Home First: Improving Graphical User Interface Designs to Support Patient Flow and Discharge from Hospital Wards

Suzannah Downie
2131572

Submitted to Swansea University in partial fulfilment
of the requirements for the Degree of Master of Science

Swansea University
Prifysgol Abertawe

Department of Computer Science
Swansea University

30th September 2022

Declaration

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

Signed (candidate)

Date 29/09/2022

Statement 1

This work is the result of my own independent study/investigations, except where otherwise stated. Other sources are clearly acknowledged by giving explicit references. I understand that failure to do this amounts to plagiarism and will be considered grounds for failure of this work and the degree examination as a whole.

Signed (candidate)

Date 29/09/2022

Statement 2

I hereby give my consent for my work, if accepted, to be archived and available for reference use, and for the title and summary to be made available to outside organisations.

Signed  (candidate)

Date 29/09/2022

Abstract

The flow of patients through hospitals and associated healthcare services represents one of the key challenges faced by healthcare providers [1]. Bottlenecks and delays within the patient flow process contribute to significant costs and are associated with negative patient outcomes [2]. To support in reducing patient flow issues, many healthcare organisations employ the use of digital information systems, driven by the rise of ubiquitous computing technology [3, 4, 5]. Working in partnership with our stakeholder, Swansea Bay University Health Board (SBUHB), we employ ethnographic methods to examine how an existing patient management system, *Signal*, supports the transition of clinically optimised patients from beds on hospital wards into home and community-based care settings.

We undertake a series of semi-structured focus groups and one semi-structured interview with members of staff involved in the provision of community care services through this existing system. We consider the ways in which the current system in its "as is" state meets the needs of this unique set of users and document where challenges currently exist. Following this we design a set of graphical user interface prototypes aimed at better supporting these users to complete the tasks necessary for ensuring adequate patient flow, and gather feedback from these users on the efficacy of the designs. We also consider extensively further avenues for investigation in relation to patient flow, as facilitated by community-based care workers through SBUHB's Signal system. We find that, in it's current form, Signal lacks key features in the area of notification and awareness. We also find that the system would benefit significantly from further investment in more intelligence-led features and better integration with other systems.

Acknowledgements

I would like to express my deepest thanks to my supervisors, Martin Porcheron, Daniel Archambault, Pete Arnold and Scott Yang, for their endless guidance and feedback. In addition, I would like to thank everyone at Swansea Bay University Health Board who has helped to make this investigation possible, in particular Matthew Knott, Helen Thomas, and Jo Hartery. I'd also like to thank the Home First staff who took part in this study for their invaluable input during the various participatory group sessions. Finally, I would like to thank my partner Kyle, and my brothers James and Joseph, for their unwavering support. Without them, and indeed the rest of my family, this work would have been next to impossible.

Contents

Chapter 1

Introduction

Technological systems designed to support users within their working environments have become a common workplace addition to virtually all workers. Indeed, it would likely be difficult to name an industry that has not been touched by the digital revolution. Whilst the ubiquitous nature of software systems and technology have rendered large-scale digital transformation projects commonplace in both the public and private sector, there remains an ongoing challenge in fully realising the benefits of such systems [6, 7]. Not least because fully realising these benefits is not just a technological problem, but a ***socio-technological*** one.

The process by which we complete 'work' is complex. While technological advancements open the world up to innovative ways of working and enhance our abilities for data capture, the successful embedding and adoption of new work-based systems is not contingent on this alone. Organisations, and the various types of work undertaken within them, are frequently far from straightforward. In his highly-cited 1988 paper on the topic, Jonathan Grudin wrote about why computational organisational support tools frequently fail, concluding that, not only do we need to understand more about how particular groups of people interact with and utilise these systems, but also how individuals themselves interact with such systems [8]. Despite Grudin's paper being more than 30 years old, the fundamental concept that in order to create effective organisational software systems, we must first understand the people that use them, remains a significant driver in the scholarly research surrounding organisational systems.

1.1 Project Stakeholder

Both this study, and the overarching project that it relates to, have been conducted in partnership with Swansea Bay University Health Board (SBUHB). SBUHB is an NHS Wales local health board covering the Swansea and Neath Port Talbot areas of South Wales, UK. SBUHB are responsible for 6 hospitals within this area, alongside supporting with the provision of community healthcare services. The organisation covers a population of around 390,000 and employs approximately 12,500 people [9].

1.2 Study Aims

This study forms part of a wider three-year project designed to consider how SBUHB's digital whiteboard system, Signal, might better support patient flow through hospitals. In this preliminary three-month long study, we seek to explicate how one particular set of users utilise the system to support the effective discharge of patients from hospital wards and back into their homes. By undertaking semi-structured focus groups and interviews, we consider limitations of the existing graphical user interfaces for aiding with patient discharge and create design prototypes intended to make processing patients easier in this respect. These design prototypes are then reviewed by the original participants to assess their suitability and helpfulness. We furthermore make clear additional needs elicited from these users and consider these as the impetus for further research into how the system might better support those engaged in patient flow processes, particularly those centred around moving patients into home and community care settings.

1.3 Responsible Research and Innovation

This project has been designed with responsible research and innovation aims in mind. It is underpinned by the guiding principle that improvements to digital systems supporting patient flow supports both staff and patient wellbeing and good health. Furthermore, "Good Health and Well-Being" is goal number 3 of the 17 Sustainable Development Goals set forward by the United Nations as part of it's 2030 Agenda for Sustainable Development. This research has also received ethical approval from the Ethics Board of the Faculty of Science and Engineering at Swansea University.

1.4 Digital Transformation in Healthcare Organisations

With the rise of digital work systems throughout all areas of working life, it seems, perhaps, understandable that one area where such systems might be thought to be of abundant use is within the healthcare sector. Certainly, the healthcare sector is not without the implementation of such systems [10, 11, 12]. The use of work-based digital support tools in hospital contexts to help 'get the work done' presents a unique set of challenges within healthcare and hospital contexts. A great deal has been documented in relation to these challenges, from issues surrounding lack of end-user IT knowledge [13], to technological and regulatory constraints [14], in addition to challenges of deploying software in real-world, particularly safety critical environments [15] and the ongoing challenge of ensuring the adoption and buy in from medical professionals [16].

Furthermore, considering systems development from a user-centred design perspective, the development of organisation-wide healthcare systems necessitates the involvement of a large variety of different users which brings with it a requirement elicitation challenge of considerable magnitude [17]. The number, and for that matter, the type, of job roles involved in the provision of healthcare is incredibly broad. This ranges from the obvious clinical roles (doctors, nurses, etc) through to allied health professionals (occupational therapists, physiotherapists, etc), administrative staff (ward clerks, receptionists, etc), alongside the many staff members involved in community care beyond the hospital walls. This is just to name those involved directly in patient care, not to mention the further managerial and administrative roles within a hospital. Not only this, but within these roles exist huge differences. For example, a nurse working on a maternity ward might have a hugely different set of tasks to complete and patient needs to attend to on a daily basis when compared to a nurse on a ward focused on gastroenterology. With this in mind, the length of the task list needed to adequately encompass the day-to-day operations of a hospital would be so long as to be nigh on impossible to quantify. As a result, determining the working needs of an employee population is incredibly difficult.

Chapter 2

Study Background

2.1 Patient Flow

The patient journey through a hospital and back home again is frequently complex. The sheer variety of patient entry points, individual medical needs, and operational demands and limitations can have a significant impact on the flow of patients throughout hospitals and associated healthcare services as patients are filtered through the healthcare system [18, 19]. Increased pressure on primary and secondary care services can often lead to delays for patients at various points in their care jourey. Such delays, whilst further exacerbating bottlenecks within the patient flow process, are also associated with negative patient outcomes and increased staff stress levels [2]. Reducing delays in an individual's patient flow journey therefore represents one of the most important aspects of ensuring a positive patient experience. While improvements to patient experience are therefore an important aim for quality improvement, healthcare providers have to contend with the very real fact that they are regularly dealing with thousands of patients at a time. Managing the flow of patients from one place to another is therefore an essential but often incredibly difficult task.

One approach to improve patient flow centres around increasing the capacity of traditional healthcare infrastructure, such as adding more buildings, more beds, and increasing nurse staffing ratios [18]. In the case of the latter, this was shown to increase mortality by Aiken et al in 2002 and as such does not present opportunities for improved patient flow [20]. With regard to building more and adding additional beds, this presents a key challenge for healthcare organisations such as the NHS. Adding new buildings

and beds takes time, is associated with increased costs, and requires additional staff for any patient flow benefits to be realised [21].

As a result of the limitations presented by simply adding more buildings and beds to improve patient flow, there have been multiple attempts to consider other mechanisms by which this might be improved. Some have considered the subject from an organisational management perspective, such as by implementing lean methodologies that seek to minimise waste processing [14] or by developing intervention strategies that optimise staff collaboration and sense of shared purpose [22]. There have also been attempts to augment the physical spaces themselves to achieve improved patient flow logistics [23]. In addition to these approaches, the fields of Computer Science and Mathematics have also been critical in the consideration of the patient flow problem. In particular, multiple mathematical and computational models of patient flow have been created to enable a deeper understanding of the key drivers of patient flow that contribute to delays and bottlenecks [24, 25, 26]. Regardless of the academic field of approach, considerations of patient flow have tended to focus on one of two key points in the patient flow process: admission into a hospital via an emergency department or other means and discharge out of the hospital from an occupied hospital bed [26]. These critical in an out points contribute to the control of the patient flow through the hospital. The most frequent cause of problems in patient flow is that too many patients are entering at the ***in*** point and not enough exiting at the ***out*** point [27].

Compared to studies concerned with the flow of patients in an emergency department context, the study of how we effectively discharge and transition patients who are well enough out of hospital occupied beds to support patient flow has had relatively less attention. For example, as of September 2022, a Scopus search for the terms "patient flow" and "emergency department" in the title, abstract, or key words yields 1070 results, whereas the same search with the terms "patient flow" and "discharge" yields significantly less with 570. What we do know for certain is that delayed discharge has a disproportionate affect on elderly patients [28].

In 2016, the National Audit Office published a report outlining the dramatic costs that delayed discharge of elderly patients has to the NHS [29]. A reported gross cost of £820 million results from older patients remaining in hospital when they no longer require acute care on a ward. Not only this, but the report also highlights that patients lose 5% of muscle strength per day residing in a hospital bed. With concerns over cost and

detrimental impact to patients in mind, further focus on how patients might be supported into home or community care environments is of primary concern.

Another way in which Computer Science as a discipline has contributed to supporting with patient flow is through the advent of ubiquitous computing. That is to say the permeation of IT infrastructure through all walks of life as both software and hardware have become easily accessible by many (but certainly not all) people. This has enabled the development of hospital systems that support the coordination of staff and patients at all points in the process. Various studies have considered systems designed to support with patient flow. For example, Tenhunen et al created a web-based system to enable patients to report symptoms before attending in-person healthcare services. This system was designed to signpost patients in more effective ways and to reduce pressure at the beginning of the patient journey [3]. Foley et al also created a patient flow system designed to manage patient flow on wards during the COVID-19 pandemic, however the focus of this was primarily on patient flow to support infection control [4]. With regard to discharge specifically, Mehta et al used data-driven analysis to assess the impact of discharge system implementation on complete and timely discharge of patients, finding that the implementation of a discharge system improved the discharge process [5]. Whilst this is positive news and confirms that discharge systems are a worthwhile investment for healthcare organisations, the authors provide very little detail as to what this system actually does and how it works. Furthermore, despite highlighting the integral link between primary and secondary care that takes place during the process of discharge; it does not consider discharge or patient flow within this wider network of care.

With regard to patient flow within NHS Wales, in particular, in 2017 the 1000 Lives Improvement Patient Flow Programme sought to develop a national approach to patient flow within Wales, working with 6 of the Local Health Boards (LHBs) to provide events and develop various patient flow improvement initiatives across the country [1]. Whilst many of the initiatives were successful, the programme acknowledged that more was to be done to improve all aspects of the patient flow process, stressing the need for continuous quality improvement initiatives such that benefits to patient flow were not quickly lost once individual quality improvement initiatives were disbanded.

2.2 The Signal System

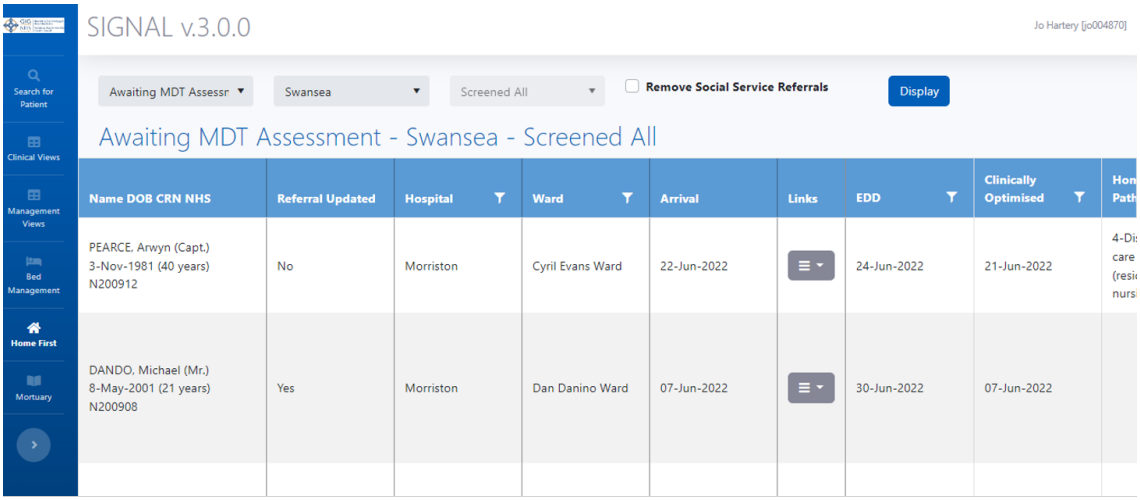
Computer systems designed to support healthcare provision are becoming a commonplace addition to healthcare workers lives, but they are not without their challenges, as we have already outlined in Chapter 1. Such systems, whilst originally being only within the realm of clinical and diagnostic tools, now encompass most hospital operations [30]. The capacity for information technology to store and process information has resulted in a proliferation of systems designed to help with even the most mundane of tasks. Furthermore, in the wake of the COVID-19 pandemic, there have been further calls to increase the digital capabilities of the NHS, particularly in relation to secondary care [31].

Swansea Bay University Health Board's Digital Services team are charged with the design, development, and deployment of a number of clinical systems designed to support NHS workers in various roles and with various tasks. The *Signal* system supports staff providing front-line care on wards by allowing them to update and process patient data and keep track of tasks through the system. It also provides digital whiteboard capabilities throughout the wards on which it operates, crucially replacing manual whiteboards for staff operating in these areas. Furthermore, it is also instrumental in supporting with the flow of patients during their hospital journey, from admission to a ward, through their time at the hospital, and frequently into home and community care settings. As a result, it is a system with a multitude of disparate uses and a variety of different user types.

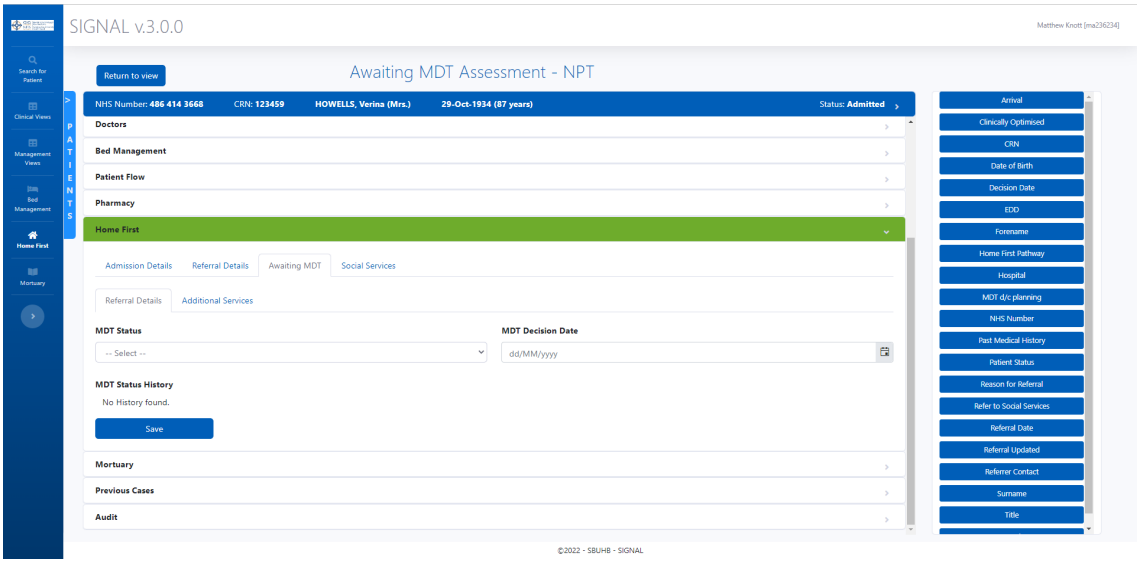
The first implementation of the system took place in November 2018 with a trial in the Singleton Hospital Assessment Unit, an assessment unit in one of SBUHB's acute care hospitals in Swansea. Following this successful trial, as of 2022 Signal is in use within a clinical setting across 4 of SBUHB's hospitals. Currently in use is Signal Version 2, which is a Microsoft SharePoint-based platform. The use of the externally developed Microsoft SharePoint system brings with it functional constraints and a lack of overall developmental control. To counter these limitations, SBUHB have made the decision to move development to an "in-house" team of developers using a Microsoft .Net framework for the upcoming release of Version 3, due to be deployed towards the end of 2022. The aim of this is to allow greater flexibility for the system to be adapted and to meet the needs of the broad collection of user types that rely upon the system. Once Version 3 has been released, SBUHB will continue to design, adapt, and maintain the system in line with user needs.

In terms of the Signal user interface itself, the system presents different 'views' of the data to staff. Depending on a person's role within the organisation, each user is assigned

to a user group which dictates both the access that they have to the system and the type of information that they see. The views are accessed via menus that take the user to a display of information that is deemed relevant to them. For example, a nurse's view contains information pertinent to the provision of patient care within a ward-based setting (bed number, date last blood sample was taken, etc.) whereas the view for someone involved in the delivery of secondary, community-based, care would see information that is appropriate in the context of this, such as the Expected Discharge Date (EDD) of a particular patient. Signal makes use of a predominantly tabular format for the initial display of information, regardless as to which user group a person belongs to. This provides an overview of all relevant patients to the user. Further access to more detailed patient information can be obtained if a user selects a patient for which they would like to drill down into. This view is then shown as a single form with grouped sections.



a) Tabular overview of all relevant patients in Signal Version 3 using test data.



b) More detailed, patient-specific, view in Signal Version 3 using test data.

Figure 2.1: Signal Version 3 layouts are generally tabular and form based. Users can access the overview (a) or more detailed view (b) of the data within the system.

The SBUHB Digital Services team also have to consider that the Signal system does not exist alone, but rather functions alongside, and in conjunction with, a number of other digital healthcare information systems. This brings with it a number of challenges, as the team must consider how these might work together as an holistic digital eco-system to support both staff and patients.

2.3 The "Home First" Programme

It has been shown that, on the whole, elderly patients do not suffer adverse effects when they return to their homes as soon as acute care within a hospital is no longer needed and the patient is considered medically fit [32]. This model of care, known as "Discharge to Assess" (D2A) in England or "Discharge to Recover then Assess" (D2RA) in Wales, aims to be patient-centred by bringing necessary care to those who need it within their own home or care setting as soon as is practicable. This model of care also has vast potential benefits for patient flow more generally. Moving patients to home or community care settings prevents otherwise clinically optimised patients from taking up already limited hospital beds when there is no clear medical benefit to the patient. Freeing up these beds for patients with more acute medical needs is therefore of primary importance for effective patient flow.

In order to successfully facilitate moving patients out of hospital wards and in to more home-like settings (be it the patient's own home or other care facility), fostering strong and successful working relationships between primary and secondary care providers is critical [18]. In order to help reduce the demand on services, NHS Wales have sought to design and implement their own D2RA model of care that prioritises collaboration across organisations to support more patient-centred care. This grew out of the 2018 Welsh Government's policy and strategy publication, *A Healthier Wales: Our Plan for Health and Social Care* [33]. The publication highlighted a growing need for closer ties between NHS Wales' local health boards and social and community care providers (usually local council or third sector operated). It also stressed that the primary vision for better health and social care in Wales relies upon more integrated healthcare services being delivered closer to a patient's home environment. Following this, in 2021 the NHS Wales Delivery Unit published a document outlining how just such a model of care could be delivered. This D2RA-inspired model of care would become the "Home First" programme in Wales [34]. The Welsh model consists of 5 "D2RA Pathways". Each of these pathways represents a different type of "Home First" patient journey. These pathways range from a preventative approach designed to use community and social care services to prevent admission to an acute hospital environment (Pathways 0 and 1), to providing various patient routes back to a home-like environment after having been treated in an acute hospital environment (Pathways 2-4). SBUHB, alongside local county councils and various third sector partners, is one of 7 Welsh LHBs partaking in the Home First national programme.

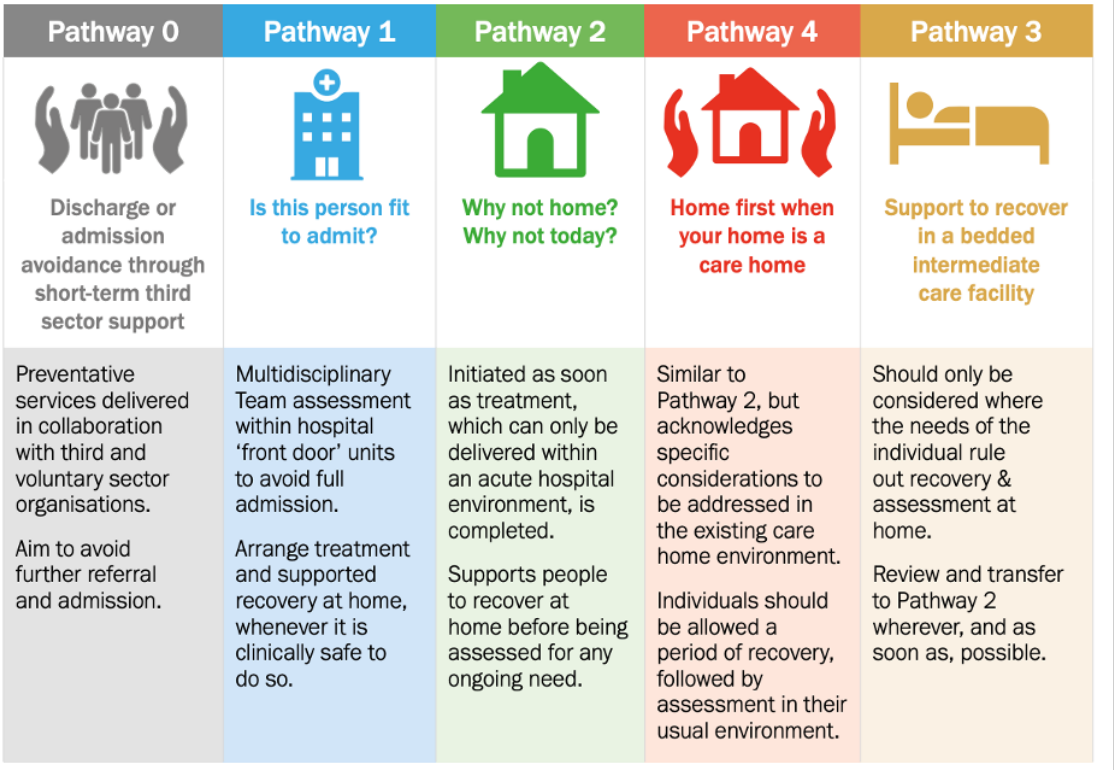


Figure 2.2: The Home First programme has five pathways of community care, ranging from a pathway of preventative care (Pathway 0) to a pathway requiring support in a care home (Pathway 4). As taken from the NHS Wales Delivery Unit [34].

In order to orchestrate the provision of community care services across these pathways, staff working in secondary care environments must frequently implement what are known as "Packages of Care" (PoC) for patients with complex health needs or for elderly patients experiencing frailty. For example, a PoC for a typical patient might consist of providing the patient with specialist equipment (such as a walking frame or a commode). It might also consist of arranging for home carers to make daily calls to help with daily living tasks, such as taking medication or making food, or for physiotherapists or occupational therapists to conduct assessments of a patient's recovery. As a result, regardless of the Home First Pathway the patient will be going through, each patient's PoC is tailored to them specifically and based on individual need. In many community care settings, including those working with SBUHB, the way that this is organised is through a Multi Disciplinary Team (MDT) Assessment which takes place when a patient is deemed 'clinically optimised' for discharge. Clinical optimisation is a medical decision made by the consultant or team responsible for the patient whilst they are in an acute hospital setting [35]. For a patient

to be deemed clinically optimised and thus considered for discharge, it must be possible to safely continue the patient's medical care in a non-acute setting. Once a patient is clinically optimised, a referral will be made to the the community care team responsible for facilitating any necessary PoC for the patient in question. This referral is then subject to an MDT Assessment made by a group of healthcare professionals, such as community nurses, occupational therapists, and physiotherapists, who will make recommendations for an appropriate PoC based on the patient's needs. This assessment, and timely completion of it, represents a critical link in the patient flow journey. Furthermore, it is perhaps worth noting at this stage that the collective name for those involved in this assessment, and the provision of care that stems from it, is the "Home First Team". While in reality the "team" itself is a disparate group of people with different roles, responsibilities, and indeed employers, they are all involved in the process of getting patients home with the package of care necessary to support recovery.

Within the context of the provision of care within the SBUHB area, the referrals to the Home First team responsible for delivering community care are made through the Signal system. Ward staff complete the referral using their view of the Signal system. At this point, the patient being referred appears in the view of the Home First team, ready for the MDT Assessment (see Figure 2.1). These referrals are then examined, processed, and accepted or rejected by a range of members of the Home First team as part of the MDT assessment. Recommendations for a PoC are then made and these are coordinated via an alternative system designed to support care in the community, the Welsh Community Care Information System (WCCIS). As a system, WCCIS sits independently of Signal.

This study and the wider project as it relates to patient flow, is to the best of our knowledge the only work that has considered how the graphical user interface of the Signal patient system, or indeed other similar systems, might better support users involved in achieving the timely discharge of patients from hospitals. Moreover, improvements to SBUHB's patient discharge process also have the potential to contribute significantly to the delivery of NHS Wales' Home First programme within the Swansea Bay area, or indeed beyond.

Chapter 3

Literature Review

3.1 Computer Supported Cooperative Work

Given that our aim in this study is to consider how the Home First team utilise a computer system to support their day-to-day work, it may serve us well at this point to consider other research that has centred on how work is completed via technological means.

How people and organisations use technology to support their day-to-day working practices, or Computer Supported Cooperative Work (CSCW) as it is frequently more formally known, has been the subject of much academic study. Emerging in the 1980's, researchers began to focus on how what we do at work, and indeed how we do it, had been subject to consistent change as technological advancements grew to influence working practices [36, 37, 38]. Given that technological change has not slowed, the field remains a vibrant area of study, with continuing investigations into software systems including emerging tools and technologies such as machine learning [39, 40] and voice assistants [41, 42], alongside ongoing considerations as to how further CSCW research might be undertaken [43, 44].

As noted CSCW researchers Kjeld Schmidt and Liam Bannon make clear in their essay on how we should take the discipline seriously, CSCW is not defined in terms of specific techniques or technologies being applied, but rather in terms of how they are pieced together in the design of systems to support various types of work [45]. As a discipline then, CSCW is usually considered as *design-centred* and not *technique-centred*. Key concerns for the broad selection of researchers in the field centre on how we might better design software systems to support those that use them over any dedication to

specific types of technology. Between 1992-1995 Rodden et al undertook the large-scale COmputer-based Mechanisms of Interaction in Co-operative Work (COMIC) project, which sought to develop further some of the theoretical principles that underpin the field [46]. The result was a series of publications that spanned, in effect, all aspects of CSCW research, from how to understand organisational contexts through to conducting field research. Of particular importance with regard to this study is the COMIC project deliverable that centres around how system design might be informed by engagement with users [47]. To elicit the requirements of systems the authors contend that simply mandating the engagement of users in the design process is not sufficient. Instead, consideration of what happens to the input of users (video recordings, transcription, etc) alongside how designers interpret this is of paramount importance. For example, the relationship between user input during the design stages of a system development project and the subsequently documented 'official' requirements of that system are not one and the same. As the authors demonstrate in their study, users do not frequently come to requirement elicitation events and say "I want X", but rather are usually facilitated by one or other interlocutors who make note of and interpret what a user says, eventually packaging this into "user requirements". System requirements are, to a great extent, translations based on original user conversations; they are not exact replicas. In this sense, there is a gap between the user and the documented requirement; within this gap sits the designer.

CSCW is, by it's nature, interdisciplinary. As a field of study concerned with digital tools and technology, it has roots in computer science and human-computer interaction (HCI), however by virtue of its focus on people and the completion of work across various industries, it's reach is far wider. The fields of sociology, psychology, and organisational studies all frequently play a role, alongside industry-specific fields, such as engineering or healthcare. Jonathan Grudin, one of the earliest pioneers of the field of CSCW, wrote of the challenges presented by this, considering that the field was frequently interpreted as "an undisciplined marketplace of ideas" [48], citing differences in academic approach, terminology, and research focus as collective sources of frustration. For Grudin, though presenting a challenge to be overcome, contributions across disciplines presented opportunities for a far deeper understanding of how people used technology to undertake work.

In their widely-cited 2004 paper on the subject, Pratt et al made the case that healthcare informatics could be vastly helped by the abundance of work in the field of CSCW [49].

Certainly, in the years that have followed a wealth of studies that consider the design of healthcare systems from a CSCW standpoint .

In their 2013 article on the preceding 25 years of CSCW in healthcare, Fitzpatrick and Ellingsen review a number of healthcare-centred CSCW articles published in notable journals and conferences (such as JCSCW, ACM CSCW, and CHI)[50]. After reviewing and synthesising their core pool of 128 papers, they conclude that there are a number of ways in which CSCW researchers can further expand their focus. They posit that researchers concerned with designing to facilitate cooperative working need to consider the implementation of healthcare-centred collaborative work systems from a more holistic and longitudinal perspective, considering the formative stages of larger-scale technological development initiatives. In addition to this the authors stress the need to truly understand the the nature of the "work" itself. In particular, developing an understanding of the patient trajectory, not just within a hospital environment, but to consider healthcare provision in all contexts, such as home and community-based care .

In this study we aim to build on the above call from Fitzpatrick and Ellingsen. By considering as our primary study subjects those that facilitate home and community-based care, we seek to better understand how the Signal software system might support those working in these fields. In addition to this, this study considers the patient trajectory as of foremost importance in light of concerns over patient flow. Furthermore, given Grudin and others' concerns about the richness that approaching systems design from an interdisciplinary perspective affords, the approach here is interdisciplinary, as we shall outline in the next section. Finally, to avoid the perils outlined by the COMIC project team of the detachment of documented user requirements from the real needs of the users, we undertake a secondary evaluation from the users themselves. By allowing users to look at and interact with prototypes before such times as they are developed for deployment within the Signal system, we provide another opportunity for the users to validate, or indeed invalidate, the interpretation of the designer.

3.2 Ethnomethodological Perspectives

This study is underpinned by an ethnomethodological approach that places the work of the Home First team, and that of SBUHB more broadly, firmly within a specific and unique context. Stemming back to work by Harold Garfinkel in the 1960's, ethnomethodology is a sociological method that posits that all interactions, however small or commonplace, are

legitimate topics of empirical study [51]. According to Garfinkel, in paying attention to the events of every day life in the same way we would pay attention to an extraordinary event, we learn about these events as "phenomena in their own right" [51, p. 1]. Of particular use in this ethnomethodologically-driven research is the concept of *indexicality*. Indexicality is the notion that life is conducted via linguistic exchange and that the circumstances of language usage are integral to it's wider meaning. All linguistic communication takes place via a shared language. Whilst the words of any language have a degree of universal significance within that shared language, they also have unique significance within each individual specific context and thus the language is *indexable* to a specific situation of meaning [52, p. 17]. Another key concern for ethnomethodologists is that of *accountability*, which is the opinion that interactions should be observable and reportable. In short, accountability refers to the way in which humans make sense of their own every day activities in order to maintain order. It considers that even those tasks or actions which might appear chaotic to a layperson have an inherent orderliness. Indeed, for many ethnomethodologists, such actions are purposeful and represent rational actions to members of a shared group [53, p. 17].

Though ethnomethodology is the study of everyday interactions across all parts of human life, a great deal of ethnographic work has centred on work-based interactions. Indeed, noted sociologist Anne Warfield Rawls credits Garfinkel with proposing what she considers an "alternative theory of work" [54] which considers that workers themselves are the harbingers of greatest knowledge about work-based practices. For Rawls, Garfinkel, and many other ethnographers, understanding work necessitates that researchers enter workplaces and engage with the workers within them.

With regard to work-based information systems, the use of ethnomethodology as an approach by which we may further consider the design and use of such systems has been widely utilised. Dourish and Button suggest that there is a foundational relationship between ethnomethodology and computer science that should be further harnessed in the design and development of information systems [55]. The authors term this relationship "technomethodology" and stress that considering systems design through this symbiotic lens presents opportunities for new models of design. With regard to accountability in systems design more specifically, Sara Eriksén made clear the case for accountability as a component of design in 2002 [56]. In addition to stressing the need to design for accountability, Eriksén also highlighted that, as a concept, accountability occupied

various meanings within the study of Human Computer Interaction (HCI), all of which contribute to a richer understanding of how systems might be designed. In the years that have followed, ethnomethodological approaches have been used to support the design, implementation, or appraisal of numerous information systems [57, 58, 59].

Ethnomethodology has also found extensive use within the healthcare field more broadly. Writing in 1995, Paul ten Have catalogued extensively the ethnographic approaches that focused within the area of medical studies, concluding that, whilst ethnographic considerations of things like doctor patient interaction had received a great deal of attention, much more could be done to investigate how medical work is completed accross the board [60]. Maura Dowling has also suggested in her 2007 discussion paper on the topic that ethnomethodology as a research approach had immense potential for generating new insights in the field of nursing studies [61]. Following this, numerous studies have emerged that have used the approach within a nursing or healthcare delivery context. For example, Newton et al used the approach to better understand the relationships between learning environments experienced by trainee nurses and their effects on medical knowledge transfer [62]. In addition to this, Erin Willis has used ethnomethodological techniques to understand the role of online communities in supporting patient self-management of arthritis [63].

Finally, it is worth considering ethnographic literature that has been conducted at the intersection of the fields of healthcare and computer systems design. Perhaps of key importance in relation to this study, Hartswood et al suggest an approach that they term "co-realisation" for the design of IT systems in medical and healthcare settings [64]. They consider co-realisation as building upon key ethnomethodological and participatory design principles to improve what they term "user-designer relations". The authors posit that designers fail to consider use over design, which tends to privilege considerations of "new technical artefacts" over "their effective configuration and integration with work practices" [64]. Co-realisation is achieved by bringing the technical design and development process to the users themselves. To achieve this as optimally as possible, the authors stress the need for an "IT facilitator", knowledgeable in systems design alongside having excellent technical development capabilities who can work with the users to help them to translate their needs.

This study attempts to take the approach championed by Garfinkel, Rawls, and indeed many subsequent ethnographers; that to best understand how work can be achieved in specific environments, we must speak to workers who operate within them. In the

context of our focus on systems design for patient flow and discharge, this does not mean consulting the developers responsible for creating the system, but rather speaking to those workers who are intimately involved in the discharge of patients. It also uses transcription as an ethnographic tool to better understand the nature of the SBUHB Home First team's needs of the Signal system. By using conversational analysis (CA) and documenting indexable interactions about how the Home First team use and engage with the Signal system, we intend to gain useful insight in to their meaning. We also support the concept of accountability by seeking to make their work more visible through such documentation and subsequent systems design. We further aim to build on existing ethnomethodological work by considering work-based interactions that are situated at the intersection of information systems and healthcare. Following the work of Hartswood et al, we further consider how IT facilitation can successfully elicit previously undetermined user needs to inform the design of more people-centred healthcare informatics systems that better support patient discharge.

3.3 Designing for Situational Awareness and Concentration

One area of study that warrants particular attention in light of our study is the concept of *situational awareness*. This is the academic study of how those engaged in cooperative work achieve goals through an understanding of what an individual's working goals are and how these fit within a wider network of activities, aims, and processes that go beyond that person. Furthermore, it stresses that an individual's knowledge and understanding of such things is one of the principal requirements for successful collaborative work.

Within the situational awareness in healthcare space, Bardram et al have developed a system, AwareMedia, to improve situational awareness within surgical wards. The system itself is designed to allow all staff involved in the provision of surgery to have social, spatial, and temporal awareness, thus supporting cooperative working across individuals, spaces, and time [65].

Tenenberg et al highlight how the work to be done is often facilitated through what they consider a *shared intentionality* between workers [66]. Furthermore their work seeks to situate the concept of awareness within a broader landscape of semiotic study that is concerned with the encoding and decoding of meaning. The authors stress that people successfully work together through an alignment of signifiers. By understanding these

shared signs and symbols shared understanding takes place across multiple actors and, as a result, cooperation between workers can take place.

Distinctly different from, but frequently closely coupled with awareness as a concept, is the consideration of how we might design systems such that they help users to maintain concentration on a task at hand. Of key concern here is how design choices play a critical role in task completion but can also unintentionally distract from it. Within a single interface, or indeed a set of interfaces, this is a challenging balancing act that has been the study of much scholarly work. Early work in this area tended to focus primarily on maintaining focus in life-critical or military environments [67]. Writing in 2005, Shneiderman and Bederson, recommended that the study of how interfaces might be designed with concentration in mind should be further expanded so as to include all forms of computer-supported work [68]. This has proved to be fertile ground as many scholars have sought to try to understand how to best communicate information to users.

One particular design element that has prompted a great deal of research is the system notification. Notifications are designed to alert users to new information. Whilst alerting users to new information is integral in allowing users to be situationally aware of their working environment, frequent interruptions (such as those resulting from notifications) have been shown to be disruptive. For example, Horvitz et al have demonstrated the effect of instant messaging notifications on task memory and performance, showing that they can hinder a user's retention of a task alongside increasing the time it takes to complete a task [69, 70]

There have been further nuances spotted in the empirical study of notifications. Klauck et al conducted a user study to acertain the degree to which gaze distance impacts upon the noticeability or distractiveness of a notification. The authors found that how far away from an interface a person is, and how that notification itself is displayed, significantly changes the degree to which a notification is considered just notification enough or an unnecessary distraction [71]. Tasse et al have also found in their large sample study that different notifications are considered either likable and effective or annoying depending on the importance of the information being delivered and the method of delivery [72].

Chapter 4

Study Design

4.1 Methodology

Over a series of weeks, we held a two semi-structured focus groups and one semi-structured individual interview with various members of the NHS Wales's 'Home First Team'. As a user group, the Home First Team are a crucial patient link and play a vital role in getting patients who are well enough back into their homes with the right support and care. With this in mind they play an essential role for both patient outcomes and patient flow. The ultimate aim of this study is to understand how this particular working group use the Signal system. In addition to how these particular Signal users use the system, we were also interested to understand the ways in which the system perhaps falls short of the needs of the Home First Team, if at all.

Following these user discussions, we then created a series of new 'Home First'-centred graphical user interface prototypes that have been designed based upon the elicited additional needs discovered as part of our investigation. These prototypes were then sent to our users for additional qualitative review and feedback.

It is worth noting at this stage that many of these conversations centre around two versions of the system – Signal V2 (SharePoint) and Signal V3 (.Net Framework). As Signal V3 is yet to be released to end users, the majority of the research subjects' experiences are those of Signal V2

4.2 Selection of Participants and Informed Consent

The selection of participants was conducted in partnership with our stakeholders at Swansea Bay University Health Board. This was because, as an organisation, they were best placed to provide information about appropriate contacts to be involved in the study. A total of 11 participants working across SBUHB and Swansea Council were contacted to take part in the study, all of which work as part of NHS Wales' Home First programme in varying capacities. Of the 11 subjects contacted, five agreed to take part in the study. Participants were contacted and invited to take part via email and were all provided with the study's Participant Information Sheet which outlined the study's aims and the requirements of the participant. Prior to conducting semi-structured interviews with the participants, they were asked to complete subject informed consent forms, in either hardcopy or via a digital form, to confirm their consent to be involved in the study. A breakdown of the participation groups held, and the number of participants in each, can be found in Table 4.1.

Participation Group	No. of Participants	Job Title
Focus Group 1	2	Research Innovation & Improvement Hub Manager WCCIS Business Change Manager
Focus Group 2	2	Team Lead Physiotherapist Community Matron
Interview 1	1	Team Clerical Officer

Table 4.1: Breakdown of participation groups, including number of participants and job tiles.

4.3 Study Location

As we have previously noted, one key issue affecting NHS Wales is that the organisation is exceptionally busy. Clinical staff, in particular, have very little time to take away from their routine jobs providing direct and indirect patient care. In addition to this, staff are based across multiple SBUHB sites and travelling between these sites might otherwise take time out of an individual member of staff's schedule. Accessibility of staff was therefore a key challenge in this study. As a result, the focus groups and interviews were held via multiple mediums, so as to best accommodate the staff themselves. In total, 3 meetings with various 'Home First' staff took place, one in person at Morriston

Hospital in Swansea, and two online facilitated via Microsoft Teams. Further information regarding this can be found in Table 4.2 below.

Participation Group	Location
Focus Group 1	Morriston Hospital
Focus Group 2	Remote - Microsoft Teams
Interview 1	Remote - Microsoft Teams

Table 4.2: Location of each participation group.

4.4 Semi-Structured Approaches and Data Capture

We used semi-structured conversational approaches across all of the participatory groups as a research method. As a method, semi-structured interviews and focus groups enable the direct discussion of key pre-defined topics, but allow for the flexibility to alter a course of discussion in light of new information discovery [73]. As a method they have been widely used in the field of HCI as a way to maintain adaptability to a given subject's remarks [74, 75]. As a methodology they thus support human-centredness as a study design ethos. For this study specifically, in each group we had a universal predefined set of questions to prompt conversation with the Home First team along similar lines (see Table 4.3). Though we entered each group with a pre-defined set of questions, in many cases we might deviate from these questions, or use alternative lines of questioning, where this was appropriate and to question the users further about what they had said.

Conversations with the the Home First team were recorded, so as to capture as accurately as possible what had been said by the study subjects. The method of recording differed depending upon whether the participatory group was in person or online. In person

Questions
What is your role?
What do you do as part of that role?
Can you walk me through the patient flow journey from your perspective?
How do you know you have a referral?
What medium do you use to access Signal?
What information do you need?
Does all of the information you need come from Signal?
What happens next?

Table 4.3: List of the initial prompt questions, as discussed with participants.

discussions were recorded using a handheld recording device and online discussions were recorded using the in-built recording functionality on Microsoft Teams. These recordings were password protected during transit and were then transcribed to text as a documentation of the proceedings no later than 14 days after the participant had taken part. To ensure anonymity, participants were transcribed with generic identifiers, such as Participant 1, Participant 2, etc. The original audio and video recordings were then deleted, such that the only remaining document pertaining to the discussions is the anonymised transcripts. Full copies of the transcripts may be accessed in Appendix A as part of this document. Furthermore, as we have already outlined, ethics approval for this was received from the Ethics Board of the Faculty of Science and Engineering at Swansea University.

Once the discussions with the participants had been transcribed, we then read through and analysed these in depth along thematic lines. Once we had drawn out reoccurring themes and challenges expressed by multiple people, we began to isolate issues and to consider which might be best candidates for our prototypes. Within the scope of this study it was not possible to create prototypes or remedies for all of the issues expressed by our participants. Instead we aimed to create one set of user interface prototypes designed to help with one key problem, whilst documenting further challenges that warrant additional exploration as our project with SBUHB continues over the coming years. It is also worth highlighting that, whilst our prototypes concentrate on changes to a graphical user interface, we did not restrict our consideration of challenges to only those that might be remedied by changes to the interface. Issues raised in two or more participatory groups were considered key findings.

Chapter 5

Results

Following discussions with the Home First team, a number of important details have emerged in relation to this team's use of the Signal system. This chapter is thus organised as follows, we first outline some of the key findings, which we separate by thematic topic and make reference to specific interactions with our participants that led us to conclude that there was an issue. Next we select one key issue as the candidate for our prototype creation. We then introduce our prototypes with specific reference to supporting literature to demonstrate the basis for our design choices. Finally, we outline the user response to the prototypes.

5.1 Key Findings

5.1.1 Two Way Communication

One of the key areas for improvement highlighted by the participants was that there was nothing in Signal V2 that made the users aware that changes had been made to a referral. To recap on the process briefly, referrals are made to the Home First team from a ward, the Home First team then conduct an assessment as to the patient's needs based on this referral and recommend a package of care to meet the patient needs. From a Home First perspective, an initial email is sent to a generic shared inbox to alert them to a new referral. Frequently, these referrals from the ward are incomplete, or do not contain enough information for an assessment to be made. These can be returned to the referring ward, as outlined by Participant 3, who describes the recently created role of Business Support Officer (BSO):

> *PARTICIPANT 3: And yeah, since we've had BSOs, because initially it was just therapists and we would do all of this. [...] [They] monitor the monitoring box and then move them to discharge and are quite heavily involved from this side, again, from the receiving of a referral and they'll also and take a referral and send it back if it's not appropriate and contact the referrer.*
>
> *INTERVIEWER: Yes so can you send it back? So, for example, say you get a referral and it's like, you know, either this needs more information or it's not quite right and it needs to go back. Can you then send it back to the ward?*
>
> *PARTICIPANT 3: So yeah, what we do, again, is it is quite... with Signal, it's all about ticking and unticking boxes, isn't it? So, we would just go into the referral complete where they've checked the box on the ward and we would untick it, which then just moves it back [...]*
>
> (Participant 3, Focus Group 2)

This makes clear that the implementation of Signal has necessitated the need for more systems-focused workers, such as the role of BSO within the Home First programme for the SBUHB area. Not only this but it is also evident that Signal facilitates, to some degree, two way communication; communication to the Home First team when a patient needs to be referred, and communication back to the ward team where that referral is not sufficient, or where it is not appropriate. Effective communication tools are essential for workers in the respective ward-based and Home First-based teams to maintain a sense of situational awareness between each other. Within the context of the Home First team, one area of particular concern is that once the ward teams have made any necessary updates to a referral and sent it back to the Home First team via Signal, there are limited ways to know that this has happened. This was highlighted by many of the participants over the course of this study:

> *PARTICIPANT 2: Well, what happens is, the ward fill in their referral. Check it as complete. There's only one other box that they can update, so if we go back and need extra information off the ward, cos we need a little bit more information, you know, they then have to manually phone us and go 'we've updated this section'.*
>
> (Participant 2, Focus Group 1)

PARTICIPANT 3: [...] What we do find on Signal is for those patients that we've sent back to have more information when the tick box is re-completed it will just turn back up, we don't get an e-mail notification and we don't get any sort of notification that they've arrived back with us. [...] if the referral was a week or so, days ago, they could be further down the list, so if we do have in Signal sort of eight, ten patients, we wouldn't be notified that that person has now come back to us. It relies on us making sure that we'll keep checking Signal [...]

(Participant 3, Focus Group 2)

PARTICIPANT 5: No, problem number one. It's not always that I receive messages, sometimes I don't, so I need to check Signal anyway every day, because I need to, I need to know that we have all referrals that are in Signal.

(Participant 5, Interview 1)

It is widely known that working memory for tasks is limited to approximately 3-5 chunks of information [76]. With this in mind, it is evident that much more could be done to make sure that the Signal system supports it's users in managing their cognitive load, rather than relying on the Home First team remembering what is happening with a patient. If they have been sent back to the ward for more information, for example, or if the ward have updated a referral and sent it back to Home First, ways in which Signal could be configured to alert users to this information would be worthwhile.

Attempts have been made as part of Signal V3 to let users know when an update has been made to a referral, however, participants highlighted some key issues with the planned Signal V3 interface. Plans for a single column in the overview table that involve stating whether a referral has been updated "Yes" or "No", do not necessarily have the effect of making the action on a referral any clearer, despite the best of intentions from the development team (see Figure 2.1.a). One particular exchange between Participant 1 and 2 makes clear the issue:

PARTICIPANT 2: It does say now, look, in version 3 whether the referral has been updated or not.

PARTICIPANT 1: Yeah I was just looking at that though because, obviously, it's yes or no. . .

PARTICIPANT 2: What happens if it gets updated twice?

PARTICIPANT 1: Well, exactly, yeah. And also does that tie in with the arrival, clinically optimised dates, the EDD times, the dates, etc., because you know at that point in time you are thinking it's not been updated but it's in the system before the order of [Name], which is – he has been updated. . .

PARTICIPANT 2: Since when?

PARTICIPANT 1: When was it updated? So it's like. . .

PARTICIPANT 2: Referral updated date. . .

PARTICIPANT 1: It means nothing to me, because it could have been updated two weeks ago.

PARTICIPANT 2: So they have obviously listened, then, to [Name] and [Name]'s feedback, going 'we don't know if it's been updated or not', so they've gone 'you can tell if it's been updated now'.

PARTICIPANT 1: There's no information there that gives me anything extra, apart from it's been updated, yes or no.

(Participants 1 and 2, Focus Group 1)

Based on this interaction, it is clear that more work needs to be conducted to make the, frequently back and forth, nature of the referral process more understandable to the Home First team. We also know, and have previously outlined in Chapter 3, the varying perspectives through which graphical user interface design can support sensemaking and awareness. Based on these primary findings, we intend to design prototypes that might better support the Home First team to conduct their daily work, thus seeking to contribute to better patient flow through the Signal system.

5.1.2 Quality and Quantity of Information

There was a general consensus across all users that the interfaces and associated data were not dynamic enough or relevant. For example, Participant 1 highlighted that a key reason that referrals are sent back and forth in the first place stems from not having the right information to process the referral when it is sent from a ward. They suggested that improvements to interfaces on the ward-side might contribute to improvements in processing the referrals for the Home First team. They likened this to information processing when we read newspapers:

> *PARTICIPANT 1: [...] when you see a newspaper it's massive isn't and you say 'I'm not reading that. . . it's massive', and then you see a little shorter version, The Times, for instance, you've got the little square Times and the big square Times. Some people like the big one, other people like the smaller one. It's more pages to go through, but it doesn't seem so intense and overwhelming. So it is looking at people's mindset and saying right 'how can we make it so that it is sharp and snappy, but it's the same information?'. So it is the same information you are asking for but it's more intuitive, informative, interactive way. By making it list upon list upon list it's counter-intuitive, it's destructive, really, because you're like 'I've got to fill all of these boxes in??' and already you've just lost them. [...]*
>
> (Participant 1, Focus Group 1)

Signal uses a largely tabular and form-based interface, and many needs are met by either adding columns to the table-based view, or adding fields to a relatively static form-based view that is already information heavy. The result of this is a somewhat cumbersome interface. Whilst much of the information might be both important and necessary, considering ways to make this more digestible from a user perspective would likely be worthwhile. It might also be preferable to consider how interfaces work across the whole patient referral process as improvements to these at earlier points in the process might contribute to more effective patient discharge via Home First.

5.1.3 Considering the Mobile Nature of the Work

Signal is currently limited to desktop computers, but many participants expressed the challenges that this brings for healthcare environments, in particular. On wards, computers are generally shared devices, so accessing the Signal system to conduct patient-specific work is contingent on a computer being available at the right time, this has knock on effects, as outlined by Participant 4 in our study. Participant 4 works as part of the Home First team, but spends a great deal of time on wards trying to support effective patient referrals from the ward into community care:

> *PARTICIPANT 4: Because wards are a confined space. You can't exactly set yourself up with your laptop. And especially for us as Community staff, because we're not part of a ward team, we sort of, we're in, doing our handover and then we try and sort of find a quiet space away from the ward to do all our updates. But you know sometimes*

> *it's really hard, isn't it? Because if you don't do your update there and then, you're thinking 'right, what did I decide for that patient'. [...] So yeah, if you could put the update straight on [...]*
>
> (Participant 4, Focus Group 2)

One way to improve this from a purely usability perspective might be to consider more mobile devices that could better facilitate immediate updates at the point of decision making. Participant 1 highlighted that other systems used within community care are mobile friendly, which contributes to better uptake and data quality:

> *PARTICIPANT 1: Is it possible to make it mobile friendly? I ask the question about mobile friendly because everyone has handheld devices, and we use it for the care homes, within the care homes submitting data on a handheld device, and it's because they will. They're sitting there and they haven't got to go and sit at a desktop and have those challenges [...] So it's looking at it from a user perspective, what can we do to make it easier?*
>
> (Participant 1, Focus Group 1)

5.1.4 Lack of Integration

Finally, and perhaps intricately related to many of the concerns outlined here, it is clear that the Signal system suffers from a distinct lack of, what we might term, *intelligence-led* features. The result is a system that holds a large amount of data, but does not currently utilise this to support the Home First team to be more aware of what needs to be done or to help them complete their work more generally.

For example, one key way that the Signal system might better serve the Home First team is through better integration with other healthcare systems. Currently, as part of the MDT Assessment, the Home First team manually transfer patient data on to a Microsoft Word form by copying and pasting from various parts of emails sent from Signal and the Signal system itself, which, as we have established, is already in a less than optimal format. Following this, it is then shared in a Microsoft Teams channel for a decision to be made because the decision relies upon the consensus of multiple, not necessarily co-located, people. Once that decision is made, the Microsoft Word document is then uploaded to WCCIS and more information is manually added. This was raised as an issue by two of our participants:

PARTICIPANT 3: [...] what we find with Signal is the format the referral form and it gets to us. It's not in the most readable format for us. There's a lot of tick boxes and a lot of gaps and things, we don't always have enough information. So we have our own, we've developed it really over time as we moved on to WCCIS, our own triage screening form with all the information that we would need to decide on packages of care and what was required. So we transfer [...] everything they can from Signal, and then we would complete the rest then with all the other information that we need and that document is attached to WCCIS, so everybody can see, uh, or everybody within the team can see, you know, what we've decided really.

(Participant 3, Focus Group 2)

PARTICIPANT 5: It takes, I don't know about 5 to 10 minutes to copy and paste all information. If I copy and paste information from the program, it's much, much, more longer because I need to copy and paste every single, I don't know, phrase. I can't copy and paste a whole page from Signal. I can copy and paste only words and phrases because it's structured, you know Signal, it's structured...and I receive notifications to my inbox, and copying and pasting using this notification, it's much easier. It's much quicker for me, yeah. But just an idea for me it would be much better if I could upload the paper the paper referral from Signal.

(Participant 5, Interview 1)

There are various ways by which this overly manual process might be improved so as to save the time of those working within the Home First programme. For example, by automatically creating the MDT Assessment form from the data already in Signal, or by connecting to WCCIS to share data via API or other means.

What is clear from these findings is that there are a multitude of ways in which the Signal system could be designed more sympathetically for the Home First team such that it provides them with more useful ways to manage how they work. In concluding our findings here, it is worth noting one particularly telling comment from one of our study participants that makes no reference to specific problems, but highlights the larger-scale challenge faced in the development of systems that span both hospital and community care settings:

PARTICIPANT 2: [...] I suppose the history around Signal is that it wasn't built for Home First and the community, it was built for something else and the people in wards,

> *that move around different wards, operate very differently to the way they operate in the community. So there's a round peg in a square hole.*
>
> (Participant 2, Focus Group 1)

This makes even clearer the need for additional dialogue with the Home First team users. By including them more meaningfully in the system design process, it may be possible to assuage the assertion that they are simply "a round peg in a square hole". We have outlined here some initial challenges and suggestions for improvement that our conversations with them have unearthed. Following these conversations, we isolate the concept of better two way communication and situational awareness for further graphical user interface design considerations. While the additional findings are important, and should not be discounted, this issue was the only problem to be raised in all three of the participation groups studied. We therefore seek to create a set of prototypes that provide a more comprehensive view of the patient referral process.

5.2 Prototype Design

All prototypes were created using Figma, which is widely used in both industry and academia for graphical user interface and user experience design [77]. Early in the project we had considered using Adobe Illustrator for the design of the prototypes, but this had significant drawbacks because it only allowed for the creation of static prototype images. One of the key benefits of using Figma is that it is possible to replicate as closely as possible the real Signal user experience, which was extremely useful for our purposes. It is able to display interfaces as if they were in a real-world setting. It also allows for a user to interact with the prototypes via clicks, with each click able to navigate the user to a different view. Because of this, it is more immersive and replicates an experience much as if the user were interacting with a front-end web application.

The prototypes were designed to stay as close to the existing Signal system as possible in terms of look and feel. The rationale behind this is that the Signal system is already a developed and deployed piece of software. Owing to this, what we might consider the more aesthetic aspects of the Signal system (menu bars, layout, colour schemes, etc) have already received a great deal of time and investment from SBUHB. Whilst there might be considerations to be had about the effectiveness of these from a user-centred systems design perspective, this would be considered out of scope with regard to this study,

Whilst we wanted to give users the ability to interact with a prototype that was as close to the real Signal system as possible, to maintain focus on our task at hand we only allowed for users to navigate through the prototype in a way that was pertinent to our finding that the Signal system should give better oversight of referrals and enable users to clearly see when an individual referral is updated. The intention here was not to create a fully functioning replica of the Signal system, but to create pathways that enable us to better understand the ways in which this particular problem could be improved upon.

For the purposes of this article, some relatively small images of the prototypes are included here, larger images of the prototypes alongside links to view these interactively at any time can be found in Appendix B.

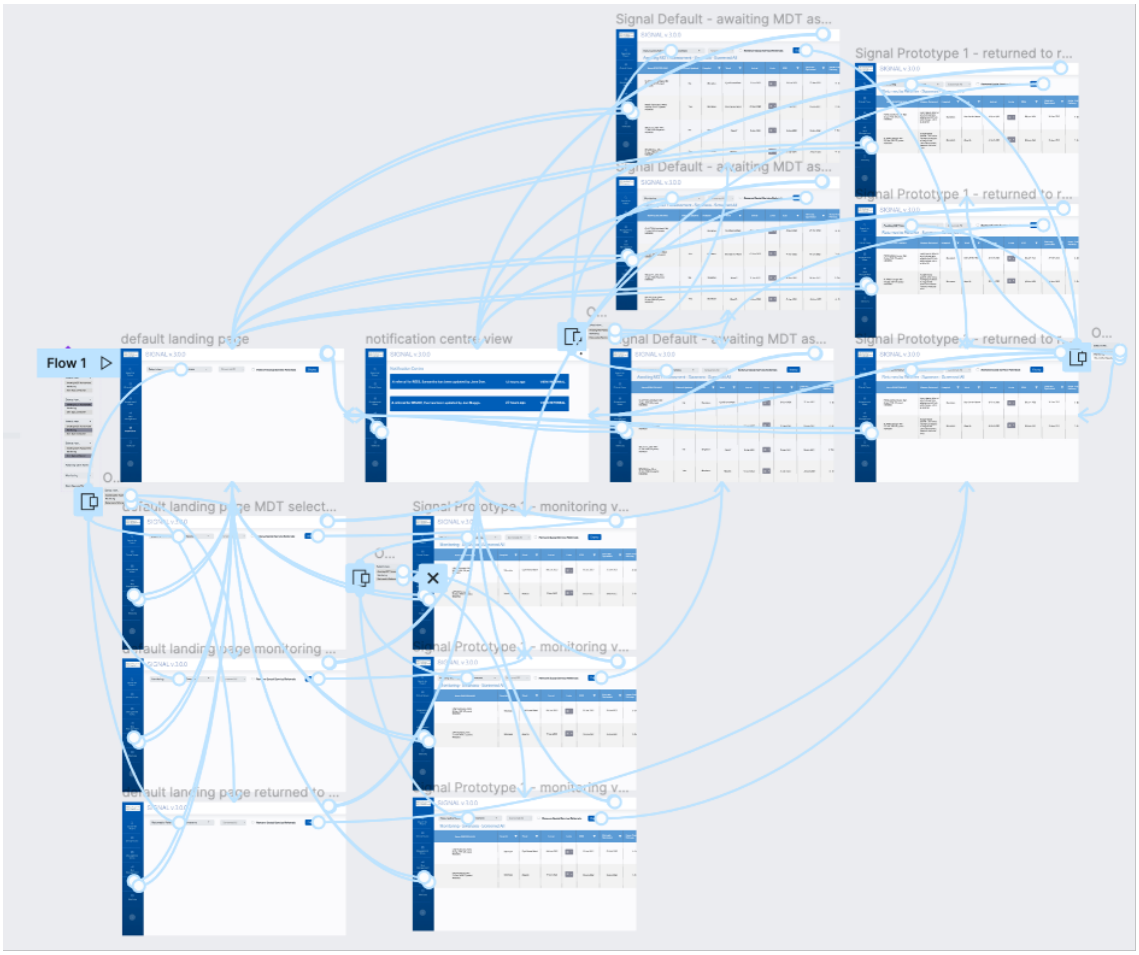


Figure 5.1: Demonstration of the prototyping view within Figma. Lines between views demonstrate where clicks and navigation between interfaces can take place.

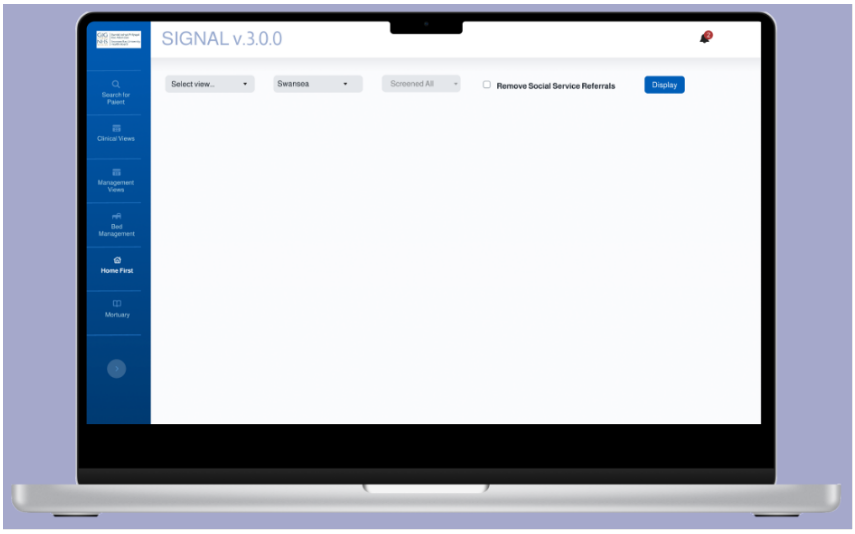
5.2.1 Prototype One

Figure 5.2: Prototype 1 with changes to the tabular user interface to better highlight changes in the status of referrals.

Prototype One is the simplest of all of the prototypes we created. This prototype can be accessed directly by clicking here. A user guide to support navigation of all prototypes can be found in Appendix B. The idea with this prototype is to allow users to see which referrals have been updated but the aim here is to keep disruption to the current Home First interfaces to a minimum. It has previously been shown that users create mental models of applications, and that consistency supports the creation of such models [78]. In addition to this, it has been demonstrated that previous user experience with applications supports improved user experience [79]. Given that our users are all familiar with Signal and its associated interfaces, and considering these factors, the existing interface remains largely the same save for the addition of colour coded banners above patients for which specific conditions are met. A green banner displays where a referral has been updated and how long ago this was. The purple banner displays where a referral has been returned to a ward. This therefore means that the Home First team retain oversight of referrals sent back to wards such that they have awareness of referrals that are likely to be ready to process once they are updated, perhaps allowing for better anticipation of demand. When returned referrals are sent back to the Home First team from a ward, the intention would be that a purple banner would change to a green "referral updated" banner. Here we have two attention grabbing elements designed to provide information to the user, location and

colour. The reason that colour has been chosen as the an attention grabbing element is because it has been shown to be a pre-attentive property in areas of data visualisation more generally [80]. In addition to this, it is widely known that our peripheral vision is limited and it is through our foveal vision that we see colour in more detail [81]. For this reason, we attempt to grab the user's attention by placing the notification for Prototype One in the location likely to receive the greatest level of user gaze. In the case of Signal, this is likely to be the where the names of referred patients are, as it is through this area on the screen that navigation to more details about the referral takes place.

5.2.2 Prototype Two



a) Signal landing page with addition of notification bell and red badge in the top right corner to alert users to updates.

b) Dedicated notification centre that provides further detail regarding updates and the people who have made them.

Figure 5.3: Prototype 2 uses a notification bell to alert users to updates (a), and has the addition of a notification centre (b) designed to give more comprehensive information about any updates.

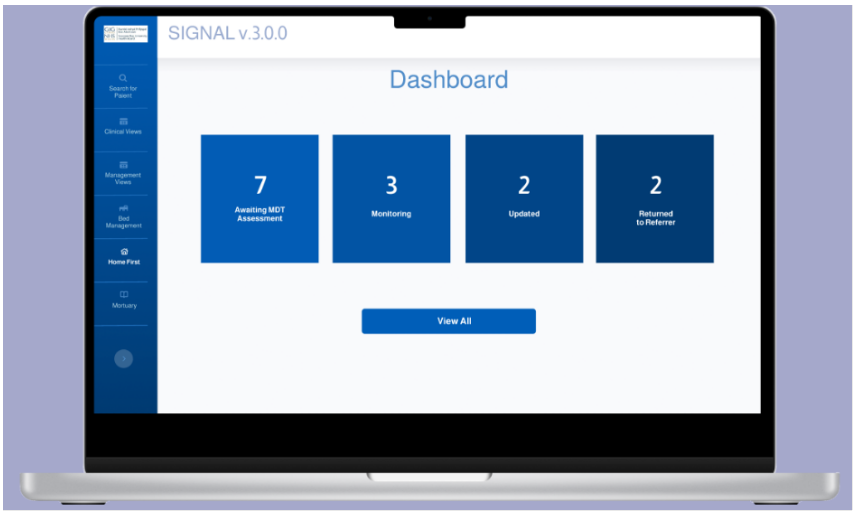
The second of our prototypes can be accessed interactively by clicking here. Prototype Two utilises the current Home First blank landing page. Users may use the existing drop-down menus to navigate between the different views of the data, just as they can

currently. A new addition to this interface is the addition of a notification icon and badge to the top right-hand corner of the landing page interface (see Figure 5.3.a). The badge is intended to display a number whenever an update is made to a referral, thus letting the Home First team know how many updates have been made to referrals they are responsible for since they last checked. The final change to the existing Signal system in this prototype is the addition of a new dropdown menu item that enables users to navigate to view all referrals that have been returned to the referrer, again providing overview of which referrals are likely to be sent back to the Home First team, such that they might attempt to better anticipate demand.

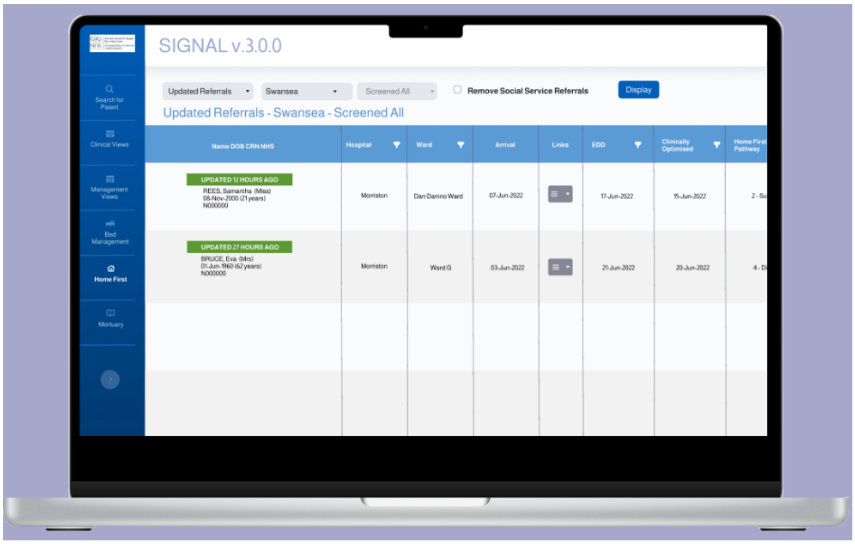
In contrast to Prototype One, Prototype Two takes the approach of initially relying on peripheral vision, rather than foveal vision. This is influenced by the finding, as outlined by Klauck et al, that notifications have both high visibility and high distractiveness if the user is in close proximity to the user interface, regardless as to what that notification is [71]. Given that the users of Signal are predominantly situated at desks, using a user interface on a desktop PC or laptop, they are likely to be in close proximity to the interface itself. To attempt to mitigate against notifications being an annoyance for users, we used the notification bell and badge icons, which are situated at the periphery of a user's field of view. As a design choice this is rooted in Tasse et al's findings that users preferred message and badge notifications and that they had relatively low levels of annoyance to users when directly compared against other mechanisms of attention grabbing [72]. Tasse et al highlight that user appreciation of this set of icons might be rooted in user engagement with social media applications, such as Facebook and Twitter, which utilise similar methods of notification. Whilst Tasse et al used the message icon, we considered that a message icon might perhaps be misleading as users do not receive direct messages from other users in Signal. Instead, we replaced the message icon with a notification bell. As a result, the intention with Prototype Two is to ensure effective noticeability, whilst attempting to minimise distractiveness. Users may click on the notification bell to navigate to a new "Notification Centre" which contains further information about which referrals have been updated, and who updated them (see Figure 5.3.b). This supports user control, as the user is able to choose when they wish to navigate to the Notification Centre. The propensity for user to feel overwhelmed by incoming notifications has been well documented [82, 83]. With this in mind, separating out further detail about changes

to a referral seeks to prevent the user from being overwhelmed by incoming information, the receipt of which they have no control over.

5.2.3 Prototype Three



a) Signal landing page uses tiles to group referrals based on their status.



b) Navigating in to the "Updated" tile shows only those referrals for which updates have been made.

Figure 5.4: Prototype 3 uses a tiled landing page and allows users to isolate only updated referrals by clicking on the "Updated" tile. Referrals in the "Returned to Referrer" tile are returned to the referrer, but Home First can still view these allowing holistic oversight and awareness.

The final prototype we have created can be accessed interactively by clicking here. Prototype Three makes use of a tiled initial interface that we have called the Dashboard. Currently Signal V3's landing page is a rather sparse interface, with a great deal of the available interface not used (see Figure 5.3.a for an example of this). Users must currently utilise a dropdown menu and select a particular group of referral types (Awaiting MDT Assessment, for example) before they have any idea as to the amount of referrals they currently have. On the Dashboard there are four tiles, each representing a different status of referral, alongside a number outlining how many referrals currently in the system belong within each group. By navigating into the "Updated" or "Returned to Referrer" tiles, the user will see that the same banners as outlined in Prototype One are used to provide more details as to when an update took place.

In the design of this prototype we consider how humans organise information such that they can manage cognition via perception. In particular, we consider the Gestalt Laws, which focus on how humans perceive information visually. Whilst there is some rejection of gestalt psychology as originally outlined [84, 85], many of the laws still provide us with a useful way to consider human perception. In particular, Prägnanz (the law of simplicity) considers that humans will generally interpret information in the simplest way possible [86]. In addition to this, Gestalt Laws posit that humans group similar things in order to make sense of them [87, p 181]. While originally developed as a concept long before the concept of the graphical user interface existed, many HCI scholars have utilised Gestalt principles in the design of user interfaces [88, 89, 90]. With this in mind, the design intention of Prototype Three is to attempt to make better use of the available space on the initial landing page, whilst giving the user a simple view of the status of referrals currently in process. This is, in effect, a process of grouping the referrals for the user, thus supporting both principles of simplicity and grouping as outlined in the Gestalt Laws. In addition to considerations of the Gestalt Laws, Prototype Three also considers as a driving design principle noted computer scientist and HCI researcher Ben Schneiderman's visualisation mantra. For Schneiderman, information presented visually should follow the following design principle: "Overview first, zoom and filter, then details on-demand" [91]. This prototype makes the landing page that Home First users first see an overview rather than a largely empty page. Instead of the user needing to navigate around the system to piece together an overview of all referrals in the system, one is immediately presented to them upon logging in. It does not provide *all* of the information, to avoid

overwhelming the user, but it does seek to provide enough to give a general oversight of the status of all referrals currently in process. Users can then click into individual referral status groups to effectively "zoom and filter" the results.

5.3 User Feedback

Once the prototypes had been created we then sent them to all five of our participants for some brief feedback via an online questionnaire. Users were sent links to the prototypes in Figma alongside a user guide outlining how to interact with the prototypes and how to provide their feedback. A copy of this guide can be found in Appendix B. The feedback gathered was both quantitative (i.e. rank the prototypes in terms of the following...) and qualitative (i.e. please describe what you like/dislike about...). A copy of the questionnaire can also be accessed via Appendix B. Four of the five participants responded with feedback. One participant did not respond.

5.3.1 User Rankings

Participants were asked to rank the three available prototypes in terms of the following:

- **The prototype that best helped the user to understand the *status* of referrals.**
- **The prototype that gave the best *oversight* of referrals.**
- **The prototype that was easiest to *interact* with.**

The result was a rather mixed picture, with no prototype being considered better than the others outright. Indeed, Prototype Three was considered best on all three fronts (status, overview, and interactivity) by 2 out of 4 users, however, complicating matters slightly it was also considered the worst performer on all three fronts by the other 2 users. The full breakdown of user feedback on these points is further illustrated in Tables 5.1 to 5.3. We replicate this data in tables rather than data visualisations owing to the small sample size.

Table 5.1: The prototype that best helped the user to understand the **status** of referrals.

User Number	**Rank 1**	**Rank 2**	**Rank 3**
User 1	Prototype Two	Prototype One	Prototype Three
User 2	Prototype Three	Prototype One	Prototype Two
User 3	Prototype Two	Prototype One	Prototype Three
User 4	Prototype Three	Prototype Two	Prototype One

Table 5.2: The prototype that gave the best **oversight** of referrals.

User Number	**Rank 1**	**Rank 2**	**Rank 3**
User 1	Prototype One	Prototype Two	Prototype Three
User 2	Prototype Three	Prototype One	Prototype Two
User 3	Prototype Two	Prototype One	Prototype Three
User 4	Prototype Three	Prototype Two	Prototype One

Table 5.3: The prototype that was easiest to **interact** with.

User Number	**Rank 1**	**Rank 2**	**Rank 3**
User 1	Prototype One	Prototype Two	Prototype Three
User 2	Prototype Three	Prototype One	Prototype Two
User 3	Prototype Two	Prototype One	Prototype Three
User 4	Prototype Three	Prototype One	Prototype Two

5.3.2 Qualitative Feedback

The qualitative feedback provided by the users was limited but still provided some insight as to whether or not the suggested user interface changes were worthwhile in the eyes of the users. When asked what they liked about the prototypes, all prototypes received positive feedback in terms of their efforts to make clearer the status of referrals. A more detailed outline of the feedback for each prototype is outlined below.

5.3.2.1 Prototype One

Users expressed that they like the ability that Prototype One gave them to know when a referral has been updated. For example users provided the following comments:

> *Indicating that a referral has been updated would be helpful in screening and to ensure timely responses and referrals being processed.* (Prototype One)

> *On the awaiting MDT tab, if a referral has been updated, it is clear to see when it was last updated or returned to referrer* (Prototype One)

When asked what they disliked about the Prototype One, users provided less further detail as to what they disliked about this prototype, with some stating "N/A" which we take to mean that they did not have anything bad to say about the prototype. One user did suggest that they were not able to see referrals that we're "on hold". "On hold" referrals are referrals that have had an MDT Assessment approved, but for one reason or another the patient is unable to leave hospital yet. We acknowledge that this is an omission on our part, and that an "on hold" referral would constitute an additional referral status that has not been included in these prototypes.

5.3.2.2 Prototype Two

Users received the addition of a notification centre, one of the central design features of Prototype Two, positively:

> *Having a notification centre would be really helpful in screening. When we are dealing with a number of referrals at a time it would be really helpful to be notified of something that has happened or changed in Signal in regards to the patient.* (Prototype Two)

Users also highlighted that separating out referrals that have been returned to a ward was a useful design feature, stating that one of the things that they liked about Prototype Two was that it displays those returned to a referrer in a separate list.

Similarly to Prototype One, users did not express that they disliked much about Prototype Two, with some users again using "N/A" text in these fields. One flaw outlined by one participant was that it was not possible to add a patient for an MDT Assessment that had not been first admitted to an SBUHB hospital. While this is a legitimate issue and warrants further investigation, these prototypes were not designed for the purpose of adding new patients for referral. As such, we view this not so much as a failure of the prototype in question, but rather as an additional Home First requirement for further consideration.

5.3.2.3 Prototype Three

The final prototype was well received in terms of the Dashboard, with one user commenting:

> *I like the dashboard element that gives you an overview of how many referrals are at each stage.* (Prototype Three)

Much as with the previous two prototypes, some users entered "N/A" into the field that asked for comments about what they disliked. The only other negative feedback was another comment from a user about not being able to add new patients that had not first been admitted to an SBUHB hospital:

> *It doesn't allow you to add individuals that have been referred from hospitals outside of the locality such as Princess of Wales.* (Prototype Three)

Again, whilst this is a very real concern in terms of the Signal system's ability to meet the needs of the Home First team, we refer the reader to our statement on this under Prototype Two above.

Chapter 6

Discussion

Though we have already provided some discussion of the particular thematic findings in Chapter 5, we now ought to outline in more specific detail the significance of our findings more broadly in relation to the aims of our study. It is abundantly clear from the results obtained as part of this study that the Home First team hold a plethora of information as to where the Signal system falls short for their specific needs. Conversations with the users have been highly effective at drawing out previously unearthed problems, such as the challenges that a lack of system integration and system intelligence brings, and the long winded, highly manual processes that result from this. In addition to this, we have also uncovered where proposed solutions to problems still fail to recognise effectively the extent of the issue. For example, where Signal V3 attempts to remedy a lack of information in Signal V2 by adding a "Yes/No" column to an already information-heavy display. Given the crucial role that the Home First team play in moving patients out of ward-based hospital beds, this is particularly important for the study of patient flow.

With reference to the prototypes specifically, the general consensus was that users found having the additional ability to gauge the status of referrals in more detail a positive addition to the Signal system. What is less clear based on this feedback is the degree to which there are any noticeable points of difference for users beyond this. For example, as a collective, users displayed no clear allegiance to any of the prototypes in particular. We suggest that there is further work to be completed with regard to understanding the efficacy of the different designs. For example, further dialogue-driven ethnomethodological studies designed to elicit how the Home First team feel about each prototype design could prove useful. Moreover, quantitative approaches might also be useful here, such as those

employed by Horvitz et al [69, 83], as they may enable us to assess how users undertake the completion of tasks in a test environment. This would be particularly useful in relation to the speed and accuracy of task completion and it's impact on patient flow.

There were a few statements from the participants regarding what they disliked about the prototypes. It is, perhaps, encouraging that many of the participants chose to enter "N/A" when questioned as to what they disliked. It is also useful to note that, while we have considered some of the negative feedback as out of scope for our current purpose, for example creating the ability to add a new user, this demonstrates that the users are reflecting upon the study itself and it's implications for the way in which the Home First team work. By this we mean that just by having had in-depth conversations about their use of Signal, and by viewing and interacting with the prototypes, users are now thinking critically about what they see on the user interface and are considering how this might be reconfigured so as to serve them better as users. Just as Rodden and other researchers working on the COMIC project in the 90's suggested, our users did not come to our sessions stating outright that they wanted certain changes made [46]. Instead, the additional requirements of the team have became evident through a process of something like "co-realisation", as defined by Hartswood et al, with users seeking to consider their own needs while researchers adopt the role of what they would term "IT facilitator" [64].

Overall, the implications of this study are that the Home First team, and community care more generally, need further input into the Signal system's development process if we are to truly consider patient flow comprehensively. At the moment these users appear to have been considered as on the periphery of acute hospital services, and as such there has been a lack of time and investment into system improvement for these users. If we are to truly realise the benefits to patient care that have been outlined by Offord et al [32] and Haraden et al [18], then improving links between primary and secondary care is crucial. This will require a united effort from all concerned. It certainly requires more time and investment on the part of SBUHB and us as researchers seeking to improve patient flow, however, it also requires that the Home First team consider improvements to the Signal system as an essential part of how they might improve their own service delivery.

Chapter 7

Study Limitations and Reflections

It is worth highlighting at this stage that there were a number of limitations and challenges with regard to this study that we ought to document. Firstly, this work only considers the perspectives of the Home First team. Whilst, historically, this group of users have been less involved in the development of the Signal system despite being key users, this study does not consider any other groups of users, such as the ward-based staff who make referrals to the Home First team and thus initiate each patient's journey out of hospital. Focusing on this one group of users, whilst aiming to ensure that the system design is built around this very specific set of users, means that the Signal system has not necessarily been considered holistically.

Another key limitation of this study is that we are considering design in light of an already existing system. As an organisation Swansea Bay University Health Board have invested hundreds of thousands of pounds in the creation of Signal, alongside extensive investment in staff and resources to support this already existing system and infrastructure. With this in mind, it was simply not possible to think about design improvements that "start from scratch", as it were, as the practicality of implementing this would result in significant disruption and loss of their ongoing investment. Instead we had to consider this as an exercise in adaptation and augmentation, rather than a clean blank slate. As a result, the suggested prototypes therefore had to be designed with this in mind, with the interface attempting to stay as close the the existing Signal interface as possible, whilst still making changes beneficial for the Home First team to conduct their roles more easily.

In addition to this, our participant sample size was 5 participants, which might be considered rather small. While it was intended to keep sample sizes small to ensure that

it was possible to ensure the quality of the ethnographic data, we acknowledge that 5 participants is a smaller sample size than might perhaps have been ideal. This leads us to outline what was perhaps the most challenging issue of all. Namely, that NHS Wales, SBUHB, and the vast majority of staff engaged in the provision of primary, secondary and tertiary care within Wales are under unprecedented pressure, with demand for services at an exceptional high [92, 93, 94]. The ramifications of this were significant for this research, which was conducted over a limited period of 3 months. This had a number of large-scale implications which we shall outline below:

- **Participatory Design Workshops.**

  The original intention of this study was to hold a series of three in-person participatory design workshops. These workshops were intended to have between five and seven participants in each, and were designed to consider the perspectives of the home first team, clinical ward-based staff, and management staff, with each member group partaking in one workshop. This was intended to give a holistic picture of the patient discharge and home first process, such that prototypes could be created for each user group in light of the findings and to support patient flow across all aspects of Signal usage. As part of the workshop design, it was intended that members engage in co-design activities (such as creating their own graphical user interfaces using pens and paper) and that these designs would further inform the final prototype creation in Figma. Unfortunately, owing to the significant staff capacity constraints outlined earlier in this chapter, it was not possible to hold these workshops within the time frame. Despite these workshops not going ahead, they were extensively planned for and a copy of the workshop design materials can be found in Appendix C.

- **Fragmented and Online Engagement.**

  Engagement from Home First staff was limited, again owing to significant constraints on staff time. In most cases we had approximately one hour with participants, and in one case 30 minutes, due to an unscheduled emergency. Whilst significant progress was made in this small time frame to elicit needs and concerns of the participants, it is likely that this limited access to staff had a direct impact on the quality of the conversations and was not conducive to building rapport with the participants. This was further compounded by the online nature of some of the focus groups and interviews (3 of the 5 participants engaged online via Microsoft Teams).

This study comprises a small part of a wider project with Swansea Bay University Health Board which intends to look at patient flow more broadly over the course of the next three years. It is therefore anticipated that work to build further engagement from staff across the health and social care services offered in the SBUHB area will be ongoing and will be of key importance.

Chapter 8

Conclusions and Future Work

What is clear from the work we have so far undertaken is that Signal could further benefit from more features that help the Home First team to orient themselves within a demanding, fast paced, and crucial part of the patient flow process. The changes suggested and prototyped here centre around notification and awareness, as this was a key challenge raised by the Home First team during our discussions. Beyond this, what is also clear is that there are a number of other concerns around the current system that highlight the need for further investigation centred on making the system more intelligent, more dynamic, and better integrated with existing systems. We intend to undertake a great deal more work to consider all of these issues further over the next few years.

If we return to the words of Participant 2 outlined earlier, in order to move on from the conception of Home First being a "round peg in a square hole" (Participant 2, Focus Group 1), it is necessary to consider, at a fundamental level, how they undertake their work and how they fit within the wider healthcare delivery picture for SBUHB. For Signal to be of greater benefit to the Home First team, and thus to contribute to more streamlined patient discharge and flow, it is essential that further consideration of the needs of this team take place such that the they are no longer considered in this way, but rather are considered essential to the optimisation of patient flow processes and discharge. Writing in their introduction to a special issue on the topic of field-based studies in 2013, Crabtree et al highlight the need for HCI researchers to leave the lab and embed themselves more fully with their study subjects [95]. For the editors of this special issue, the pervasive nature of computing systems had meant that it was now no longer possible to simply pass through with the researcher as a tourist, of sorts. Instead, more time would frequently be

needed with our research subjects in order to better understand, design for, and improve computational systems. We therefore anticipate that further longitudinal ethnographic studies should take place to continue to build on the findings of this work. Further work to embed with and engage the Home First team, despite the ongoing staff capacity challenges, would enable us to further consider how Signal should be adapted to meet the needs of this team for the benefit of patients in the Swansea Bay area.

Bibliography

[1] H. Crisp, "Delivering a national approach to patient flow in wales," *Learning*, 2017.

[2] A. Rojas-García, S. Turner, E. Pizzo, E. Hudson, J. Thomas, and R. Raine, "Impact and experiences of delayed discharge: A mixed-studies systematic review," *Health Expectations*, vol. 21, no. 1, pp. 41–56, 2018.

[3] H. Tenhunen, P. Hirvonen, M. Linna, O. Halminen, and I. Hörhammer, "Intelligent patient flow management system at a primary healthcare center-the effect on service use and costs." in *EFMI-STC*, 2018, pp. 142–146.

[4] M. Foley, I. O'Neill, B. O'Neill, H. Humphreys, K. Burns, E. de Barra, and F. Fitzpatrick, "From bench to bedside–development of an integrated covid-19 patient flow management system," *Journal of Hospital Infection*, vol. 106, no. 1, pp. 211–213, 2020.

[5] R. L. Mehta, B. Baxendale, K. Roth, V. Caswell, I. Le Jeune, J. Hawkins, H. Zedan, and A. J. Avery, "Assessing the impact of the introduction of an electronic hospital discharge system on the completeness and timeliness of discharge communication: a before and after study," *BMC Health Services Research*, vol. 17, no. 1, pp. 1–10, 2017.

[6] A. Alami, "Why do information technology projects fail?" *Procedia Computer Science*, vol. 100, pp. 62–71, 2016.

[7] B. Tabrizi, E. Lam, K. Girard, and V. Irvin, "Digital transformation is not about technology," *Harvard business review*, vol. 13, no. March, pp. 1–6, 2019.

[8] J. Grudin, "Why cscw applications fail: problems in the design and evaluationof organizational interfaces," in *Proceedings of the 1988 ACM conference on Computer-supported cooperative work*, 1988, pp. 85–93.

[9] Swansea Bay University Health Board. [Online]. Available: https://sbuhb.nhs.wales/about-us/swansea-bay-uhb/

[10] D. A. Almajali, A. Tarhini *et al.*, "Antecedents of erp systems implementation success: a study on jordanian healthcare sector," *Journal of Enterprise Information Management*, 2016.

[11] A. Clarke, J. Adamson, L. Sheard, P. Cairns, I. Watt, and J. Wright, "Implementing electronic patient record systems (eprs) into england's acute, mental health and community care trusts: a mixed methods study," *BMC medical informatics and decision making*, vol. 15, no. 1, pp. 1–8, 2015.

[12] R. K. Kodali, G. Swamy, and B. Lakshmi, "An implementation of iot for healthcare," in *2015 IEEE Recent Advances in Intelligent Computational Systems (RAICS)*. IEEE, 2015, pp. 411–416.

[13] P. Rajković, D. Janković, and A. Milenković, "Developing and deploying medical information systems for serbian public healthcare: challenges, lessons learned and guidelines," *Computer Science and Information Systems*, vol. 10, no. 3, pp. 1429–1454, 2013.

[14] A. Al Owad, P. Samaranayake, A. Karim, and K. B. Ahsan, "An integrated lean methodology for improving patient flow in an emergency department–case study of a saudi arabian hospital," *Production Planning & Control*, vol. 29, no. 13, pp. 1058–1081, 2018.

[15] T. R. Hansen, J. E. Bardram, and M. Soegaard, "Moving out of the lab: Deploying pervasive technologies in a hospital," *IEEE Pervasive Computing*, vol. 5, no. 3, pp. 24–31, 2006.

[16] A. Takian, A. Sheikh, and N. Barber, "We are bitter, but we are better off: case study of the implementation of an electronic health record system into a mental health hospital in england," *BMC health services research*, vol. 12, no. 1, pp. 1–13, 2012.

[17] A. J. Abugabah and O. Alfarraj, "Issues to consider in designing health care information systems: a user-centred design approach," *electronic Journal of Health Informatics*, vol. 9, no. 1, p. 8, 2015.

[18] C. Haraden and R. Resar, "Patient flow in hospitals: understanding and controlling it better," *Frontiers of health services management*, vol. 20, no. 4, p. 3, 2004.

[19] R. Hall, "Patient flow," *AMC*, vol. 10, p. 12, 2013.

[20] L. H. Aiken, S. P. Clarke, D. M. Sloane, J. Sochalski, and J. H. Silber, "Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction," *Jama*, vol. 288, no. 16, pp. 1987–1993, 2002.

[21] S. Karakusevic, "Understanding patient flow in hospitals. nuffield trust. 11 oct 2016."

[22] M. Johnson, N. Burgess, and S. Sethi, "Temporal pacing of outcomes for improving patient flow: Design science research in a national health service hospital," *Journal of Operations Management*, vol. 66, no. 1-2, pp. 35–53, 2020.

[23] S. Villa, M. Barbieri, and F. Lega, "Restructuring patient flow logistics around patient care needs: implications and practicalities from three critical cases," *Health care management science*, vol. 12, no. 2, pp. 155–165, 2009.

[24] T. Coats and S. Michalis, "Mathematical modelling of patient flow through an accident and emergency department," *Emergency Medicine Journal*, vol. 18, no. 3, pp. 190–192, 2001.

[25] R. Konrad, K. DeSotto, A. Grocela, P. McAuley, J. Wang, J. Lyons, and M. Bruin, "Modeling the impact of changing patient flow processes in an emergency department: Insights from a computer simulation study," *Operations Research for Health Care*, vol. 2, no. 4, pp. 66–74, 2013.

[26] P. Bhattacharjee and P. K. Ray, "Patient flow modelling and performance analysis of healthcare delivery processes in hospitals: A review and reflections," *Computers & Industrial Engineering*, vol. 78, pp. 299–312, 2014.

[27] A. Arkun, W. M. Briggs, S. Patel, P. A. Datillo, J. Bove, and R. H. Birkhahn, "Emergency department crowding: factors influencing flow," *Western Journal of Emergency Medicine*, vol. 11, no. 1, p. 10, 2010.

[28] N. Vetter, "Inappropriately delayed discharge from hospital: What do we know?" *Bmj*, vol. 326, no. 7395, pp. 927–928, 2003.

[29] N. A. Office, "Discharging older patients from hospital," 2016.

[30] R. G. Fichman, R. Kohli, and R. Krishnan, "Editorial overview—the role of information systems in healthcare: current research and future trends," *Information systems research*, vol. 22, no. 3, pp. 419–428, 2011.

[31] R. Hutchings, "The impact of covid-19 on the use of digital technology in the nhs," *Nuffield Trust*, pp. 2020–08, 2020.

[32] N. Offord, P. Harriman, and T. Downes, "Discharge to assess: transforming the discharge process of frail older patients," *Future Hospital Journal*, vol. 4, no. 1, p. 30, 2017.

[33] Welsh Government, "A healthier wales: our plan for health and social care," 2018, https://gov.wales/sites/default/files/publications/2019-10/a-healthier-wales-action-plan.pdf.

[34] NHS Wales Delivery Unit, "Delivering home first. hospital to home community of practice: key learning and practice examples," 2021, https://gov.wales/sites/default/files/publications/2021-08/hospital-to-home-community-of-practice-key-learning-and-practice-examples.pdf.

[35] NHS England, "Monthly delayed transfer of care situation reports: Definitions and guidance," 2006, https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2015/10/mnth-Sitreps-def-dtoc-v1.09.pdf.

[36] L. A. Suchman, "Office procedure as practical action: models of work and system design," *ACM Transactions on Information Systems (TOIS)*, vol. 1, no. 4, pp. 320–328, 1983.

[37] L. J. Bannon and K. Schmidt, "Cscw: Four characters in search of a context," in *ECSCW 1989: Proceedings of the First European Conference on Computer Supported Cooperative Work*. Computer Sciences Company, London, 1989.

[38] P. M. Cashman and I. Greif, "Workshop on computer-supported cooperative work," 1984.

[39] S. Passi and S. J. Jackson, "Trust in data science: Collaboration, translation, and accountability in corporate data science projects," *Proceedings of the ACM on Human-Computer Interaction*, vol. 2, no. CSCW, pp. 1–28, 2018.

[40] S. Chancellor, E. P. Baumer, and M. De Choudhury, "Who is the" human" in human-centered machine learning: The case of predicting mental health from social media," *Proceedings of the ACM on Human-Computer Interaction*, vol. 3, no. CSCW, pp. 1–32, 2019.

[41] R. N. Brewer, L. Findlater, J. Kaye, W. Lasecki, C. Munteanu, and A. Weber, "Accessible voice interfaces," in *Companion of the 2018 ACM Conference on Computer Supported Cooperative Work and Social Computing*, 2018, pp. 441–446.

[42] J. Cambre and C. Kulkarni, "One voice fits all? social implications and research challenges of designing voices for smart devices," *Proceedings of the ACM on human-computer interaction*, vol. 3, no. CSCW, pp. 1–19, 2019.

[43] N. McDonald, S. Schoenebeck, and A. Forte, "Reliability and inter-rater reliability in qualitative research: Norms and guidelines for cscw and hci practice," *Proceedings of the ACM on human-computer interaction*, vol. 3, no. CSCW, pp. 1–23, 2019.

[44] C. Fiesler, J. R. Brubaker, A. Forte, S. Guha, N. McDonald, and M. Muller, "Qualitative methods for cscw: Challenges and opportunities," in *Conference companion publication of the 2019 on computer supported cooperative work and social computing*, 2019, pp. 455–460.

[45] K. Schmidt and L. Bannon, "Taking cscw seriously," *Computer Supported Cooperative Work (CSCW)*, vol. 1, no. 1, pp. 7–40, 1992.

[46] T. Rodden, L. Bannon, and K. Kuutti, "The comic research project on cscw," in *Conference Companion on Human Factors in Computing Systems*, 1994, pp. 171–172.

[47] L. Bannon, J. Bowers, P. Carstensen, J. Hughes, K. Kuutti, J. Pycock, T. Rodden, K. Schmidt, D. Shapiro, W. Sharrock, and S. Viller, *Informing CSCW system requirements*, ser. COMIC-D-2.1. Lancaster University, 1994.

[48] J. Grudin, "Computer-supported cooperative work: History and focus," *Computer*, vol. 27, no. 5, pp. 19–26, 1994.

[49] W. Pratt, M. C. Reddy, D. W. McDonald, P. Tarczy-Hornoch, and J. H. Gennari, "Incorporating ideas from computer-supported cooperative work," *Journal of biomedical informatics*, vol. 37, no. 2, pp. 128–137, 2004.

[50] G. Fitzpatrick and G. Ellingsen, "A Review of 25 Years of CSCW Research in Healthcare: Contributions, Challenges and Future Agendas," *Computer Supported Cooperative Work (CSCW)*, vol. 22, no. 4, pp. 609–665, Aug. 2013. [Online]. Available: https://doi.org/10.1007/s10606-012-9168-0

[51] H. Garfinkel, *Studies in Ethnomethodology*. Prentice Hall, 1967.

[52] A. Coulon, *Ethnomethodology*. Sage, 1995, vol. 36.

[53] G. Button, *Ethnomethodology and the human sciences*. Cambridge University Press, 1991.

[54] A. W. Rawls, "Harold garfinkel, ethnomethodology and workplace studies," *Organization studies*, vol. 29, no. 5, pp. 701–732, 2008.

[55] P. Dourish and G. Button, "On" technomethodology": Foundational relationships between ethnomethodology and system design," *Human-computer interaction*, vol. 13, no. 4, pp. 395–432, 1998.

[56] S. Eriksén, "Designing for accountability," in *Proceedings of the second Nordic conference on Human-computer interaction*, 2002, pp. 177–186.

[57] T. Clemmensen, "A human work interaction design (hwid) case study in e-government and public information systems," *International Journal of Public Information Systems*, vol. 7, no. 3, 2011.

[58] P. Gillingham, "The development of electronic information systems for the future: Practitioners,'embodied structures' and 'technologies-in-practice'," *British Journal of Social Work*, vol. 43, no. 3, pp. 430–445, 2013.

[59] R. Srinivasan, "Ethnomethodological architectures: Information systems driven by cultural and community visions," *Journal of the American Society for Information Science and Technology*, vol. 58, no. 5, pp. 723–733, 2007.

[60] P. t. Have, "Medical ethnomethodology: An overview," *Human studies*, vol. 18, no. 2, pp. 245–261, 1995.

[61] M. Dowling, "Ethnomethodology: Time for a revisit? a discussion paper," *International journal of nursing studies*, vol. 44, no. 5, pp. 826–833, 2007.

[62] J. M. Newton, A. Henderson, B. Jolly, and J. Greaves, "A contemporary examination of workplace learning culture: an ethnomethodology study," *Nurse Education Today*, vol. 35, no. 1, pp. 91–96, 2015.

[63] E. Willis, "The making of expert patients: the role of online health communities in arthritis self-management," *Journal of health psychology*, vol. 19, no. 12, pp. 1613–1625, 2014.

[64] M. Hartswood, R. N. Procter, P. Rouchy, M. Rouncefield, R. Slack, and A. Voss, "Working it out in medical practice: It systems design and development as co-realisation," *Methods of Information in Medicine*, vol. 42, no. 04, pp. 392–397, 2003.

[65] J. E. Bardram, T. R. Hansen, and M. Soegaard, "AwareMedia: a shared interactive display supporting social, temporal, and spatial awareness in surgery," in *Proceedings of the 2006 20th anniversary conference on Computer supported cooperative work*, ser. CSCW '06. New York, NY, USA: Association for Computing Machinery, Nov. 2006, pp. 109–118. [Online]. Available: https://doi.org/10.1145/1180875.1180892

[66] J. Tenenberg, W.-M. Roth, and D. Socha, "From i-awareness to we-awareness in cscw," *Computer Supported Cooperative Work (CSCW)*, vol. 25, no. 4, pp. 235–278, 2016.

[67] L. E. Stallman, "Recent investigations of user interface improvements for a military wearable computer system," *Usability Evaluation and Interface Design: Cognitive Engineering, Intelligent Agents, and Virtual Reality*, vol. 1, p. 101, 2001.

[68] B. Shneiderman and B. B. Bederson, "Maintaining concentration to achieve task completion," in *Proceedings of the 2005 conference on Designing for User eXperience*, 2005, pp. 9–es.

[69] E. C. M. C. E. Horvitz, "Notification, disruption, and memory: Effects of messaging interruptions on memory and performance," in *Human-Computer Interaction: INTERACT*, vol. 1, 2001, p. 263.

[70] M. Czerwinski, E. Cutrell, and E. Horvitz, "Instant messaging and interruption: Influence of task type on performance," in *OZCHI 2000 conference proceedings*, vol. 356. Citeseer, 2000, pp. 361–367.

[71] M. Klauck, Y. Sugano, and A. Bulling, "Noticeable or distractive? a design space for gaze-contingent user interface notifications," in *Proceedings of the 2017 CHI conference extended abstracts on human factors in computing systems*, 2017, pp. 1779–1786.

[72] D. Tasse, A. Ankolekar, and J. Hailpern, "Getting users' attention in web apps in likable, minimally annoying ways," in *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, 2016, pp. 3324–3334.

[73] K. Raworth, C. Sweetman, S. Narayan, J. Rowlands, and A. Hopkins, *Conducting semi-structured Interviews*. Oxfam, 2012.

[74] Z. Hussain, W. Slany, and A. Holzinger, "Investigating agile user-centered design in practice: A grounded theory perspective," in *Symposium of the Austrian HCI and Usability Engineering Group*. Springer, 2009, pp. 279–289.

[75] A. Tutia, K. Baljon, L. Vu, and D. K. Rosner, "Hci and menopause: Designing with and around the aging body," in *Extended abstracts of the 2019 CHI conference on human factors in computing systems*, 2019, pp. 1–8.

[76] N. Cowan, "The magical mystery four: How is working memory capacity limited, and why?" *Current directions in psychological science*, vol. 19, no. 1, pp. 51–57, 2010.

[77] Figma. You're in good company. [Online]. Available: https://www.figma.com/customers/

[78] J. W. Satzinger and L. Olfman, "User interface consistency across end-user applications: the effects on mental models," *Journal of Management Information Systems*, vol. 14, no. 4, pp. 167–193, 1998.

[79] P. Langdon, T. Lewis, and J. Clarkson, "The effects of prior experience on the use of consumer products," *Universal access in the Information Society*, vol. 6, no. 2, pp. 179–191, 2007.

[80] C. G. Healey, K. S. Booth, and J. T. Enns, "Visualizing real-time multivariate data using preattentive processing," *ACM Transactions on Modeling and Computer Simulation (TOMACS)*, vol. 5, no. 3, pp. 190–221, 1995.

[81] J. Johnson, "Chapter 6—our peripheral vision is poor," *Designing with the Mind in Mind; Johnson, J., Ed.; Morgan Kaufmann: Boston, MA, USA*, pp. 65–77, 2010.

[82] S. T. Iqbal, X. S. Zheng, and B. P. Bailey, "Task-evoked pupillary response to mental workload in human-computer interaction," in *CHI'04 extended abstracts on Human factors in computing systems*, 2004, pp. 1477–1480.

[83] E. B. Cutrell, M. Czerwinski, and E. Horvitz, "Effects of instant messaging interruptions on computing tasks," in *CHI'00 extended abstracts on Human factors in computing systems*, 2000, pp. 99–100.

[84] J. Wagemans, J. H. Elder, M. Kubovy, S. E. Palmer, M. A. Peterson, M. Singh, and R. von der Heydt, "A century of gestalt psychology in visual perception: I. perceptual grouping and figure–ground organization." *Psychological bulletin*, vol. 138, no. 6, p. 1172, 2012.

[85] J. Wagemans, J. Feldman, S. Gepshtein, R. Kimchi, J. R. Pomerantz, P. A. Van der Helm, and C. Van Leeuwen, "A century of gestalt psychology in visual perception: Ii. conceptual and theoretical foundations." *Psychological bulletin*, vol. 138, no. 6, p. 1218, 2012.

[86] S. Guberman, "Gestalt theory rearranged: Back to wertheimer," *Frontiers in psychology*, vol. 8, p. 1782, 2017.

[87] C. Ware, *Information visualization: perception for design*. Morgan Kaufmann, 2019.

[88] D. Chang, L. Dooley, and J. E. Tuovinen, "Gestalt theory in visual screen design—a new look at an old subject," 2002.

[89] R. Fraher and J. Boyd-Brent, "Gestalt theory, engagement and interaction," in *CHI'10 Extended Abstracts on Human Factors in Computing Systems*, 2010, pp. 3211–3216.

[90] B. J. Jansen, "The graphical user interface," *ACM SIGCHI Bulletin*, vol. 30, no. 2, pp. 22–26, 1998.

[91] B. Shneiderman, "The eyes have it: A task by data type taxonomy for," in *Proceedings of IEEE Symposium on Visual Languages*, vol. 96.

[92] Social Care Wales. (2022) A healthier wales: a workforce strategy for health and social care, delivery plan 2022 to 2023. [Online]. Available: https://socialcare.wales/about-us/a-healthier-wales-workforce-strategy-delivery-plan-2022-23#section-42226-anchor

[93] Welsh Government. (2022) Nhs activity and performance summary: June and july 2022. [Online]. Available: https://gov.wales/nhs-activity-and-performance-summary-june-and-july-2022-html

[94] NHS Confederation. (2022) Summer has been more challenging than any winter, say nhs leaders. [Online]. Available: https://www.nhsconfed.org/news/summer-has-been-more-challenging-any-winter-say-nhs-leaders

[95] A. Crabtree, A. Chamberlain, R. E. Grinter, M. Jones, T. Rodden, and Y. Rogers, "Introduction to the special issue of "the turn to the wild"," pp. 1–4, 2013.

Appendix A

Transcripts

A.1 Focus Group One

INTERVIEWER: I wonder if you could just go through for me the different roles that make up the home first team, because I just know you as the home first team.
PARTICIPANT 1: We don't know them.
PARTICIPANT 2: We don't know them, that's the thing.
PARTICIPANT 1: Because, obviously, there are elements of the Home First team that we are not involved with. [P2] might know a few of them as they are involved with...
PARTICIPANT 2: And they'd be different, wouldn't they, between Neath Port Talbot and Swansea. INTERVIEWER: Is this just a difference in job titles or is it...
PARTICIPANT 1: Structure
PARTICIPANT 2: Structure
PARTICIPANT 1: So you might want to get structures from each of the home first teams, because they will have structures sitting beneath the managers of who is doing what and the different roles and responsibilities. So that could be a good starting point for you as well really about understanding the complexities.
INTERVIEWER: So that's kind of what I was hoping to do...
PARTICIPANT 2: Yeah
PARTICIPANT 1: Yeah, I think it would be a job to jot down what everybody says, you still haven't got a structure, visually. You've still got words on paper. So I think you need to, maybe, get some confirmed structures of how they are.
INTERVIEWER: Do you know who would be best for that?

PARTICIPANT 2: [Name] for Swansea, and [Name] for Neath Port Talbot, [Name] is going to be leaving in a fortnight, isn't she so...
PARTICIPANT 1: You need to, yeah, because they probably won't back fill her role for a number of weeks, so again if you want something really quick.
INTERVIEWER: That's the structure, but if you had to sum it up more broadly in to the types of people.
PARTICIPANT 2: Social workers, therapy, so they have a number of pathways... and dependent on... then it increases the level of intensity, so 0 is a very preventative approach, you know, signposting to third sector organisations. It could be rehab, it could be social work
PARTICIPANT 1: And all of those are defined anyway in this sort of spec document, so I think you need to get your hands on a spec document.
INTERVIEWER: So this is what [Name] sent me, which shows pathways 1-4 and then obviously what they different respective pathways are.
PARTICIPANT 1: So you got the list of the teams there [inaudible] Neath, Swansea, you've got the list of the therapy teams there. Social workers, DLNS, OPAS, ICOP.
PARTICIPANT 2: So older persons assessment...
INTERVIEWER: Yeah, see I don't know what any of those acronyms mean, so if we could clarify those.
PARTICIPANT 1: So pathway 0 is third sector which is the CVSs, isn't it, Swansea, Neath Port Talbot.
INTERVIEWER: What does CVS mean?
PARTICIPANT 1: Voluntary sector
INTERVIEWER: So Pathway 0 is CVS voluntary.
PARTICIPANT 1: Yeah so it's Swansea, Neath Port Talbot, there's one in Swansea, one in Neath Port Talbot.
PARTICIPANT 2: So dependent on where the person resides when they are discharged, the ward, or would be hospital social worker team I guess, signpost
PARTICIPANT 1: Probably to highlight is that they might have slightly different...
PARTICIPANT 2: Services
PARTICIPANT 1: Yeah, on offer but also the flow and process might be slightly different depending on which organisation you go to.
INTERVIEWER: Okay so that's Pathway 0, and then we've got Pathway 1, and is that sort of is that person fit to be admitted?

PARTICIPANT 2: So this is still trying to prevent, isn't it? Is this person fit, to an ax, what's an ax?
PARTICIPANT 1: Don't know what an ax is, MDT at the hospital front door, yeah so again, to avoid full admission.
PARTICIPANT 2: They could be seen by AE, for instance, and rather than them being admitted to a ward, they could be discharged with a level of support.
INTERVIEWER: So it would be, say for example, someone turns up at the front door, as it is, and then, so the MDT assessment is that done in real time, because that assessment would be a referral through Signal, yes?
PARTICIPANT 2: It would, yes, because you are discharging them from wherever they are as in
PARTICIPANT 1: Out in to..
PARTICIPANT 2: Back out. . . .at this moment in time I don't think pathway 0s and 1s are on Signal, but in version 3 they will be.
INTERVIEWER: So going forward that's going to be the way that it works. So AE would discharge them. . .
PARTICIPANT 2: So they'd say that involvement needs to happen from. . .
PARTICIPANT 1: It's a drop into a little box really, isn't it, and that little box not going in to. . . going home. . . or going on to a ward or something else, it's about the bits in between, sort of going in to the third sector avenue and the next sort of obvious channel they would fit in to. . . ummm. . . .so again looks like its an assessment process which they have gotta hit the right notes.
PARTICIPANT 2: So on the system they have an MDT assessment, so it could be made up of the therapy team, they could assign it to. . . to say that they need to be involved. I'm not sure what ICOP is, but OPAS is the Older Persons Assessment Service. DLNs and Social Workers, so we know what those are, district nurses, and then underneath, this one is a big one, referrals on to teams with the community who could support a safe discharge from the emergency department. That is ACT, the Acute Clinical Team. So they sit, the Acute Clinical Team, almost have a foot in each camp. They're acute but their aim is to prevent as well so along certain pathways they could go in and they could. . . .so instead of them being on the ward for monitoring, the acute clinical team could monitor them within their own home by popping in. So that would be, you know, they'd be made up of district nurses as well.

PARTICIPANT 1: So that's the next step to stop them going in to a fully committed environment.
INTERVIEWER: That helps with a lot of my questions because a lot of my questions were about, sort of, at what point.
PARTICIPANT 1: Do people get involved?
INTERVIEWER: And it seems that it is at any point really because really depends on the pathway that that person is given.
PARTICIPANT 1: Yeah
PARTICIPANT 2: Yep
INTERVIEWER: So pathway 1 is to prevent admission...
PARTICIPANT 2: And I suppose rather than the Home First team, it's rather the Home First program isn't it? Because even the pathway 0s it's making sure that they are signposted to the correct level of support.
PARTICIPANT 1: I don't think that there's a Home First team, as such, it's a program of events.
PARTICIPANT 2: So we've got a hospital social work team, I think that they are going to be renamed in the near future to the Home First team, just you know, for clarity, but dependent upon, cos there could be our CRS therapy would be involved so it's not the team as such doing the do it's more getting the right people involved. INTERVIEWER: I think team implies that maybe there's a bit more cohesion than I am seeing that there is. There are lots of cogs going on and...
PARTICIPANT 1: I think there's a danger in sort of, um, classifying things as specific bits of stuff, it's about looking at it from the wider perspective, isn't it, which is the wider team, not just about specific individuals, cos then you do class them as a team when they are not specifically a team, they are a group of support networks that come together to make sure that pathway 0, pathway 1, 2, 3, 4 etc., have the right level of capability to do the right thing for that particular individual.
INTERVIEWER: Okay, so pathway 1 is to prevent admission and that's done at the point of maybe someone turning up in the emergency department, would it, um, only be at that point, or would someone get put on pathway 1 even before they have been to a hospital?
PARTICIPANT 2: It could be, it doesn't have to be from the emergency department, a GP could be getting involved.
INTERVIEWER: So it's at any point prior to admission to a ward?

PARTICIPANT 2: Yeah
PARTICIPANT 1: Yeah, I think anybody in the NHS framework that could potentially be stopped or helped going in to one or the other different pathways. The thing is they might go from pathway 1 back to pathway 0 because that's the best route for them. So it's not a case of keep them in pathway 1 and leave them in pathway 1, or whatever, it's about making sure that there is a flex between them all really.
INTERVIEWER: So if you did need to change pathways, does that get handled through Signal?
PARTICIPANT 2: So there are three options on Signal, so the ward will refer to [Name] and [Name]'s teams to manage, depending on Swansea or Neath Port Talbot. So the ward will refer with their pathway. Then they'll complete an MDT and choose their pathway. Then on discharge from that discharge support at the very end you are asked to confirm what they left as. So at three points within quite a short space of time, because for rapid discharge what is it, 42 hours?
PARTICIPANT 1: 42 hours...
PARTICIPANT 2: 48 hours?
PARTICIPANT 1: About two days roughly, isn't it, yeah.
PARTICIPANT 2: So they could have three different pathways within 48 hours. INTERVIEWER: Do you ever find that... I am aware that I am talking to you and, maybe, you don't encounter this first hand, but do you ever find that people forget or fail to update things?
PARTICIPANT 2: I don't think the system has been as up-to-date, historically, as it could have been, because we have had problems with data and, as a result of that, I know the Swansea team now have a daily triage at 3pm where they check everything to make sure it's all up-to-date.
INTERVIEWER: And this is from the home first perspective?
PARTICIPANT 2: From [Name]'s perspective to make sure that, 'right, is anyone waiting for anything? What's going on with everything? You know that kind of daily handover just to make sure that nothing is missed.
P21 It's this human error, human intervention really at the very start, and I know from a data background that any data that's missing is because it's not been put in by something or somebody, so there's either an automated process where it's barcoded or whatever, or it's a human to actually put the stuff in. So if there are gaps...
PARTICIPANT 2: And there are...

PARTICIPANT 1: And there's gonna be gaps because you are asking people to do something as part of their daily routine, which even though it could be embedded, and they could be factored in, they could miss it because of other factors or other reasons. And the triage bit that [P2] is on about that the teams do, is an avoidable process perhaps, if everybody did it right at the start, so what we are doing is building in something that is a sticking plaster, really, to a more fundamental process, around perhaps training and awareness, and being cited on the right thing, making it easier for people to put the data in in the first instance.
INTERVIEWER: So beyond making the interfaces better, is part of the issue the embedding of these systems within large organisations?
PARTICIPANT 2: Yes
PARTICIPANT 1: Yes
INTERVIEWER: Because I know, for example, that when version 3 of Signal goes live, there's a plan to have lots of support around using the system.
PARTICIPANT 2: But are people going to engage in that support? Are they going to engage?
PARTICIPANT 1: I think you've got to get to the real level of the problem, and you only get that by asking the questions about why? Why isn't it done, you know why, why, why? And it comes down to the people at the sharp end who are absolutely inputting the data and why aren't they doing it. And until you understand why, they system isn't going to be what it should be and can be, so you need to go back to that sort of fundamental questions, to say 'why aren't you doing it then? Is there something that is stopping you from doing it? Why is it stopping you from doing it?' because you've got to understand the reasons behind. It's the training is part of the problem but again, if they are at the sharp end, nurses, or whoever they are, putting data in, then are they the right people to do that? Or does it need to be given to somebody specific with the generalist nature that can go round and update records on a regular basis and at the same time.
PARTICIPANT 2: On behalf of, and that can say 'right we need this, this, this, and this, referred'.
PARTICIPANT 1: Yeah. . . yeah. So it's looking at the process from the really lowest level and say building that in.
PARTICIPANT 2: And that's a really good comment actually, to be honest. Because, for example, in terms of the ward fill in the referral and at the very end they've got to complete a tick box to say 'referral complete. Check'. And only then once that check

box is complete, does it show up for the home first team for them to action. Without them checking that check box, it sits like...
PARTICIPANT 1: in the ether...
PARTICIPANT 2: in the ether, yeah.
INTERVIEWER: So if, for example, a nurse, you know, they might fill it in, but until they have ticked that box...
PARTICIPANT 2: But while filling it in they may get 'oooh okay...'... pulled away.
PARTICIPANT 1: Pulled away. So should it be their responsibility... I'm just posing the questions, really, saying should it be their responsibility to update the system where they are there as clinically proven people to care for the ward and whoever is in that ward. They are not administrators, as such, so could there be a question about that process from the very start.
INTERVIEWER: It does pose a much wider question. Hospitals not only have very specialist needs because the systems have to be specialist because, you know, you can't just take a piece of software off the shelf, you couldn't just have Microsoft Teams because Microsoft didn't consider hospitals. So there's a need for very specialist development work and systems, but that that has to be married up against the fact that these are people working on the front-line in fast moving environments.
PARTICIPANT 2: Yeah
PARTICIPANT 1: Yeah, but also bought in to that there's a thinking that what we do is we build the systems first without building in the right data that is required. So we build the systems and then think about the data, what we are not doing, really, is looking at it from the rawest possible level of interaction and saying 'right, what is it that we need? What are the basics that we absolutely need to collect?' and build the system based on what we need as opposed to what the system can give us. So again, you are flipping it on its head.
INTERVIEWER: Okay, so if we just get back to this, so Pathway 2, just while I familiarise myself with the pathways...
PARTICIPANT 2: So they've had their treatment, they're sorted, they've been stitched up or they've got a water infection and they have had all of their anti-biotics and they're a bit more coherent, they can go home, not concerned about them anymore. So the rapid discharge referral is made via Signal for reablement package of care. So the social worker can support with the mental capacity to see if they have the mental capacity to make...
PARTICIPANT 1: Decisions, isn't it.

PARTICIPANT 2: So as soon as we've said, 'right they can go home with a package of care', can go quickly then to either Swansea or Neath and go, right, rapid discharge. So they can go now the Swansea team, Neath team can sort out all of the necessary things that need...
PARTICIPANT 1: Yeah, the number of calls per day, the adaptations, anything else that needs to go in to that package of care. It could be something quite simple, something could be more difficult, more time consuming but building in the time element to this could be useful because we haven't got the time elements... because if it goes from the assessment process to the triage team, how long does that take? Is that 2 days, 3 days, 5 days, 10? It all builds up in to the flow of patients going out of the hospital.
INTERVIEWER: Yeah, because this was going to be my next question... so we know that, in order to make a referral through Signal so as you can actually see it at your end the 'Home First' views, obviously the box has to be ticked and then it comes through and it's obviously on their dashboard then they have oversight over it then, so how long roughly does it take to process?
PARTICIPANT 1: Including that sort of triage bit you need bits in there to say how complex or how simple the case is. Because if you have something in there, that is to say, it's a simple one and done, you can account for the simple one and dones and say, right, why are they still in there then? You could also have the more complex, um, criteria then to say well this is more complex because it needs adaptation, needs this and that, as part of your view and your dashboard and your management information you should have to hand, and to make decisions on. And you can say, right, we understand why it's not been done yet because we've got adaptations. So you've got a holistic view or what that's about. I haven't seen any reports to be honest, and I don't know what's involved in that sort of triage bit, but you would expect to see certain bits of evidence in there in order to form that sort of, erm, 'what do we do next?' bit.
INTERVIEWER: The only thing I have seen is the flow which says that it shows on the dashboard with which assessment is made, so it can either be accepted, rejected, or placed on hold.
PARTICIPANT 2: For version 3, yeah.
INTERVIEWER: And obviously that, if it's on hold...
PARTICIPANT 1: But why is it on hold? That's what I am asking.
PARTICIPANT 2: So there are specific reasons, so you can only put it on hold if, so the patient isn't clinically optimised yet. So the ward have put through the referral but

Mrs Jones has now had a fall and she needs to stay in hospital and so right, we need to put her on hold because we can only take, so for each hospital stay, limitation, well for some it's a limitation but then it saves duplicate referrals, is that for one particular hospital stay you can only go through the Signal system once, so if I put a referral on for Mrs Jones and then we closed it. We couldn't put another referral on, she couldn't come through this pathway again.
PARTICIPANT 1: So we have built the system, not around the patient, we built around a process. Which is the wrong way around.
PARTICIPANT 2: Yes.
PARTICIPANT 1: So we need to review the process because we are not dealing with a person, we are dealing with a process, which is, to me, flawed.
PARTICIPANT 2: Yeah. It is. It is. But I suppose the history around Signal is that it wasn't built for Home First and the community, it was built for something else and the people in wards, that move around different wards, operate very differently to the way they operate in the community. So there's a round peg in a square hole. INTERVIEWER: So is it that it has been expanded so as to include referrals to Home First but there are things missing?
PARTICIPANT 2: Yeah, with community it is far more flexible and broad, whereas moving from one ward to another, you know in patient services it's quite standard and straightforward.
PARTICIPANT 1: But then again if we are looking at patient-centred approach and patient-centred records, we should be building the data capture around the person, not around individual processes, which is why it's sort of disconnected at the moment.
INTERVIEWER: So that flow, they show on the view, and you might then make an assessment that that's accepted, for example, as a referral, but then obviously the next day, before someone has managed to come out of hospital, they have then had a fall. So is there a way, once it's been accepted, can you put it then on hold after? PARTICIPANT 2: You can't put it on hold, what you can do is delay the discharge. So there's two different things, you're not ready to fully assess and say what they need as a pathway because they're not clinically optimised, but then once you'd done the MDT assessment and you are waiting for them to discharge, you could delay the discharge for awaiting the equipment or awaiting staff member or, I dunno, their daughter to be available to pick her up from hospital, or whatever.
PARTICIPANT 1: So are those pick lists available to choose from and report on?

PARTICIPANT 2: They are.
INTERVIEWER: We know what's going to go live with version 3 but then obviously it's whether people... because I think with any system you end up... workflow systems, obviously we are talking about patient flow specifically, but whenever you have any system where people are relying on it for data and something is moving through a process, you miss...
PARTICIPANT 1: Well we need to put the times in there to measure the timings through the system as well because obviously some people are going to be delayed longer or shorter and so do we need to understand what those different things are and then we can analyse if people are in certain parts and still in process, we can then analyse what can we do to make it better and take that element of delay out. And improve the flow, improve the system, that's the idea of data isn't it? We can't just sit on data and be like, well, we've got delays, it's how do you then improve?
INTERVIEWER: So I am getting the impression from you that it's been designed for wards because that's the acute need and then, how do we get these people out of hospital, and how do we get them home and how do we give the care that they need, and everyone is going to be different. So the stuff that surrounds the acute care has been less considered?
PARTICIPANT 1: It hasn't been captured in the original design of Signal.
PARTICIPANT 2: It wasn't in the original spec.
PARTICIPANT 1: It's a bolt on, isn't it, and the trouble with bolt ons is that they are good for certain things but not fit for purpose for what you need it for. There's no point in creating two systems to do the same thing, so maybe, I dunno who develops Signal but...
PARTICIPANT 2: The Health Board.
INTERVIEWER: It's internal.
PARTICIPANT 1: It's internal, yeah. So there could be a way of making it more, sort of, intelligent. Capturing the right things.
PARTICIPANT 2: There's definite gaps in terms of the community services but it's not a criticism of the system, it's more about the specification. It wasn't built and designed for that so, it's like, we do have two systems, we have an Excel spreadsheet and Signal because any patient that gets discharged from Velindre [Cancer Centre] or Princess of Wales [Hospital], so they've gone to a different hospital for some, you know, significant treatment and have to come back to their home environment, they can't come in via Signal because, it's only our locality.

INTERVIEWER: Is that a frequent occurrence?
PARTICIPANT 2: About 8 a month, for Neath Port Talbot.
INTERVIEWER: So there's no way currently to handle people that are coming from what we would consider not SBUHB?
PARTICIPANT 1: Signal is permissions-based though, isn't it?
PARTICIPANT 2: Well, I don't know. I think it is permissions-based but I don't think we are allowed to input, only the ward are allowed to input the referrals off then, because it then moves them off their Signal and on to ours, whereas, [non-SBUHB patients], are not on anyone's Signal so for us to put them on Signal, it would have to be brand new.
INTERVIEWER: So they'd have to be put on through an SBUHB word first?
PARTICIPANT 2: But that functionality would need to be built in for community services because it could be that you know, I've got my parents visiting me for the weekend, or whatever, and they live in, I don't know, Ceredigion. So they're known down there but they've come to visit me for the weekend in Swansea and have had a fall. They've ended up in [SBUHB's] Emergency Department and need something, so it's...
PARTICIPANT 1: Yes, it needs a bit of thinking about. Going back to the starting point, really, again, isn't it? About who do you record, yeah, as well. It's not about how do you record, it's about who you record and if they are staying in hospital and being discharged to a different part of the country, how is that managed?
PARTICIPANT 2: How is that transition, yeah. But they could be coming to me, they could be in hospital in Ceredigion. And we could be there, thinking 'I'm not happy wait my mother going home to her own house, I want her to come and live with me in Swansea Bay for 6 weeks so that she is properly rehabilitated and I can make sure that she is safe'.
PARTICIPANT 1: Would she then go through which pathway though?
PARTICIPANT 2: She would probably go through, either 1 or 2 because I may still need, um, a package of care for her. Much reduced.
PARTICIPANT 1: But is it allowable for her to go through the pathways in this university health board?
INTERVIEWER: Oh...I don't know.
PARTICIPANT 1: Well that's the question, because obviously if we assess them with our own triage team, social workers, etc, in this locality and they've got different care in the, down in Ceredigion, how do you marry the two? You can't.

PARTICIPANT 2: I mean some boundaries could be closer, maybe I chose a bit too far way, it could be Hendy...
INTERVIEWER: But the principle is the same isn't it?
PARTICIPANT 1: The principle is the same. It's about how do you marry up the different pathways and their care, we can't. Because we have different, disparate, systems which don't interact or talk to each other, which is the biggest flaw, really, isn't it, with a lot of this stuff, um, to manage the person through the journey. This is all about the process, the system, which is driving the process, which is driving the journey which isn't as patient-centred.
PARTICIPANT 2: Yeah but that's where we've had lots of examples of, you know, patients going through pathway 2, um, and then they have gone 'oh hang on, they'd gone to stay with their daughter-in-law'. Where does she live? Hendy. But they've done a lot of work in readiness for that discharge and it.
PARTICIPANT 1: And it falls thin I think. So maybe at the starting point the home address of the person needs to be drawn out earlier in the process as well. So again, you're looking at flow and process and the critical information needed to assess what is it you need to assess and, again, if they are in Hendy or Ceredigion, then do you send them on the journey and waste that effort and time, you know, with all the involvement of all the different perspectives in that journey for it to come to nothing at the end. You've just taken it away from someone who does need the journal and can do it quicker. I'm just throwing up some challenges.
INTERVIEWER: That's great. Because I want to know what the problems are because, um, systems can help people to do their work but, you know, we have to understand where, especially if you are looking at something of this scale, there are inevitably going to be things that weren't considered and patient journeys and pathways that are very real, but they don't fit within the system as it stands.
PARTICIPANT 1: But that's the point though, we are making it fit the workflow. Not looking at it from the right perspective.
INTERVIEWER: Okay so a patient comes in and they're, perhaps, on holiday in the Bay area. So they get admitted here but they need to be discharged and they would be discharged to, I don't know, another place, England or wherever, could be anywhere. How would that currently be handled?
PARTICIPANT 1: It's not.
INTERVIEWER: It would just stop?

PARTICIPANT 2: I don't know in terms of the Home First pathway. [Name] and [Name] are best to answer.
PARTICIPANT 1: But I am guessing, if they've got to be discharged to their home environment, there would have to be conversations with the home environment, and again, in terms or timescale, how would that feature in the timescales if it happens. If it doesn't happen, then you go back to the original part of it and say 'where are they from?'. Obviously we can treat them to a certain point in in AE and they can be admitted to hospital to make sure that they are safe and well. But then at what point do we get in touch with the local NHS? And how is it facilitated, what's the flow? What we are looking at is it just from a Swansea Bay perspective here, we are not looking at it from a wider NHS perspective. Which is, again, going back to the patient, you don't care where the patient is from.
PARTICIPANT 2: And that's where the flow could be vastly improved.
PARTICIPANT 1: We are insular, really again isn't it. We are looking at it from our own perspective, with a silo mentality and that's part of the problem. We've seen from the work we have done recently is that we have so many different silos, people doing their own thing, and not really connecting well. They need to connect and join up the dots. Improve the patient experience, from hospital to home, home to hospital. So how do we then improve that patient experience.
PARTICIPANT 2: We'd need to know if they are going in, exactly what medication they are on, and sometimes that can take a while to get hold of, can't it.
PARTICIPANT 1: You mention anti-biotics, are they going home with the right medication? Because sometimes they're not and then they've got to go to their local pharmacy to pick up their prescriptions, and the pharmacy is closed, and people say, you know, 'I'm not going home until I've got my prescription', so again, it's understanding what those delays are, that we need to iron out. And something in place to make it flow for the patient, this is about the patient being at the centre, for me anyway. . . and that goes for the Signal process in its whole, because what we are looking at is a specific part of the flow. Well, Signal isn't just about the flow it's about the wider programme.
PARTICIPANT 2: And I suppose yeah, more transformation stuff, if you are identifying at MDT that they need, or after assessment, that they need all this equipment, rather than having to contact equipment, you've identified it within the system, can it not just automatically order in this, this, and this.

PARTICIPANT 1: We've got a care home system that does automatic emails to care homes and extrapolating various bits of data and various things, but also they can access the information, and look at it and review it, and look at what they've done. This is a step further than that really, isn't it, because you are on about automating the flow out, which is where flow forms a type of approach, which then once it hits a trigger, it'll then automatically send emails out to various participants and bodies, to say this is what needs to go and it goes in to a general inbox, not people's inboxes because people often leave and it doesn't get actioned and there has to be a network of general inboxes to support the way of working. So taking it wider all the time and making it automated, making it more interactive, so we're fit for purpose.
INTERVIEWER: So as far as you understand it, Signal doesn't facilitate any kind of communication?
PARTICIPANT 2: Well, what happens is, the ward fill in their referral. Check it as complete. There's only one other box that they can update, so if we go back and need extra information off the ward, cos we need a little bit more information, you know, they then have to manually phone us and go 'we've updated this section', it's not 'oh – this has been updated'.
INTERVIEWER: So through the system, you've got no way of communicating backwards?
PARTICIPANT 1: Well, the thing is, if you missed that email, you are reporting on out-of-date information, so you know in terms of information being live, which Signal is, it's a live system, those live updates have to be refreshed on a sort of incremental basis throughout the day which, I am guessing it is, but then nobody is alerted to those updates.
INTERVIEWER: So that's the thing, would things like notifications, or even notification symbols on dashboards...
PARTICIPANT 2: or even if it was sort of conditional formatting, cos what Signal is is a list of patients, so all of these have had an MDT, they're all now being monitored awaiting discharge, for instance, so even if the ward wanted to update any of the information there, if it just was red, or in bold to say...
PARTICIPANT 1: Yeah, you could just put a flow in and create a report saying 'these people haven't been updated as of, say, 11am'. So you're alerted to the case and the update and what that update is, so you've then got more information and intelligence at your disposal to make those decisions on what they need, where they go, etc. Real time intelligence, as opposed to what is it now which is a phone call, if someone remembers to phone you. Sometimes they don't because, you know, they get caught up doing something else.

INTERVIEWER: So if I understand correctly, what we are saying right now is that someone could make a change to someone's referral MDT assessment record...
PARTICIPANT 2: So the referral will go then to awaiting MDT, so I could pick it up, as a triage person, and go 'oh I need a little bit more information from the ward', so I ask them for more information and they go 'Okay, I'll update it but I can only update it in this one particular...'
INTERVIEWER: How do you ask them for more information?
PARTICIPANT 1: Phone
INTERVIEWER: A phone. So there's no way for you to just kind of ping it back to them and say 'you've sent this, can you just do this?'
PARTICIPANT 1: No.
INTERVIEWER: And also, so say an update is made, that then impacts something...
PARTICIPANT 2: They'd phone and they go [inaudible] the update.
INTERVIEWER: So if they don't ring you, the only other way to see that change is to go through every patient and look and see if any changes have been made?
PARTICIPANT 2: Every record.
PARTICIPANT 1: Time consuming. There has to be a two-way flow to all this information gathering and passing information back and forth between each other because if there is something missing in that data record, which isn't extra, it's just missing, then the system should pick up that. It should not let you submit that record with missing information. There should be conditional formatting in the fields to make sure that it's completed, holistically, properly, before they submit. So, again, I am not sure if Signal can do that, but I am guessing it can't.
INTERVIEWER: I thought that...I am sure...
PARTICIPANT 2: There are mandatory fields.
PARTICIPANT 1: But it won't let you submit? Will it let you submit without the mandatory fields being filled in?
PARTICIPANT 2: There are so... there are about 5 I think in version 2, in version 3 there will be more mandatory fields, because a lot of the time at the moment the dementia information isn't updated in version2. I think they've requested that it be made mandatory for version 3 because why would you send somebody for a mental capacity assessment when we already know that they've got dementia.
PARTICIPANT 1: Exactly

PARTICIPANT 2: Well, you may still send them for one, but you need that information.
INTERVIEWER: It also may be that, as we have established, people on the wards are quite busy so there may be a tendency to not. . . you need more fleshed out information, even if it's a free text field, for example. It might be a mandatory field, that's fine, you can prevent someone from making that referral, but what you can't do is force someone to give you a full picture of exactly what's going on with what the home first team need to do. If you need to send it back, obviously you'd have to ring and say 'look I don't have enough information'. Then of course that brings in the other issue, which is people being busy and demands on time, and have they got the time for you to be sending stuff back for them to look it again and go 'oh okay, what did I actually mean'.
PARTICIPANT 1: Well you're taking them away from what they really should be doing isn't it? It goes back to the fundamental question of have we got the right people doing the form filling? Building the right infrastructure, really. It's not, personally, it's not there at the moment. The right people fill in the forms because they've got the right knowledge capacity, the training, the awareness, erm, the skills, you know, to do it properly.
PARTICIPANT 2: And time.
PARTICIPANT 1: Well that's the big element, isn't it, time.
INTERVIEWER: When it comes to contacting people about a patient, is the process of that an easy one?
PARTICIPANT 1: We've got different systems for contacts, haven't we, and again, it's. . . .the system
PARTICIPANT 2: Depends on the local authority, yeah. So Swansea's systems are very different to Neath Port Talbot's, on Signal it does open up and it does give the history of the wards they are on, or the wards they've been at, so you can see where they've gone, I don't think it goes down as far down as professional level.
PARTICIPANT 1: I wouldn't have thought so, no. Because that is not part of the original spec, I guess. So, going back to the original spec, have we built the system to do something which isn't what it's required to do. It's been added on. It's resources, time, and cost. There's a massive cost element. How long has Signal been in now? 3 years, maybe 3, perhaps, I am not sure. But again, it's been in quite a long time and a considerable development cost to Swansea Bay so have we quantified what that is and how much does it need to take it to the next level in terms of that development time? Because obviously, if it's going to be more than it needs to be then you've got to question. . .

PARTICIPANT 2: Is it the right system?
PARTICIPANT 1: Is it the right system. So before you do any development you do that cost/benefit stuff.
PARTICIPANT 2: Especially for the community aspect of it, because that's not what it was built for. But yeah, it could be developed...
PARTICIPANT 1: It could be. If it's going to cost a million pounds then surely it's better to say 'hmmm, we can develop something else which is fit for purpose, which is built on what we need it to be, which is this all-encompassing, all improvements in flow, and that only costs 500 grand, so why are you spending a million pounds when you could be spending 500 grand?
INTERVIEWER: So would you say that would be looking more at integration, rather than having entirely new systems? I am not sure how well, if at all, Signal interacts with other systems?
PARTICIPANT 2: Is there a WPAS integration?
INTERVIEWER: I think there might be links from Signal to WPAS. That's saving you typing the URL, but it's not physically communicating any data.
PARTICIPANT 1: I don't think they share any data across the systems, do they? I think there is part of the issue because you are duplicating a lot of the information in different systems and, if you are keeping one record up-to-date, brilliant, but to keep two up-to-date, there is a going to be errors. So again, it goes back to the fundamental question, if you are going to develop this system, do you spend the time, resource, and effort in based on cutting costs, however much it's going to be? Or do you absolutely say 'right, because of what we have learned and what we have identified then do we built something which is fit for purpose which does cover the aspect of hospital to home, home to hospital, that two-way flow.
INTERVIEWER: So the ability to go both forwards and backwards?
PARTICIPANT 2: They go backwards, yeah.
INTERVIEWER: Okay, so if we change direction slightly, if we were to create a working definition of what the home first team did, how would that look?
PARTICIPANT 1: It's too broad.
PARTICIPANT 2: I suppose a working aim is to prevent people going in to hospital...
INTERVIEWER: So I guess we would say, it is a large and disparate collection of people and organisations, with the ultimate aim is to, either prevent someone from going and having to be in hospital, or trying to get them home form a hospital with the necessary package of care.

PARTICIPANT 1: It's got to be a coherent, integrated way of working, that's basically it, isn't it? Without that coherency, without that sort of integrated way of working, involvements from the right parts of the NHS and the community, you are never going to have that, sort of, all-encompassing patient flow. You're going to have it in silos again, so it's to break that silo mentality down. It's got to be patient-focussed, really.
INTERVIEWER: So we've talked about the patient flow journey from a Home First perspective, we know you get that referral through and we've talked about the challenges. You know, the patient doesn't necessarily go one way through that flow and managing that through Signal is difficult...
PARTICIPANT 1: Yeah.
INTERVIEWER: So how you get a notification that there is a referral to deal with – does it just appear? No one gets an email or anything?
PARTICIPANT 2: I am not aware of anything. There's just an 'Awaiting MDT' tab [in Signal], and you can look at the ones that haven't been complete now as well. So there's a tab or something, I can't remember what it is called, so you know all the ones the hospital have filled in and actually completed and there will be people on there that have since passed away.
INTERVIEWER: And how do you manage those out of the system?
PARTICIPANT 1: Well again, if you build the system from scratch, and building for it to be fit for purpose, you would build in those trigger points, wouldn't you, and automate the system to alert...
PARTICIPANT 2: The right person.
PARTICIPANT 1: The right person within the team by that generic inbox facility. To say that 'oh now we need an MDT assessment for... whatever', or 'we need a dementia assessment', blah, blah, blah, it goes to the right teams, or individuals within the teams, based on that automated patient flow. To make them aware that, ok now, there's another two new referrals in today.
INTERVIEWER: So at the moment is it very person-driven? Making people remember?
PARTICIPANT 1: But what happens if someone is off sick, or COVID, then how do we play that out in terms of making people aware that there are new referrals to be dealt with. What we have done is built around people as opposed to the patient. We haven't got that flow right.
INTERVIEWER: So even things like reminders going?

PARTICIPANT 1: Simple things.
PARTICIPANT 2: Yeah. . . I suppose the ability to add somebody would make such a difference to anyone that works in the community, you know?
INTERVIEWER: So, if someone is coming from somewhere else, for example, I can add a patient? Right now, it's out of your hands.
PARTICIPANT 2: We've got a spreadsheet on the side, and we go 'right okay, so we have to look at all of our things in Signal and then we have to compare our spreadsheets'
INTERVIEWER: So that's through necessity, right? It's not like you are not using Signal. So are you using it as intended, but it doesn't facilitate these unique use cases?
PARTICIPANT 1: Yeah
INTERVIEWER: And at the moment is everything desktop? I know for example, on the wards they use print outs because they can't just carry a laptop around everywhere they go on foot.
PARTICIPANT 2: I am not aware of [Names] doing lots of print outs.
PARTICIPANT 1: Is it mobile friendly?
INTERVIEWER: I don't think it currently is, because that was going to be another question. . .
PARTICIPANT 1: So that's going to be part of that development stage. Is it possible to make it mobile friendly? I ask the question about mobile friendly because everyone has handheld devices, and we use it for the care homes, within the care homes submitting data on a handheld device, and it's because they will. They're sitting there and they haven't got to go and sit at a desktop and have those challenges. They've got log ins, they've got permissions, they've got passwords, erm, they just go in and drop the data in. So it's looking at it from a user perspective, what can we do to make it easier? Are there multiple screens?
PARTICIPANT 2: There's multiple tabs.
PARTICIPANT 1: So are those tabs in the right order?
PARTICIPANT 2: I think so, from my perspective. From my overarching perspective.
PARTICIPANT 1: From a user perspective, are those tabs in the right flow so that sequentially move from one to the other?
PARTICIPANT 2: Well the ward can only see one tab, so they'll only see that one.
PARTICIPANT 1: But do they need to see more than one tab? Because there are the bits in the other tabs that need to be put in a ward view, isn't it?

INTERVIEWER: So that might be a question. So from one perspective it's in the right information, but from another they are like 'maybe for the assessment, I would like to have...
PARTICIPANT 1: But again, it goes back to the user. How do they find putting data in to Signal? Because if they had one... because maybe on some of those tabs that data is superfluous, it's meaningless, it doesn't need to be there. So strip it out, and just drag in the bits that are needed, so that you've got one view, on a mobile device, that they can go, duh, duh, duh, duh. I know it's simplistic view but...
PARTICIPANT 2: Populated as much as possible.
PARTICIPANT 1: If something needs to be changed, then change it once, change it for the better, and make sure that it is the right thing to do. Putting patients at the centre, rather than tinkering with something which is going to be costly and then still not fit for purpose.
PARTICIPANT 2: I suppose it's more the fit for purpose for those that work in the community field, it seems fit for purpose for those that work on wards...
PARTICIPANT 1: I don't think it is, because it's missing data though isn't. So it can't be, because the person at the end, the user, isn't using it.
PARTICIPANT 2: True.
PARTICIPANT 1: So what is it that needs to be reworked in order to make it fit for purpose for the greater good, really, isn't it?...
INTERVIEWER: This is the Awaiting MDT Assessment, so this is obviously what they would see when someone has ticked that box to say 'yes, refer', this is where it would come in and, presumably, in a real-world example you are going to have many more than two people.
PARTICIPANT 2: It does say now, look, in version 3 whether the referral has been updated or not.
PARTICIPANT 1: Yeah I was just looking at that though because, obviously, it's yes or no...
PARTICIPANT 2: What happens if it gets updated twice?
PARTICIPANT 1: Well, exactly, yeah. And also does that tie in with the arrival, clinically optimised dates, the EDD times, the dates, etc., because you know at that point in time you are thinking it's not been updated but it's in the system before the order of [Name], which is – he has been updated...
PARTICIPANT 2: Since when?
PARTICIPANT 1: When was it updated? So it's like...
PARTICIPANT 2: Referral updated date...

PARTICIPANT 1: It means nothing to me, because it could have been updated two weeks ago.
PARTICIPANT 2: So they have obviously listened, then, to [Name] and [Name]'s feedback, going 'we don't know if it's been updated or not', so they've gone 'you can tell if it's been updated now'.
PARTICIPANT 1: There's no information there that gives me anything extra, apart from it's been updated, yes or no.
PARTICIPANT 2: So I know I need to look at it, but I don't know which part.
PARTICIPANT 1: But when, because, you know, somebody else could come and look at that now and say 'oh that's been updated', two weeks ago, it could have moved on since then in terms of the timeframes, it could have missed its clinically optimised date or the EDD date or whatever. So as part of that flow then, something else could have taken precedence, on top of that. Which means that column means nothing to me.
PARTICIPANT 2: As a user.
INTERVIEWER: For a front-line person working with Signal, this is the view they would see, so it's this tabular view...
PARTICIPANT 1: But also, based on their permission, is that menu bar down the left-hand side, is that linked to your permissions to log in?
PARTICIPANT 2: It should be, it should be. As far as I... I haven't, this is the first time I am actually seeing version 3, I've only ever been shown version 2.
PARTICIPANT 1: I've never seen version 2! This is all new to me. But again, Awaiting MDT Assessment, in the drop downs...
PARTICIPANT 2: And the clinically optimised date. Yeah they were clinically optimised on the 21st but what about the 22nd?
PARTICIPANT 1: When's the update? If this is a live feed coming through, then obviously, you'd need dates in there, obviously, to say 'as of today' this is the current position. There's no, for me, from the visual, there's...
PARTICIPANT 2: It's a list...
PARTICIPANT 1: It's just a list of stuff. There's no reference point to say 'as of today, these are the outstanding bits...'.
PARTICIPANT 2: Yeah
INTERVIEWER: So if someone is coming in to do their work, how well does it facilitate someone to properly do the tasks that they need to do?

PARTICIPANT 1: It's got to be focused, it's got to be quick and simple, it's got to show what needs to be done. Anything else sits beneath that, it's fine. But this is your dashboard to say 'hmmm. . . as of today, these are all the things you need to sort out'. It's that sort of high-level dashboard-critical view really that needs to be brought through. To have list upon list upon list upon list, erm, is possibly not the way forward.
PARTICIPANT 2: But not only that, this should just be telling you all of these are awaiting MDT Assessment. There's X amount, how many are waiting?
PARTICIPANT 1: That's that summary, with a date saying as of today.
INTERVIEWER: So are you saying that a lot of this information shouldn't be on this view?
PARTICIPANT 1: Shouldn't be. Doesn't need to be.
PARTICIPANT 2: It depends on what you're going in to do. Are you going in to analyse something? Where technically that should be done by PowerBI in the future, or are you going in to actually do the work.
PARTICIPANT 1: What are you doing with it?
PARTICIPANT 2: Because surely, you'd just be clicking on [Name] and then you'd have all of the information to conduct the assessment.
PARTICIPANT 1: If I need to look at [Name], as a person, and say okay 'what is it that needs to be done?', where would I go?
PARTICIPANT 2: Depends on what type of staff you are, I think, because. . .
PARTICIPANT 1: Which is based on your permissions, isn't it? So if we go back to the structure, it's got to be down to your activity and what you need to conduct your business. . .
PARTICIPANT 2: I know [Name] has had issues. . .
PARTICIPANT 1: There's no point having a general dashboard that everyone can go on and go right 'where do I go from here then? I'll click this button. . . no. . . wrong button. . . back again'. You're wasting valuable time and resource.
PARTICIPANT 2: [Name] is very digitally aware.
INTERVIEWER: Yeah, I want to know from them 'what are the tasks you're doing?'. We know that they are doing an MDT Assessment, but what does that mean in terms of them logging in and navigating a system.
PARTICIPANT 1: Is it defaulting to Swansea? Swansea area or is it Neath Port Talbot, you know I am just looking at the thing. . .
PARTICIPANT 2: So in version 2 there's two different tabs. [Name] will look at the Swansea tab and [Name] will look the Neath Port Talbot tab. I don't know. . .

INTERVIEWER: You'd navigate that drop down, I assume, so you see where it says Swansea. I am guessing you'd change that to Neath Port Talbot.
PARTICIPANT 2: But [Name] would only ever log in as Neath Port Talbot and [Name] would only ever log in as Swansea, so why would they want to click it?
INTERVIEWER: So it's an extra click that you don't even need?
PARTICIPANT 1: Well exactly, it's looking at the interactivity between your profile and what you need to see, isn't it? Sorry...
PARTICIPANT 2: Yeah, no it's good.
PARTICIPANT 1: It needs to be interactive with your capacity, your level of capability to do something with Signal, isn't it. And it, erm, is looking at the least clicks possible. It's always about the least clicks possible for me. So that you can go through and go right 'they're next' or whatever it's going to be. So, make it as easy as possible that's why it needs to be done on a [Gestures to phone].
INTERVIEWER: So you think having other... obviously currently everything is optimised for desktop but...
PARTICIPANT 1: Looking at key critical bits for the user to do. Stripping it back to the bits that they don't need, unless they do and then you give them the option to do it, but it's that fundamental, key criteria that they need to put in first and foremost.
INTERVIEWER: When you work in this kind of area, as I am establishing, especially on the wards, this is not a job where you are just sat at a desk...
PARTICIPANT 1: No, no.
INTERVIEWER: You're out and about all of the time and is it not practical to be interacting with a desktop?
PARTICIPANT 1: No, but then it goes back to, is it easy to do, is it quick to do? Is it simple? How long is it going to take you to do the forms. If you've got tabs upon tabs upon tabs to go through, it's going to take somebody 10 or 15 minutes. They're not going to sit there for 10 or 15 minutes if someone is screaming to go to the bathroom in a ward. Or they've fallen out of bed, or whatever. So you leave that and you go, and maybe it logs you out. Then you've got to start from scratch again. That's no good for the person sitting there at the very start. So, it needs to be done by a particular person that has responsibility. Or could it be that they don't do it, someone else does it.

INTERVIEWER: Part of the reason that they get out of sync data on the wards is because they are doing these print offs because they can't carry a laptop with them. You know, if you are trying to provided primary care, you can't also be carrying a laptop...
PARTICIPANT 1: But it's double handling though, why would you encourage double handling of information? The idea of using smart technology, it's got to be the way forward for system data capture. Erm, but it's got to be the right person doing that data capture. They understand why they are doing it; they understand that this form is quite simple to go through. It is sort of listed in that quite, kind of, sequential format. It is dynamic, in a way, where you click on one box, it takes you somewhere. It's got to be that dynamic sort of capability built in to the system as well, as opposed to just a whole screen of questions. You go 'I've got to fill all that in... really?'. It's that comprehension of that 'oh it is quick because it's dynamic'. So you could answer one question, go on to the next, it doesn't seem so laborious.
INTERVIEWER: So at the moment, it's quite tabular and it's quite form based, so you're either looking at a table of people's names, or you are on a specific person and then it's like a form.
PARTICIPANT 1: Well it's that mindset you got, when you see a newspaper it's massive isn't and you say 'I'm not reading that... it's massive', and then you see a little shorter version, The Times, for instance, you've got the little square Times and the big square Times. Some people like the big one, other people like the smaller one. It's more pages to go through, but it doesn't seem so intense and overwhelming. So it is looking at people's mindset and saying right 'how can we make it so that it is sharp and snappy, but it's the same information?'. So it is the same information you are asking for but it's more intuitive, informative, interactive way. By making it list upon list upon list it's counter-intuitive, it's destructive, really, because you're like 'I've got to fill all of these boxes in??' and already you've just lost them. How can we make it not to be that?
PARTICIPANT 2: Yeah if you're putting a patient through Pathway 2, you don't need all of the...
PARTICIPANT 1: Other bits.
PARTICIPANT 2: So Pathway 1, sorry, or Pathway 0, because you know that you're not going to get everyone else involved.
PARTICIPANT 1: So let's make it dynamic, let's make it sort of helpful for the person filling it in, but also for the person on the other end. It's sharper, slicker, quicker.

PARTICIPANT 2: It's the confidence as well. Because, obviously, people trust enough to use Instagram, Facebook, this that and the other. It's quite often it's like the staff confidence in our data and our systems and things isn't quite there.
PARTICIPANT 1: Because it's so fragmented, disjointed, it's not really got the right flow. We're asking too many questions when, you know, we don't need to ask those questions. It's looking at what you need to ask, at that time, and what's relevant, what's irrelevant. But stuff that's irrelevant at that time, they don't need to see it, why is it on the screen, it doesn't need to be there? If they haven't got to fill it in, it doesn't need to be there.
INTERVIEWER: So do you actually think that mobile is a way forward?
PARTICIPANT 1: Everybody at work, if they're on lunchbreaks they'll go on Instagram or Twitter, they are all interacting with a mobile device, really.
INTERVIEWER: Obviously you wouldn't be able to display that in the same way so...
PARTICIPANT 1: But I am not on about the display, it's the data capture, the data capture is the fundamental bit that's giving us all the problems, obviously the flow and stuff like that, but the data capture is so disenfranchised, with the person putting it in because they're using paper, and they miss the boat, something else has updated the record and then all of a sudden their paper is not right and they have to think 'oooh, why's that different then?'. The time and effort and resources wasted in that down time. It's unproductive. We need to look at it and say 'right, what is it that we need to show so that we can get the data in at that point in time?'. Take away the bits that don't need to be done.
PARTICIPANT 2: It's the same as that list... which bits do I need?
PARTICIPANT 1: Which bit do I look at? Just wasting time, going through the bits that you don't need to go through. What is it that you need to see.
PARTICIPANT 2: At some point you may need that overview, as a manager...
PARTICIPANT 1: But if you can click on that, later on in the system, if you got the facility to do that. What is the key bits of information that you want to see that is going to help you do your job? Not everyone wants to see everything, you can't contemplate it. Some people won't even look at it, it will just turn then off anyway. Then you've lost their confidence in the system, as well. So to keep confidence, it's got to be sharp, short, dynamic and it's got to work.

A.2 Focus Group Two

INTERVIEWER: That and pretend it's not there. And really what I'm looking for is just a quick discussion about all things Signal. So let me share my screen. There we go. So can you let me know if you can see?
PARTICIPANT 3: Yeah.
PARTICIPANT 4: Small it is, but I can see it.
INTERVIEWER: Is it small? Let me try and see if I can make it bigger.
PARTICIPANT 4: Is because I haven't joined to the bigger screen, but I won't do it because it interferes with my Signal.
INTERVIEWER: OK, so as long as you can read, you can read the text. That's really all that matters, and it's really just so as you can see, some of the question prompts which I want us to have a chat about. So what I'm interested to understand, and we're going to just have a discussion about this. I've got a couple of questions that are prompts, but really whatever comes into your head is a valid experience. You all use Signal. And I want to hear about how you use Signal and what you use it for and where you struggle with using Signal because that's how we can solve the problems is if we identify them.
INTERVIEWER: So I'm interested to understand from you, I know of the Home First team, OK and I'm very much aware that that's actually a disparate set of groups of people that all interact together to try and deliver kind of community care and get patients back in their homes as quickly as possible because that's where they do best. What I'm more interested in is the stuff at the bottom here, so how you actually do it. Do you both use Signal now? The version two? Yeah. OK, so that's good. And what do you what types of tasks do you use it for? Is it cause? I know there's the CDT assessment.
PARTICIPANT 3: Yeah. Yes, so for me, I work in screening a lot. So I work on the MDT assessment, but so a patient is identified and referred in one of the hospitals and they complete the referral which brings it to the MDT assessment and awaiting MDT assessment box. And then from there I'm involved with screen in the referrals and then making a decision, accepting in it. And you know, taking the referral from there really. So from that point, I sort of tend to use it and I know in the hospital like the nurses and you guys use it a lot more. if we are in-reaching and we might put the referral on ourselves in the hospital to the team. But I know I don't know, Clare, then the DLN's use it a lot as well, don't you for your COPS and things.

PARTICIPANT 4: Yeah. So we monitor the patient flow tab and which has got all your clinically optimized patients in the hospital. So as part of the in-reach model that we facilitate as part of the wider Home First team, we are constantly in that COP, in that patient flow tile and we look and find the patients that are potentially waiting and what they're waiting for to try and look to see whether we can infiltrate and expedite discharges via the various pathways. And we use it for, um, medical history. We use it for data admission. We use it for who's allocated to the patient, what the current status of the patient is. We also use it for IPC, so Infection Prevention and Control. To filter if there's any IPC issues. . . so that's the sort of the Ward View and the Patient Flow View that we use, we update in the MDT box as well. So if we've done an interaction on the ward, we will update in the MDT box on the Ward View. We often we may sort of change the status of a patient, but obviously that would be in collaboration with the Ward Team, if they're not clinically optimized or ready for us to support. We also put referrals through, as [name] said. So we put referral through to either reablement bed facility, reablement at home, or therapy only. Or social work, we often do social referrals and we also support then the MDT, the Community MDT, in the integrated team that Home First tile, it's H2H now but it's going to be Home First and we're making amendments to version two now from August the 22nd and we manage that tile as well in relation to patients that are waiting assessment, monitoring, and discharging as well, and updating the pathway they're discharged to and, yeah, it's a day-to-day business as usual for us using Signal across all sort of processes in the in the patient's pathway and our daily interaction.
INTERVIEWER: Yeah. So I'm aware of the different pathways. Not as not as aware as you are, but I certainly know what they are and the various different pathways 0, 1, 2, 3, 4 and so on. Do you only use a desktop for that? So do you do it through a computer online? Because I know for, for instance, the nurses obviously they'll print out and the doctor's they'll have, like, physical printouts because you can't carry a computer around with you. So if you're having to kind of be up and about, sometimes they'll do print offs. But do you only interact with the desktop screen?
PARTICIPANT 3: Yes. Yeah we do.
INTERVIEWER: Yeah, yeah. And do you ever find. . .
PARTICIPANT 4: Yeah, sometimes we print it off. Sometimes we have printed off. . . sometimes we will print off and if we sort of need to work. If the girls are agile and we need to. . . say we want to look at everyone that was in the therapy process, we're trying to pick patients for

a reablement bed. We may filter, you can export to a list and sometimes we do sometimes export. We use the list that's exported for actions and for monitoring. But we tend to pull off the information and put it into our own database, but sometimes we have pulled lists off. The ward, obviously, used the Bed Plan View and they print that off, don't they, for each ward, but obviously because we work across all the sites we wouldn't want one for each word. It would just be a waste of paper. So yeah, we do print off a specific function, but we don't use iPad. I don't think there is an app on an iPad is there to use? No.
INTERVIEWER: There's not, but it's something I'm definitely open to discussing with people because in a hospital, obviously, it's not a desk, it's not a desk environment. You know, you're not always at a desk like an office worker. And so considering. . . now, none of this may be implemented, but it's worth understanding what might help. . . and so in the group that we held last week, they mentioned things like potentially even phone because obviously your phones are very mobile. So people have definitely mentioned that in the past. I don't know if that's something that you would agree what might be useful in terms of doing your day-to-day job. So when you're working, would it be easier for you to interact with, say, a phone over a desktop? Just because it's more agile, it's more able to move around with you.
PARTICIPANT 4: What do you think [name] if you was in-reaching?
PARTICIPANT 3: And yeah, I mean the ways we get around, we tend to either use the computers on the ward, but iPads definitely. I think other way when you are in-reaching and you do need it, I think it would be handy if it was something that you could you know you could look at on an iPad.
INTERVIEWER: Hmm. Yeah. And do you ever find that that's an issue because sometimes, you know, if there's a delay between you actually, you know, making a decision or experiencing something to do with the patient and then obviously getting back to the place where you can actually physically, you know, there's often probably a delay I assume.
PARTICIPANT 3: Yeah, there can be. Because if you're on a ward and you wanted to put, like, if when we have been in-reaching and identified a patient and wanted to get on to Signal to get the referral to our screening team, it's great if the computers are available on the wards but then they aren't always when you got doctors and other professionals sort of using their computers, so sometimes it is case of waiting until you can go and get back somewhere to do it, so yeah I mean iPads would be great, anything that could be transportable like that I would say.

INTERVIEWER: Certainly. I'm not saying the NHS are going to give you all iPads, but it's worth knowing because it will factor in. [Name] are you still OK for time or are you. . . ?
PARTICIPANT 4: I would have to go soon, but from my perspective, some of the wards. . . so the idea was that we had a live board round where Signal was visible on the wards. And then you had like a keypad attached where you could update some of them are touch screens. We did have them down in Gorseinon and it was because, you know, the whole issue. . . the whole point was it was going to replace the white boards that we used to have with the patients' names on them. We used to try and put straight lines on and it used to be a bit of a headache and then somebody would rub something off and you never knew what was on there. . . .and so the whole point was we're going to have Signal on sort of live boards and I think some of the wards did go ahead. I'm sure they did them in Singleton.
INTERVIEWER: Ward G has it but they're not interactive, as far as I know. So maybe that's another thing to consider is, from a ward perspective, interactivity is maybe something to consider as well as being able to touch those whiteboards and. . .
PARTICIPANT 4: Yeah, because wards are a confined space. You can't exactly set yourself up with your laptop. And especially for us as Community staff, because we're not part of a ward team, we sort of, we're in, doing our handover and then we try and sort of find a quiet space away from the ward to do all our updates. But you know sometimes it's really hard, isn't it? Because if you don't do your update there and then, you're thinking 'right, what did I decide for that patient'. Especially if you're looking at lots of patients and you're trying to keep a book then you're carrying a file and something else, know what I mean? So yeah, if you could put the update straight on. I mean there is a way you can get on to Signal, you can do it, it's not impossible, but if there was an easier solution, obviously we would, we would welcome that.
INTERVIEWER: Yeah, and and maybe this is just you quickly, [Name], cause we'll have a bit more time, [Name] hopefully, but do you ever? So, I know from talking last week they mentioned that there are certain problems with Signal in the sense that if a patient doesn't get referred from a from a ward for example, like there's a really set flow through Signal which is the patient you know comes in, goes on to a ward, and then we try and discharge them and then they go through a set pathway with home first and if anything deviates from that then Signal is not maybe best equipped to handle that, so I don't know if you've had any experiences of, you know, trying to deal with a patient and maybe having problems because they haven't come from a ward or they're on award, but they

need to go into the community somewhere else. For example, if they're on holiday and they need to go into the community in another place.
PARTICIPANT 4: So you can only use Signal for people admitted on to a ward. You can't use it if they're in ED because they aren't on Signal. And obviously once they're discharged from hospital you can't do anything then because they're not on Signal. Signal is for the line with patients that are sitting in their hospital beds with the exception of the Home First ties, if they if they are discharged home, they can remain in our Home First tile until we discharge them. But obviously any updates then they're not you know it would only be updates and we put in because obviously they're not involved in any other teams? They've left a ward... but I know that [Name] did say that there was a possibility that we could add patients on. So if we had a referral from elsewhere for a patient that wasn't an area that was using Signal, we could potentially add them on and build that function in. They said that it that it wouldn't be impossible. So we could manage all it all in one place. And for us it's hard because we use in a separate system WCCIS, as well. So it would be whether it benefit us or not really I suppose because the whole point of having the updates for the live patients in the hospital is that it's a shared system that while the patient still in the bed. So I don't know whether there's something to explore in relation to... you know for it'd to be a small number of patients that are in ED that are referred that we can't put through and the majority of patients would need to come through the hospital Signal process and there was an issue around having two referrals and so if you had a social worker referral, you couldn't have a referral for reablement at home at the same time. But that's been mitigated now with the new updates that are going to be in place from the 22nd.
INTERVIEWER: Yeah, because I'm aware there's the new flow where you can put someone on hold because you couldn't previously. You know, if someone was referred, then it was like they either had to be accepted or rejected. And that was it.
PARTICIPANT 4: Yeah. Or we have to close it down and then that means that referral is gone or, you know, it had to be pulled back and it skews the data for reporting. But yeah, what they're doing now is they're going to put it like a pause of referral, so that you could go back to the ward, but it's not necessarily shut down and so that was an issue. You are right. Yeah. I'm really sorry. Gotta go. I I do apologize.
INTERVIEWER: No, that's fine, [Name]. I really appreciate all the time you've given. I know it's stressful, so.

PARTICIPANT 4: If you want me to do anything or explain anything on an e-mail, drop me an e-mail and I can get back to you on an e-mail. But [Name] is really good as well.
INTERVIEWER: What I what I will be doing just quickly before you go is I'll be creating some interfaces that are just for people to look at. So things that we could improve through Signal and I'd like to send them to you just to get your feedback on them. And but that would be in your own time, that would be on your own time, OK? Brilliant.
PARTICIPANT 4: That's fine. That's absolutely fine. Thank you so much. Lovely to meet you. And sorry to be a pest. Take care. Bye. Bye. Bye bye.
INTERVIEWER: Bye bye.
INTERVIEWER: So am I'm right in thinking you said that you were involved in the MDT assessment?
PARTICIPANT 3: Yes, that's what I basically like. . . we've done some in-reach, but I'm more familiar with the like receiving of the referral. So when someone's come through to the H2H tile, then that's where we pick up the information about the referral. So from there then we'd sort of screen the information and then we'd utilize Signal to update the MDT discharge planning tile. So that hospital, you know, we can see that's where it's useful that we can, they can see our decision and what we're putting the referral forward for and then we'd select where like [Name] said, whether it was a reablement bed or they were coming through for us for therapy and care or whether we need to. . . it's been discussed and we put it back for a social worker referral. Otherwise, we would move it into the monitoring box and then, umm, we'd monitor them until they leave hospital. Then we would discharge and like [Name] said, at that point when we're monitoring them and when they are discharged from hospital, we use our WCCIS, our sort of notes and our system then.
INTERVIEWER: Yeah. So that's kind of so after the referral has been kind of finally accepted and everything's finished off from a Signal perspective, that's when the next system that that you guys use from a kind of community, presumably community care perspective where you're trying to kind of, uh, what's the word? Kind of bring together lots of different people because I'm aware that community care is lots of different. . . you've got physiotherapists, you've got, yeah, you've got carers.
PARTICIPANT 3: Yeah, we're all. Yeah, we all use it. Yeah, we've got carers, nurses, therapy staff. We all use it out in the community.
INTERVIEWER: That's the other system that you use after Signal, so it's kind of. It would leave Signal at the point at which the referral is accepted, and then you kind

of move it and then the actual administration of that person's package of care is done through WCCIS? Am I right in saying that?
PARTICIPANT 3: Yeah, on WCCIS then we would use the. . . so we would decide from the Signal information what is needed. We do our own sort of fact finding and like screen of that referral and we would obviously inform Signal then of what our decision is. But then the main, all the information that we've gathered, we would process it on WCCIS then and that's where our careers and social services where we can all see, oh, we can all access and see the information.
INTERVIEWER: So putting someone on to WCCIS is that a manual process? Do you have to physically transfer and how much of the information do you, do you take that from Signal and transfer it into the other system?
PARTICIPANT 3: We do. And what we find with Signal is the format the referral form and it gets to us. It's not in the most readable format for us. There's a lot of tick boxes and a lot of gaps and things, we don't always have enough information. So we have our own, we've developed it really over time as we moved on to WCCIS, our own triage screening form with all the information that we would need to decide on packages of care and what was required. So we transfer again it's usually it's our BSOs that work with us, our Business Support Officers, they would basically copy and paste a fair bit, everything they can from Signal, and then we would complete the rest then with all the other information that we need and that document is attached to WCCIS, so everybody can see, uh, or everybody within the team can see, you know, what we've decided really.
INTERVIEWER: Yeah.
PARTICIPANT 3: So we get the information from Signal, but we also do a lot more phoning, gathering further information, and then it is a manual process on WCCIS we have to, if the person isn't on WCCIS, it's creating an account and then creating a referral to our team and then add in the whatever information, the document that we've that we screened.
INTERVIEWER: OK. And that that brings to mind two questions actually then. So the first question is. If it were possible for some of that manually entered information to go straight into WCCIS, would that help? Like if for example, again, you're for more familiar with the systems and the processes. So if hypothetically speaking at the point at which you accepted the referral and it needed to move on to WCCIS. If it, you know, if it automatically did that and then took any data from Signal that it needed. . .
PARTICIPANT 3: Yeah.

INTERVIEWER: It may be that you need to still populate it with other information, but that process of creating and getting what information from Signal is necessary for that referral, would that help? Or would that be useful in any way or not?
PARTICIPANT 3: And I didn't know. I don't. Not sure sort of how it would work. Like I said, with Signal, it it's not in a readable format for us. I don't know how... what are you thinking?
INTERVIEWER: Don't worry about technically, because that obviously I am aware that, although I'm in a Computer Science department... for me, in fact I did a slide of this, it was like... here, you know ultimately don't worry about whether anything is possible. Like don't worry about 'ohh is that technically possible?'. Because I can then figure it out. It might be that it's possible, in which case great. It might be that it's like not possible, but there's maybe another way that we can kind of do it that achieves roughly the same goal. And so certainly with systems there is a way to...
PARTICIPANT 3: Yeah, yeah.
INTERVIEWER: Behind the scenes. So even though what you see doesn't look to you in that you know, you know when you're saying you're looking at Signal and you're like, this is not designed for... would you say it's not kind of not designed for a human to absorb or designed for someone in the Home First to absorb that information.
PARTICIPANT 3: Yeah, it's, yeah, it's the layout. It's the, um, and the information, not all the information we need is on that referral itself. So... yeah.
INTERVIEWER: OK, that's useful. And so there is a way, technically, for even if when the way that you see it is a bit of a mess to you and you don't really... it's harder for you to work with. Behind the scenes that information is stored. And so there's definitely a way that we, theoretically speaking anyway, there's definitely a way that that could be passed to another system and then it would just instead of....
PARTICIPANT 3: Yeah.
INTERVIEWER: Yeah, it would just, it would just populate it. I'm not saying this is definitely what we're going to do, but that's definitely something that that could be done, which is the passing of that information. I'm just wondering if that would help?
PARTICIPANT 3: Yeah, I mean anything that would reduce admin because a lot of what we do in terms of the referrals and from Signal and information and then admin to, um, get the referral, get everything onto WCCIS, there is a quite a lot of admin that goes on. So

if I mean if there was anything that would reduce the amount that we'd physically need to do, then yeah, then theoretically I think that, that would that would help.
INTERVIEWER: That's useful. And then also you mentioned that not all of the information that you need is necessarily on the referral. So do you find. . . because when you get the referral, it's come through to your cause. You don't have visibility over it until someone in the ward ticks, you know, ready, ready to go. And then at that point, that's when it shows for you. You're like, OK, we've got a referral to deal with and we need to do the assessment. So the pieces. . . what information do you need to make that assessment? And is it all in Signal or do you sometimes have to kind of ring people or contact people to try and get information that you don't have?
PARTICIPANT 3: Yeah, that's what we have to do. Yeah. So we normally have to ring and get further information. There's quite a lot of tick boxes, um, sometimes it's not for just for just the like some of the therapy referrals, they'll say like why somebody was admitted to hospital, but they're not necessarily doesn't prompt about any like a lot of our patients come out they have had surgery or falls and fractures of what they've had done. I think some of the wording on it doesn't always prompt some of the things that we would need to know for us to determine what we do with that referral in terms of the therapy, whether it's something that a physio could pick up. Obviously, cause I'm a physio or whether one of our assistants would pick up and in terms of care sometimes you know people might request it just as AM PM, lunch, tea. We might need more clarification. So it's just, it's not always like ticking the boxes doesn't always give us the information that we need. Medication is a big thing. Like for the nurses tend to get more involved with about the level of someone's medication. And I think part of the reason with Signal is not all the boxes are mandatory. So sometimes it's we're getting more information because some boxes aren't filled in. So we, we do have the option to. . . and if it, if there's very minimal information we have unticked the box, called the referrer and said we've passed it back to you, but we do find that we do need to contact referrers and ward staff just to get fill in the gaps, really.
INTERVIEWER: Yeah, and how often? How often would you say that you need to kind of go back. So you get the referral and you're looking at it, how frequently is it just like right I've got everything I need, versus, I don't have everything I need. Someone needs to give me more information.
PARTICIPANT 3: Yeah. Um, for our therapy only referrals that come through, we don't often need to do too much with. They tend to be the most sort of the straightforward, to

be honest, we do we contact all of the referrals that are requesting care because of the scrutiny you know with care that we always already have a limited availability for care, we are always phoning sometimes it's not about the information, we might have a really good, clear referral, but we do have to call referrers just to question and ask them about some of the calls and to see whether we could link in with families if they could do that call. So we, regardless of the information on Signal, we'd call everyone. Every referrer the nurses will speak to the ward staff, the nurses on the ward together. And that more than accurate information about medication, skin integrity and therapist will often want to get a bit of an idea about what we're going to be needing to do on discharge. So I would say all of the care referrals, there's a lot of phone calls that do go on.
INTERVIEWER: OK. So do you think that it's always going to be the case. So are there instances where it doesn't matter what's in Signal, you're going to have to go back, or do you think that there are maybe ways that we could reduce the amount of back and forth?
PARTICIPANT 3: Umm. I think, well, the more... remember when we first came on to Signal, we were told they were going to be lots of mandatory fields that need to be completed. Uhm, I don't think there are that many mandatory fields that are being completed because we always said that would help, because we did this information that we definitely need to know. It would limit it if we have a really good full referral then it would limit the amount of fact finding phone calls that we would need to do, but it wouldn't eliminate all calls. But that's just part of our screening process that we need to involve the referrer and family members. Umm. But yeah, I guess for me, maybe it's the mandatory... there can't be very many mandatory fields because we get referrals with very, very minimal information on them.
INTERVIEWER: So is it a case of there were fields that you believed at the beginning should have been mandatory and then obviously in practice, when you're getting those referrals, there's less information because obviously I think from the ward point of view, I'm not sure if maybe this might have changed for version three, but I know that really the thing that makes the referral go is that final tick box saying we're ready to send this referral. And so it would, yeah, it's difficult to know to what extent that... you know forcing... cause I appreciate everyone's busy. You're trying to care for patients and your primary job is frontline patient care. And so sometimes you don't necessarily and they don't necessarily have the time to update it. So do you always know who to contact? So

when you get a referral and it comes through and, say, you do need to go back because you need to speak to someone about something. How easy is it for you to find that person?
PARTICIPANT 3: And it is on, it's on Signal, the referrers on there is only sometimes. I think it just allows you to write it in. So there isn't. . . there might be a name, but not always like a number. Umm, but there is the box of like who's referred the patient. So that doesn't tend to be. It's more trying to get hold of it. You know like day-to-day. If someone on the ward, trying to actually get hold of that person, that if they are out in with the patient but yeah there is a box. So that's the, you know, we do know who we need to contact for the referral.
INTERVIEWER: OK. And another thing was you mentioned that there's a monitoring, or maybe [Name] mentioned this actually, it was one of you that mentioned that the monitoring. . .
PARTICIPANT 3: Yeah. We've got the monitoring, yeah. Yeah. And how do you find that process? Because do you have to? Do you get any notifications? Yeah. Do you know how to try and find where that this happened?
PARTICIPANT 3: No, no. So when we first moved on to Signal, that was a learning curve because we didn't realize that when we accept people into whatever they go in and they move into the monitoring tile, that they will stay in there. And even when they're discharged, they will just say discharge next to them. So it was, it is like a daily, like a manual. Again, not BSO was we didn't have BSO initially, but they keep an eye on that box. And when people have left the hospital and they will go in and discharge the patient. So if it is a bit of a manual task.
INTERVIEWER: Yes. So I'm interested to understand from you kind of when people. . . when people have moved, when people could be cleared from Signal, for example, there's no need for them to be there, do you still see them?
INTERVIEWER: Yeah.
INTERVIEWER: OK.
PARTICIPANT 3: Yeah, you can. And the reason you can is because I think if they were on a hospital ward and they were discharged, they'd be removed from Signal. But because they've been put into the H2H tile and they'll still be on there until we close them. But it does no, it does know that they've been discharged because they'll be a discharged sort of next to the patient's name, but they because they're sitting within our hospital to home, we still have to remove them from the system.

INTERVIEWER: Yes, I would it be useful if, for example, say someone had this this, let's call it a status. Say someone had the status of discharged and so they're currently sitting in with other patients, you know, so it's like you're having to kind of comb through. So would it be useful for those to actually come in somewhere in once it moves to that point for it to actually it to be somewhere else and not, you know, where you're working and the screen that you're working within? Is that something you think might be useful?
PARTICIPANT 3: Umm. Again, yeah. Anything that's going to free up us having to go through and check things. I'm just getting Signal. I've just to see if there's anyone in there at the moment that's discharged but, yeah, I mean, if there was anything that would limit the amount of things that we have to do, you know our admin sort of tasks.
INTERVIEWER: Sometimes someone's on hold because it needs to be updated at the kind of ward side, right? And we've talked about how you have to comb through to find... so for example, someone on hold, you've gotta physically go through everybody, every patient multiple times, presumably a day to see if anything has changed for that patient, is that currently the situation?
PARTICIPANT 3: If they go on, if they're on hold with us, this usually you know we're trying to find out something, you know, we're waiting on information. Is there someone on there now that's discharged but he's gone home. Sorry. In the monitoring box and it just says it either says patient status, inpatient or discharged. So he's being discharged from hospital but he's still on our system until we physically go in and we have to select more like monitoring complete and discharge, we just physically have to go in and remove from the system, there's a few of them in there.
INTERVIEWER: Yeah, I'm wondering if it would be useful to, like we said, if that status of discharge happens, to actually move it somewhere else. So if someone could go and do that in like a batch job, if you're not, I mean so like... obviously being discharged and multiple points throughout the day and that is that in real time being updated in Signal.
PARTICIPANT 3: Yeah, yeah, it should be by the ward. Hmm.
INTERVIEWER: Yeah. And I'm just wondering if something needs to happen to only those discharged patients and they're not actually, are they at that point, they're not on hold anymore?
PARTICIPANT 3: No, they're not on hold at the point that they're in the monitoring box. When they're when they're in monitoring, we're literally waiting for them to leave hospital so that we're monitoring them. Sometimes something happens, they become not medically

fit and then we have to send the, you know, we would discharge or send the referral back ready for them to re refer when they're medically fit or they're just waiting for, you know, for their discharge. So they're just held there until they've left hospital and then that's where, at this point, we're using WCCIS. You know, we would use our system then.
INTERVIEWER: So when something, when someone, needs action, what would be useful? It's like all these people need me to actually, you know, I need to pay attention to these patients because this is what needs to happen to these patients, rather than you having to kind of comb through. Is that something that you think might help?
PARTICIPANT 3: Yeah, I mean because like you said, we don't get any notifications on Signal also like, you know, notifications would be great if we were told that this person... because what we find that we have to do sometimes, it is dependent on somebody having discharged them because what we do find is that we have to use, like, the clinical portal just to go in just to see, actually, is the person still in hospital? Or has the person been discharged? So again, that's something that our BSOs do when they monitor this box they go through. And they might need to use. They might use the portal to check. Notification that if there were notifications, yeah, potentially that would be helpful to say that this person has been discharged.
INTERVIEWER: Mm-hmm. Because that's the point at which you need to do something. Is that right? So, at the point at which.
PARTICIPANT 3: We just, yeah. And again it's an, it's almost like an admin job for us just to yeah, we know that they've gone home, we can close them on Signal from that point, everything's on WCCIS for us. Yeah. And it's for our data collection, we do keep the dates of discharge of these people. So, I guess for the BSO it would help.
INTERVIEWER: Yeah. So, it would help them to do that job. Obviously that that presumably the ones that going through this as part of their daily job is trying to kind of comb through that.
PARTICIPANT 3: And yeah, since we've had BSOs, because initially it was just therapists and we would do all of this. So, our BSOs that we've got in Home First at the moment will get, will go into the awaiting MDT assessment, and will go into the person. They'll do all the copy and pasting of the information we need onto our, sort of, format and then does use it to move people into monitoring. [They] monitor the monitoring box and then move them to discharge and are quite heavily involved from this side, again,

from the receiving of a referral and they'll also and take a referral and send it back if it's not appropriate and contact the referrer.
INTERVIEWER: Yes so can you send it back? So, for example, say you get a referral and it's like, you know, either this needs more information or it's not quite right and it needs to go back. Can you then send it back to the ward?
PARTICIPANT 3: So yeah, what we do, again, is it is quite. . . with Signal, it's all about ticking and unticking boxes, isn't it? So, we would just go into the referral complete where they've checked the box on the ward and we would untick it, which then just moves it back to the to the box before. So, it would move it back to the awaiting referral. So, it'd be sat there ready for the ward staff to go into that tab re-pick it up and adjust it.
INTERVIEWER: Yeah. And obviously they would have to, they don't get a notification either. So they would just have to kind of notice that something is there.
PARTICIPANT 3: Yeah, or, we phone them. We would always phone them just, but yeah, they wouldn't get a notification otherwise. So, we do have to phone them.
INTERVIEWER: But I wonder if maybe.
INTERVIEWER: A notification, I mean this is maybe something to speak to the ward teams about, but I wonder if them getting a notification would save a phone. Like obviously wherever you can save time is useful in terms of, you know. . . currently when everyone works, everyone's interacting with systems. So, like you know, people interact with Signal and WCCIS and we're using Teams now. We're always using technology. But I think it's really important that it has to work around what you do because. . . especially with Signal, because Signal is a bespoke piece of software, is like we can't change how Microsoft Teams works because that's left up to Microsoft, whereas with Signal it's an, it's an internally developed Swansea Bay system and so there is more flexibility to kind of if it's seen that there's a need for something.
PARTICIPANT 3: There is one thing I've just thought of that is that we do that they can be a bit of an issue. So we always get just an e-mail notification to our generic hospital discharge inbox when a referral has come through on Signal, it's just a snapshot to say, doesn't say the patient'spatient's name. It says a few details from Signal just to alert just that something has come through on to Signal and that's because we always used to use the hospital discharge. It was an e-mail because before the days of Signal for us, and for areas like ED that can't use Signal, they have to send a paper format through to the e-mail box. What we do find on Signal is for those patients that we've sent back to have more

information when the tick box is re-completed it will just turn back up, we don't get an e-mail notification and we don't get any sort of notification that they've arrived back with us. You just have to like sort of. . . and if the referral was a week or so, days ago, they could be further down the list, so if we do have in Signal sort of eight, ten patients we wouldn't be notified that that person has now come back to us. It relies on us making sure that we'll keep checking Signal, and that we know everybody that's on there or we're in the middle of screening them. So again, just because we've talked about notifications, that's something that we do have to be careful not to miss anyone, because. . . I don't know why it is, but because they've maybe we've had the notification the first time and we send it back, we don't get any other notifications that it's actually turned back up with us.
INTERVIEWER: Obviously, if it goes back to them, they're not. Ahh, you uncheck it and check it again, don't you? So you would uncheck. It would go to them and then they would check it again. But there must be some trigger that only happens when it's the first. When it comes to you the first time and then if it goes back and comes back, that doesn't trigger anything. So that's really useful.
PARTICIPANT 3: If we had a notification and say, let's say that this, you know, this person is now being completed and we've sent them back to you. Umm, I mean the idea is that we don't have a lot of people sat in our Signal because we're screening them and processing them quickly. But obviously sometimes you get influxes of referrals, just, it's up to us really to keep on top of everybody that is sat in Signal for us.
INTERVIEWER: Yeah. That's all excellent and really useful. I know we have almost run out of time, so just to let you know, kind of, what I'm going to do next. As you know, so obviously everything that we talked about has been really useful, and it's certainly going to help me to design some mock ups of where I think changes could be made. And then I would like to send those mock ups to you. Just I'll send it along with the questionnaire and just saying hopefully should take, you know, 10 minutes or so maybe just for you to look at the designs I've made and kind of feedback on them and say whether you think it will help, whether this is not going to help at all, or whatever feedback you've got, but that would just be done electronically and you wouldn't have to dedicate another hour talking to me. But yeah, so that's all the next steps. I don't know if you have any questions or?
PARTICIPANT 3: No, I think so. I think no. Nothing I can think of and I at the moment.
INTERVIEWER: Thank you so much, [Name]. I'm just going to stop. I'm going to stop recording.

A.3 Focus Interview Three

INTERVIEWER: OK, so I think that's now recording and transcribing. Yeah, it looks like it is. That's great.
INTERVIEWER: So, [Name], are you are you employed by a do you have a .gov e-mail address rather than an NHS one?
PARTICIPANT 5: Yes, I I'm employed by Swansea Council, yeah.
INTERVIEWER: Ok great, so I've had discussions with various people at Swansea Bay and also those that work for Swansea Council about Signal and the way that the home first team use it now. After these discussions, I'm going to create some prototypes that are kind of different ways of maybe looking at Signal and using Signal to do your job and so. Those prototypes that I create are going to be really informed by a lot of the discussion that we have. So, can you just quickly outline for me what your job is in that in that Signal process? So what is it that you do? I'm aware that you're a Business Support Officer, which I think they call a BSO don't they? Yeah. And so what does that actually, can you let me know, kind of what that involves, really?
PARTICIPANT 5: So I help our screening team with referrals. So basically we take this referral through from Signal and I need to copy and paste information from the referral on Signal to our special triage screening form. So I use information from Signal, copy and paste it to special form. Then our screening team are working with this referral and they after that they make a conclusion on what to do with this patient. So after that I have to accept referral on Signal and upload all data to a different system, WCCIS. If you know this.
INTERVIEWER: Yeah, I've heard of WCCIS. Yeah.
PARTICIPANT 5: Yeah, yeah.
INTERVIEWER: So with that, is it that currently it's manual? So currently it's like you've got to physically copy and paste that information, is that right and how much information is it? Is it quite a lot, is it quite time consuming?
PARTICIPANT 5: It takes, I don't know about 5 to 10 minutes to copy and paste all information. If I copy and paste information from the program, it's much, much, more longer because I need to copy and paste every single, I don't know, phrase. I can't copy and paste a whole page from Signal. I can copy and paste only words and phrases because it's structured, you know Signal, it's structured.
INTERVIEWER: Yeah.

PARTICIPANT 5: And I receive notifications to my inbox, and copying and pasting using this notification, it's much easier. It's much quicker for me, yeah. But just an idea for me it would be much better if I could upload the paper the paper referral from Signal.
INTERVIEWER: Ohh so is it like the notification that you get from Signal has a bunch of information in that in that notification, and that's what you use. So you don't actually use or you.
PARTICIPANT 5: Yes, yes, yes.
INTERVIEWER: OK. So you get the notification comes in and it's an e-mail. And so from Signal as the e-mail and that's got some information that you use to transfer over to, is it straight into WCCIS or does it does it have go somewhere else first and then into WCCIS?
PARTICIPANT 5: No, it's a special screening form, just the like a paper form. I can share my screen and I can show you if you want. Yeah. Yeah.
INTERVIEWER: Yeah, sure. That would be really, really lovely.
INTERVIEWER: There we go. Yeah, I can see your screen now.
PARTICIPANT 5: So this is Signal. For example, this lady. This is our referral form which I need to fill in.
INTERVIEWER: OK.
PARTICIPANT 5: So if I use uh Signal and I need to copy and paste every. Piece of information like that. I can't do it like that.
INTERVIEWER: Yeah, yeah, I see what you mean because it's, the formatting is difficult.
PARTICIPANT 5: Yeah. So I can do only very slowly.
INTERVIEWER: OK. And so this form, once you filled it in with all of the information that you need to transfer the patient, what happens with this form?
PARTICIPANT 5: After I fill in this form, I upload it to a special channel on Teams and the screening team, uh, check in all the information and call to the ward, to the nursing team. So they are working with this referral, checking all information and they decide what to do with this patient, basically.
INTERVIEWER: And then presumably they come back to you and say whether it's accepted or.
PARTICIPANT 5: Yes, yeah, yeah.
INTERVIEWER: Rejected. Are you able to let me know, just a kind of, doesn't necessarily have to be everyone that works on that team, but the type of people that are on that is? So that's the MDT assessment, yeah.

PARTICIPANT 5: Yes, yes, yeah.
INTERVIEWER: Yeah. So can you let me know kind of the types of people that are on that team? So is it social workers, is it?
PARTICIPANT 5: No, it's a therapist. It might be an occupational therapist or physiotherapist. So our team it's about, uh, three people. Usually it's OT or physiotherapist, and the nurse, and then usually it's me.
INTERVIEWER: OK, perfect. So that's really useful. And then so they will come back to you, and do they just just kind of message you back on Teams to say so and so is accepted or?
PARTICIPANT 5: Now I can show you a ready complete referral if you want, one moment... So this all this information is from Signal, but further they put their own information, mental capacity issues, medication needs. It's from the nurse. This is from the nurse...
INTERVIEWER: OK, so this this this bit, so some of this is not in Signal. Some of this is like a response from the nurse, based on the referral, saying, based on the information that you've sent me from Signal, this is the recommendation that I have for the package of care, for example and the and the medication and things like that.
PARTICIPANT 5: Yes, yes and.
INTERVIEWER: Yes, OK. So that's useful.
PARTICIPANT 5: And at the end this is the outcome. So this patient is going for a one single call a day. I am, it's a in the morning. Ohh no 3 calls actually AM, tea time, and bed. So this patient is for care and for therapist OT for right sizing. And so this is completed referral after that I need to upload this referral to WCCIS.
INTERVIEWER: OK. So it's at that point. So let me just check that. I understand the flow correctly, so you get a notification from Signal saying that there is a referral ready to be processed.
PARTICIPANT 5: Yeah, yeah.
INTERVIEWER: You then log into Signal and you've got that very tabular view or you might take the information from the e-mail if everything is in there.
PARTICIPANT 5: Yes, yes.
INTERVIEWER: So is it... that e-mail does that always contain the information you need or do sometimes you need to go into Signal, or to sometimes you need to contact someone else?

PARTICIPANT 5: No, problem number one. It's not always that I receive messages, sometimes I don't, so I need to check Signal anyway every day, because I need to, I need to know that we have all referrals that are in Signal.
INTERVIEWER: Yeah.
PARTICIPANT 5: Problem number two. Uh, when I receive the notification, it's not always all information that I need in this notification, so I need to check Signal anyway.
INTERVIEWER: Yeah, I see that. You get this referral; it comes in as an e-mail and it's in Signal. And sometimes you'll have to kind of coordinate between the two or maybe even contact someone else potentially. Then once you have all of the information and you can fill in this form, this MDT assessment form, that then goes to a Teams channel and is reviewed by the MDT assessment team, who then make their recommendations for the package of care and then it comes back to you.
PARTICIPANT 5: Yeah.
INTERVIEWER: And then you transfer that information into WCCIS? Is that right?
PARTICIPANT 5: Yes, that's correct. Yeah.
INTERVIEWER: Perfect. So, so now I have. Because that's one thing that I've been trying to do is trying to get a real handle on exactly how, how this works from your perspective, you know what do you do because obviously the wards use Signal a lot. But it's primarily for kind of administering stuff in the wards and then the referral then comes to you, and it's kind of knowing what happens after that point, because I think there are definitely ways that Signal could be improved.
PARTICIPANT 5: Yeah.
INTERVIEWER: So thank you for that. It's really, really useful. Let me share actually no, let me share my screen again. Uh, where is it? There we go. And we'll share the Signal presentation again just for the prompts. Really just to get make sure I'm not missing anything. I want to talk to you about so OK. We've just done that kind of walk through, so bullet point number two there, that walk through the patient flow journey, that's kind of what you've just, I mean it's not the patient flow but that's the flow of the referral and obviously that's integral for the patient flow.
INTERVIEWER: You mentioned that sometimes you don't get the notification, or you know you only get a notification when it's a brand-new referral. Is that correct? Yeah. So if anything's happening with that referral, there's no reminders for you. There's no notifications to you. Do you think that having more kind of notifications or even logging

into Signal? If you could see better what's changed and what needs your attention, would you find that useful?
PARTICIPANT 5: Yes, yes, I would. Definitely.
INTERVIEWER: That's useful information. And at the moment, do you use Signal on a desktop?
PARTICIPANT 5: Yes, yes.
INTERVIEWER: Are you happy with the desktop situation, or would you prefer for it to be, you know, a different medium to see it, how do you find using the desktop?
PARTICIPANT 5: No, I use Signal only my on my laptop and I don't need to use the iPad or phones. Maybe it's more appropriate for people in the hospital, but not for me.
INTERVIEWER: Yeah, no, certainly that's something I thought you might say. So that's really useful. OK. So moving on to that third question, we've got that how do you do it? And then how do you know we have a referral, we've just talked about that. We've talked about the medium. So we talked about how you see the information, you're happy to see it on a desktop computer just on a computer screen.
PARTICIPANT 5: Yeah.
INTERVIEWER: You have mentioned that you don't necessarily have all of the information that you need when you get that referral. So can you maybe talk me through a bit? What are the types of information that might be missing? And if there is missing information what you do to kind of correct that?
PARTICIPANT 5: There is always missing information if the referrer put it in a different box and I can't see it on my notification. So if we're going to Signal and the referral I need the bit about appropriate referral but you can see this bit is, well, quite big. And this information I can't see from the notification, maybe because it's too long, I don't know, but I always need...
INTERVIEWER: So you always need to come in and get this information from Signal, yeah.
PARTICIPANT 5: Yes, yes. And also medication management.
INTERVIEWER: OK, so when you come into Signal now like you've got this view...
PARTICIPANT 5: Yeah.
INTERVIEWER: Do you ever find that they're that they're still information missing, even from this view, even if you come in this way? Or do you usually have everything you need?

PARTICIPANT 5: Usually I have everything, but if the referrer put bits of information to this field, notes patient goals. There is no, so I always need to check this piece of the referral on Signal.
INTERVIEWER: So a patient that might be ready to be referred, might then not be ready to be referred, if you know what I mean, so sometimes, you know, maybe they have a fall, maybe they're ready to come out of hospital, but then they take a fall and then they're not quite ready to come out yet. So what do you do in those circumstances? Do you just? Does it just get left in Signal? And then you just have to wait until...
PARTICIPANT 5: You mean if the patient is not medically fit?
INTERVIEWER: Yeah. So if maybe they were medically fit, and they made the referral, but then the next... say on Tuesday they make the referral and the person's fit, but Wednesday they have a fall and then they're no longer, you know they need to stay in for a little bit longer. How do you handle that from your perspective, once the referrals come in to you, how do you handle that?
PARTICIPANT 5: We untick this referral and send it back, so I removed this click. Answer yes, yeah.
INTERVIEWER: Uh, OK, yeah. And that will send it back to the ward. OK, if you do that, do you then lose sight of this, or can you still see it, or does it go from your sight? You can't see it anymore.
PARTICIPANT 5: I think I can see it here, but I'm not sure.
PARTICIPANT 5: Yeah, yeah.
INTERVIEWER: Also, because this is version 2, isn't it that we're looking at whereas they're moving to version 3 I think in September.
PARTICIPANT 5: I think I can see it here awaiting referral, but I'm not sure.
INTERVIEWER: So that's fine. OK, so you've done, you've sent it back and the ward need to do something. They do what they need to do and then they send it back to you.
PARTICIPANT 5: Yes. And then when they send it, I won't receive the notification again.
INTERVIEWER: Yeah. So this is something that's proving to be a problem, which is, you know, you'll get the first notification, but then any subsequent... it's come back to you, you have no idea. So you have to physically go into Signal.
PARTICIPANT 5: Yeah.

INTERVIEWER: Am I right in saying that you have to physically go into Signal and kind of check on the status of every patient manually yourself and remember what's happening with those patients. Would you say that's correct?
PARTICIPANT 5: Yeah, that's correct.
INTERVIEWER: Do you find that an issue then?
PARTICIPANT 5: Yes, it's quite the issue, yeah.
INTERVIEWER: OK, great. And then another thing I actually wanted to mention. We've talked about how it's really important that you have the right information to be able to do your job. How do you feel about the way that it all looks on Signal is it enough information? Is it too much information? In some cases, you know, how do you feel about when you're looking at Signal and looking at a patient, do you do you find it easy to kind of go through each patient and find what you need to find?
PARTICIPANT 5: We'll have, uh, all basic information, but it depends on the referrer because sometimes people just don't put all information that they need to put.
INTERVIEWER: And then would you send it back to them then? Is that when you'd untick and send it back?
PARTICIPANT 5: We usually, yes. Usually we send it back, yeah.
INTERVIEWER: Do you do you get to put any notes to say why you sent it back?
PARTICIPANT 5: Yes, there is a not a very, I don't know, good thing at the moment because I don't have any field to put, uh, my comment, so I need to use like a basic field where information is about the patient and it's not right, I think, to put my comments in this field.
INTERVIEWER: So you're currently putting them in somewhere else that just because you have to.
PARTICIPANT 5: Yeah so if for example, this referral is not right and I want to send it back for some reason, so I usually. I usually do like that, so this is the reason for the referral. Not appropriate, for example, so my comment, so I put it here.
INTERVIEWER: So do you think, and obviously that's not really what that box is intended for. So what you're saying is you'd rather have a kind of, when, if you say you untick the referral thing and Signal knows you've unticked and you're sending it back, if then a box appeared to say why are you sending this back?
PARTICIPANT 5: Yes, it would be great. Yeah, yeah.
INTERVIEWER: OK, so that's great. Let me just have a look at my prompt questions to make sure there's nothing else that I want to talk about. I mentioned this already actually.

You know, if so, when you get that referral, you're having to go into the referral e-mail and also Signal to kind of gather the bits of information that you need.
PARTICIPANT 5: Yes. Yeah.
INTERVIEWER: The views that you see. So for example this view here. So you've got a person. Do you need all of that information? Do you use all of that information?
PARTICIPANT 5: Uh, you mean all information from the referral on Signal? INTERVIEWER: And columns of information and then obviously when you click in you end up with this kind of form like you've got here. This form-like view. Do you need all of the information that's on this form?
PARTICIPANT 5: I would say 90
INTERVIEWER: 90
PARTICIPANT 5: No, I would say 90
INTERVIEWER: Yeah.
PARTICIPANT 5: The tag details obviously address and NHS number name, so everything from here I need.
INTERVIEWER: Yeah. So you would say from your perspective that actually it's a lot of information, but you need, like 90
PARTICIPANT 5: Yes, yeah, yeah.
INTERVIEWER: Another thing that I was going to mention.
INTERVIEWER: So we we've talked about how you're having to manually transfer this information from Signal or from the notification e-mail into that form. That MDT assessment form.
PARTICIPANT 5: Yeah.
INTERVIEWER: Would you? I'm just kind of thinking off the top of my head actually about the ways that we could maybe make that better. Would it be useful to you if you could? If Signal could take care of completing that form for you?
PARTICIPANT 5: Yeah, yeah. I was going to ask you about this. Yeah, it would be very helpful if I could upload this. I don't know, ready-made form in Word, which I can, umm, I don't know. Not like a picture, definitely, but in Word document Microsoft Word.
INTERVIEWER: Yeah, but if you could get, yeah, if you could, cause obviously the nurses then have to still fill in their bit don't they? So obviously, but if you could, rather than you having to go through and collate all of the information that you need that goes on that form, would it be useful if that form was kind of built into the Signal referral, if that

makes sense? So by the time you got it, you had that, and you could just then pick it up then and send it along for the MDT Assessment.
PARTICIPANT 5: Yes, yes, very much.
INTERVIEWER: OK. And let me just check, I think we've covered a fair amount. Is there anything that off the top of your head that we haven't talked about that that maybe, when you use Signal winds you up or drives. You know when you're using a system every day, and you're like "I wish you could do this" or "I wish you could do that". Is there anything that kind of springs to mind that you where you feel like Signal doesn't meet your needs.
PARTICIPANT 5: Yes, you know, I deal with two systems WCCIS and Signal and when I got my access to WCCIS, before that I had quite a long training day. I don't know. Maybe because WCCIS is more complicated, I'm not sure, but I didn't have any training on Signal. So just someone showed me how to copy and paste this referral. That's all. And for me it would be helpful, I don't know to have, uh, like a training with Signal, because I'm sure there are many, many functions that I know at the moment. So I would like to receive a training, maybe I don't know for an hour for two hours, I don't know.
INTERVIEWER: You bring up a really good point. Very useful feedback.
PARTICIPANT 5: Yeah, because I'm an admin, I often receive a questions from the hospitals on how to create referrals and, from my side, I have no idea how to create referral, but because I only receive referrals but I would be very happy to help people from another side to how to create the referral so I don't know it just. Maybe just me, but.
INTERVIEWER: The only way that you can create a referral on Signal as it stands, as far as I'm aware, is if that patient is already a patient on a ward. So they should already have a record.
PARTICIPANT 5: Yes, yes, it's lack of training, yeah.
PARTICIPANT 5: Yeah.
PARTICIPANT 5: Yes, yes. Yeah, yeah.
INTERVIEWER: And so that thing I've mentioned, do you ever process anyone that's coming from a different area? So say someone needs to be referred for home care in Swansea, but they are currently in hospital in like, you know, another place that isn't Swansea Bay. Do you handle any of those referrals or is it? Is it just the ones that come in through Signal?
PARTICIPANT 5: No. Occasionally we receive referral created, probably by mistake, from different, I don't know. Umm. See, just for an example from Port Talbot or somewhere else, but we can't accept this referral because we only deal with patient who live in Swansea.

We don't deal with patient from Port Talbot or Carmarthen. In this case, I just as I said, untick them and some send them back.
PARTICIPANT 5: Can I show you what? Yeah.
INTERVIEWER: Anything else? Anything else you want to bring up? Yeah.
PARTICIPANT 5: Probably you know about this, but about week ago Signal has changed. And before I was able to see only referrals for our home first team rapid discharge, but now I see all referrals from every pathway.
INTERVIEWER: And obviously that's not useful for you because you're only concerned with the referrals that matter to you.
PARTICIPANT 5: Yeah, 176 referrals from all pathway. I noticed because people still not sure how to use Signal properly, they can create referral and send it to another pathway by mistake and my worry is that we can lose this information if it's under another pathway and no one pays attention, so it's not very good that, yeah.
INTERVIEWER: This still that you're looking at is what they call Signal version 2, which is they've obviously made an update because, like you're saying, it's changed slightly so the view that you see now is the view of everyone and you've got to filter it down.
INTERVIEWER: Which isn't ideal because it really should know you're only interested in, am I right in thinking you're only interested in certain pathways in Swansea?
PARTICIPANT 5: Yeah.
INTERVIEWER: This version of Signal that you're looking at will change in, I think in September.
PARTICIPANT 5: OK.
INTERVIEWER: When they move to version 3.
PARTICIPANT 5: OK.
INTERVIEWER: So it might just be that's a temporary thing and that when they move to version 3.
PARTICIPANT 5: Yeah.
INTERVIEWER: You will only see the ones that are relevant for you again.
PARTICIPANT 5: OK.
PARTICIPANT 5: It would be better.
INTERVIEWER: But I'm not certain
PARTICIPANT 5: Yeah, just my worries is because I filter at the moment for pathway to support the discharge with required new package with care. So I deal only with this

five referrals, but if someone from the hospital create referral not under this pathway but different one by mistake and I won't see it and...
INTERVIEWER: Uh, so you're worried that you're worried? It's kind of lurking in the system somewhere that you're not going to know that it's there.
PARTICIPANT 5: Yes, yes, and unfortunately I'm not able to check 176 referral to find this.
INTERVIEWER: No. Ohh yeah. And even then, even then, even if you found one you how can you be sure that it's not incorrect and you know, how can you know whether it's definitely incorrect or correct? So that's all really useful information, and that's definitely going to be something that informs what I do next with this. Now one thing I should mention is that Signal, the current Signal that you see, and version three that's coming out in September. Everything that we talked about isn't going to change in those versions of Signal because we're thinking a bit longer term. You know, all of the stuff we're talking about. Yeah, is really just to inform maybe development going forward.
PARTICIPANT 5: Yeah, I understand. Yeah. Yeah, I understand.
INTERVIEWER: Yeah. So the next steps for me. I'm going to transcribe what we've talked about and all of the things that you've said and all the problems that you've raised, which have all been really, really useful. Thank you. Once I've done that, I'm going to create prototypes of new views of Signal, so new ways that it could look to help you do your job better and what I would like to do in the next, they'll be ready in the next sort of two weeks. And what I would like to do is to send them back to all of the people that I've spoken to. So you and anyone else I've spoken to as part of this study, just so as you can just see what I've mocked up now. It won't be the system. It will just be a mock-up of what I think the system could look like. And then what I would like to do is to get your feedback on that. Is that something you'd be happy to do is just take a look at some of these prototypes and feedback to me as whether you think they'll help?
PARTICIPANT 5: Yes, yes, definitely.
INTERVIEWER: Brilliant. Brilliant. OK, so...
PARTICIPANT 5: Sorry, sorry. So sorry to be a pain. Can I can I mention one more problem?
INTERVIEWER: Yeah, of course you can.
PARTICIPANT 5: So I use Signal at the moment on my NHS laptop because I have two. I use Signal on my NHS laptop. If I use Signal on my Swansea Council laptop, it's a real problem because first I need to upload another program, Citrix Receiver to all.
INTERVIEWER: Yeah, so you get the VPN.

PARTICIPANT 5: Yes, to open the Signal and I can't do it straight way. It's a, it's a process, so using Signal on NHS laptop it's, it's straightforward. I clicked, I opened. That's all using Citrix Receiver, it's a it's a pain and I stopped doing this because sometimes it's not opening at all, sometimes. And also a very strange problem. If I use Signal on, if I open Signal and use it on my Swansea council laptop. Uh, I don't know how to explain. So for example if I put my mouse here. It's like moving a little bit so to open monitoring I need to put my mouse here for example.
INTERVIEWER: This is actually where you're selecting...
PARTICIPANT 5: Yeah, if I need to open awaiting MDT Assessment, I need to put my mouse here and click and then I'll open MDT assessment. So so it's...
INTERVIEWER: How do you know where you need to click? Is it you just learned, you just learned?
PARTICIPANT 5: From, yeah, yeah, just learned.
INTERVIEWER: So it's like if you need to click somewhere new. You wouldn't know where to click.
PARTICIPANT 5: No, no.
INTERVIEWER: You'd have to try and figure out what you need to click? OK, well, that's interesting. But yeah, so that's on your Swansea Council laptop, yes?
PARTICIPANT 5: Yes, it's on Swansea.
INTERVIEWER: We've got two minutes left. Do you have any other any questions or anything for me just while we've got 2 minutes or?
PARTICIPANT 5: No, I think we're covered.
INTERVIEWER: It's really important that if, when we're thinking about systems that we talk to, the people that use them because they will be the people that have a lot of insight and we need to, you know, they'll know where things aren't working or where things could be improved. So thank you very much indeed for sitting with me and talking through all of this.
PARTICIPANT 5: OK.
INTERVIEWER: And yeah, if you if you could feedback, I would love that. I'd be very grateful.
PARTICIPANT 5: OK, that's great. Yeah, I understand.
INTERVIEWER: Fabulous. All right. Well, thank you so much for talking to me today. It's been really, really useful and like I said, what we talked about isn't going to change

Signal in the short term, but it might help. It might help in the longer term. So that's what I'm hoping and, but yeah, alright. Well, thank you so much for your time. Take care and I will be in touch soon.
PARTICIPANT 5: Yeah. Thank you. Thank you. Take care. Bye. Bye. Bye bye.

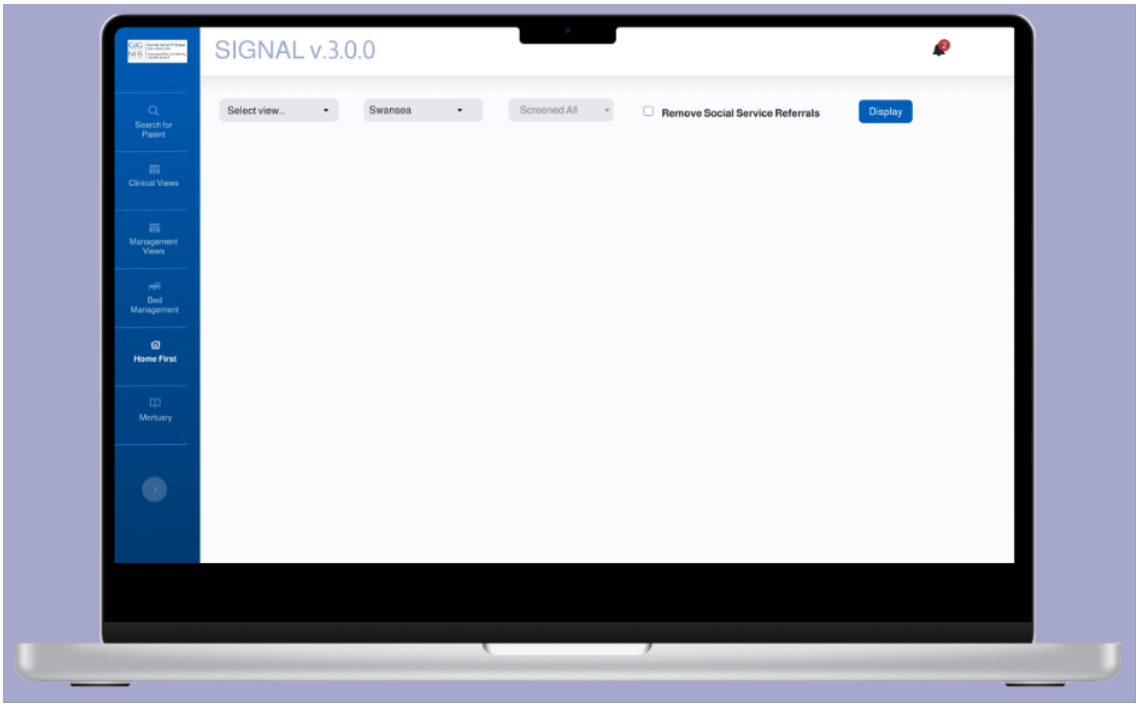
Appendix B

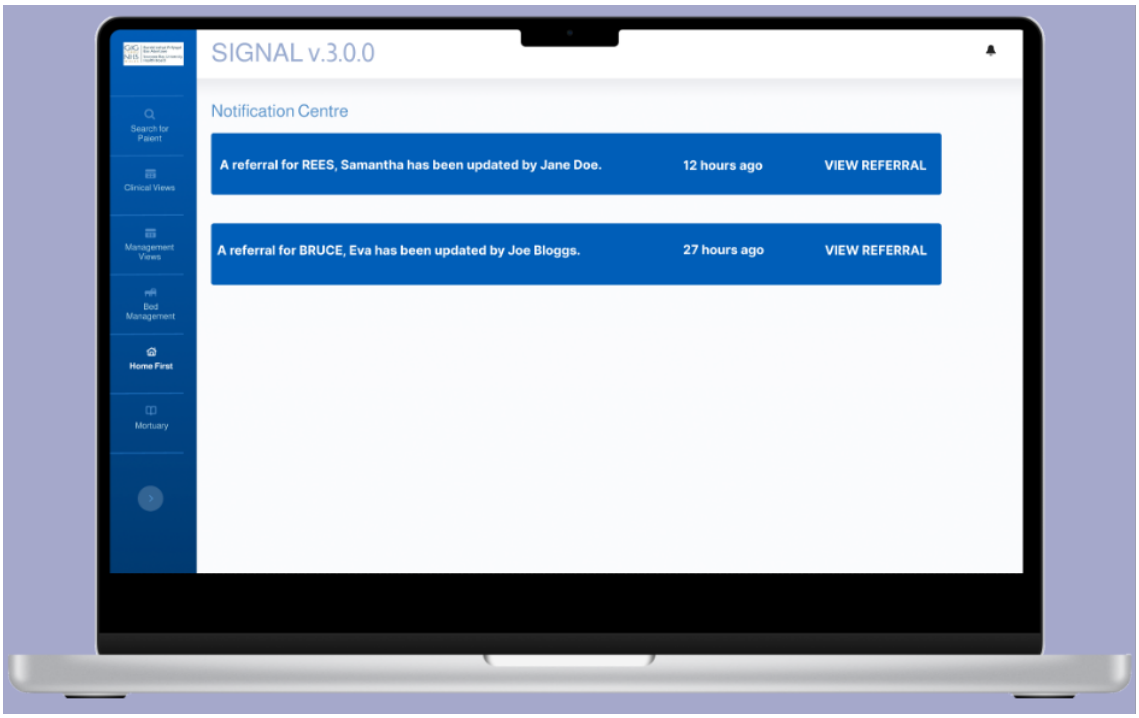
Prototypes

B.1 Prototype One

Figma: CLICK HERE

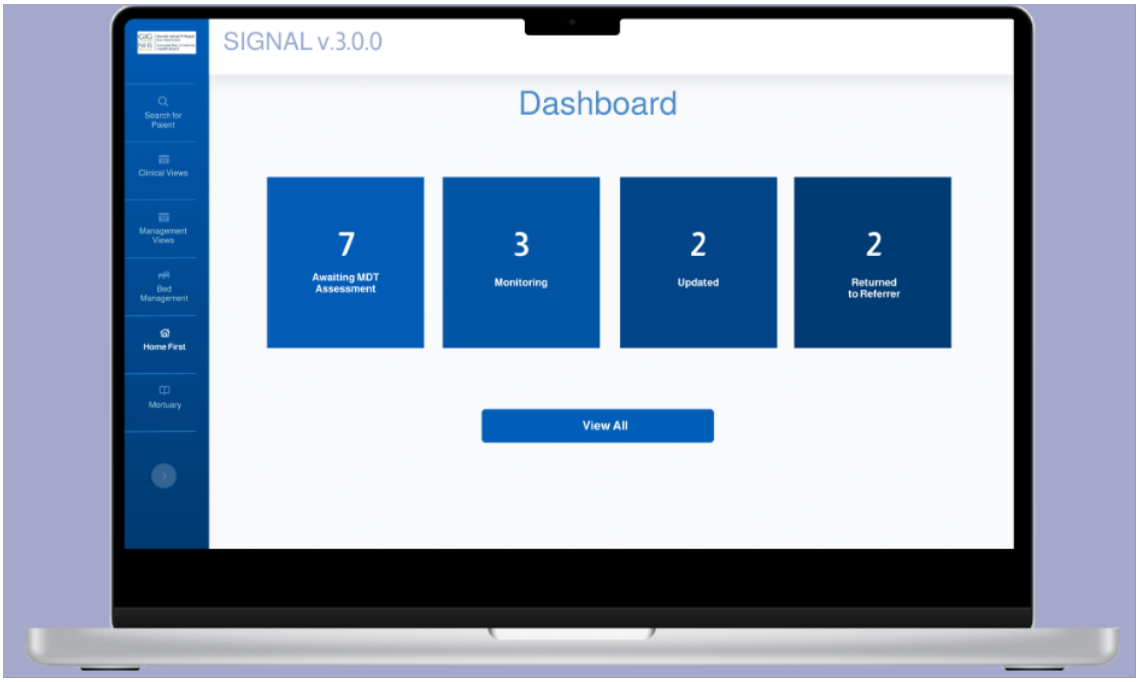
B.2 Prototype Two

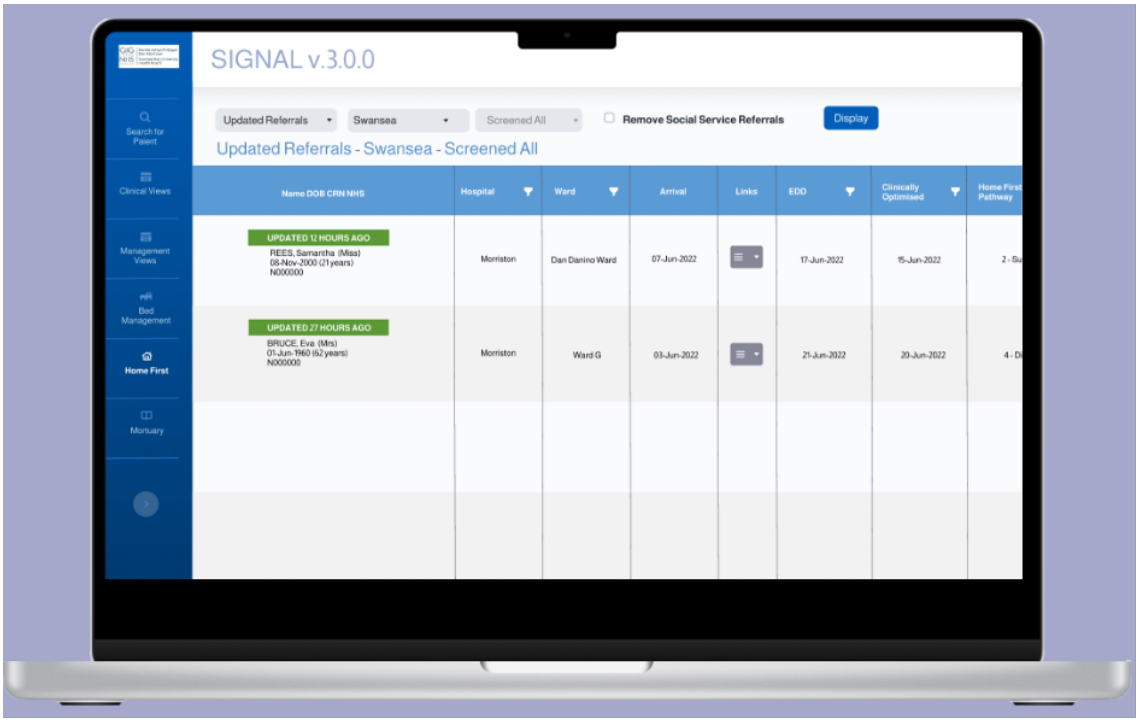




Figma: CLICK HERE

B.3 Prototype Three





Figma: CLICK HERE

B.4 User Guide

Prototype Review Guide

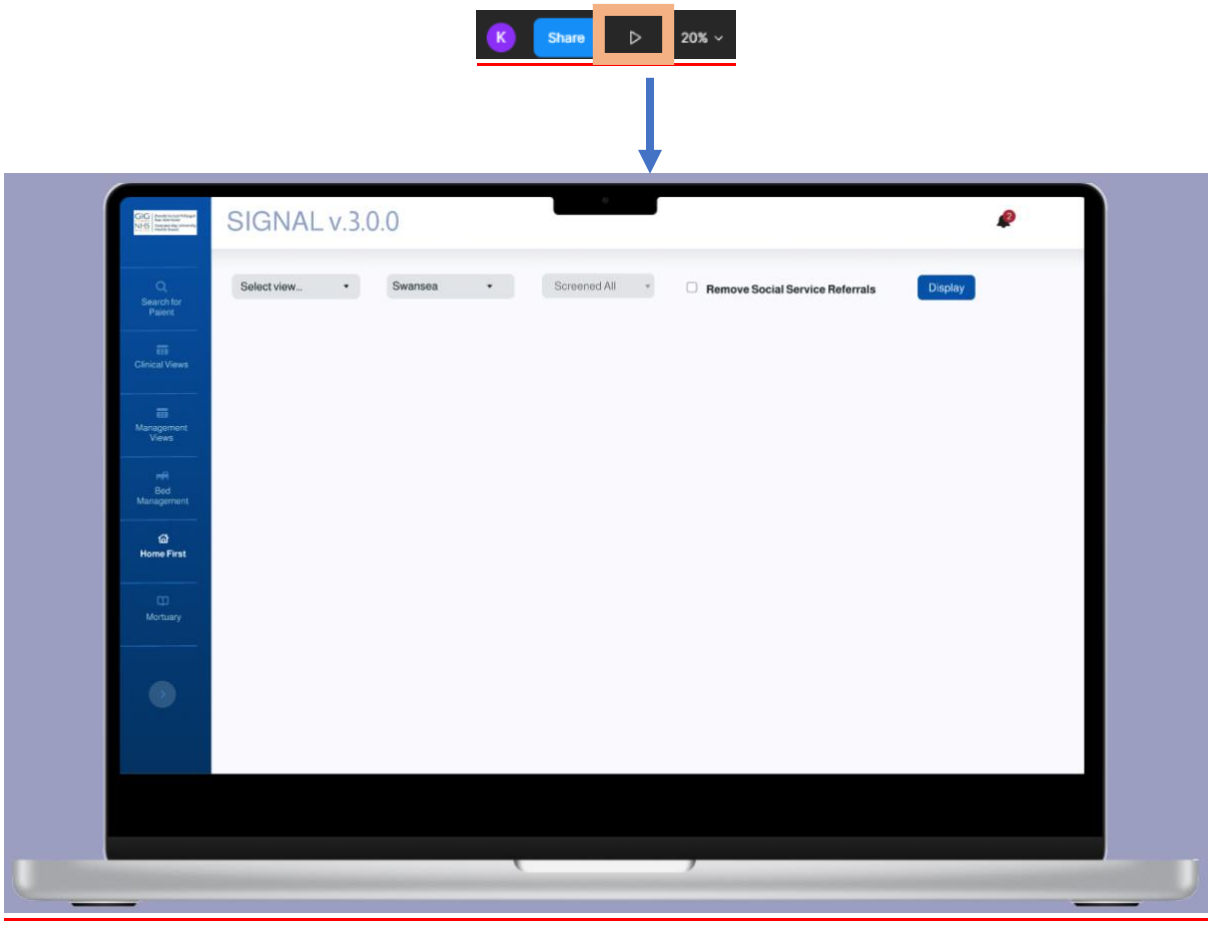
Thank you for taking part in this study and for agreeing to review these prototypes. This guide will talk you through each prototype.

Each prototype has been designed to achieve the following aims:

- **Notify Home First that updates have been made to a referral.**
- **Give the Home First team oversight of referrals that have been returned to the referrer for more information.**

Instructions

Under each Prototype section below you will find a link to that prototype. This will take you to a piece of software called Figma which has been used to create the prototypes. To view each prototype in as close to a "real-world" environment as possible, please click on the play button in the top right-hand side which will allow you to view the prototype as if it were real.



Under each Prototype section below are instructions designed to help you to navigate the prototype and to note particular features.

Once you have reviewed each prototype, please complete the relevant section in the questionnaire at the following link:
https://forms.office.com/Pages/ResponsePage.aspx?id=LrXKu76f1kOi859mxD3yaBrKTarijbdJkaY4ZSILactURFFMMlpZTU1LRU1KQloxWlA5SjVZWFE1MC4u

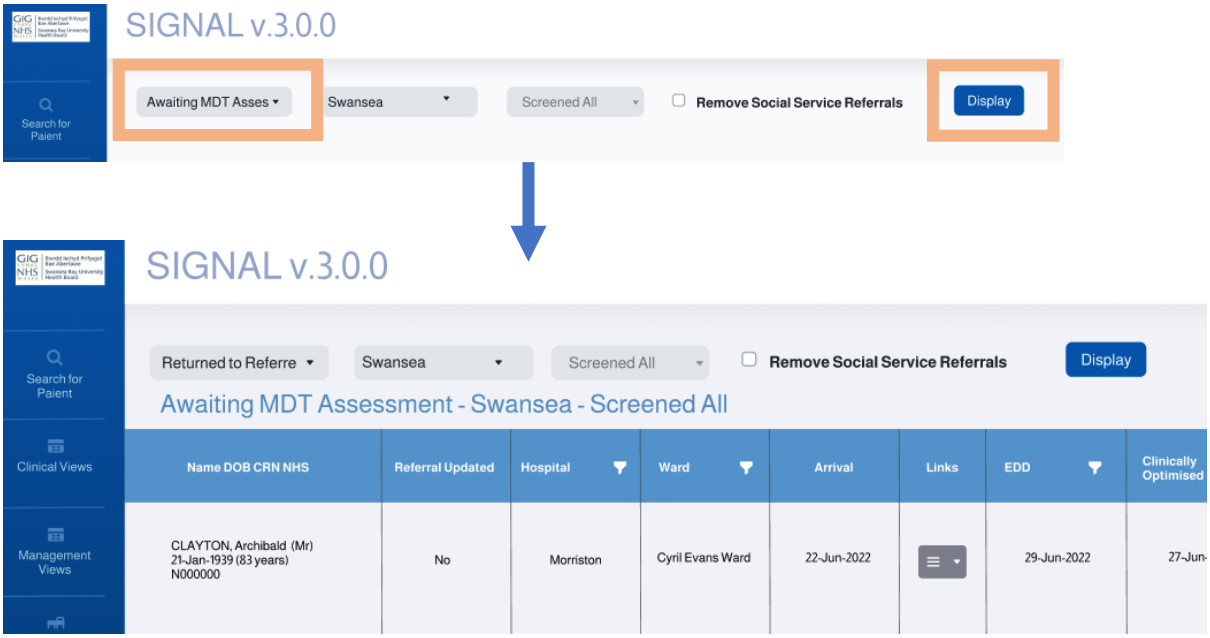
You may wish to complete each section as you review each prototype to help you remember your thoughts, or you are welcome to complete the whole thing after reviewing all of the prototypes.

Whilst each prototype has been designed to look as similar as possible to Signal Version 3, you will only be able to interact with the elements on the screen that are relevant to the above aims. You will not be able to interact with everything.

The following can be clicked on in ***all*** prototypes:

1. On any screen, you will be able to return to the beginning at any point by clicking on the 'Home First' logo in the left-hand sidebar:

2. You can select a view from the left-hand selection box on any screen on which it appears. Once you have selected a view, you can click "Display" to show this view of the system. This will allow you to navigate between different views of the system:



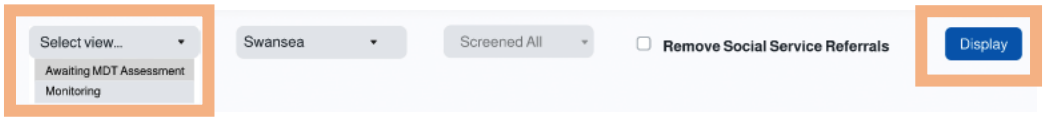
ALL PATIENT DATA IN THESE PROTOTYPES IS FICTIONAL

Prototype 1

This prototype can be accessed by clicking the following link: https://www.figma.com/file/nfskzKiYf9N2tARuBOKkot/Prototype-1-Signal-Home-First?node-id=0%3A1

Please undertake the following steps:

1) From the main landing page, please navigate to the "Awaiting MDT Assessment" view by selecting this view from the 'Select view' dropdown list and then clicking 'Display':



2) This will bring up the Awaiting MDT Assessment View. On this view, please note that there are banners indicating if a referral has been updated (and the time at which that took place), or if the referral has been returned to the person who referred it because more information is needed:

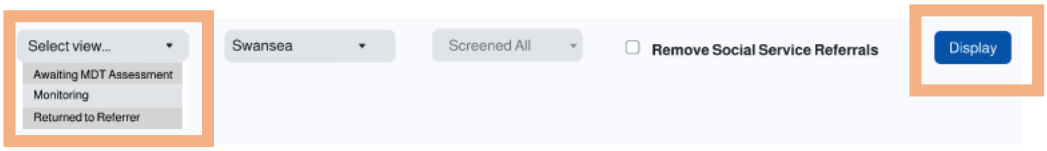
Prototype 2

This prototype can be accessed by clicking the following link: https://www.figma.com/file/MwYa2JsqmPNSDUBLGmk4yo/Prototype-2-Signal-Home-First?node-id=0%3A1

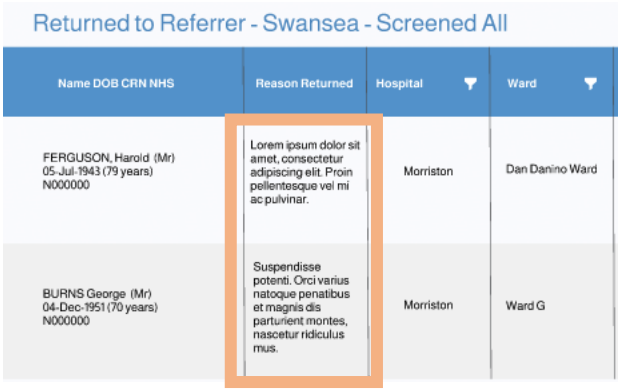
Please undertake the following steps:

1) On all views, please note the notification icon in the top right-hand corner of the page:

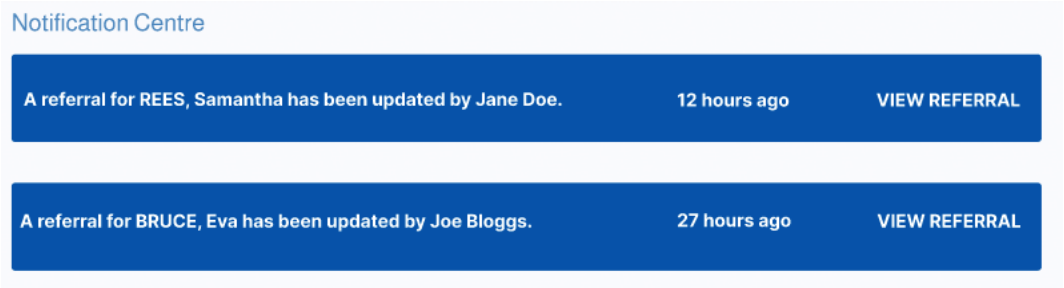
2) Using the “Select view” dropdown list, select the “Returned to Referrer” option and then click “Display” to bring up this view:



3) Please note that the “Returned to Referrer” view also provides a display detailing the reason that the referral has been returned to the person who referred it:



4) Click on the notification icon on the top right of this view to be taken to a ‘Notification Centre’. This centre outlines which referrals have been updated, at what time, and by whom. In practice, this would also allow you to navigate to the updated referral in question by clicking ‘VIEW REFERRAL’:

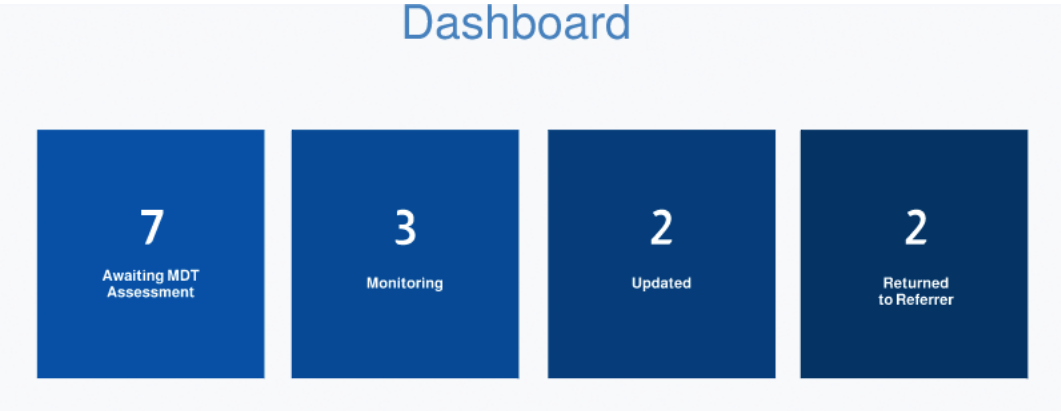


Please note that you will not be able to view the referral in this prototype, this is just to give you an idea of the intention of the Notification Centre.

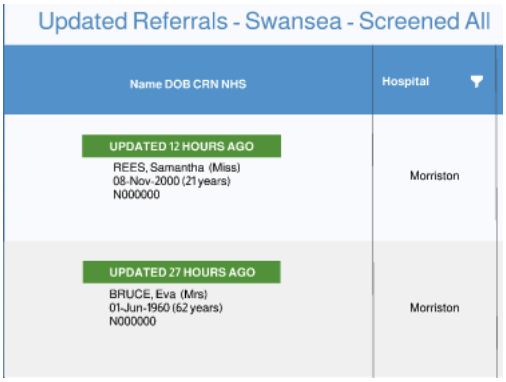
Prototype 3

This prototype can be accessed by clicking the following link: https://www.figma.com/file/czYh5hAEYLf0RWvNimtdNf/Prototype-3-Signal-Home-First?node-id=0%3A1

1) Please note the landing page of this prototype makes use of a tiled layout for various states that a referral may be in, **each of these tiles can be clicked and interacted with**:

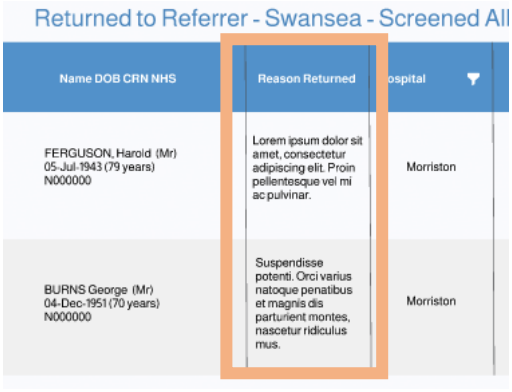


2) Click on the "Updated" tile to view all referrals that have been updated, and when they were updated:



3) Click "Home First" to return to the main dashboard:

4) From the main dashboard, click "Returned to Referrer" to navigate to this view and note the reason for the referral return:



Thank you for taking the time to review these prototypes and for feeding back. Your contributions are invaluable!

If you have any questions at all about what is required, please do get in touch with Suzannah Downie at 2131572@swansea.ac.uk

B.5 User Feedback Questionnaire

Signal Prototypes - User Feedback

Thank you for agreeing to take part in this study. If you have any questions about completing this form or any other part of this prototype review, please do get in touch with me at 2131572@swansea.ac.uk.

* Required

1. Please provide your job title: *

Prototype 1

2. Please answer the following questions about Prototype 1: *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
I am able to see and utilise relevant information in Prototype 1.	◯	◯	◯	◯	◯
Prototype 1 will help to manage the MDT Assessment	◯	◯	◯	◯	◯
Prototype 1 will help improve the flow of patients through the system	◯	◯	◯	◯	◯
Prototype 1 will help to collaborate with colleagues	◯	◯	◯	◯	◯

3. What did you ***like*** about Prototype 1? Please be as detailed as possible. *

4. What did you ***dislike*** about Prototype 1? Please be as detailed as possible. *

Prototype 2

5. Please answer the following questions about Prototype 2: *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
I am able to see and utilise relevant information in Prototype 2.	◯	◯	◯	◯	◯
Prototype 2 will help to manage the MDT Assessment	◯	◯	◯	◯	◯
Prototype 2 will help improve the flow of patients through the system	◯	◯	◯	◯	◯
Prototype 2 will help me to collaborate with colleagues	◯	◯	◯	◯	◯

6. What did you ***like*** about Prototype 2? Please be as detailed as possible. *

7. What did you ***dislike*** about Prototype 2? Please be as detailed as possible. *

Prototype 3

8. Please answer the following questions about Prototype 3: *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
I am able to see and utilise relevant information in Prototype 3.	◯	◯	◯	◯	◯
Prototype 3 will help to manage the MDT Assessment	◯	◯	◯	◯	◯
Prototype 3 will help improve the flow of patients through the system	◯	◯	◯	◯	◯
Prototype 3 will help me to collaborate with colleagues	◯	◯	◯	◯	◯

9. What did you ***like*** about Prototype 3? Please be as detailed as possible. *

10. What did you ***dislike*** about Prototype 3? Please be as detailed as possible. *

Comparison of Prototypes

Please rank the prototypes in terms of the following:

11. The prototype that best helped you to understand the status of current referrals in the system. *

- Prototype 1
- Prototype 2
- Prototype 3

12. The prototype that gave you the best oversight of all referrals in the system. *

- Prototype 1
- Prototype 2
- Prototype 3

13. The prototype that you felt was easiest for you to interact with. *

- Prototype 1
- Prototype 2
- Prototype 3

Appendix C

Workshop Preparation

C.1 Workshop PowerPoint Slides

Improving Visual Interfaces for Computer-Supported Working and Patient Flow Improvement in Healthcare Settings

Suzannah Downie (MSc Candidate)
Department of Computer Science, Swansea University

Swansea University
Prifysgol Abertawe

Suzannah (Suz) Downie - About Me:

- MSc Candidate - *Centre for Doctoral Training* in *Enhancing Human Interactions and Collaborations with Data and Intelligence-Driven Systems*, Department of Computer Science, Swansea University
- Progressing to PhD in October, subject to passing my MSc!
- Funded by the Engineering and Physical Sciences Research Council
- PhD Stakeholder: Swansea Bay University Health Board
- PhD Supervisor: Dr Martin Porcheron

Swansea University
Prifysgol Abertawe

Project Outline

This study aims to understand the ways in which those involved in the provision of care for patients at SBUHB hospitals can be further supported using Signal. We are particularly interested in patient flow and how this might be further improved.

We'd like to know:

- How you use Signal, if at all.
- In what ways Signal currently supports you within your roles.
- In what ways the system's interfaces might be further enhanced so as to to better support you.
- What matters the most to the Home First team with regard to Signal.

Swansea University
Prifysgol Abertawe

Workshop Outline

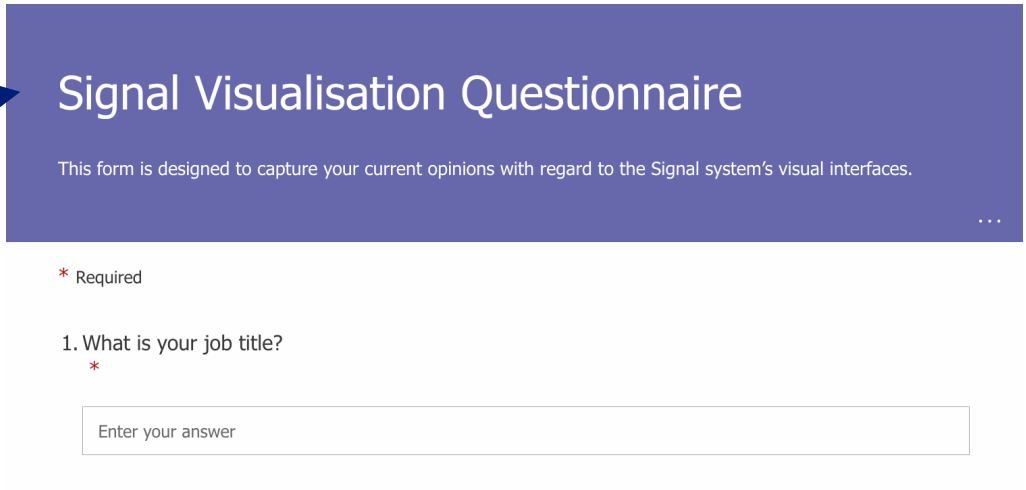
Activity	Time
Introduction and project outline	10 mins
Questionnaire completion	10 mins
Fact finding session	20 mins
Example interfaces	15 mins
Break	10 mins
Co-design activity	20 mins
Co-design pitch	15 mins
Pulling it all together, wrap up, and next steps	20 mins

Questionnaire

Please complete the following questionnaire:

https://forms.office.com/r/f2MKz1JJ4X

It should look like this



Before we get started…

This workshop will be interactive!

- This is not a Computer Science test.
- We want your thoughts and ideas, however wild they might seem to you!
- All ideas are useful.

Fact Finding – Who, What, How?

- Who are Home First Team?
  - Roles
  - Working definition

- What do you do?
  - Walk me through the patient flow journey.

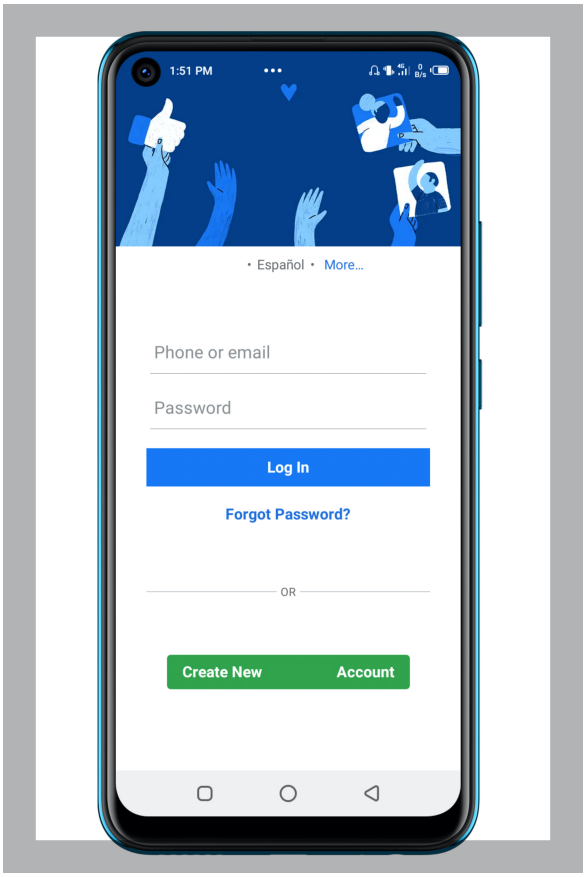
- How do they do it?
  - How do you know you have a referral?
  - What medium? Desktop, printout, etc.
  - What information do you need?
  - Does this information all come from Signal?
  - What happens next?

User Interfaces

What is a user interface…?

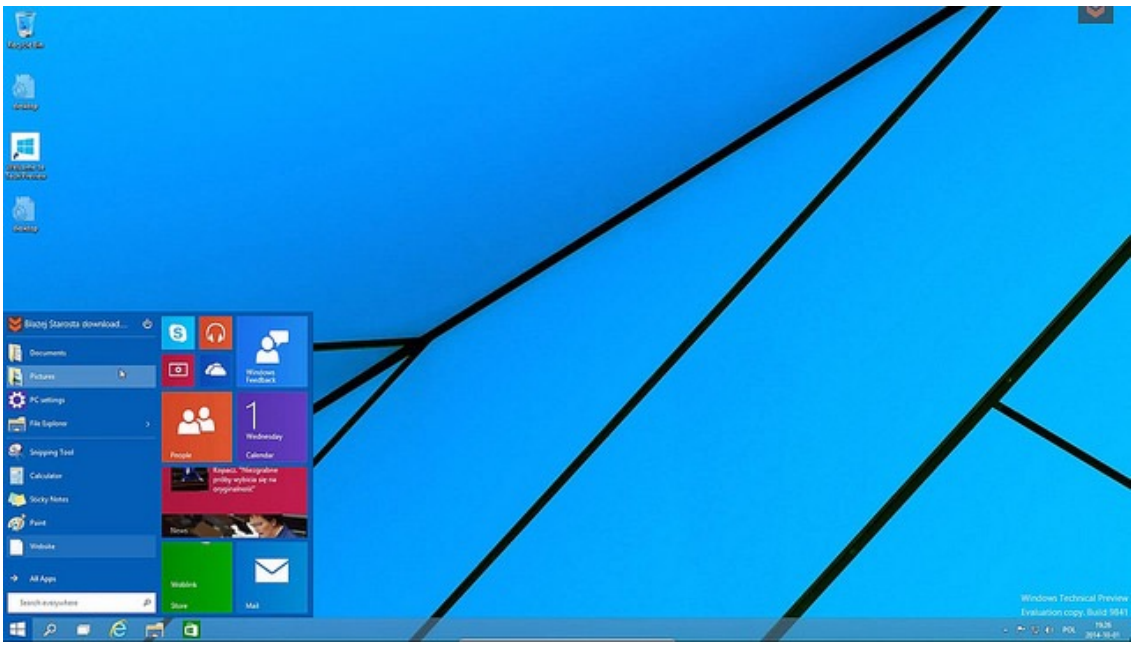
A user interface is what most users physically interact with when they use a computer. The way that we interact with these can be wildly different. As computer users, you interact with these interfaces all of the time, in both personal and professional capacities.

We encounter user interfaces on desktop computers, but also on mobile phones, tablets, and even smart speaker devices like Google Home and Amazon Alexa!

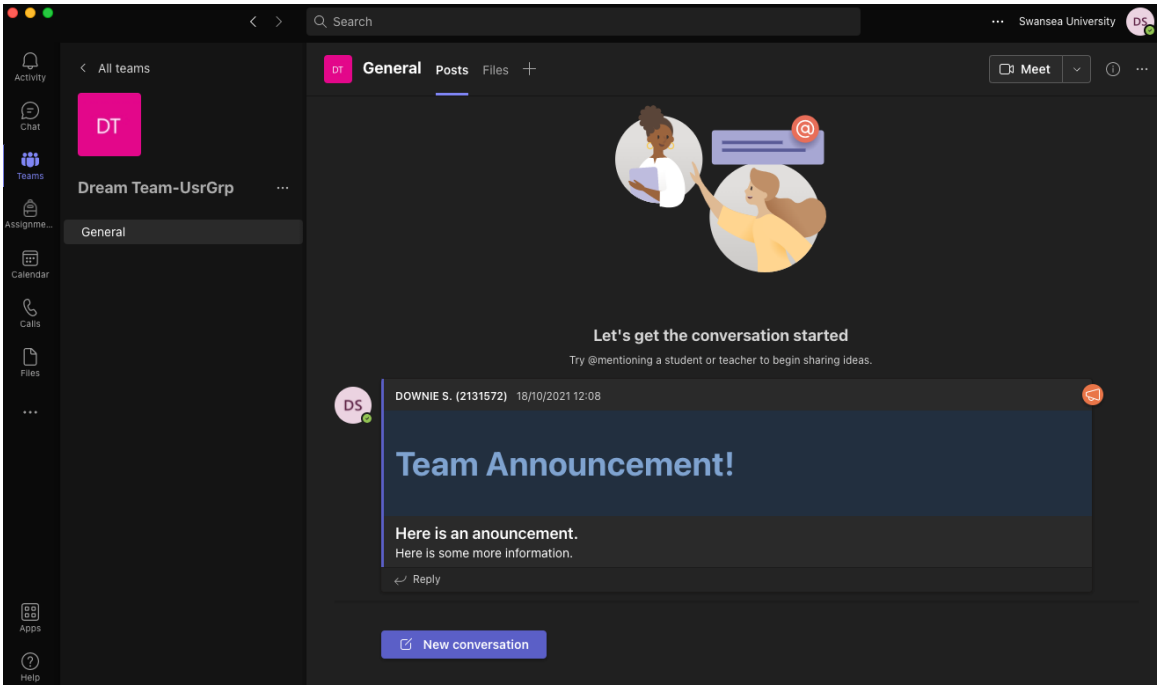

1:51 PM
• Español • More...
Phone or email
Password
Log In
Forgot Password?
OR
Create New Account

Facebook

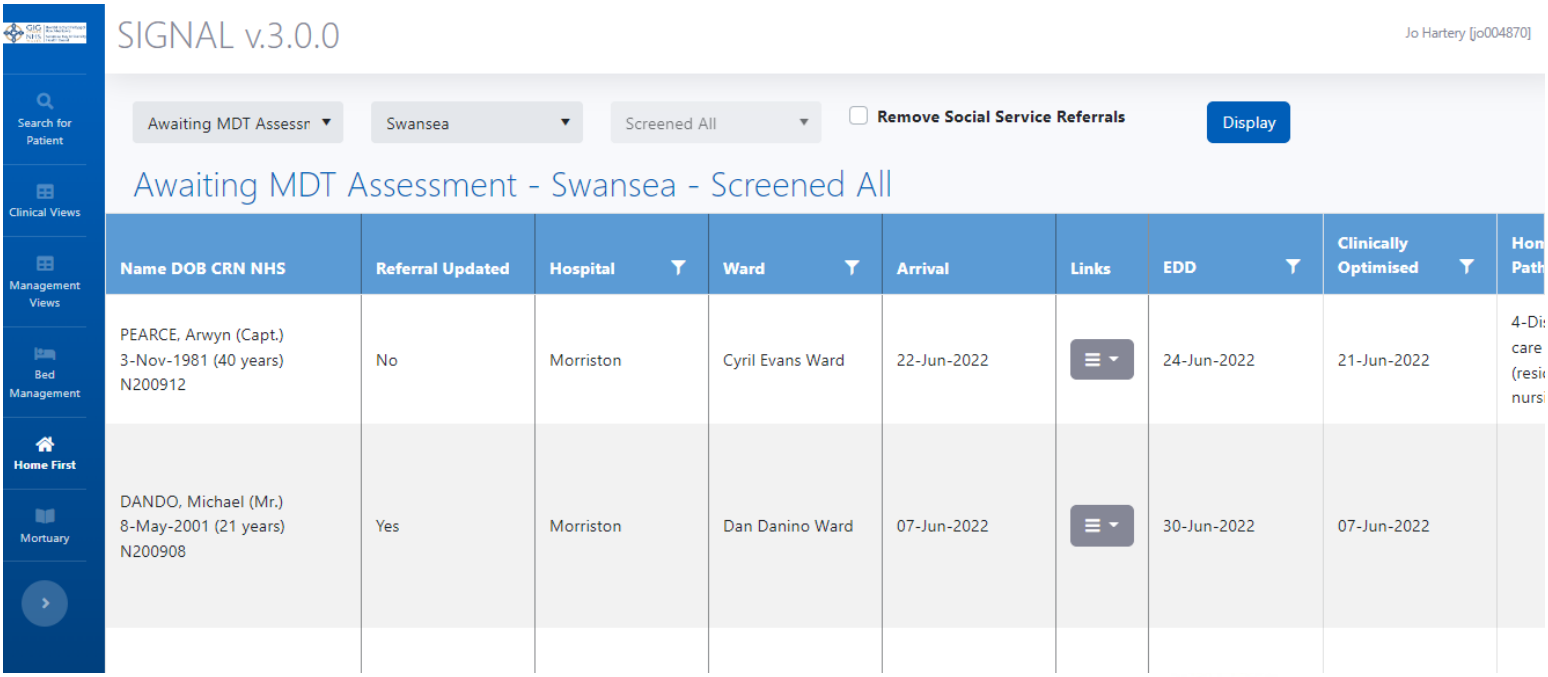
Microsoft Windows 10



Microsoft Teams



Signal User Interface – Home First View



Swansea University
Prifysgol Abertawe

BREAK – 10 mins

Co-Design Time!

Design your own user interface! Use 10 minutes to brainstorm and 10 mins to translate that brainstorm to paper.

- Think about how you do your job and how this might be facilitated through a computer interface. This could be desktop, phone, tablet. Whatever you think would work best.

- Think about the information you need to do your job – is it all immediately available? How long does it take you to find that information? Would you like it more accessible?

- It doesn't have to bear any relation to Signal as it stands.

- Don't get hung up on what is 'technically possible'!

Design Pitch

Walk us through your designs…

- Why have you made the choices you have made?
- What do you think are the most important features in your design?
- How do you think this will help you?

Wrapping Up

TASK: Take a piece of paper and write down the three most important things you'd like to be able to do in Signal as a patient flow system and why.

Next Steps:

- Transcription and analysis of materials.
- Prototyping and feedback
- Write-up and findings

THANK YOU!

If you have any questions, don't hesitate to contact me:

Suzannah Downie (2131572@swansea.ac.uk)

Swansea University
Prifysgol Abertawe