both arms.

The data from both samples was brought together once all data was collected and integrated to demonstrate that the SUS scores provide evidence that the qualitative data is robust and supported by the results from the quantitative data.

3.7.7 Time and resources

The quantitative data collection methodology was something which was created and circulated widely via existing channels or users and was a quick survey for participants to complete in their own time and did not require any involvement from the researcher apart to monitor the numbers collected. The post data collection required some further analysis but given the SUS has a predetermined method, this was done with an Excel formula and in only a small amount of time.

The qualitative data collection took significantly longer for the researcher and the participants, depending on the length of the structured interview and the participants ability to expand on answers and the detail they could provide. There was significantly more post data collection analysis of this data, however this was supported by the use NVivo14, a qualitative analysis software programme provided by UWTSD. This allows for transcribed interviews to be analysed using key words and phrases and then grouped into themes automatically once parameters are established by the researcher.

3.7.8 Data saturation

The definition of saturation refers to a point in time where capacity for the creation or absorption of anything new, such as in fluids or for this study, data, reaches a maximum. This will be evident when the researcher begins to see a pattern of repeated data being collected and so can consider the saturation point reached, (Scott, 2023).

3.8 Conclusion

In summary of the research approach discussion, this study employed a mixed methodological approach and sought to utilise the identified strengths of each. By focussing on the strengths, the study aimed to mitigate the potential weaknesses of the respective methodologies. By aiming to create a truly synergistic approach which

maximises the benefits, this study aimed to create a more robust understanding of the research problem.

Chapter 4 Results

4.1 Introduction

This section will collate and present the two datasets collected from the research. There are both quantitative and qualitative methodological approaches undertaken in this study.

4.2 Quantitative Results and Analysis

The SUS was piloted on three individuals who were not part of the AHP survey sample cohort. They were asked to access the Microsoft form and complete the SUS and feedback directly to the author. The comments from the pilot phase allowed the study to correct certain language in the information sheet and in the presentation of the SUS, which proved valuable and helped to ensure the validity of the questionnaire.

The system usability scale was live for a period of 6 weeks and shared via a wide range of options, aiming to target those users identified by the National Programme Team.

The participants for the quantitative study were self-selected by those who received the form and thought they had enough knowledge of the system in order to provide an answer. A total of 40 individuals responded to the SUS form and all 40 responses were used in the final analysis. It may be useful in subsequent studies to increase the questions, to be able to understand the demographics and professional status of the participants. This may have allowed for further investigation into the responses and deeper statistical analysis.

Table 4.1 shows the full list of participants and their individual scores. The table also demonstrates the calculated SUS score and the final rating of the system based upon these scores.

Table 4.1 SUS Raw Data

Participant Number	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	SUS SCORE	Rating
p1	1	5	2	5	1	5	1	5	1	5	2.5	Awful
p2	1	5	1	3	1	5	1	5	2	5	7.5	Awful
p3	1	5	1	4	1	5	1	5	1	5	2.5	Awful
p4	1	5	2	2	3	3	3	4	2	5	30	Awful
p5	2	5	3	1	2	4	1	4	3	3	35	Awful
p6	4	4	1	5	2	3	2	5	3	5	25	Awful
p7	5	4	3	1	2	3	4	4	3	4	52.5	Poor
p8	3	4	2	4	2	3	3	4	2	4	32.5	Awful
p9	1	5	1	5	1	5	1	5	1	4	2.5	Awful
p10	3	4	2	2	2	4	4	4	2	4	37.5	Awful
p11	2	5	2	3	2	4	1	5	3	5	20	Awful
p12	1	1	1	4	2	4	3	4	2	2	35	Awful
p13	5	1	5	1	3	2	5	1	5	1	92.5	Excellent
p14	2	4	4	2	2	2	4	5	4	4	47.5	Awful
p15	2	4	2	2	2	4	3	5	4	2	40	Awful
p16	5	3	3	1	3	5	3	4	5	4	55	Poor
p17	2	5	2	3	2	5	2	5	3	3	25	Awful
p18	2	3	2	1	1	4	3	2	4	3	47.5	Awful
p19	1	4	2	3	2	4	2	3	3	3	32.5	Awful
p20	2	4	2	3	2	4	2	4	3	4	30	Awful
p21	5	5	1	3	1	3	1	5	1	5	20	Awful
p22	5	1	5	1	3	4	5	1	5	1	87.5	Excellent
p23	3	4	2	4	3	4	2	3	2	4	32.5	Awful
p24	2	5	3	2	1	3	1	5	4	4	30	Awful
p25	5	5	1	3	2	5	1	5	1	5	17.5	Awful
p26	5	5	1	5	1	5	1	5	1	5	10	Awful
p27	1	5	1	4	1	5	1	5	1	5	2.5	Awful
p28	1	1	3	2	4	2	5	3	3	2	65	Poor
p29	2	5	1	5	2	5	1	5	1	3	10	Awful
p30	1	5	1	3	1	4	2	5	1	5	10	Awful
p31	4	4	3	3	3	2	2	4	4	5	45	Awful
p32	2	4	2	3	2	5	1	5	2	4	20	Awful
p33	1	4	1	2	1	3	2	5	3	3	27.5	Awful
p34	3	4	2	4	2	5	2	4	2	4	25	Awful
p35	1	5	2	4	2	4	2	5	1	5	12.5	Awful
p36	3	4	2	5	3	5	2	4	2	4	25	Awful
p37	1	5	1	4	2	5	1	5	2	4	10	Awful
p38	1	5	1	3	2	4	1	5	2	5	12.5	Awful
p39	4	3	3	4	2	3	3	3	3	4	45	Awful
p40	1	5	1	4	1	5	1	5	1	5	2.5	Awful

Based upon this table, a simple pie chart was created to show the overall spread of the results, figure 4.1,

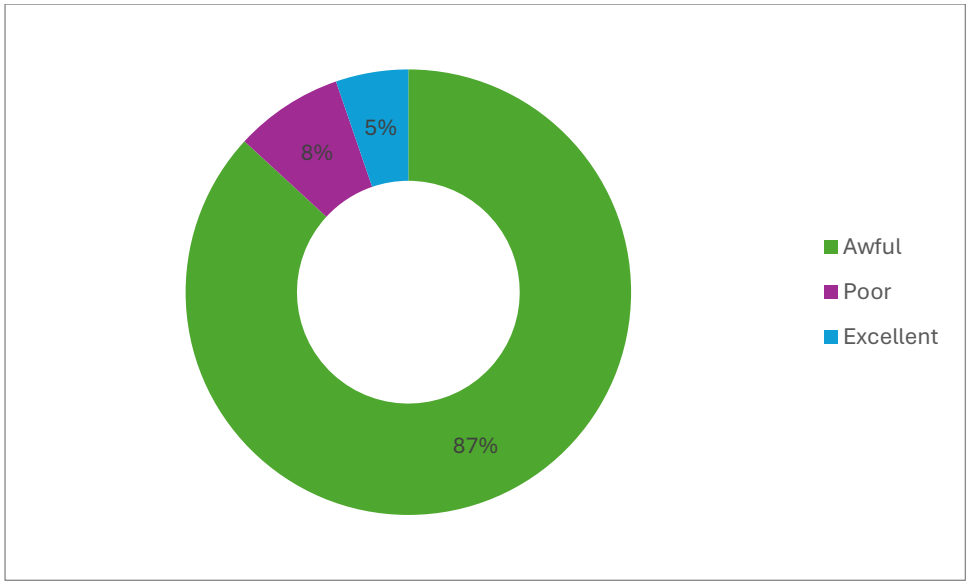

Figure 4.1 SUS Rating

The percentage of participants who rated the system at *poor* or *awful* was 95% and just 5% of respondents scored it as *excellent*. No participants identified the system as being *good* or *okay*.

The two *'excellent'* results are outliers and when viewed in a scatter graph, figure 4.2, it becomes clear that they are significantly different to the other 95% of results.

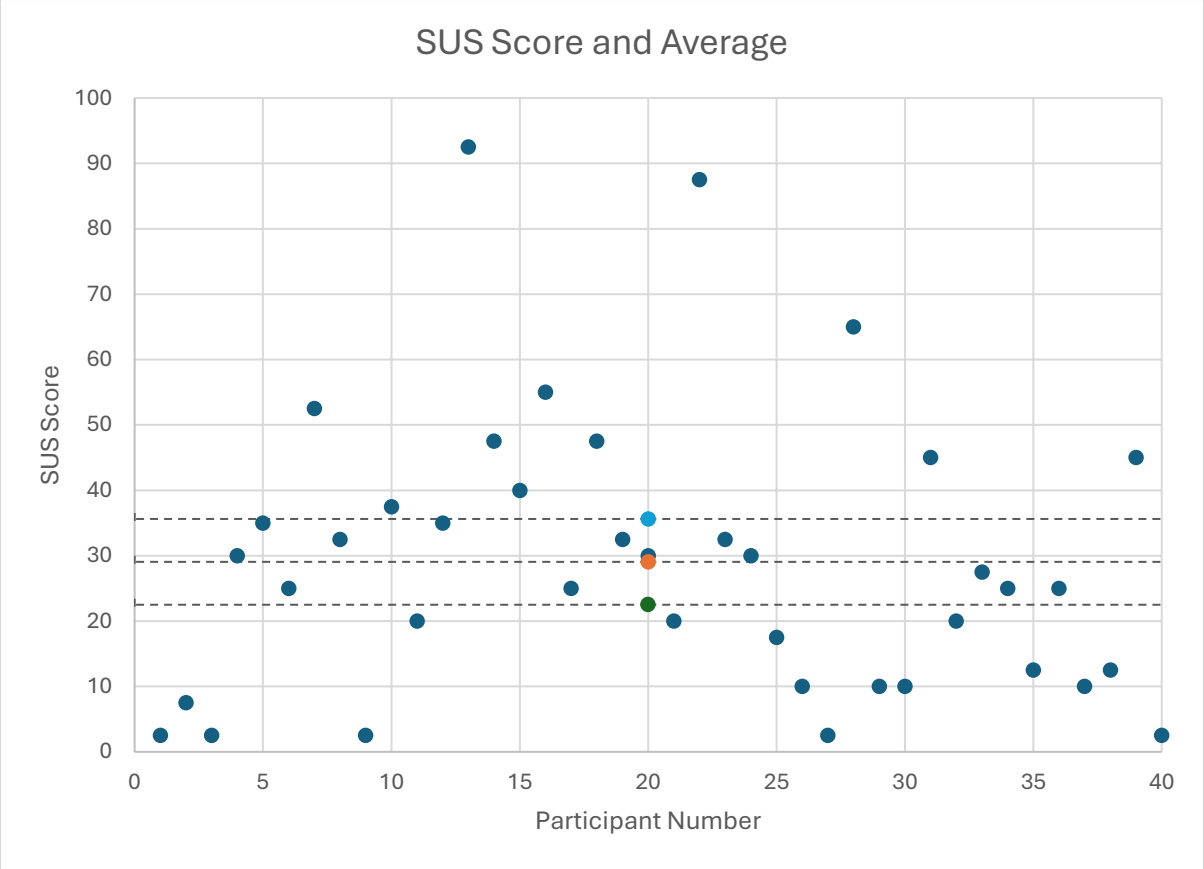

Figure 4.2 Scatter Chart displaying SUS results

The mean number stated in table 4.2 is the mean of the 40 results and was calculated as 29.06. This remains within the '*awful'* rating from the SUS scoring mechanism. When considering these results, the median was calculated and was found to be 26.25, again, well within the *'awful'* rating from the SUS rating chart.

The standard deviation of the results was 21.41. This is evident in the spread of scores displayed in table 4.3.

In summary, there were 40 responses to the SUS questionnaire and 95% (n=38) scored WCCIS as *'poor'* or *'awful'*, with just 5% (n=2) scoring WCCIS as *'excellent'*.

Table 4.2 Statistical Analysis of SUS scores

	N	Minimum	Maximum	Mean	Std Deviation	Std Error	Lower Confidence Limit	Upper Confidence Limit
Participant	40	2.5	92.5	29.06	21.41	2.34	22.51	35.62

As demonstrated in figure 4.3 and table 4.2 the data captured via the SUS allows to have a 95% confidence interval that the average score of 29.06 and therefore '*awful*' can be accepted as significant.

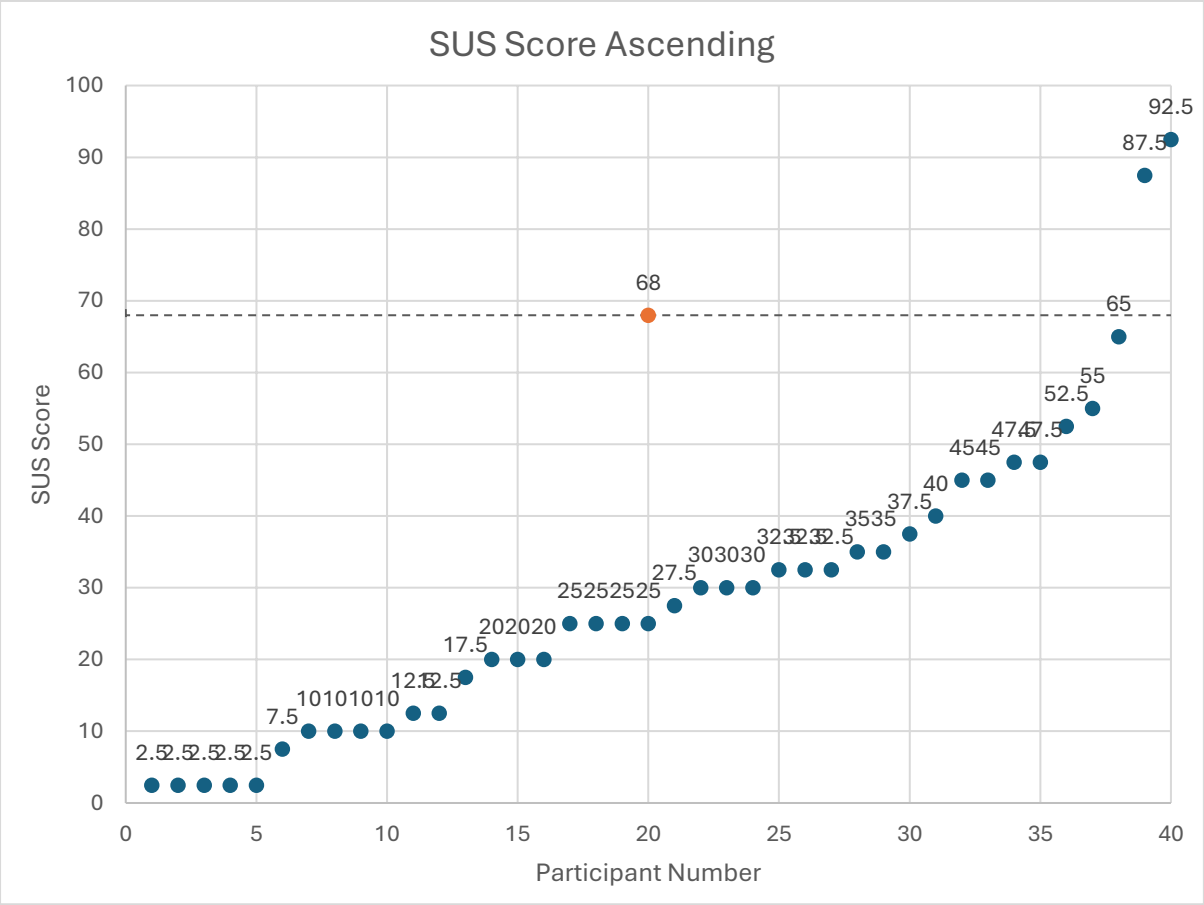

Figure 4.3 Scatter graph of SUS in ascending order

In figure 4.3, the indicated figure of 68 is the recognised level of what is considered good. As highlighted in the points charted in figure 4.3, all but two of the respondents scored below this level. There is not a consistent negative scoring pattern identifiable as there is a full range of scores plotted. Conversely, the two respondents who scored as *'excellent'*, both scored in the highest range available.

4.2.1 Inferential analysis

Due to the nature of the SUS questionnaire and the fact that this study was not seeking to understand the population from which the responses were received, but simply the system usability score for WCCIS, it is not possible to conduct any meaningful inferential statistical tests upon the data.

4.2.2 Non-response bias

Non-response bias is a phenomenon within research that has been well described by Survey Monkey, (Survey Monkey, 2024) and describes the issue of individuals not responding to a call for a survey for a number of potential issues, such as time pressures, feelings regarding the subject and many others. A potential solution suggested by the research is to call a randomly selected group of individuals who did not respond to gauge their opinions on the topic, but importantly not to complete the survey as a whole. This random approach allows the investigator to establish the general trend of opinions.

The author called ten individuals and asked their general feelings regarding the system, and it was found to be overwhelmingly negative in terms of the usability of the system. All of those contacted agreed that digital systems, interoperability and shared electronic records is the way forward and should be progressed as a matter of urgency. Therefore, it is possible to infer from the results that those who did respond, did represent the general feeling of the population, even if this cannot be proven with any statistical significance.

As a result, it is the belief of the author, through the primary data, phone calls to non-responders and anecdotal evidence that WCCIS in its current version is not fit for purpose for allied health professionals.

4.3 Qualitative Results and Analysis

4.3.1 Qualitative pilot

The semi-structured interview questions were constructed through research. It was piloted on three non-AHP users of the system and significant flaws were identified in the initial set of questions. This reduced the potential for bias and increased the likelihood of useful primary data being collected.

Table 4.3 provides the guides for the semi structured interviews.

Table 4.3 Semi-structured interview questions

1	Senior AHP leadership in digital	Did/does your health board have an AHP or a representative at a suitably elevated position in which to represent your requirements, please explain your answer.
2	2 – Governance of AHPs in requirements gathering	Do you feel that there was enough clinical engagement in the requirements phase of WCCIS, explain your reasoning?
3	3 – Communication strategy and engagement	Was there sufficient engagement in the development of WCCIS across the whole of the AHP workforce? Do you remember any communications coming from the programme or were you reliant on information from another source? Could your health board or the National Programme Team in Digital Health and Care Wales do more to elicit the requirements of clinicians who deliver care, if yes, how?
4	4 – User centred design	What are your biggest frustrations with the system if you are a current user and if you are not, what are your perceived frustrations with WCCIS? Do you have your own thoughts and ideas on what a system should do and how it should behave and feel able to articulate that to a programme of work such as WCCIS?
5	5 – Future project requirements	What more could DHCW, and health boards do to address the limited presence of AHP digital senior leadership across Wales? What are the potential consequences of not investing in leadership?

4.3.2 Participants

This category describes the job roles of the participants who participated in the interviews.

Table 4.4 Participants

Job Title	Total
AHP manager in Health Board	1
Team leader in Health Board	4
Clinical Informatics Lead	2
Head of Service	2
AHP Business improvement manager	1
Deputy Head of Service	1

4.3.3 Themes

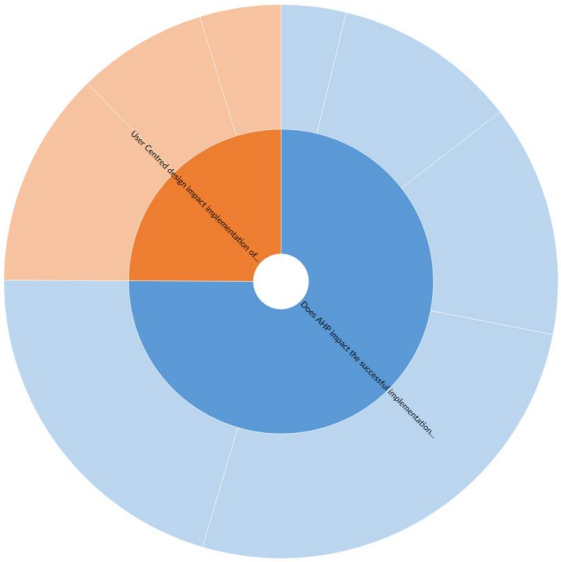

Figure 4.4 NVivo14 Representation of Answers

NVivo produced a summary of the critical themes, figure 4.4, compared to each research question. The blue section, approximately 75%, constitutes the responses to

the first research question – does having funded AHP leadership impact the implementation of an electronic patient record? The orange section, approximately 25%, relates to the second research question: does utilising a user-centred approach affect the successful implementation of an electronic patient record?

Delving into each of the sections, figures 4.5 and 4.6 further highlight the volume of responses received for each of the themes emphasised by the qualitative data analysis.

4.3.4 Research Question 1

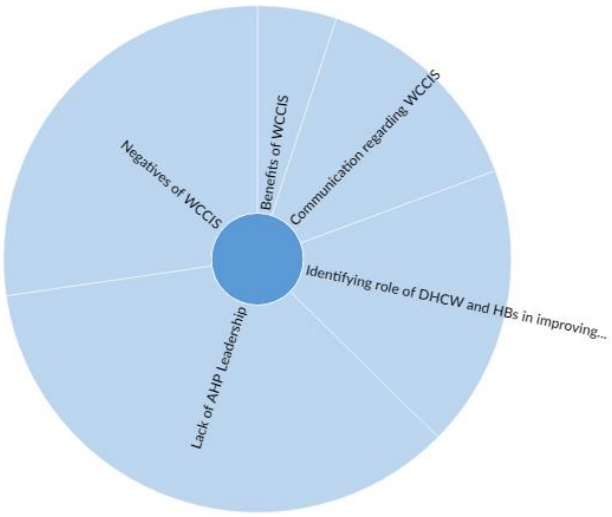

Figure 4.5 NVivo14 visual representation of RQ1 Themes

Figure 4.5 is a visual depiction of the first set of themes identified regarding research question 1.

4.3.5 Lack of AHP leadership in digital

Of the 11 interviews, this theme became the most used option for individuals with 84 references to the lack or perceived lack of AHP leadership in digital, particularly around the implementation of WCCIS over the last eight years. The participants all stated the

same points regarding digital leadership within the allied health professions across all the health boards: there was not a recognised, funded individual with the responsibility for reviewing the requirements and functionality of WCCIS. As a result, there was a lack of strategic direction for AHPs in Wales, and the programme team within DHCW concentrated on those voices which were coordinated. The following two quotes point to the fact that there was no recognised AHP in a position to impact strategic direction.

I would say when I was first involved in WCCIS in Powys. We didn't have good AHP representation at an executive level. I think that was a gap. AF1

At that point, I think the only AHP who had any kind of involvement or knowledge of anything was an occupational therapist who just happened to be the team lead of a multidisciplinary mental health team. One of the early interventional psychosis teams was led by an OT, and as far as I'm aware at that point that was the only Allied health professional who would have had any involvement. BM2.

4.3.6 Negatives of using WCCIS

Continuing from the lack of leadership conversation from the interviews, negatives regarding the use of WCCIS in AHP clinical activities was a close second, taking the overall feedback volume to nearly 75%, as demonstrated in Figure 4.5. This is a prevalent theme when talking to colleagues informally, the system just is not fit for purpose. It does not reflect the current working practices of AHPs or the team around them, such as administration. Individuals reported tasks taking longer, being more obstructive and likely to result in errors and potential patient harm.

It's created work for them rather than the purpose, which is to make it leaner. AW3

No, like it's so easy to make mistakes, isn't it? It's easy to get lost in what menu you're in and what screen you're in and being in the wrong patient, that kind of thing. JHJ6

The biggest frustration initially was that we were working on it, putting information on and then we'd save it, but then the information would disappear. KM4

Is so difficult to navigate and I think that's one of the main problems really is that it's really difficult to find the information that you need and want MJ5

4.3.7 Identify the role of DHCW and Health Boards in improving outcomes

Following on from the lack of AHP leadership and the negatives of WCCIS in clinical practice, participants identified that DHCW and health boards had a significant role to play in ensuring history is not repeated and AHPs are not left behind with regards to digital developments in the NHS in Wales.

A large amount of time and money needs to be spent on funding AHP-specific roles, nationally and regionally, that sit at the requisite level to demand a voice at digital forums to represent the requirements of AHPs truly.

All participants discussed that there needs to be coordination between the national organisation, DHCW, and the local health boards. There is a risk of repetition or moving in opposite directions with regard to digital developments. There was a strong opinion regarding doing things once, but allowing for necessary divergence where local practice dictates.

And so, I know we asked this in the workshops previously, but do you think we should have AHP leaders in digital? Yes, I do, absolutely. KM4

In the central and the outside to help to represent this part of the service. This part of the service, you know AHPs are the third largest group and nationally I think there's only one person in a room of probably. NE6

Consultation having that central point, having that lead, making sure that if there is all Wales lead or a health board lead that they've got the right people to communicate with that you've almost got like a working group around. RC8

And we've got very clear structures, we've got the executive directors of nursing, the directors of nursing, the chief nursing officer's office. You know, all of those kind of structures in place and then feedback up and down all the way to the frontline. BM2

4.3.8 Communication regarding the WCCIS programme

Many interviews also focused on the lack of communication regarding the implementation of WCCIS, but before that, even the development of the strategy surrounding digital solutions. The people interviewed were all senior clinicians or management and reported little to no centrally released information regarding the programme. They might have heard about it via other means, such as having an interest in digital developments. Being able to receive communications from the national programme team or their regional leads would have allowed them to decide whether or not they needed to become involved rather than relying on waiting for an invite, which often never came.

So, I don't think I was ever aware of being involved or consulted on the design setup of WCCIS AF1

It's a while ago now, but I don't recall a very effective or meaningful engagement process. AF1

Communication has been very strategically directed towards regional leads, which are the people who do not even use the system properly. AS4

All we knew was, there was a new computer system coming. No frontline users had actually been shown it. We didn't know the scope of it, what it could do, what it couldn't do, what it was supposed to replace. BM2

I did feel that it was quite collaborative once we were engaged, but I don't have any knowledge of what happened prior to that. JHJ6

But no, probably not in terms of system and whether the system was what we needed and what we needed it to do, because I think probably at the outset we'd have said no, it didn't. RC6

4.3.9 Benefits of using WCCIS

The final theme identified through reviewing the transcripts was the perceived benefits of using WCCIS. This was not as clear a theme as the others, as there is a distinct benefit to using digital when all you previously had was paper-based medical records. Therefore, the theme aims to establish the benefits of WCCIS, appreciating that the workload may have increased for each practitioner to realise the perceived benefits. Several participants stated that viewing other healthcare professionals' records was a benefit, but limited to those that used WCCIS as their primary electronic patient record as WCCIS was not interoperable with other systems, such as the Welsh Clinical Portal (WCP). The ability to view the patient record remotely was recorded as a benefit, but tempered with the issue that notes could be recorded in multiple places within the system, making the usability and safety of the system far from satisfactory.

It is good from the point of view of being able to see multiple services and being able to look at what Podiatry have done, what OT has done, what the nurses have done, you know, so there is there's value in having to look at that. But again, I think looking at

whether you, whether you've whether you record something under the referral or under the person, I mean again when I introduce staff to it, it's a bit embarrassing how complicated it is. AF1

we were predominantly paper records up until that point, it did give us that digital functionality. KH3

It's good as a starting point, but it could be better. KH3

We felt there was a lot of anxiety around the initial introduction of WCC as we were going from paper notes to this, so it was, you know, people are really nervous, but people did generally get the kind of grips with it quite quickly. MJ4

4.3.10 Research Question 2

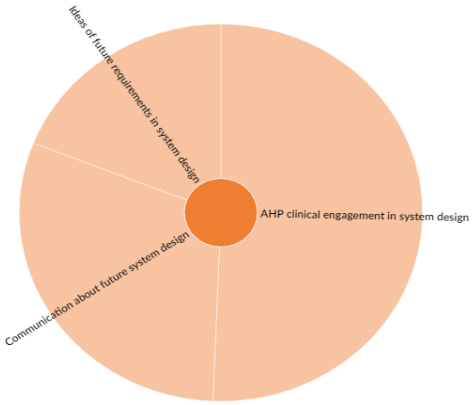

Figure 4.6 NVivo14 RQ2 Themes

Figure 4.6 represents the themes collated from the interview questions regarding the second research question, How can utilising a user centred design approach affect the successful implementation of an electronic patient record? As illustrated in figure 4.6, only three themes were identified regarding this second question, as it presented more as a hypothetical question about future requirements and aspirations for digital systems.

4.3.11 AHP clinical engagement in system design

Interviewees stated that clinicians and the teams surrounding them should be wholly engaged, from the earliest possible point in digital transformation. They acknowledged they might lack the digital competency or qualifications. Still, they had the clinical expertise and workflow knowledge to be able to articulate their requirements sufficiently to develop the system that met their needs as an end user. The biggest potential pitfall identified is the lack of recognised posts and positions for people to have the protected time to commit to writing and reviewing system requirements. They have the clinical experience but are not released to workstreams such as this. This was reflected in the lack of digital AHP leadership highlighted earlier.

Having maybe more direct focus groups or direct input with clinical staff of all grades. AF1

The actual users are, you know, like so often you've got the team leaders and the people like that in the conversations, but they oversee it. They don't actually touch the system or go into it or, you know. JHJ7

Actually, our systems would be much better if you had more people involved in making sure it was going to work for everybody and then take what will work for everybody and specialise it where is needed and that's where the bit where you always start from. MJ2

Purchasing systems that aren't fit and also from a staffing perspective. I think this is a really you know us on the clinician's side of things, clinician clinical staff, but also me as a manager having to constantly deal with system changes is really hard work. We've got constant updates trying to constantly adapt to changes in so many systems that we work. RC6

4.3.12 Communication regarding new developments

All the interviewees had varying experiences of communication regarding ongoing or upcoming digital developments, especially regarding Connecting Care. They still believed that WCCIS was a constant concern and was worthy of their time and investment as it was the digital solution available to them currently. However, it is known in some quarters that WCCIS was a burning platform and that Advanced or Microsoft was offering no further support. The backlog of changes was longer than the known contract length. This came as a surprise and frustration to some of the interviewees as they were in the process of implementing WCCIS locally and facing a lot of challenges from AHPs who were struggling with using the system clinically. They reported not knowing about Connecting Care and said this was a lack of communication coming from the national programme team but also from their regional leads. A high proportion of those interviewed did not receive regular digital updates; they didn't know this was an option, and they were often too busy with operational demands to read through mailshots or posts from DHCW. There was discussion around how the national role within DHCW could do more to reach out to the groups of clinicians across Wales, but being one person, this was unlikely to be successful in any meaningful way. AHPs want to know about developments that will impact them locally, from local sources, that understand their HB requirements, so that they can get involved with those developments.

Speaking directly to clinicians is what patients would want. AF1

Absolutely. Absolutely. By listening to the clinical informatics, who are close to the ground, by taking viewpoints from different levels of practitioners, everybody has a stake in this, and they all want different things from the systems, whatever that may be. AS2

Communication has been very strategically directed towards regional leads, which are the people who do not even use the system properly. NE6

Communication has been very strategically directed towards regional leads, which are the people who do not even use the system properly. DH4

4.3.13 AHPs ideas for future system development

The AHPs who were interviewed all had firm opinions on what was needed regarding an electronic patient record.

You log in quickly, collect the right ward, and go off. If I want to find somebody's record, I can filter out by profession, I can find what they've written really quickly. I can find a patient really quickly. MJ4

There is a simple and basic level of requirement that AHPs wish to see, and this would improve clinician time management as so much time is wasted on the system being down, relying on printing out for safety or having a system that requires multiple clicks to reach the outcome they desire.

I certainly know the people to go to, to gather their thoughts and opinions. I think if I didn't know, I'd probably ask. I'd I understand the need to scope. I need to make to make sure that it's right. RC6

One individual who is not a clinician but works alongside AHPs directly in a business improvement and development role stated that;

I do have a very strong view of what a system could look like that would make it work well. I've got a very clear vision of what you would need to do to make that work properly, and I feel that I would be pretty comfortable conveying that to a programme designer. DH3

They are actively offering to support the technical architects, the data engineers, and the programme managers with clinical experience and knowledge. Still, they are often

overlooked as it is often system first, workflow second. As mentioned, the Welsh Nursing Care Record (WNCR) is a straightforward system built around clinicians' requirements. As such, it has been widely adopted even by those who admit to having low digital competency.

I'd like it to communicate with or take the place of WPAS as well. So, I have one system and possibly to be able to communicate with Welsh clinical portal. KH5

4.3.14 Codebook

NVivo produced the codebook, which was used to code the transcripts, which is displayed in table 4.4. These codes were generated and modified as the transcripts were reviewed and re-reviewed according to the Framework Methodology of qualitative analysis (Gale et al., 2013).

Table 4.5 NVivo14 Codebook

Name	Description
Benefits of WCCIS	Are there any identified and realised benefits of the current WCCIS offering?
Communication regarding WCCIS	Was there sufficient communication about WCCIS, what was coming and how to get involved?
Identifying role of DHCW and HBs in improving outcomes	What more can be done by DHCW and HBs to improve the AHP involvement in system design?

Name	Description
	Examples of times when AHP leadership was mentioned, either present or absent
Negatives of WCCIS	Identified times when WCCIS has a negative impact on clinical work
RQ2 - User Centred design impact implementation of EPR	
AHP clinical engagement in system design	
Communication about future system design	How could DHCW and programmes communicate more meaningfully with clinicians regarding upcoming developments?
Ideas of future requirements in system design	

4.4 Conclusion

The qualitative data collection reached saturation after 11 interviews. The methodology of semi-structured interviews over Microsoft Teams, with automatic transcription, proved to be a success as more people from around Wales were able to attend. There was potential for Face-to-Face to limit the geographical reach of the author due to the size of Wales and the spread of WCCIS users.

Overall, participants in the interviews were able to participate fully in the interviews, and the author believes that they could answer openly and honestly, without overt bias regarding WCCIS implementation, AHP digital leadership and communication. The themes that emerged were consistent across all 11 interviewees. However, there were

notable differences in people's opinions of the implementation process and, depending on the health board and the level of AHP digital leadership offered.

This dissertation set out to evaluate and analyse the implementation of WCCIS across health and social care within Wales. There were two research questions established at the outset and these were:

1 – Does having funded Allied Health Professional leadership impact the implementation of an electronic patient record?

2 – Does utilising a user-centred design approach affect the successful implementation of an electronic patient record?

The background to this question was the apparent lack of implementation within health boards across Wales but the apparent success in implementing WCCIS within Social Care. The author of the study sits as the only fully funded clinical informatician in Wales for allied health professionals, and so was well placed to be able to talk to the lack of strategic decision-making within the executive directors for AHPs.

As a result of this current understanding of the problem, a mixed methodology approach was developed using the pragmatic philosophy of research in order to combine quantitative and qualitative studies to focus on the key problem – does having a funded AHP leader impact the implementation of an electronic patient record.

The results of the research are highlighted in the previous chapter but to summarise the key findings would be as follows.

Quantitative – 95% of respondents rated WCCIS as *poor* or *awful*, with just 5% rating the system as *excellent* according to the SUS scale and rating system from Brooke,. J. (1995). 40 individuals responded to the call for users to take part in the quantitative research arm of this study and although this falls below the recommended sample size for the population and therefore curtailed our ability to infer statistical significance for the population as a whole, a series of follow up phone calls to users who did not complete it, demonstrated a complete agreement with the findings collated through

the SUS overall findings, that WCCIS is not fit for purpose for AHPs in the clinical setting.

Quantitative – 11 virtual interviews with AHPs and users of the WCCIS system found that there was a general theme of lacking National AHP strategic direction resulting in a system that was procured before the requirements and workflow were established and therefore in the purchasing of a system which increased workload and was a barrier to prudent healthcare provision. There were examples of local good practice, but this was confined to small individual teams within the boundaries of large health boards, and all were on a voluntary basis by parties with an interest in digital and service improvement. There was consensus that at the highest levels, there was insufficient leadership for AHPs in the strategic direction of digital clinical systems.

When this is compared to findings from the literature review, there are clear comparisons with other such failed implementations of digital clinical systems.

Looking at the National Programme for IT (NPfIT), a key finding of several thorough investigations into the background of the development of the plan and the implementation, showed a clear lack of clinical voice and although not specifically AHP in nature, an assumption or inference can be made that a failure for all of the NHS staff could be directly linked to AHPs within that system also.

Several papers reported that by not involving clinicians in the design, procurement and implementation of digital clinical systems, there was clear evidence that the likelihood of adoption was significantly reduced, (Jeffries *et al.*, 2021; Muinga *et al.*, 2021; Calleja *et al.*, 2022). This statement is fully supported by this study and is clearly visible in the opinions of 95% of respondents who scored WCCIS as *'poor'* or *'awful'*.

The interviews provided a significant insight into the usability of the system, reflecting the results of quantitative study, but further than the simple binary, there were themes surrounding the lack of AHP leadership, lack of communication regarding developments and the negative impact upon workload and job satisfaction. The job satisfaction and ability to deliver meaningful care was a key theme in the Quintuple aim work undertaken by Nundy, Cooper and Mate, (2022) and the theme of negatives

elicited from the interviews clearly highlights the risks of implementing a system that adds to workload.

A survey was undertaken by IPC, Oxford Brooks University and the Welsh Government regarding WCCIS in 2021 and looked at both current users and of equal importance, non-users in a piece of research to better understand reasons for and against implementing WCCIS, (Institute of Public Care, 2021b, 2021a)

The current research aligns almost completely with the findings and recommendations of the paper in terms of system usability and leadership. However, the responses to the IPC paper were overwhelmingly from Local Authority sources but this aligns to the overall number of users being at 88% local authority and just 12% being health care professionals. The themes found within this paper are strikingly similar to those elicited through the qualitative data of this research study and given that over 3 years have passed is indicative that Wales and AHPs in particular are no further forward in their ability to influence digital strategy or system development.

The paper reported individuals creating significant workarounds in order to use the system in a manner that suits their needs. This term of workarounds was also described by a number of clinicians during the interviews and led onto the risk of workarounds meaning the system was evolving without a plan and so was becoming unrecognisable to the system that was launched on day one.

An interesting finding that is not reflected in current literature and which would provide a glimmer of hope with regards to implementation of digital clinical systems such as WCCIS is the report from a particular participant who did have an individual with a keen interest and a seat at the development table as their direct line manager. Important to note that this individual was not paid as a clinical informaticist or digital lead but was positioned at just the right level in order to help shape local development of both functionality and information design. The participant stated that due to the nature of her own leadership, one of open and honest communication with all her members of staff, any information she received from her line manager was relayed to those around her and below her. This communication was seen as one of the reasons WCCIS was viewed as a success in her small team, notwithstanding the overall failure

of WCCIS as a clinical, interoperable digital system. However, the communication here was focussed on what was being delivered and not an invitation to participate in the development and creation of a system, but it did mean a slightly smoother transition to a new system, so there is definitely strength and value in open, honest and timely communication from the programme team and national leaders in DHCW.

Chapter 5 Discussion

5.1 Introduction

Following on from the results, this next chapter seeks to discuss the implications of the results and consider their meaning when compared to the findings of the literature review.

5.2 Key Findings

5.2.1 Lack of AHP leadership in digital

There is no lack of AHPs in managerial positions throughout the NHS and local authorities in Wales, the whole spectrum of agenda for change is covered and so there are individuals in positions with decision-making authority. However, the research question was considering leadership in digital. The findings of this research are categorical and robust, there is insufficient AHP leadership with the singular remit of digital as found in (Schwarz *et al.*, 2020). The SUS scale highlights the impact upon digital clinical systems when leadership is absent, and strategy is written in isolation from the voice of the clinician. The thematic analysis of the interviews also highlights the lack of digital AHP leadership as not a single individual had someone with the sole responsibility of driving the strategy for the benefit of the clinician. This also was not simply a case of not knowing who it was that was leading, but an absolute absence of leadership in this arena. There was mention of individuals with an interest, but this was all that was proposed as the solution. There was no systematic approach to funding of positions and training in order to raise the next generation of digital AHP leaders and as a result there was drifting, occasional involvement and generally discontent amongst AHPs and digital systems.

5.2.2 Negatives of using WCCIS

The amount of negativity surrounding the use of WCCIS as a clinical system vastly outweighed the positives of WCCIS. There were clearly benefits to moving to digital from a paper-based patient record, but this could be found in a plethora of already tried and tested digital systems, such as WCP, without having to endure the pain of WCCIS and its lack of functionality for the end AHP user. WCCIS as a clinical system

for electronic patient records is simply not fit for purpose and this was evident in this research and previous research undertaken by (Jarva *et al.*, 2022). There is anecdotal evidence that individuals have left their careers in health as a direct result of the implementation of WCCIS in their service area.

5.2.3 Identifying the role of DHCW and Health Boards in improving outcomes

This finding was a key part of the research as focussing on the negatives is not the objective, but understanding why WCCIS failed and what can be done about it on a national level and to ensure history is not repeated. Each participant stated that DHCW had a significant role to play in ensuring that roles were created and funded to allow for a coherent message to be delivered to clinicians and to system developers about the requirements of AHPs and that systems must meet their needs as a priority and not rely on workarounds as discussed by Konstantinidis et al., (2012) . There was also the role of the executive directors of therapies and healthcare sciences (DoTHs) in releasing staff on a funded and backfilled basis to contribute to national digital developments. Digital is often seen as an add on or nice to have, but the evidence collected here highlights the impact a poor digital system has upon clinical work and staff morale.

5.2.4 Communication regarding the WCCIS programme

Another of the findings of the interviews was the distinct lack of communication from the national programme team, Welsh Government, DoTHs and regional leads to end users of the system. All reported not knowing anything, or very little about, the system before it was procured and once procured, they were told a system is coming, with no opportunity to contribute to its configuration or implementation. This has been robustly evidenced as a very poor practice and AHPs involved from the earliest possible opportunity have always demonstrated a greater buy-in to the system and therefore a higher likelihood of adoption when communication and involvement is greater, supported by Feely et al., (2023). There was communication from individual to individual, but this was limited by the size of the audience and the availability of the AHP lead in DHCW.

5.2.5 AHP clinical engagement in system design

All of the previous research from the literature review and from primary collected data of this study point towards a requirement of AHPs to be involved in system design. There needs to be digital leadership in order to request AHP involvement, but there must also be AHPs with the time and requisite skills and knowledge in clinical practice and digital in order to achieve a digital system which meets at the very least a minimal viable product and does not make their work harder than before its implementation, discussed by Brooks and Grotz, (2010).

5.2.6 Communication regarding new developments

As previously discussed, regarding WCCIS, communication is key to any developments and this research sought to look at future developments as well as historical and a key theme established was that communication from trustworthy sources to frontline clinicians was a key aspect in any strategic decision. There is evidence of the different levels of communication requirements, from informed only, to consulted and finally assurance sign off requirements. AHPs categorically stated they are key in the delivery of healthcare and as such as decision regarding systems they utilised must be communicated fully to them at the earliest possible point as considered by Hailey, Yu and Munyisia, (2014)

5.2.7 AHPs ideas for future system development

The final theme extracted from the interviews was that AHPs across the board have ideas about what they would want and expect from a digital clinical system. They stated they alone know their clinical requirements and that is not feasible for a system to designer to understand those needs without spending time alongside them in the clinical setting or in a workshop to better understand the requirements as considered in Ewing and Cusick, (2004). There is an increasing body of professionals who are working on digital and as such it now permeates through professional bodies' communications and conferences. The AHPs in Wales have ideas, but lack the voice required to articulate them to the requisite level for impact.

5.3 Theoretical Implications

Overall, the findings of this study align strongly with the current theories of system development, but they differ in that they highlight the distinct lack of AHP leadership and therefore clinical engagement necessary to ensure a robust and suitable electronic patient record. The study highlights the lack of learning from previous failures and the repetition of errors regarding the lack of clinical engagement in system development. It is the belief of the author that system developers and programme managers believe that they do understand the requirements of AHPs and so feel that they are not required to engage with end-users. There is an element of hubris displayed by these senior individuals which has led to so many catastrophic failures within healthcare IT systems.

This study therefore proposes that the current theories are modified slightly to avoid the beliefs of one or two senior leaders becoming unquestionable and this can be done by having a procurement pathway and system development strategy which categorically states the need for AHPs to be involved at all stages of procurement and implementation. Having this requirement added to the theories reduces the opportunity for AHPs to be excluded either overtly or covertly by individuals who do not recognise the role of AHPs in the delivery of care or the uniqueness of the AHP requirements.

The broader implications of this study are clear. There must be greater educational offerings to all involved in the delivery of AHP care across health and social care. There should be a clear measurement of digital capabilities within the workforce and support offered at all levels, from basic computer literacy to advanced PhD research. With improved educational offerings, AHPs will be better placed to demand a seat at the table, not just because of their clinical duties, but due to their understanding of digital transformation as a whole. There must be a wholesale shift in the funding model for AHPs involved in digital. The focus on single products and funding which follows the product can result in divergent systems which cause information to be siloed and potentially increase the burden upon clinicians. There must be a shift in the recognition of the role of AHP leadership in digital by DoTHs and by Welsh Government which allows roles to be created and funded but also listened to and part of the discussion, rather than an afterthought.

5.4 Practical Implications

The practical implications of this study are closely aligned to the theoretical implications in that these theories are currently being utilised and the changes to the theory are directly aligned to the practice of digital transformation.

The key practical implication from the research findings is the need to increase the presence of AHP digital leadership as an absolute necessity and one which is required immediately. The current offering of WCCIS is not fit for purpose and did not have sufficient AHP digital leadership in place throughout the lifecycle of the product and as we move into Connecting Care (WCCIS phase 2), an entirely new procurement cycle, with multiple strands of community care, mental health and social care, the requirement for AHP digital leaders to be present, representing the needs of the service and providing a conduit to DoTHs, the frontline and the programme team has never been greater. However, funding remains the issue. There is no money for these positions and therefore, although agreed by all, they remain theoretical in reality. Second to the lack of funding is the absence of individuals able to undertake the roles if they were available, thus the need for increased educational offerings at all levels.

The research findings are categorical when it comes to making recommendations regarding real-world application of the findings. There is an absolute need for AHP digital leadership and education across the NHS and local authorities in Wales. This primary research continues on the journey started by Oxford Brookes and focusses on the role of AHPs in the successful implementation of future developments.

5.5 Methodological Reflection

5.5.1 Strengths

This study utilised a mixed methodology approach to data collection following the pragmatic research philosophy. There were strengths in the ability to use quantitative data to justify and explain the findings of the qualitative data. The rationale behind

utilising a mixed methodological approach was the desire to fully explore the problem of WCCIS implementation through an understanding of its usability through the SUS and through a deeper dive into the key themes affecting the implementation with regards to AHPs.

5.5.2 Limitations

Utilising a mixed methodology approach is a challenging one and one which as discussed in Chapter 3 is debated in current research circles with regards to its efficacy and use. The study required the creation and managing of two separate data collection techniques and processing. Each research type also requires a different analysis method, quantitative relying on descriptive and inferential statistics and qualitative requiring thematic analysis. This added to the complexity of the study and in a small population meant that finding a large enough sample was challenging.

5.5.3 Methodological challenges

The challenges that presented themselves are highlighted previously, but a mixed methodology approach presents the main challenge of splitting the requirements for the data collection and requiring two types of analysis and then a triangulation of the results in order to answer the research questions.

5.5.4 Future studies options

Following the choice to undertake a mixed methodological approach to these research questions, the author would recommend a single methodological approach but ensuring that greater detail was considered in the detail of the study questions. An example may be, a qualitative study but utilising in person focus groups to increase the number of voices and opinions regarding the topic, and potentially increasing the variety of thoughts.

5.6 Integration of results

The study results decisively and comprehensively answer the research questions, alongside the previous research considered in the literature review.

The quantitative data highlighted the widespread dissatisfaction with the WCCIS system amongst AHPs in Wales.

The thematic analysis of the qualitative data elicited several key themes which pointed directly to the lack of AHP digital leadership bearing significant responsibility for the lack of suitability of WCCIS for AHPs working clinically. As shown in Chapter Four the lack of digital AHP leadership was the most commented upon and discussed theme from all the interviewees. There was a lack of strategic direction and a lack of communication at the required levels in order for AHPs to understand the implication of the system and no opportunity to become more involved in the development of the statement of requirements.

When considering the second question, the thematic analysis also supports the need for utilising a user-centred approach if an electronic patient record's implementation is to be successful. The extremely poor SUS rating of WCCIS and the clear and consistent themes from the participants of the interviews only strengthen the thinking that a true user-centred design may lead to an improved implementation.

5.7 Strengths and limitations of study

This study demonstrated an originality in its design and focus of the subject in the AHP workforce in Wales. It gave a voice to an often overlooked, yet vital section of workers within the NHS and local authorities in Wales.

There were a number of limitations of this study identified by the author. Namely, the sample size was not representative of the population, and this was in part due to the extremely difficult situation AHPs in the NHS and local authorities are facing meaning clinicians were unable to find the time and space to read and respond to the request.

The SUS scale used was too simple a tool to allow for inferential statistics to be used or any further investigation as there was only a single tail. The impact of this was that the data could only be considered utilising descriptive statistics and did not allow greater analysis of the reasons for the results.

The interview questions were created by the author and so limited by their own knowledge of leadership and user-centred design. The potential impact of this decision was that the questions and answers were too focussed on a particular area and kept the conversation from investigating new opinions in greater depth, which may have led to greater insights into the issues.

These limitations were considered in the creation of the study and were accepted as limitations to the data collection and potential outputs. The validity of the results is not adversely affected by the limitations and may only slightly impact the ability to generalise the findings to a wider population.

5.8 Conclusion

This discussion has brought together the current academic thinking through the literature review and the primary data collected for this study, specifically considering AHPs and WCCIS. The result is that this research has further deepened the understanding of the requirements of AHPs with regards to having nominated digital leaders in positions of influence when it comes to the development and implementation of digital clinical systems.

Chapter 6 Conclusion

6.1 Recapitulation of key findings

The key findings of this study have been clearly identified and validated through the quantitative data collection.

The initial scope of WCCIS was not sufficiently well described or controlled as there was a distinct lack of AHP digital leadership involved in the discussions or decision made with regards to the procurement of the system which would be suitable for AHPs across Wales. Table 6.1 summarises the key findings.

Table 6.1 Key Findings

1	Lack of AHP digital leadership historically or currently.
2	Lack of communication regarding the development of digital solutions for AHPs historically and currently.
3	AHPs across Wales find the current WCCIS offering not fit for purpose
4	The AHPs this study liaised with feel competent to articulate the requirements of a system based upon current and future working practices.

These key findings, answer the research questions categorically. The current offering of WCCIS is not fit for purpose as there was a lack of AHP digital leadership in its creation or management and therefore the implementation was not successful. The idea of user-centred design is robustly supported by the literature and the thematic analysis of the data highlights that AHP users are competent and capable of providing such user-centred design in order to better shape future digital solutions in Wales.

6.2 Contribution to knowledge

This study has provided a unique view into the large world of AHPs and highlighted the impact upon care delivery as a result of a poorly designed digital system. The study adds to current knowledge also with regards to AHP digital leadership being required at the highest level in order to better inform future digital developments.

The novelty of this study is found in the AHP approach. Many of the current research papers and studies consider the view of nursing and medical and may only consider AHPs as a side note. The frustrations of AHPs are clearly articulated by the results of this study and should be considered as a significant factor for any future development in which AHPs are a key stakeholder.

6.3 Research questions

The study addressed the two research questions effectively. There was challenge in recruiting the numbers of staff identified for the sample, but this was due to the pressures the NHS and social care is currently experiencing. However, those that did complete the SUS questionnaire and those who participated in the interviews reported an overwhelming dislike of WCCIS and identified the lack of digital AHP leadership and apparent absence of UCD bearing the responsibility for its failure.

There were some examples where this general thematic outcome was not supported. In the quantitative data collection, two participants rated WCCIS as excellent, scoring well above 90, significantly above the average. Due to the anonymous nature of the SUS, the study was unable to investigate these responses any further, but the author has considered the potential reasons for the high score. Firstly, the scores were almost completely opposite to the majority, so the user may have misunderstood the instructions and scored inversely to their thoughts. Secondly, the respondents work in a niche and isolated arm of AHP service provision, which through luck or planning, had good support initially and works in a way which suits that particular service area.

6.4 Overall significance

When the results of this study are considered within the context of the field of healthcare and digital solutions, it raises questions about the design of programme boards and digital assurance across Health Boards in Wales, not only for AHPs, but for all those employed in the service of healthcare. One change in a system rarely occurs in isolation and any change must be considered in the light of the whole system. An example being, a newly developed AHP system only accepts electronic referrals, however, their main supplier of referrals has no means of creating electronic referrals

and relies solely on paper. The implementation of this new system was done in isolation and on go live, the problem surfaces but cannot be addressed in a timely manner and so patients suffer a lower quality service provision.

Academia needs to ensure that more robust studies are undertaken on the impact of poorly designed and implemented digital solutions in health and social care. This body of evidence can then be used as the basis for future programme developments and to provide the impetus for Health Boards to create governance structures locally and nationally.

This study, although focussed upon AHPs, has an impact on society as a whole. Improved digital solutions developments can result in a more efficient and effective NHS and local authority, which improves access and potentially improves patient outcomes or experience.

6.5 Recommendations

Future research should concentrate on the reasons why investment is not being made more rapidly across the NHS workforce but importantly within AHPs. There needs to be a better understanding of the career pathway for clinicians and digital.

Once this is better understood, decision-makers and those that control funding can be challenged about lack of investment and given the evidence and solution for the problem facing AHPs currently.

When considering future research, it would be prudent to consider the role of the programme board and the role of the senior responsible officer for the programme in deciding the level of involvement of clinicians in the gathering and agreeing of requirements. This study is proposing through its findings that the lack of AHP digital leadership adversely impacted the implementation of WCCIS and any future research should take this information into consideration when establishing the stakeholder map.

There is room for potential extensions to this study in that a much wider sample could be sought and a more novel approach to data collection. The questions should also

be developed further to gain more insight into the roles and responsibilities of the respondents to gain greater insight.

Should this extension form part of future research then it will further strengthen the explicit need for AHP digital leadership, funding and support of decision makers to lead and support digital solutions through to implementation.

6.6 Concluding remarks

This study is the culmination of not only a year's research, but also a career spent on the frontline as an AHP and as the only National Clinical Informatics Lead for Therapies in Wales. There is a plethora of digital systems being used, some clinicians using over 9 independent and unique systems, including paper-based records, which have been developed in isolation and as a result present AHPs with a significant challenge to deliver meaningful care in a prudent manner. This must not be allowed to continue as it is wasteful, erodes confidence in health and social care and worst of all, potentially puts the citizens of Wales at risk of harm. Wales must address the clearly articulated and evidenced shortcomings in the management of digital solutions development and implementation.

Chapter 7 References

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Chapter 8 Appendices

Appendix 1 – SUS Questionnaire

Welsh Community Care Information System System Usability Scale

This is a SUS questionnaire to capture user's understanding of WCCIS - Brooke, John. (1995). SUS: A quick and dirty usability scale. Usability Eval. Ind.. 189.

1. I think I would like to use this system frequently

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

2. I found the system unnecessarily complex

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

3. I thought the system was easy to use

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

4. I think that I would need the support of a technical person to use this system

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

5. I found the various functions in this system were well integrated

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

6. I thought there was too much inconsistency in this system

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

7. I would imagine that most people would learn to use this system very quickly

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

8. I found the system very cumbersome to use

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

9. I felt very confident using the system

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

10. I needed to learn a lot of things before I could get going with this system

- ◯ 1 - Strongly Disagree
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - Strongly agree

Appendix 2 – Semi-structured Interview Questions

1 - Senior AHP leadership in digital

Did/does your health board have an AHP or a representative at a suitably elevated position in which to represent your requirements, please explain your answer.

2 – Governance of AHPs in requirements gathering

Do you feel that there was enough clinical engagement in the requirements phase of WCCIS, explain your reasoning?

3 – Communication strategy and engagement

Was there sufficient engagement in the development of WCCIS across the whole of the AHP workforce? Do you remember any communications coming from the programme or were you reliant on information from another source?

Could your health board or the National Programme Team in Digital Health and Care Wales do more to elicit the requirements of clinicians who deliver care, if yes, how?

4 – User centred design

What are your biggest frustrations with the system if you are a current user and if you are not, what are your perceived frustrations with WCCIS?

Do you have your own thoughts and ideas on what a system should do and how it should behave and feel able to articulate that to a programme of work such as WCCIS?

5 – Future project requirements

What more could DHCW, and health boards do to address the limited presence of AHP digital senior leadership across Wales? What are the potential consequences of not investing in leadership?

Appendix 3 – Ghant Chart

Project stage	September	October	November	December	January	Febuary	March	April	May
Ethics submission/approval									
Supervision									
Project Outline development									
Develop and refine methodology									
Literature Review									
Develop Method section									
Primary data collection									
Secondary data collection									
Data analysis									
Develop Results section									
Develop Discussion section									
Develop Conclusion section									
Final revisions									
Complete Dissertation & Submit									