Neary, K

Grand challenges in UK healthcare, exploring the contribution of a multi-stakeholder Innovation Hub to support knowledge driven, user-led innovation

Grand challenges in UK healthcare, exploring the contribution of a multi-stakeholder Innovation Hub to support knowledge driven, user-led innovation.

Dr. Katherine Neary

K.R.Neary@ljmu.ac.uk

Grand challenges in UK healthcare, exploring the contribution of a Multi-stakeholder Innovation Hub to support knowledge driven, user-led innovation.

Abstract

This study critically explores a novel approach to addressing grand challenges within the UK healthcare system through an onsite hospital Innovation Hub (IH). Specifically it examines how an IH space can support priorities of stakeholders interested in addressing grand challenges in healthcare.

The study uses a case study methodology to present findings from a user-led IH which used a collaborative multi-stakeholder process. Rich qualitative data was collected from IH stakeholders to inform an emerging understanding of this complex space.

A key finding is the importance of the IH staff team as an essential element to sustaining and improving the functionality of the space. They work as intermediaries, supporting the innovation process and managing needs of participating stakeholders. The study identifies the importance of recognising tacit knowledge within an organisation, like a hospital, developing knowledge-led approaches to collaboratively address complex organisational challenges.

Hospital Managers need to appreciate differences between IH and other hospital functions. It is important to consider if the hospital has resource required to operate the IH, and capacity to wait for outcomes from an experimental, but potentially impactful collaborative approach to innovatively improving healthcare provision.

Key words

Healthcare innovation; Healthcare Grand Challenges; Innovation Hub; Collaborative Innovation; User-led Innovation; Clinician-led Innovation; Hub Staff Team

1. Introduction

Societal grand challenges are complex global issues affecting humanity, which require urgent action. The 17 UN Sustainable Development Goals have become an accessible way to understand grand challenges through 17 numbered priority areas to address between 2015 and 2030 (UN, 2015). 'Good Health and Wellbeing' is acknowledged as UN SDG 3 which seeks to '*ensure healthy lives and promoting well-being for all at all ages'* (UN 2015). Use of a collaborative approach can strengthen efforts to address complex societal grand challenges whilst harnessing innovative and bold new insights (George et al, 2016).

Globally the complex challenge to provide healthcare which meets the complex and diverse needs of people across life stages requires contextually appropriate interventions. Within the UK, meeting the mental and physical healthcare needs of the population remains a grand

challenge. Despite the UK provision of a free to access healthcare system, health inequalities and gaps in life expectancy between socio-economic groups are a current cause of concern (Alderwick et al, 2024).

The UK National Health Service (NHS) has always been associated with seeking to solve grand challenges. The NHS was founded in 1948 to meet the healthcare needs of a post-war population and has been met with a series of political, economic and societal pressures ever since (Williams, 2025). Current challenges can be simply categorised under an increased volume and demand for healthcare services and increasingly complex patient needs (McKee et al, 2021, Anderson et al, 2022, Halkes et al, 2024). The pressure of these challenges impacts the delivery of its operational, financial and healthcare delivery objectives (e.g. Dalingwater, 2020, Nixey, 2023, Williams, 2025). Furthermore, a lack of organisational capacity within the NHS exacerbates pressures for staff. Thus, innovative solutions which seek to reimagine methods to address complex healthcare challenges are of emerging academic and societal interest (e.g. Arora et al, 2021, Cripps and Scarbrough, 2022, Hossain et al, 2024). This study explores the contribution of an onsite user-led Innovation Hub (IH) as a physical space to address innovative ways to support addressing grand challenges in paediatric healthcare. This is a context where complex organisational and societal issues must be considered.

IH have no universally agreed definition, but are characterised as collaborative physical spaces for creativity, dialogue and development work beyond normal operational organisational boundaries (Saidi et al, 2017, Magadley and Birdi, 2009, Carstensen and Bason 2012). In some cases, hospital-led commitment to addressing issues which impact patient experience can be seen through innovative use of hospital space and stakeholder resources. Globally, there are a small number of dedicated Hospital spaces which are named as places for innovation, often termed as hubs, accelerators, maker-spaces or centres. Collectively these spaces intend to nurture innovation, support multi-stakeholder collaboration, and provide resources to enable problems identified by hospital 'lead users' to be considered. This research focuses on the contribution of a hospital-based IH as a novel approach to addressing grand challenges, by using the tacit 'sticky,' context-rich knowledge of users (Von Hippel, 1994).

In this study, the term 'user' refers to hospital staff and clinicians. In studies of 'clinician-led' IH, groups of staff users have primary roles including Advanced Nurse Practitioners, Resident Doctors, Surgeons and Consultants (Lüthje and Herstatt, 2004, Svensson and Hartmann, 2018). Within the specific context of paediatric healthcare, NHS values of quality healthcare and person-centred care are applied to address specific needs of this patient user group (Dimitri, 2019). These include a requirement for redesigned health care processes suitable for paediatric needs, embracing use of interactive digital technology and a heightened awareness of holistic healthcare (Tettegah and Garcia, 2016). These areas of importance reflect a salutogenic healthcare perspective; that achieving good patient health requires provision for both clinical and broader emotional patient needs (Mittelmark et al, 2022, Bauer et al, 2019).

The specialised focus of UK paediatric hospitals provides a localised context to explore the notion of whether hospitals should be places that treat just the clinical, medical needs of children, or if their contribution could be more extensive. The emerging view is that hospitals can provide a nexus for collaborative connection between internal and external actors (Hyrkäs et al, 2020, Huynh et al, 2024) who, together, can begin to combine skills and resources to respond to grand challenges impacting UK healthcare (Arora et al, 2021). Furthermore, decisions in the NHS to devolve some decision making to a regional level have provided the Boards of individual Hospital's with influence on a hospital's strategic aims, organisational culture and financial planning, as outlined by Abela (2023). This in turn creates opportunities to reconsider the structure and breadth of hospital departments and the potential of leveraging user knowledge and staff resource to innovatively explore new activities which meet emerging needs within healthcare delivery (Aakhus et al, 2018, Cadeddu et al, 2023).

Although there is a well-developed extant literature on user-led innovation, beginning with seminal work on 'lead users' by Van der Ven (1986) along with studies on the importance of innovation spaces (e.g. Moultrie, 2007 and Thune and Mina, 2016), literature focused specifically on the healthcare context is scarce (e.g. Barlow, 2017, Crupi et al, 2020, Hyrkäs et al, 2020). Although, there are some studies on Hospital based IH they are mostly country specific, for example from South Africa (Saidi et al, 2017), Finland (Hyrkäs et al, 2020) and France (Manent et al, 2024). Studies within the context of the UK NHS are limited and do not focus on the specialist requirements of a paediatric context (Halkes et al, 2024, Savory, 2009).

This study addresses a gap in the literature on the role of the IH staff and other stakeholders who operate in IH, by understanding their contribution as key actors within the innovation process (Guinan et al, 2019, Howells, 2006). Specifically the paper seeks answers to the question: "How can IHs leverage multi-stakeholder collaboration to address complex health challenges and foster innovative solutions?" To answer this question data was gathered to form a case study of a multi-stakeholder IH, located within a United Kingdom (UK) National Health Service (NHS) paediatric hospital. This specific context is ideally suited to understand how an IH can leverage collaborative multi-stakeholder innovation, and contribute to healthcare grand challenges due to the location, process and use of a knowledge-based user-led approach. Hospital based IH are an unusual facility within the NHS.

2. Theoretical Background

The importance of Innovation spaces, like IH are recognised as providing a dedicated space for multi-stakeholder collaboration, in an environment which requires a different mindset, skills and competences than what is needed within the healthcare delivery space of the main hospital building (Carstensen and Bason, 2012).

The NHS has existing national NHS innovation schemes which seek to provide opportunity to address challenges within a healthcare system under duress from capacity, financial and

process issues (Arora et al, 2021, O'Dowd, 2024). Yet, the onsite innovation space of a hospital based IH provides a physical in person venue for this activity to allow for more consistent and focused inclusion of users within a collaborative innovation process.

The location of the IH is significant, entering the IH space marks a departure from the main leaving hospital. The distinction in setting is very important to supports users to move from delivering patient care, to instead apply their knowledge in an innovative way (Jiménez and Zheng, 2021, Peschl and Fundneider, 2012). Onsite IH minimise the proximity between workspaces which is a significant factor when seeking to maximise user accessibility and participation within a collaborative innovation process (Samet, 2016, Pereno and Eriksson, 2020). Bason (2010) acknowledges this is particularly important in Public Sector environments, like Hospitals which otherwise do not have shared non-clinical, private spaces which are accessible to both internal and external collaborators.

Studies have highlighted the importance of IH a providing non-clinical physical space which 'non-threatening' thus facilitating multi-stakeholder collaborative working between internal and external collaborators (Magadley and Birdi, 2009:315) as 'uncommon partners' (Gryszkiewicz et al, 2016). A shared environment can support networking and idea creation (Jiménez and Zheng, 2018) within a stimulating environment which fosters collaboration (Cacamo, 2020, Fecher et al, 2020) in pursuit of creating novel healthcare products, services and approaches (Björklund et al, 2019). The potential to explore collaborative partnerships is of interest and value to hospital stakeholders. Within a hospital, users have experiential knowledge and, in some cases specialist skills, which could be used to address grand challenges, if combined with access to external resources and stakeholders.

The increased visibility healthcare user roles within collaborative innovation activities acknowledges the breadth of impactful involvement users can make to address complex challenges (Bessant et al, 2025, Huang et al, 2024, Schiavone and Schiavone, 2020,). The evolving roles of users as part of user-led innovation projects are considered within the literature mostly from the role of patients (João Jacinto et al, 2025, Iakovleva et al, 2021). Within paediatric healthcare, the complexity of ethical processes positions healthcare staff and being most accessible users to contribute their experiential knowledge to collaborative innovation processes (Garibyan et al, 2021, Svensson and Hartmann, 2018).

These studies build on the seminar work on 'lead users' by Van der Ven (1986) by considering the contribution and support different user groups needs to support collaborative healthcare innovation projects as a way to benefit from user experience and insight (Bessant et al, 2025). Herstatt, Schweisfurth and Raasch (2016) examined the potential importance of staff contribution as collaborative innovation as 'Embedded Lead Users', working within the organisational context. Yet, the complexity of operating an effective innovation space echoes challenges found across the healthcare sector; capacity, resource availability, effective communication, use of digitalisation and complex stakeholder requirements. It is therefore necessary to explore what is needed to create a healthcare

innovation space within a hospital campus, building on the work of Sharma and Meyer (2019:189) and their 'Full-Service Design Incubator' model. The importance of dedicated space within an IH is considered as important to aid collaboration within hospitals, supporting social interaction and the flow of knowledge between stakeholders (Saidi et al, 2017).

There is an emerging body of literature on the contribution of IH staff who are employed to manage and administer IH operations. Howells (2006) considered the role and importance of staff acting as intermediaries to support the innovation process. Long et al (2013) recommended that there is an important role to act as boundary spanners, supporting the flow of information between stakeholders who are otherwise not connected. Moreover the process framework developed by Moultrie et al (2007) suggests how an IH space in a particular operational context can emerge, whilst acknowledging complexity and the need for continual review to support effective implementation. Due to the evolving nature of the IH case study used in this research, a prior study into the evolution of IH's structure, purpose and main components termed 'The Innovation Shift' (Hattori and Wycoff, 2002) provides valuable prior results. This work is significant as it introduced and acknowledged the influence of organisational context on how the Innovation process emerges and changes to align with dynamic operational priorities.

3. Methodology

The methodology for data collection and analysis was designed to align with an exploratory approach to collect rich narrative data from IH stakeholders (Stebbins, 2001). The research was guided by a social constructivist perspective and followed a qualitative case study methodology. This was suitable given the exploratory nature of the research question and lack of comparable empirical case studies. The opportunity to access a hospital based IH, a rarity within the NHS, provided a valuable prospect to explore its 'specialness' (Siggelkow, 2007) and collect rich empirical data to, 'tell the story' of this IH (Eisenhardt and Graebner, 2007). The single case study method is suitable to explore new phenomena, to inform the generation of new constructs and begin to understand their inter-relationships (Yin, 2009). Alignment to the philosophical position of social constructivism acknowledged that knowledge gained within the study would follow a constructed process informed by the interpretations of individuals; researcher interactions within the case study setting, and the experiences of stakeholders working within it. Use of a single case study for this research was appropriate for the research design which was seeking to gather empirical data from a 'powerful' example which held potential to 'see the world, not just the literature in a new way' (Siggelkow, 2007). This case study site provided the necessary organisational context, collaborative working processes and user-led activity to be considered as a valid illustrative case to explore grand challenges in healthcare, and the contributory role of multi-stakeholder innovation (Yin, 2009). Thus, following the principles of social constructivism recognised that the qualitative data collected would be influenced by multiple

interpretations of reality; my own perceptions, and the opinions of interviewees working within the specific social context of the research setting.

3.1 Setting

The IH is located within the hospital campus but has an independent entrance, accessed through
a public external courtyard. To enter the IH staff can use a hospital swipe card system, external visitors use a doorbell answered by IH staff. The Hub physical space is 1000 square metres on a single level. The IH has an industrial feel semi-finished feel, with a grey concrete floor, exposed electrical metal work and air-conditioning pipework and a number of concrete support columns. The interior and absence of windows gave rise to informal use of the phrase 'The Bat Cave' to describe the IH amongst stakeholders.

The IH was zoned so different work could be conducted in parallel. This meant the IH was an open but multi-purpose space. For example a display area near the entrance displayed product proto-types and colourful promotional materials. This served to showcase current projects and signalled existing collaboration with commercial and research-based organisations. A small area was dedicated to incubating small local businesses who were using the IH as a space to make refinements to their products with the aim of eventual adoption into the NHS. This active workspace contained technology including 3D printing equipment and examples of 3D printed models. This tangible output of health innovation in progress contributed to the Hub as a live working environment and the shared goal of digital, creative paediatric innovation in a tangible way.

In contrast, the majority of the IH space housed banks of office desks, some with desktop computers. This area functioned as a workspace the 10 non-clinical Hub team and also 4 clinical staff who worked from the IH on a semi-regular hot desk basis, subject to clinical priorities. Areas of soft seating provided space for stakeholder meetings, facilitating broad ongoing contributions to the collaborative multi-stakeholder innovation process. The IH also functioned as an event space given the relative flexibility of the layout compared to other areas of the hospital. All furniture on the main floor space was moveable which provided opportunity for networking, presentations and meetings. However due to changeable use of IH space, alongside the continual desk-based needs of staff, at times noise issues emerged. This was mitigated to an extent by small additional spaces accessible around the perimeter of the main floorspace. These spaces offered a small kitchen, toilets, two meeting rooms and two specialist spaces providing simulated environments. The first designed to replicate a child's bedroom with the aim of testing products in the future. The second housing VR equipment for training and exploratory concept development.

3.2 Data Collection

The data collection process was conducted in three stages as shown in figure 1, participant observation was used prior to commencing the interviews and continued whilst the interviews were undertaken. Waddington (2004) suggests this approach to using participant observation as part of a qualitative methodology increases research visibility, with the intention of the researcher becoming a familiar presence in the research setting prior to the interview data collection phase.

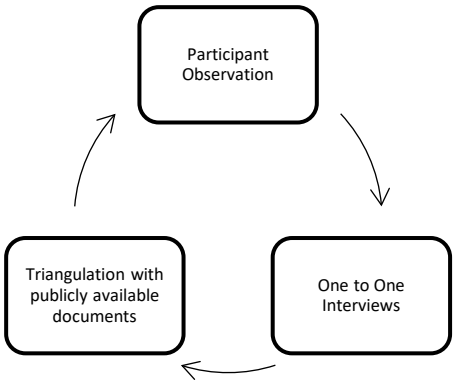

Figure 1 Data collection Process

The purpose of the data collection was to gather experiences from key IH stakeholders. Data was gathered through interviews, participant observation and document analysis. Collecting data through interviews began with making a list of potential research participants. This was compiled through forming a list of IH stakeholders using publicly available information. Each person was approached in person if they were working in the IH and, or via email, so details of the study could be shared in line with the ethics process . If they chose to participate, this was the main method of selecting interview participants. A small number of participants were introduced to me whilst I was collecting observational data in the Hub space, through a snowball technique.

The recruitment process was challenging given the busy and changeable work priorities of staff working at all levels in the IH and wider Hospital. As shown in Table 1 25 semi-structured interviews were conducted with IH stakeholders. Due to the sensitive nature of the research setting it was not possible due to enter wards or include patients and their families in this study. Interviewing multiple stakeholders participating in the IH enabled collection of data to form a case history, adding valuable context to the case study.

Role	Number of interviews conducted
Hospital Board	3

Professional External	4
Professional Internal	11
Senior Clinical	3
Junior Clinical	1
Nursing	3

Table 1 Interviewee numbers by category

Each interview lasted 45-60 minutes, each was transcribed verbatim, generating 356 pages and 216,598 words of data, sample interview questions are within the Appendix.

Participant observation enabled a picture of weekly activities to be gathered, which included: the use of IH space, the interaction between stakeholders and the priorities of the IH staff team. Including a 'participant as observer' component to the research design enable incorporation of 'at a glance' approach (Cunliffe, 2003). The rich qualitative data gathered enabled an organisational understanding of the IH to be gained. This data was gathered during weekly observation of IH activities by the researcher over a period of one day a week over a 6-month period, observing how the space was used and daily activities. This method is useful in exploratory case study research to develop an in depth understanding of a research context like an IH (Simons, 2014). Participant observation fieldnotes formed a secondary source of qualitative data.

Document analysis was also used to enable triangulation of the qualitative data sources. Due to the early stage of IH operation and confidentiality agreements NHS innovation and strategy documents which were publicly available provided useful and timely information (e.g. NHS, 2019).

3.3 Data Analysis

Interviewees were coded to preserve the anonymity of research participants, they were assigned a pseudonym and a role term. The role term, shown in table 2 is used to accompany direct quotations to preserve anonymity given the small number of interviews in the data sample.

Role Term	Description
Hospital Board	Interviewee was Hospital Board member
Professional External	A non-clinical Hub stakeholder who is employed in their main role outside of the hospital. This includes staff who are incubating their business in the Hub space, staff who work for the NHS in a non-

	clinical role but are not directly employed by the Hospital.
Professional Internal	A non-clinical Hub stakeholder who is employed in a professional services role in the Hub team in project management, stakeholder relationship management, administrative or I.T roles. This category also covers research participants who had their main role elsewhere in the Hospital in areas including administration, fundraising, educational and holistic care programme management.
Senior Clinical	A clinical member of Hospital staff working at the level of a Surgeon or Consultant.
Junior Clinical	A clinical member of Hospital staff working below the level of Surgeon or Consultant.
Nursing	A member of Hospital staff who works as a Nurse or Advanced Nurse Practitioner.

Table 2 Interviewee Role Term categories

Interview data was analysed thematically and used in combination with participation observation data. The case study data was interpreted using an abductive process, as it entailed moving between concepts derived from the literature review and a thematic analysis of the data. This aided critical reflection on the differences between data collected within interviews and fieldnotes. It was also valuable when triangulating the qualitative data sources as there was no archival data available due to the early stage of operation of the IH studied (Merriam and Tisdell, 2016). Therefore publicly available documents on NHS current Strategy, particularly with reference to innovation activities were used to support the triangulation process as appropriate (e.g. NHS, 2019).

To analyse data a thematic approach was used as this enabled patterns of activity to be identified. The template analysis method was chosen as it supports the analysis of large volumes of detailed textual data to generate patterns. This technique is appropriate for analysing exploratory qualitative data at it uses iterative and flexible coding (King 1998). Template analysis is used in management and organisational studies as a suitable way to thematically code extensive qualitative data (e.g. Radcliffe et al 2022) and explore themes arising from qualitative interviews in an organisational context (Cassell and Bishop, 2019). The process develops a series of increasingly focused templates which evolve to produce connectivity between themes in the data, starting from using a priori codes emerging from

the literature review (King, 2012). The method allows for additional codes to be added, should additional themes arise when coding the transcripts.

The first stage of template analysis aims to generate an overview of the data. As such, a small sample of 4 transcripts were coded using a priori codes identified within the literature review. Table 3 shows the stages of the template analysis coding process.

Stage	Codes	Origin of Code	Number of transcripts
Stage 1	Organisational Culture – OC Policy and Strategy – PS Performance – PRF Partnership and Collaboration – PC Purpose - PU	A priori codes from the literature	4
Stage 2	Organisational Culture – OC Policy and Strategy – PS Performance – PRF Partnership and Collaboration – PC Purpose – PU *Value Impact and Measurement - VIM*	All codes remain relevant with need to add new code – Value Impact and Measurement which emerged during this phase of coding.	10
Stage 3	Organisational Culture – OC Policy and Strategy – PS Performance – PRF Partnership and Collaboration – PC Purpose – PU Value Impact and Measurement - VIM	All codes remain relevant with no need to add new codes.	25
Stage 4	Codes sub-divided and regrouped		

Table 3 Stages of the Template Analysis Process

During stages 1, 2 and 3 of the analysis process interview transcripts were methodically interrogated for evidence of a priori codes as shown in stage one of Table 3. When reading each transcript the process seeks identification of relevant quotations which can be linked to an a priori code. Once identified quotations within the transcript were highlighted using a colour-based key. The next stage is copying the quotations onto post-it note and adding it to the connected a priori code which is written on a large piece of paper which acted as a template. Overtime connected quotes become clustered around the connected code. Scope within the method allows for codes to be added, as they emerge and retained if they are consistently within the interview data and different to existing codes in use. This is how the code 'Value/Impact Signs and Measurement – VIM' emerged within Stage 2 of the Template Analysis Process. Using paper and post-it notes a tangible picture of significant and

recurrent patterns in the data emerged. This analysis process builds an understanding and establishes connectivity and relationships between disparate perspectives of stakeholder interviewees. One code was added during the 2nd stage of the process, during the third stage all remaining transcripts using the existing codes, there was no further need to add additional codes. This signals that the codes used are appropriate to understand data collected.

In accordance with the Template Analysis process during the 4th and final stage Codes can then be sub-divided, and re-grouped as needed, to ensure the template is an accurate reflection of the interpretation of the data collected. The purpose of this final stage of the template analysis process is to present and structure the data in a clear and usable manner to provide a structure for the following findings chapter (King, 1998). The final template is useful to inform generating an understanding of connections between the empirical findings and existing literature, and to support answering the research question.

4. Findings

The goal of this study was to explore the contribution of an onsite user-led hospital Innovation Hub (IH) to understand how using a multi-stakeholder collaborative approach can contribute to addressing healthcare grand challenges. The case provides opportunities to better understand the functions and barriers to enabling an IH's contribution by leveraging user-led innovation within a dedicated onsite hospital space. The context for this study reflects broader challenges within the UK public healthcare system and presents a complex organisational healthcare setting where societal issues are balanced against operational demands. Findings identified that the contribution to healthcare grand challenges was influenced by the physical, organisational and interpersonal dimensions of the IH.

The findings are presented in five sub-sections, as shown in figure 2, this structure acknowledges the complexity of factors which emerged from the data collection and their contribution to answering the research question.

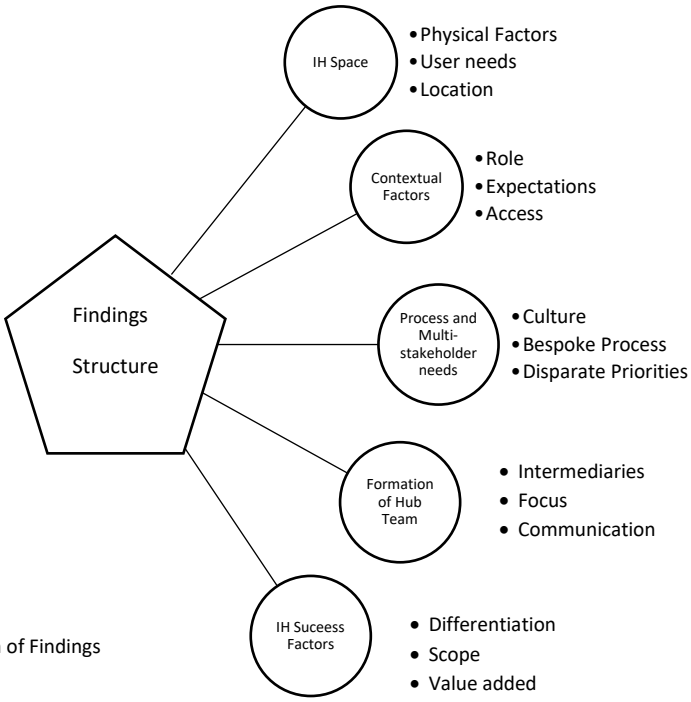

Figure 2 Presentation of Findings structure

4.1 Understanding the complexity of the user-led space Hub and physical environment

In the case study, locating an IH within a hospital campus was significant, as it provided a bridge between two complex organisational settings. The main hospital adheres to robust processes, and safeguards which create necessary barriers to external actors. The Hub space seeks to welcome interaction between multiple stakeholders and create an accessible space for both users and external stakeholders. Locating the IH on the hospital site, yet with independent access is important in terms of accessibility and functionality. A staff member based in the Hub (Professional External) suggests that this space acts as a

> *'showcase… every time a visitor comes (in the Hub) they see our stuff – it is easy to understand. What we do has a machine which makes everything really cool.'*

Strategically, a place to explore how scare healthcare resources can be innovated, and in doing so, potentially overcome existing organisational challenges has great potential.

> *'There is obviously value in the things we are doing in the hospital and in innovation, there is a lot of knowledge in the hospital which has a value, so if we can make that commercialised and a revenue generator, it will help us …grow our innovation offer, because the more money you earn the bigger the team that you can have supporting it, and ultimately the more innovation you do, it will help healthcare in the hospital' (Professional Internal).*

The IH faced complex challenges in addressing the healthcare challenges identified by users working in the hospital setting. The provision of a dedicated innovation space resolved a fundamentally practical requirement and enabled stakeholders to be brought together to enable core collaborative activities as explored by Caccamo (2020). Yet operationally, how to manage emerging issues and form an effective collaborative working process, raised a further set of challenges. Within the IH, the core asset, arguably, was the ability to access lead user tacit knowledge. Here the term 'user' refers to clinical users working elsewhere in the main hospital. They were the active user group in the innovation space at the time of data collection.

> *'You get a lot of inventive and entrepreneurial people in medicine who get a bit crushed by it, because medicine is performing the same thing over and over again really, that is what it is, lots of tasks to be done. Whereas some people want to do a deed, a let's get that dragon, some people like that, and you need to give them the opportunity to do it' (Senior Clinical).*

User insights enabled current hospital challenges to be shared. Their ability to identify specific current issues and unmet needs, combined with their job-specific training uniquely positioned them to suggest specific ways to overcome these challenges. Users experienced problems facing individual patients, whilst dealing with organisational issues which impacted their clinical role.

For the hospital, and the wider NHS organisation there were anticipated impacts on patient experience, job efficiency, health literacy and treatment of complex cases, due to limitations within current linear-approved processes, which did not make use of emerging technological advances.

Users were familiar with NHS operating processes and current systems. They also had a high level of role-specific training, and often used problem solving approaches in their main hospital role (Saidi et al 2017). This was of value to other stakeholders, and for innovation purposes, because the users' knowledge was informed by experiential awareness. It was rare for external stakeholders to be able to access this valuable knowledge in their research or commercial product development work (Herstatt, Schweisfurth and Raasch, 2016). Often working in a more siloed manner, external stakeholders had their own priorities when seeking to make incremental or transformational contributions to healthcare knowledge and provision of products and services. Yet, innovation concepts which incorporated an alignment with existing NHS processes were seen as operationally advantageous.

In alignment with the localised control of NHS Trusts, the case hospital within this research had a set of connected strategic aims and the hospital board acknowledged innovation as a distinct strategic aim. There was a shared belief and energy in using the IH as an approach to address and exceed operational hospital objectives of excellent patient care, quality and delivery. This aligned with a broader perspective of the potential of innovation as a positive contributory factor to address grand challenges facing healthcare.

> *'As an NHS team we are looking to find things that make our practice and our services safer, and higher quality, … a better experience for patients and for service users, and how we add capacity to the system, to preserve the healthcare system' (Professional External).*

Yet, actions to practically contribute to this aspiration were rare within NHS Trust Hospitals and as such, a hospital based IH was a novel atypical part of NHS Trust Hospitals. Despite having broad organisational support from Hospital Board members, in practical terms there was no existing process to facilitate achieving their aspirations. Balancing the workload of clinical staff to make best use of their expertise was operationally complex.

4.2 Understanding contextual factors which impact Hub operational development and sustained effectiveness.

This challenge required establishing a shared organisational understanding of how best to balance two core hospital requirements; meeting current clinical care needs whilst exploring how user-led innovation could inform resolving healthcare challenges to improve future outcomes. Practically, this challenge was evident in the Hub by seeing which types of clinicians participated in Hub activity. Over time, a pattern began to emerge which suggested a link between Hub participation and the level of mobility in Clinical role. This was evident through participation staff who could more easily meet their primary medical care job role and additionally, participate in Innovation Hub activities. There was a notable absence of participation from staff with Ward bound roles and set shift patterns.

Despite the close proximity to the main hospital, these staff were less able to access the Hub. At the time of data collection, there was a noted absence of nursing participation for this reason, despite wealth of tacit knowledge gained from close contact with patients. Efforts to agree on how to democratically enable staff involvement in the Hub, to share their tacit knowledge, without compromising immediate patient care needs. This in part was due to workload considerations and how to address backfilling ward bound staff within current process structures. Contribution and tacit knowledge of ward bound staff were acknowledged to have value to the user-led innovation process by the Hospital Board. Resolving this complex challenge was ongoing, but beyond the scope of this study.

Despite being a challenge it was important as part of the organisational culture of the hospital where the Hub was located. The hospital was nationally recognised as particularly innovative and person centred.

> *'when we set the vision strategy for this organisation, we aim to become Internationally recognised, world class, leading in paediatric healthcare. To do that you need great facilities, great people, … great research, stable money, but you also need great innovation now we are slowly putting these pillars together (Hospital Board).*

Yet, beneath the shared focus on delivering a child centred healthcare experience, differences in the operational organisational culture of the hospital and the Hub had emerged and were proving difficult to resolve. Efforts to better align the innovation culture

of the Hub with the main hospital were suggested by some key decision makers to help integrate the Hub into NHS systems and planning cycles. However, this idea was resisted by Hub actors who appreciated the premise of innovation as inherently less linear and more experimental; the Hub needed to be different. Despite shared core values, an inability to align, and often quantify the value of Hub Innovation activity exacerbated anxiety and created frustration amongst Hospital internal stakeholders who were used working within more predictable, rigid, organisational healthcare norms.

Different frustrations identified by stakeholders with a commercial background were also emerging and exposing weaknesses in effectively communicating why context specific healthcare innovation processes differed from typical commercial process in terms of pace and risk.

> *'I'm sounding very critical aren't, I but I know what good looks like, so I am enormously frustrated, enormously frustrated* !*... I know it is going to work! If we do this then it will work' (Professional External).*

However, clinicians involved in the IH identified the benefits of the IH space, environment and processes. A senior clinician noted,

> *'…the physical role of the Hub is to give people a little bit of a phase shift in their head. When you are in here you shouldn't be thinking like a clinician, you should be being a bit more experimental…. on a ward I am conditioned to behave differently. I am not in a high risk, let's have a go at this, kind of frame of mind. Whereas down here I am, it's the setup, its rough and ready, very changeable and it is in the hospital but it's not really in the hospital, and it's a place where I can bring people (Senior Clinical).*

Over time a pressure from within the Hospital increased expectations for the Hub to work a manner which aligned with main organisational processes. A desire to introduce a trackable timeframe to manage development of an innovation product, with accompanied resource use reflected the risk averse nature of Hospital organisational culture. Hospital stakeholders found it difficult to commit support to Hub projects when they lacked use of tangible evidence-based decision making, a shortcoming explored by Madden et al, (2024). At the time of data collection, it was the experiential, tacit, person-centred motives which provided initial ground to explore potential of the suggested innovation concept or problem to seek to overcome. Particularly in terms of acknowledging the complexity of factors which contribute to 'good health.'

> *'I think a lot of our focus is moving towards physical and mental health. I think we like to pride ourselves on thinking that we have always taken a holistic view of children when we are caring for them…. so thinking about the emotional aspects of healthcare and what children experience' (Board Member).*

In a public sector organisation, use of resource is understandable closely monitored. Yet the Hub was seeking to utilise a combination of stakeholder skill and resource, and in doing so

remove some of the resource scare barriers to experimentation which were commonplace within the NHS. Would supporting such innovative approaches be a successful way to address grand challenges in healthcare, which needed a radical innovative approach?

There was a strong sense of potential value and impact within clinical staff contributing to Hub projects.

> *'I think that the role of innovation has to be a bit like lenses, or phone filters… looking at a problem with an innovation lens… it is another perspective with which to look at a problem, to get a better solution…' (Nursing).*

> *'Overcoming barriers, they (patients) have is the power to basically change a situation and give that person life… and also make a significant difference to how your life is really… It is not about money…one of the things which is very very important to understand... People (clinicians) don't come here for money, they come here for the ethos and the belief of health for all at the time of need, and a lot of people believe in that' (Senior Clinical)*

Hub approaches which reflected aspects of innovation methodology was unfamiliar to Hospital stakeholders. The lack of clarity and inherently higher level of risk introduced unease about continuity, when Hub outcomes were uncertain. At the time of data collection, conversations between Hub staff and the Hospital Board were ongoing to justify why exploratory, experimental nature of innovation projects with a high expected level of failure were necessary within the innovation space. This was exacerbated by the stark contrast to the linear, established healthcare delivery pathways used within the main hospital. For the Hospital Board, strategically planning how to support longer term operationalisation of innovation objectives within the Hub space was challenging. Increasingly, there was a need to tangibly respond to their expectations for a way to demonstrate return on investment, alongside measures of value, impact and success. No existing Hospital process could be implemented to show this. The rarity of such Innovation spaces also created limits to use of context non-specific approaches. Therefore during data collection, a key area of ongoing Hub work was seeking to reimagine and conceptualise how to share Hub process and momentum to satisfy differing stakeholder expectations.

4.3 The increased importance of process; Managing the needs of the collaborative multi-stakeholder innovation process in a hospital based IH

As part of this work, was the need to bring in some replicable structure into the working processes used within the Hub space. Although the project-based nature of innovation projects differed, they commonly used a multi-stakeholder, collaborative approach. At least initially, stakeholders beginning to work on a new project were excited by the novelty of the collaboration they had become involved with. Over time, patterns of tensions began to emerge. These were addressed and managed by staff working within the Hub, to support the collaborative process. The significance of their role became more widely acknowledged

by stakeholders over time as clarity over contribution, methods of participation and project momentum became more contentious.

The importance of establishing an effective co-created innovation process which made best use of collaborators time and resources was another new area to navigate. Initially this task was managed by founding members of the Hub, drawn from the Hospital Board and clinical staff with a prior involvement with Hospital innovation initiatives. Over time, as the magnitude and complexity of such tasks became apparent, so did the need for experienced administrative and project management staff who formed the basis of a Hub staff team. The skills and experience filled a gap within the existing Hub and Hospital skillset, and supported delivery of existing strategy.

> *'Clinicians are really involved in what is in the patient's best interest as an outcome of this innovative solution …often there are commercial drivers to it but … the people who are more expert in negotiating how that fits with someone else's agenda can help deliver that solution as I think it is quite hard for clinicians to think about all those other aspects of what drives someone to want to engage' (Junior Clinical).*

As Innovation activity in the Hub progressed, and partnerships with successful external partners became secure, knowledge of collaborative multi-stakeholder process in the Hub filtered into the main hospital, often through word of mouth. The Hospital had a strong and visible commitment to embracing emerging technologies within paediatric care and patient experience. Yet the use of the Innovation Hub as a place to explore integrating innovative technology into paediatric innovation concepts uncovered a lack of understanding about what innovation was in healthcare.

> *There is a massive culture change needed, … the whole healthcare sector and the NHS are behind the curve in terms of other industry sectors. Innovation is misunderstood and the word hugely misused. Actually in the NHS I think even more so in terms of, is this process improvement, is this transformation? Oh no its innovation. Is it innovation? You need to define what innovation means to your organisation, but we have struggled…. What is innovation to this hospital? How does it fit compared to IT, Research, Transformation? I think it is getting clearer, and probably that is where the commercial bit comes in, because transformation is not about commercial, and research has a different end output. In innovation, one of the strands is going to be commercial revenue' (Professional Internal).*

The involvement of commercial Hub stakeholders contributed to further misunderstandings amongst some hospital staff who were not directly involved. This exposed feelings of vulnerability and resistance to additional change. Concerns emerged connecting increased innovation with to additional job complexity, a lack of connected training and perceived job cuts due to digitalisation. These challenged project intentions of improved patient experience, digitalised access to information and support and improved person-centred healthcare delivery (Secundo, et al, 2019, Wolf, 2019).

A lack of understanding about the nature of multi-stakeholder collaboration uncovered incorrect perceptions of investment in Hub based technology, over addressing needs in the main hospital space. In fact, advanced technology used in the Hub was loaned or donated for project purposes and budgets were entirely separate from those allocated to core Hospital activities. At the time of data the precarious nature of Hub finances and questions over longer term continuity were not appreciated by those outside of the core team. A consistent aim of Hub projects was to improve and enhance hospital healthcare delivery processes and outcomes, supporting the strong shared values of excellent patient experience. Yet the novelty of the innovation Hub activity and collaborative processes, including working with commercial companies raised concerns and perpetuated misinformation amongst some staff. They incorrectly perceived such activities as support for privatisation of NHS services, and strongly opposed to their personal values.

The shared core belief amongst key internal stakeholders that the Hospital could make a strong contribution to resolving some of the issues it faced supported the notion of an Innovation Hub as a vehicle to achieve progress.

> *'…you have to exploit your strengths and that is what we are trying to do here, … and our asset is our expertise in health' (Professional Internal).*

A core finding from the study was the importance of the use of facilitation as a tool to aid the complex agendas and operational dynamics within a multi-stakeholder co-created innovation space. As participation in the Hub, was in addition to a clinician's primary job role, their presence was often sporadic and subject to change. Innovation project progress was negatively impacted by a lack of consistent process and sufficient resource to support the needs of the project and its participants. This lack of structure contributed to emerging challenges discussed previously outlined.

4.4 Forming a Hub staff team to support and sustain Hub activities

Over time, a shared understanding between Hospital actors emerged regarding the need to resource and task a team of Hub staff to more effectively support the needs of stakeholders involved in the collaborative process.

> *'I have a very narrow set of skills and in order to make anything happen you need a team to make it happen and a lot of those skills aren't naturally within the NHS' (Nursing).*

Their role as intermediaries was to orchestrate project management and stakeholder communication as explored by Howells (2006). In turn, this activity was anticipated address the longer-term stability of the Hub space by providing dedicated resource with experience achieving strategic objectives and implementing collaborative innovation processes. The introduction and subsequent growth of the Hub team began to resolve issues which initially emerged during the exploratory Hub start-up phase.

One example was the emergence of limitations in the skillsets of highly revered stakeholders, actively working on Hub projects. Some clinicians voiced frustration about the time needed to learn more commercially focused skills like negotiation with external stakeholders, which were far from their usual areas of expertise. Expecting clinical staff to take on such elements of collaborative working had begun to negatively impact the Hub progress and vision. Furthermore, this contributed to additional questions from stakeholders regarding the effectiveness of a Hub space to contribute to resolving grand challenges within paediatric healthcare. Importantly, the potential to do this was not in question, but an initial underappreciation of the skill set mix, to support achieving innovative aims had minimised key areas for project progression and continuity.

Over time the organisational structure of the Hub began to develop and align with needs of an innovation space. For the Hub to function and make best use of combining valuable stakeholder resources an additional core aspect to support the functionality of hospital-based innovation hubs emerged. In addition to the necessity of dedicated space, and a proximate location were the project management and administrative skills from the Hub staff team.

> *'I didn't know what a business model was…. I couldn't write a Gant chart..., but I need to know that we need one! (Nursing).*

Inclusion of these skills, often obtained outside of healthcare practice brought structure and processes to the Hub environment. This skillset was not well developed in any other Hub stakeholder group, but previously had fallen to some founding clinical staff. Hub Staff team influence brought focus and objectivity into a space fuelled by clinicians creativity, passion and possibility. Over time, the Hub was better able to contribute to grand challenges. But a collective realisation that collaborators time should be directed to where their skills were most needed, and most valuable took time. Clinicians were protective over their idea, and keen to maintain control in conversations and decision-making concurring with findings of (Tietze et al, 2020). But the demands of their primary hospital role interrupted this and disrupted the innovation process leading to calls for change from within project teams.

Hub staff were well placed to curate multi-stakeholder teams and manage the necessary frequency of contact between contributors. Their involvement increased the visibility and use of replicable processes which began to improve levels of Hub efficiency and project pace. Hub staff had capacity and experience in understanding how to address areas of stakeholder miscommunication before significant issues arose. They appreciated the frustrations of external stakeholders who attempted to understand NHS organisational systems and were committed to find resolutions.

> *The NHS doesn't understand how the NHS works! There is no chance for external companies really to understand it, more than what they do generally. I think that is where the innovation team is helpful as we can kind of connect the dots, to get the right people in the room. I think*

access for external companies is very difficult. Again that is one of the benefits we bring here and one of the selling points for external companies, that we can give you access to people that you can't normally get' (Professional).

The time Hub staff were able to dedicate to micro details helped to mobilise and sustain project design objectives and implement evidence informed decision making, as the project progressed from an idea to a potential prototype or concept under development. Introduction of this type of approach formed the basis of an initial Hub innovation process, with timeframes, projected cost types and areas of contribution for stakeholders from different backgrounds. This level of tangibility had, in the start-up phase not been as well documented and as such the perceived lack of structure had begun to raise concerns with some stakeholders used to detailed NHS processes and supporting documentation.

Furthermore, potential outputs from the healthcare innovation process required specialist knowledge to appropriately manage intellectual property, use of emerging technologies and future commercial agreements should any co-created projects reach wider sale. The Hub staff team added important skills to the Hub space which added credibility to the potential of an Innovation Hub as a resource to address grand challenges. They were able to manage complex, changeable situations by combining prior work experience which interestingly were gained in previous roles which mirrored the backgrounds of the Hub collaborators; NHS roles, research institutions, commercial settings or external innovation environments.

The Hub staff team supported the co-creative process by combining their existing expertise in the management of stakeholder relationships and complex projects to increase the resilience of the Hub space. Their presence and activities helped to meet external stakeholder expectations of what an Innovation Hub 'should be' in terms of availability of information, support services, communication methods and consistency.

'I think that you have got to communicate that everyone has their own value, and everyone has to have a tick in the box with what they want to do, if they don't, then it is a waste of time' (Professional Internal).

The dual focus of Hub staff emerged to be mainly working with external and internal collaborators to appreciate and align their disparate skills, knowledge and priorities for involvement in the Hub space. Working somewhat as boundary spanners, their role was growing to underpin, exemplify and validate Hub activity, vision and contribution through bespoke contact with different stakeholder groups. They also acted as stakeholder and project managers, projecting, planning, assessing and reviewing project progress to create a documented process from which decisions could be made.

By investing in a new group of people to work with and between existing stakeholder groups, the hospital was somewhat unintentionally, able to begin defusing tensions which were building between stakeholders who had been invested from the outset of the hospital-based hub. The context of this study revealed the deep passion and commitment amongst

those working in healthcare to improve paediatric care. The opportunity to innovate existing products, services and processes to address known current barriers and commitment to excellent patient experience was found to be both a strength and a limitation in how the Hub was informally appraised in its initial stages.

When bringing together different areas of expertise as part of a multi-stakeholder process there is understandably scope for tension and differing viewpoints.

'…they (commercial organisations) are looking for as many opportunities as you can deal with, that is the aim of business, to grow…. It is a different game to the NHS and in the public sector, here the game is how well can we deliver that service?/…/ So it is a different mentality, the pace is different and the quantities are different' (Professional Internal).

Over time increasing the Hub Staff team presence was used to depersonalise such conversations, as their involvement did not seek to uphold a particular viewpoint acquired in their clinical, research or commercial role. Rather, their participation sought to democratise the process by introducing standardised project pathways, and access to written documents outlining opportunities for resource and support. At the time of data collection, changes were being considered regarding how best to collect and review User's initial innovation ideas to better allocate Hub resources and manage expectations.

> *'…they (Users) get all these ideas but there is no resource or funding to do anything with them, so you have raised people's expectations, staff come forward with ideas thinking something like happen and you end up with a backlog of things that are never done /… / the issue is, it threatens our credibility' (Professional Internal).*

Initially, within the Hub, the user-led innovation concept had arisen from a notion of Users 'knowing best' due to their tacit and experiential hospital-based knowledge. As the project progressed, some tensions emerged within collaborative teams which raised questions about the best use of each stakeholders participation. This led to aspects of concept development being challenged, uncovering disparate areas of stakeholder views. Involvement of University and commercial industry collaborators introduced alternative ways of thinking drawn from alternative experiences including prior research findings of university colleagues, wider ongoing studies, views of commercially minded partners or risk averse Hospital Board colleagues. Defining shared, mutually agreed objectives or measures of success uncovered disparate priorities, which, without the skills of the Hub staff team could prove destructively divisive. Addressing emerging polarisation, a lack of existing usable process and a complex range of sector specific challenges which emerged when seeking to work in new and untested ways with external partners became vital for the evolution of the Hub studied in this research. What followed were strong changes, which reflected changes in Hub management, and management style.

The continued operational development of the Hub also supported a clearer articulation of its activities, goals and vision. This in turn supported the notion that Hospitals are not just a place for treating sick patients. But, with appropriate resourcing, offer a unique opportunity to provide a space which can become a nexus to address user-led healthcare challenges. A hospital-based space enables participation of clinicians as 'embedded lead users' to interact with opportunities arising from use of resource from rich external partners with the finances, equipment and contacts to practically support an innovation path to solutions (Schweisfurth & Raasch, 2015). Appraising the importance of healthcare hub locations raises questions about the suitability and feasibility of involving different types of users as important stakeholders within a collaborative, co-creative process. Proximity to the main hospital may be a deciding factor for participation for hospital staff alongside their healthcare delivery role.

4.5 Exploring the importance of contextual specific IH features; barriers and enablers of success?

A hospital location may entice renown external collaborators, who appreciate the rarity of access to leading paediatric tacit knowledge and the importance for academic knowledge or commercial product development. Yet in healthcare innovation, often the user of most importance is the patient due to their lived experience (Demonaco et al, 2020).

The paediatric context of this Hub adds complexity in terms of ethical appropriateness of involving patients as users (Geiger and Hirschl,2015) despite literature which acknowledges their interest and increasing role as innovative users in some prior studies (e.g. Oftedal et al, 2019, Schiavone, 2020). However the hospital studied in this research appreciated the importance of due diligence required to satisfy ethical requirements, and with dedicated resource was keen to explore this option as part of continued Hub development. Again, this example further supports expansion of a Hub staff team with the skills, foresight and connections to anticipate and address the varied, complex nature of innovating in a collaborative healthcare space. Over time the importance of managing a responsible, competitive and resilient Hub illustrated the value of job roles and expertise which initially were not apparent to sustaining Hub activities.

The novelty of this hospital-based Hub space, required the Hub to define and communicate its purpose, approach, contribution and alignment with broader NHS innovation schemes to clarify its anticipated value and impact. As the Hub projects mature, the prior experience of the Hub staff team began to support core hospital stakeholders as they considered the extent to which the Hub had begun to satisfy some of their initial aims. Classifying and demonstrating how the Hub created value or 'good' within the hospital, again was an area of strategic importance to multiple hospital departments. The Hub staff team were best placed to contribute to this, and in doing so support the aspirations of their clinical colleagues. Initial expectations that this role could be undertaken by clinical staff, who worked in the Hub alongside their main role was not adequately supported.

'…it was meant to be one day in the Hub… but that rarely happens, especially with the App development which has taken a lot of my time… it nearly killed me … trying to do that and everything else at the same time' (Nursing).

Similarly, initial discussions around the place of commercial product sales, and how partnerships between NHS hospitals and private sector organisations could be managed further drew on the specialist skills of the Hub staff team. Increasingly the vital nature of their contribution to an impactful Hub was appreciated as having comparable importance to the skills and knowledge project collaborators.

Understanding the complexity of a hospital based multi-stakeholder innovation space was on going. Interest in the Hub space remained consistent, perhaps due to the rare opportunities it had the potential to support. The strong shared aspiration of improving person centred paediatric care was not easily diminished, yet finer operational details continued to challenge ways to more robustly demonstrate Hub current and future impacts.

'…the guy who thought of it (the innovation concept) needs space to follow through, it won't happen otherwise…. It is about putting the infrastructure in to make the thing (Hub) a success… which includes back filling some people… but we don't have those resources in the NHS… we don't run with that sort of slack' (Hospital Board).

'…people think that they can manage (innovation) by just reading a book and going to a few events, but it falls apart if you have not been properly trained and had experience in other scenarios… it should be outcome driven…. better outcomes for people… so the five tenants of healthcare are safe, effective, timely, equitable and patient focused.' (Professional External).

Being able to convey notions of value proved complex and often intangible during the product development stages, which was a core source of contention between the working practices of innovation spaces and what was appropriate in a healthcare delivery environment, a finding which concurs with prior research by (Hattori and Wycoff, 2002). Yet some indications were beginning to emerge some, broader contributions derived from the presence of a hospital-based Hub were utilised as part of staff recruitment materials. This has proving especially useful in efforts to recruit or retain extremely skilled staff with high job mobility and a broad choice of job opportunities. Amongst the Hospital Board there was an expectation that within a difficult recruitment market, the opportunity to have a more diverse job role which included addressing current barriers within patient care could differentiate the hospital, improve retention and uphold reputation. The lack of predictability of Hub innovation work continued to be a challenge for the Hospital board. Work had begun to make better use of IT systems to capture data and use this to indicate outcomes and indicative areas of value during the innovation process. But more importantly, the need to educate Hospital staff about Hub activities was emerging as a conduit to better communication the role of the Hub space amongst patients and families.

This was a work in progress, and part of an initiative better integrate Hub activity into the progressive culture of the hospital.

5. Discussion

This study aims to understand how IH can leverage multi-stakeholder collaboration to address complex health challenges and foster innovative solutions. This research identified the importance of the role of the IH staff team as an essential part of facilitating and sustaining clinicians contribution as users. Additionally, the role of Hub space was essential to provide a non-clinical, supported space for exploratory collaborative innovation. Organisationally, hospital managers required time to understand innovation process, timescales and inherent risk factors as part of unlocking user knowledge to address complex health and wellbeing challenges.

This study makes theoretical contributions in key areas, including contributory aspects to Healthcare Innovation Hubs, Multi-stakeholder collaborative innovation and user-led innovation. These contributions are presented within the following sub-sections which contribute to more focused areas of literature on IH Space, Contextual Factors within a hospital based NHS IH, Process, Multi-stakeholder innovation and the role of the IH staff team.

The study makes a valuable contribution to the limited existing case studies of healthcare innovation hubs (Savory, 2009, Saidi et al 2017 and Hyrkäs et al 2020) adding the first UK focused paediatric hospital IH study. This research contributes to this topical research area by providing evidence of early-stage challenges experienced a multi-stakeholder team. The case study provides additional understanding into the challenges of navigating collaborative innovation within a dedicated space, with proximity to the main hospital, extending work by Samet et al (2016). The context and novelty of this case is important when developing an understanding of how innovation can co-exist within a highly regulated hospital campus, subject to operational linear processes, adding a healthcare IH focus to prior work by Moultrie et al (2007).

5.1 IH Space

Using a shared space, like an IH, to leverage collaboration between healthcare stakeholders to work collaboratively facilitates the process of exploring co-created solutions to existing healthcare challenges. This study identifies how an IH provides novel physical and creative space to develop knowledge led solutions informed by clinician's tacit knowledge of the hospital setting, extending findings by Saidi et al (2017). The healthcare context of an onsite IH enables the importance of space and proximity to be considered as factors of user participation extending the work of Jimenez and Zheng (2021) and Peschl and Fundneider (2012).

Provision of a dedicated space within a hospital campus aids participation of key users and adds to the potential of this approach to offer novel and impactful ways to address challenging healthcare problems. Yet the tension between if this is something hospitals 'should be doing' remains, within a healthcare system suffering the impacts of undercapacity to meet current demand for healthcare treatment. A further question arises about and the interdependence between external stakeholder involvement and user-led design to provide direction when seeking to overcome current obstacles or necessary improvements to healthcare delivery, efficiency and effectiveness. Such hospital-based projects have the potential contribute to medical focused and experiential aspects of healthcare. But pursuing these ideas takes investment in terms of finance, time, resource and workforce. This study presents a rich new case study to evidence this, building on previous work by Sharma and Meyer, (2019).

5.2 Contextual Factors

Within the NHS, resources are valuable commodities. The IH studied was moving towards being formally recognised as a new department within the hospital structure. Thus, seeking renewed support to sustain IH activities was a continued priority during early phases of operation. Although the financial IH budget was separate from Hospital activities, there were concerns in terms of how growth would be supported as the IH has not established a sustainable source of funding. In this way the study contributes to sustaining innovative NHS healthcare solutions, contributing to a broader study into necessary shifts in thinking and practice by Cripps and Scarbrough (2022).

During data collection difficult conversations were underway to consider and calculate best use of hospital and IH resources in an attempt to answer stakeholder questions about how resource allocation correlates to tangible results. In an innovation setting this is difficult to demonstrate in early stages of IH activity, are as, areas of value and impact, findings from this study concur with Côté-Boileau et al (2019). If an IH can effectively contribute to addressing grand challenges in healthcare, a better question maybe, what are the expected societal contributions of a hospital. This study adds valuable context to topical grand challenges in healthcare (Mittelmark et al, 2022 and Tettegah and Garcia, 2016). In 2025, as our understanding of what it means to be in good health recognise the holistic, salutogenic factors in addition to healing physical issues, will and should hospitals as organisations be viewed as making a broader contribution? If so, how will this work within a public health system. If multi-stakeholder collaboration, and access to financial and practical resources alleviates resource limitations in the NHS, there is much work to be done to manage areas including the process, finance and protection of Intellectual Property. This will support the NHS and its staff and users secure just and appropriate benefits in an area like user-led innovation, in which they are unfamiliar but recognise areas of potential impact; through engaging in collaborative knowledge-led patient focused value creation. The study makes a significant contribution to understanding the practical and organisational challenges

associated with collaborative innovation in healthcare IH (e.g. Barlow, 2017, Savory, 2009, Manent, 2024) including evolving stakeholder needs (Hattori and Wycoff, 2002, Peschl and Fundneider, 2012) factors influencing IH staff and collaborators working approaches (e.g. Howells, 2006, Guinan et al., 2019) within an IH seeking to develop an innovation culture and define the scope of activities. This extends the work of Saidi et al (2017) in a South Africa IH, and the Full-Service Design Incubator model (Sharma and Meyer, 2019) through the specific context of this IH.

5.3 Process and the complexity of multi-stakeholder collaboration

If IH are to become a familiar addition to hospital campus' the effectiveness of potential multi-stakeholder contribution requires careful consideration to appreciate core elements, identified in this study. In addition to establishing shared stakeholder values is recognition of potential benefits arising from multi-stakeholder collaboration. A commitment to explore the current and future scope of Hospital contributions to sustain collaborative approaches is key. Next, is a willingness to balance differences the differing organisational cultures of healthcare delivery spaces and innovation spaces to foster collaboration. This is complex, and this study introduces this challenge within a particular contextual setting, building on previous work by Cacamo (2020) and Fecher et al (2020). As noted in this study working towards achieving balance requires development of a set of bespoke processes to acknowledge conflicting levels of stakeholder tolerance for risk, creativity and variable pace in healthcare activity concurring with findings from Moultrie et al, (2007).

Reaching an agreement and documenting this through workable processes will help to demonstrate a direction of travel within an often unpredictable and exploratory innovation process which challenges organisational norms in a hospital setting. This is particularly important to reassure healthcare and commercial stakeholders who are seeking to define and measure of value from allocated resource. As discussed, a resilient Hub which can be sustained requires a well-resourced Hub staff team. They are able to support leveraging stakeholder contribution through working as intermediaries. Their contribution provides the foundations from which to operate a dynamic innovation process within a sector which has a number of sensitive and complex operational concerns, extending the work of Guinan et al, (2019) and Howells, (2006).

5.4 The role of the IH team to support creating value from user tacit knowledge

The approach taken to working towards demonstrating value from tacit knowledge in a IH can be done in a number of ways, depending on the innovation culture which informs the direction of Hub activities. Onsite IH are connected to the organisational culture of the Hospital they are part of and as such will be influenced by expectations and tolerance for factors including risk, changes to project plans, financial management and trackable progress. This will impact how Hub staff seek to share early stage progress, and anticipated long-term outputs within tangible and intangible IH activity. Unlike healthcare delivery it is

not possible to follow and report on linear agreed processes as multi-stakeholder collaborative innovation is dynamic, changeable and exploratory.

The role of the Hub staff and their influence are as important the availability of space and participation of core collaborators in determining if the contribution of the Hub will reach its potential. The study makes an important contribution to the role and contribution of Hub staff in a hospital based paediatric setting, responding to calls for additional studies in IH staff as intermediaries (Howells, 2006) and boundary spanners (Long et al, 2013) and knowledge brokers (Crupi et al, 2020).

Their location within the Hub, but mobility to work inside and outside of key organisational boundaries is significant at uniting stakeholders, as is their previous work history which adds commercial project, financial and stakeholder management expertise to the Hub environment. Their core role is to work to achieve a balanced approach to meeting healthcare strategic priorities. This challenging aim requires their action to sustain and direct stakeholder involvement to align their expertise with project requirements and time available for IH activity. The addition of the Hub staff team perspective holds the potential for hospitals to evolve to harness a competitive position when negotiating with external commercial suppliers, as the breadth of skills and expertise is extended from healthcare delivery tacit knowledge to include a broader area of relevance.

Thus, preserving organisational acceptance to explore novel ideas arising from users tacit knowledge and experiences is important to protect the unique contribution of hospital based IH using a collaborative process (Magadley and Birdi 2009). The study critically analysed the importance of clinicians, through seeking to understand their role and contribution. The role of clinician's as embedded lead users builds on the work of Herstatt et al (2016) in the emerging topical areas of technology led (Tettegah and Garcia, 2016) holistic approaches to addressing paediatric patient needs extending the work of Dimitri (2019) through conducting a more in-depth case study.

Thus, developing a contextually appropriate innovation process is a challenging yet necessary antidote to the specialised and emotive demands of paediatric healthcare. The study improves understanding of contextual factors within a hospital based IH, extending the work of Côté-Boileau et al (2019) who reviewed broader NHS innovation journeys and associated challenges. Findings from this study support outcomes of their study regarding the unpredictable outcomes and concerns over focus of activity with healthcare innovation which seeks a more sustainable setup. The eventual contribution made by the IH, and the types of value generated can subsequently be used to judge if this approach is in fact an effective way to address grand challenges in healthcare, irrespective of the eventual outcome of the exploratory project. These measures of success will be evaluated by stakeholders who have both shared values and wider areas of disparate priorities.

If the contribution of hospital-based innovation spaces can be managed in such a sensitive and inclusive manner, there is scope to access a previously under-utilised resource, where knowledge and experience can shape future healthcare experiences and contribute to addressing grand challenges. Through providing an onsite IH hospitals can extend the contribution of their function as organisations and better engage with connected stakeholder groups. In the public sector this can provide a redefined seat in discussions about future healthcare products and services and their suitability to meet patient and organisational needs, extending findings of Hattori and Wycoff (2002) and Peschl and Fundneider (2012).

Changing where the innovation happens, and who informs it has the potential to diversify the contribution of hospitals and their core resources. Broader involvement in and with stakeholders who influence UK healthcare, through participating in collaborative innovation, and reimagined use of hospital spaces can in turn help efforts to uphold values of person-centred care, which are so dear to many public sector NHS staff concurring with extant literature in this area with the NHS (Barlow 2017 and Bason, 2010).

5.5 Practical Implications for Hospital Managers

The findings within this study emphasise the importance of managerial understanding and support if an IH can evolve to make an effective contribution to grand challenges in healthcare. As shown in this study IH create several distinct complexities due to the experimental process and multi-stakeholder approach which operates outside of the standard linear operating mechanisms. Thus, a number of important issues for hospital and IH managers to consider arise; accommodating diverse multi-stakeholder needs, provision of space and the importance of appropraitely skilled human resource. The study explores why multi-stakeholder collaboration can be impactful to address grand challenges. The research findings share examples of arising organisational complexities regarding how to manage resource and clinicians time restrictions which can be a barrier to harnessing their valuable experiential knowledge to innovate within a hospital based IH. This finding suggests investment in additional Hub Staff members will improve the efficiency and progression of multi-stakeholder innovation projects, whilst maximising impact of clinical user participation. The study provides valuable contextually specific NHS findings on which to consider if a Hub facility could function productively in other healthcare contexts. To sustain IH activity modifications to existing operational processes along with flexibility within financial and resource planning cycles are required. Although this places additional pressure on healthcare systems with limited capacity, it is necessary to support differing stakeholder needs and specific requirements of an innovation environment which is by nature less structured and predictable. This is important to sustain clinicians participation in terms of manging their time and resources (financial and physical) as they are rare and valuable resource within a collaborative IH process.

Of particular practical importance is considering the impact of Hospital expectations of the IH and how this can be managed over time. The relationship between the Hospital and the

IH will shape the potential to develop bespoke process and operational structures suitable for an IH setting. This in turn will support leveraging an IH contribution to addressing grand challenges using the tacit knowledge of clinicians. Potential benefits could impact healthcare delivery, efficiency and scope along with boosting hospital reputational and patient experience. Currently the findings suggest that hospital managers are require dedicated time to consider the extent to which users can sustain a core role in IH activity. This will impact on their core Hospital role, but has scope to extend their contribution through influencing the development of innovation concepts. Their tacit, experiential knowledge combined with their problem-solving skill set provides valuable contextually specific experience to deconstruct complex grand challenges, and inform the contribution of non-clinical collaborators. Without creating capacity for their sustained participation, the potential of an IH is restricted to follow known rather than potentially more conducive bespoke directions. Innovation is by nature experimental, thus, within an understandably rigid, linear healthcare delivery structure new ways of working are required to maximise the contribution of onsite innovation spaces like IH. Exploring and testing new methods are necessary to navigate how to achieve integrating innovation processes into approved healthcare management structures. This is important as the role of a hospital continues to evolve and impact beyond medical healthcare delivery.

5.6 Limitations and Areas for Further Work

The first limitation of this study is the single case study focus. Any claims for generalizability need to be made with caution and further research is needed to test other contexts and countries as health care systems vary between hospitals within different organisational and national contexts. Thus, future research which included a comparative element, involving multiple Hospital based IH would provide an opportunity to better address issues of potential bias and lack of generalisability as cautioned in the literature (e.g. Zaitsava et al 2022, Eisenhardt and Graebner, 2007).

Additionally, although this Hub supported user-led innovation, and was motivated by patient needs, the lack of direct patient and family involvement at the time of data collection is a limitation. The complexity of ethics processes associated with involving paediatric patients who are undergoing treatment is well understood. There is scope to design studies which include patients and families as users subject to careful ethical consideration. A further constraint was governed by the time available to collect data. A longer data collection period, use of online interviews to offer additional flexibility may address these issues and support extending the data sample.

Within this study two main areas for further work emerged to make further contributions to the literature. The first is further studies on the Hub staff team and their role to leverage impact from a multi-stakeholder IH process to understanding their perspective, capacity and priorities, extending existing work which explores intermediaries in healthcare settings (e.g.

Howells, 2006) Boundary Spanners (e.g. Long et al, 2013, Herstatt, 2016) and Knowledge Brokers (Crupi et al, 2020).

Secondly, the function of the physical Hub space, specifically within a hospital campus requires further explorative studies to develop a broader understanding of the stakeholders needs. This study produced initial findings, further work exploring the value of digital innovation hubs and digitalisation would extend themes emerging from this research and may provide opportunities to leverage multi-stakeholder IH as a method of addressing healthcare grand challenges.

Additionally there is scope to explore emerging areas of interest which are beyond the scope of this study. These include the dynamics and tension between stakeholders with disparate priorities. At present the dynamic between commercial stakeholders and internal non-clinical hospital actors requires further work. Also, studies which explore dynamics between hospital clinicians and decision makers would identify how decisions regarding Hub innovation process, tolerance to risk and access to funding and resources evolve within this emerging area of study.

6.0 Conclusion

In conclusion, this paper presents the complexity of challenges facing a hospital IH using a single case study approach to leverage user knowledge to address grand challenges in UK healthcare. The study contributes to ongoing discussions by exploring barriers to effectively addressing grand healthcare challenges by exploring the potential of user tacit knowledge within onsite hospital IH. Despite the case study IH having favourable conditions to support collaborative innovation e.g. access to dedicated space, a capacity to develop a co-created innovation process and a network of stakeholders with initial core shared values, tensions remained between expectations of balancing NHS operational norms and innovation-led needs within the IH. The study concurs with extant literature that access to designated innovation space, such as the IH, are suited to leverage novel and complex collaborative multi-stakeholder approaches. The study deepens understanding of the scope and combination of the skills needed to foster collaborative innovation in a UK healthcare setting. Practically this study considers challenges which emerge to sustaining an IH, despite stakeholder commitment to the transformative potential of such a facility.

To address these challenges, the study documents an emerging innovative approach to building and operating an IH, which seeks to utilise the tacit and experiential knowledge of core actors, particularly clinicians as embedded lead users, and IH staff as valuable intermediaries, boundary spanners and knowledge brokers. This collaborative approach informs solutions that build upon the shared values of these actors to support providing the best quality of patient care. The emerging nature of this field of study and raises questions to be answered for other sectors and healthcare settings facing similar innovation-related challenges.

Reference List

Abela, S. (2023). *The Structure of the NHS. In: Leadership and Management in Healthcare*. Springer, Cambridge, UK.

Alderwick, H., Hutchings, A. and Mays, N., (2024). 'Solving poverty or tackling healthcare inequalities? Qualitative study exploring local interpretations of national policy on health inequalities under new NHS reforms in England'. *BMJ Open*, *14*(4), p.e081954.

Anderson, M., Pitchforth, E., Edwards, N., Alderwick, H., McGuire, A. and Mossialos, E., (2022). 'United Kingdom: Health System Review', *Health Systems in Transition, 24(1),* 1-194.

Arora, A., Wright, A., Cheng, T.K.M., Khwaja, Z. and Seah, M., (2021). 'Innovation pathways in the NHS: an introductory review', *Therapeutic Innovation & Regulatory Science*, *55*(5), 1045-1058.

Barlow, J. (2017). *Managing Innovation in Healthcare*, World Scientific Publishing Company: Singapore.

Bason, C. (2010). *Orchestrating co-creation. Leading public sector innovation: Co-creating for a better society*. Bristol: UK: Policy Press at the University of Bristol.

Bauer, G., Roy, M., Bakibinga, P., Contu, P., Downe, S., Eriksson, M., Espnes, G., Jensen, B., Canal, D. J. & Lindström, B. (2019). 'Future directions for the concept of salutogenesis: a position article.' *Health Promotion International*, 35(2), 187-195.

Bessant, J., Oftedal, E. and Iakovleva, T. (2025). 'Introduction: Meeting the inclusion challenge in innovation'. In: Iakovleva, T., Oftedal, E. and Bessant, J. ed. *Meeting the Inclusion Challenge in Innovation: Giving Voice to Users*. Berlin, Boston: De Gruyter, pp. 1-20.

Björklund, T. A., Keipi, T., Celik, S. & Ekman, K. (2019). 'Learning across silos: Design Factories as hubs for co-creation', *European Journal of Education, Research, Development and Policy*, 54,(4) 552-565.

Caccamo, M. (2020). 'Leveraging innovation spaces to foster collaborative innovation', *Creativity and Innovation Management*, 29,(1) 178-191.

Cadeddu, S.B., Dare, L.O. and Denis, J.L., (2023). 'Employee-driven innovation in health organizations: insights from a scoping review'. *International Journal of Health Policy and Management*, *12*. 1-14.

Carstensen, H.V. and Bason, C., (2012). 'Powering collaborative policy innovation: Can innovation labs help?', *The Innovation Journal*, *17*(1), 2-26.

Cassell, C., and Bishop, V. (2019). 'Qualitative Data Analysis: Exploring Themes, Metaphors and Stories', *European Management Review*, 16: 195–207

Côté-Boileau, É., Denis, JL., Callery, B. et al. (2019). 'The unpredictable journeys of spreading, sustaining and scaling healthcare innovations: a scoping review', *Health Research Policy and Systems*, 17:84.

Cripps, M. and Scarbrough, H. (2022). 'Making digital health "solutions" sustainable in healthcare systems: a practitioner perspective.' *Frontiers in digital health*, *4*, 727421.

Crupi, A., Del Sarto, N., Di Minin, A., Gregori, G. L., Lepore, D., Marinelli, L. & Spigarelli, F. (2020). 'The digital transformation of SMEs – a new knowledge broker called the digital innovation hub', *Journal of Knowledge Management*, 24,(6) 1263-1288.

Dalingwater, L. (2020). '*The NHS and Contemporary Health Challenges from a Multilevel Perspective*.' IGI Global: USA

Demonaco, H., Oliveira, P., Torrance, A., Von Hippel, C. & Von Hippel, E. (2020). 'When patients become innovators', *MIT Sloan Management Review*, 60(3), 81-88.

Dimitri, P. (2019). 'Child health technology: shaping the future of paediatrics and child health and improving NHS productivity', *Archives of Disease in Childhood*, 104(2), 184-188.

Eisenhardt, K. M. & Graebner, M. E. (2007). 'Theory Building From Cases: Opportunities And Challenges', *Academy of Management Journal*. 50 (1), 25–32.

Fecher, F., Winding, J., Hutter, K. & Füller, J. (2020). 'Innovation labs from a participants' perspective', *Journal of Business Research*, 110,(1) 567-576.

Garibyan, L., Kroshinsky, D., Freeman, E., Sakamoto, F.H. and Anderson, R.R., (2021). 'A strategy for empowering clinicians and increasing innovation: the Magic Wand Initiative'. *Archives of Dermatological Research*, *313*, 599-602.

Geiger, J. D. & Hirschl, R. B. (2015). 'Innovation in surgical technology and techniques: Challenges and ethical issues', *Seminars in Pediatric Surgery*, 24(3), 115-121.

George, G., Howard-Grenville, J., Joshi, A. and Tihanyi, L., (2016). 'Understanding and tackling societal grand challenges through management research'. *Academy of Management Journal*, *59*(6), pp.1880-1895.

Gryszkiewicz, L., Lykourentzou, I., Toivonen, T. (2016). 'Innovation Labs: Leveraging Openness for Radical Innovation?', *Journal of Innovation Management Journal of Innovation Management*, 4(4), 68-97.

Guinan, P. J., Parise, S. & Langowitz, N. (2019). 'Creating an innovative digital project team: Levers to enable digital transformation', *Business Horizons*, 62(6), 717-727.

Halkes, M., Peres, N. and Bessant, J. (2024). 'Digital futures – enabling innovation through a boundary space', in T. Iakovleva, E. Oftedaland J. Bessant (eds) *Meeting the Inclusion Challenge in Innovation*. Berlin: De Gruyter. Available at: https://doi.org/10.1515/9783111241036-009.

Hattori, R. & Wycoff, J. (2002). 'Innovation DNA: A good idea is not enough. It has to create value', *Training and Development*, 56(2), 25-39.

Herrera, M. (2016). 'Innovation for impact: Business innovation for inclusive growth', *Journal of Business Research*, 69(5), 1725-1730.

Herstatt, C., Schweisfurth, T. & Raasch, C. (2016). 'When Passion Meets Profession: How Embedded Lead Users Contribute to Corporate Innovation', in: Harhoff, D. & Lakhani, K.R. (eds.) *Revolutionizing Innovation: Users, Communities, and Open Innovation*. Cambridge, Massachusetts: MIT Press, 397-419.

Hossain, Z., Chowdhury, S.S., Rana, M.S., Hossain, A., Faisal, M.H., Al Wahid, S.A., and Pranto, M.N., (2024). 'Business Innovations in Healthcare: Emerging Models for Sustainable Growth,' *AIJMR-Advanced International Journal of Multidisciplinary Research*, *2*(5), 1-15.

Howells, J. (2006). 'Intermediation and the role of intermediaries in innovation', *Research Policy*, 35(5), 715-728.

Hyrkäs, P., Haukipuro, L., Väinämö, S., Iivari, M., Sachinopoulou, A. and Majava, J. (2020). 'Collaborative innovation in healthcare: a case study of hospitals as innovation platforms', *International Journal of Value Chain Management*, 11(1), 24 – 41.

Huang, J.H., Iakovleva, T.A. and Bessant, J., (2024). 'Fostering user involvement in collaborative innovation spaces: Insights from living labs'. *International Journal of Innovation Management*, *28*(07n08), p.2450032.

Huynh, T., (2024). 'Collaborative research in healthcare: uncovering the impact of industry collaboration on the service innovativeness of university hospitals'. *The Journal of Technology Transfer*, 1-28.

Iakovleva, T., Oftedal, E., & Bessant, J. (2021). 'Changing Role of Users—Innovating Responsibly in Digital Health'. *Sustainability*, *13*(4), 1616.

João Jacinto, M., Tria, G., Correia, L., Oliveira, M., Afonso, J., Canhão, H. and Oliveira, P. 2025. Patient innovation as a case-study example of a multisided platform for involving patients in the social innovation process. In: Iakovleva, T., Oftedal, E. and Bessant, J. ed. *Meeting the Inclusion Challenge in Innovation: Giving Voice to Users*. Berlin, Boston: De Gruyter, pp. 173-192.

Jiménez, A. & Zheng, Y. (2018). 'Tech hubs, innovation and development', *Information Technology for Development*, 24(1), 95-118.

Jiménez, A. and Zheng, Y. (2021). 'Unpacking the multiple spaces of innovation hubs', *The Information Society*, 37(3), 163–176.

King, N. (1998). 'Template analysis', in G. Symon and C. Cassell (eds.) *Qualitative Methods and Analysis in Organizational Research.* Sage: London.

King, N. (2012). 'Doing template analysis', in G. Symon and C. Cassell (eds.) *Qualitative Organizational Research: Core Methods and Current Challenges*. Sage: London.

Long, J.C., Cunningham, F.C. and Braithwaite, J., (2013). 'Bridges, brokers and boundary spanners in collaborative networks: a systematic review', *BMC Health Services Research Journal*, 13(1), 1-13.

Lüthje, C. & Herstatt, C. (2004). 'The Lead User method: an outline of empirical findings and issues for future research', *R&D Management*, 34(5), 553-568.

Madden, C., O'Malley, R., O'Dowd, E., O'Connor, P., Lydon, S., Gormly, J. and Byrne, D., (2024). 'What is the impact of healthcare innovation on measurable outcomes of healthcare organisation performance? A systematic review.' *BMJ Innovations*, 10(1-2).

Magadley, W. & Birdi, K. (2009). 'Innovation labs: an examination into the use of physical spaces to enhance organisational creativity', *Creativity and Innovation Management*, 18(1), 315-325.

Manent, M., Cohendet, P., and Simon, L. (2024). 'Helping start-ups and public organisations to align: Co-producing the co-creation context in a public hospital', *Industry and Innovation*, 31(5), 606-637.

McKee, M., Dunnell, K., Anderson, M., Brayne, C., Charlesworth, A., Johnston-Webber, C., Knapp, M., McGuire, A., Newton, J.N., Taylor, D. and Watt, R.G., (2021). 'The changing health needs of the UK population', *The Lancet*, *397*(10288), 1979-1991.

Merriam, S.B., and Tisdell, E.J. (2016). '*Qualitative Research: A Guide to Design and Implementation*'. San Francisco: Jossey-Bass

Mittelmark, M.B., Bauer, G.F., Vaandrager, L, Pelikan, J.M., Sagy, S., Eriksson, M., Lindström, B. & Meier Magistretti, C. (eds) (2022)., '*The Handbook of Salutogenesis'*. 2nd edition, Springer:UK.

Moultrie, J., Nilsson, M., Dissel, M., Haner, U.-E., Janssen, S., Van der Lugt, R., (2007). 'Innovation Spaces: Towards a Framework for Understanding the Role of the Physical Environment in Innovation', *Creativity and Innovation Management*, 16 (1), pp. 53-65.

Neary, K., (2022). 'The Role of Innovation Hubs in Supporting Collaborative Innovation: A Case Study of User-Led Healthcare Innovation.' The University of Liverpool: United Kingdom.

NHS England (2019). 'The Long-Term Plan', National Health Service, London: U.K Available at www.longtermplan.nhs.uk (Accessed 10th January 2025)

Nixey, C. (2023). 'Britain's NHS faces huge challenges in 2023.' The Economist, Available from: https://www.economist.com/the-world-ahead/2022/11/18/britains-nhs-faces-huge-challenges-in-2023 (Accessed 28/09/24).

O'Dowd, A. (2024). 'Budget 2024: Extra £22.6bn for NHS isn't enough to rebuild NHS, say health leaders.' *British Medical Journal,* vol. 387:q2407 doi:10.1136/bmj.q2407

Oftedal, E., Iakovleva, T. & Bessant, J. (2019). 'Challenges in healthcare - the changing role of patients'. in: Iakoleva, T., Oftedal, E., & Bessant, J. (eds.) *Responsible Innovation in Digital Health*. Cheltenham, UK.: Edward Elgar, pp 21-41.

Pereno, A. & Eriksson, D. (2020). 'A Multi-Stakeholder Perspective on Sustainable Healthcare: From 2030 Onwards', *Futures*, 122(1), 1-21.

Peschl, M.F. & Fundneider, T. (2012). 'Spaces enabling game-changing and sustaining innovations: Why space matters for knowledge creation and innovation', *Journal of Organisational Transformation and Social Change*, 9(1), 41-61.

Radcliffe, L., Cassell, C. and Malik, F. (2022), 'Providing, Performing and Protecting: The Importance of Work Identities in Negotiating Conflicting Work–Family Ideals as a Single Mother', *British Journal of Management*, 33, 890-905.

Saidi, T., De Villiers, K. & Douglas, T. S. (2017). 'The sociology of space as a catalyst for innovation in the health sector', *Social Science Medicine*, 180(1), 36-44.

Samet, K. A., Fache, and Smith, M.S. (2016). 'Thinking Differently: Catalyzing Innovation in Healthcare and Beyond', *Frontiers of Health Services Management*, 33(2), 3-15.

Samuelson, P. (2016). 'Freedom to Tinker', in: Harhoff, D. & Lakhani, K.R. (eds.) *Revolutionizing Innovation: Users, Communities, and Open Innovation.* Cambridge, Massachusetts: MIT Press, 217-234.

Savory, C. (2009). 'User-led Innovation in the UK National Health Service' PhD thesis, Faculty of Mathematics, Computing and Technology, The Open University.

Schiavone, F. and Schiavone, F. (2020). '*User innovation in healthcare: How patients and caregivers react creatively to illness*', Hiedelberg: Springer: Germany.

Schweisfurth, T. & Raasch, C. (2015). 'Embedded lead users—The benefits of employing users for corporate innovation,' *Research Policy*, 44(1), 168-180.

Secundo, G., Del Vecchio, P., Simeone, L. & Schiuma, G. (2019). 'Creativity and stakeholders' engagement in open innovation: Design for knowledge translation in technology intensive enterprises', *Journal of Business Research*, 119(1), 272-282.

Sharma, S. K. & Meyer, K. E. (2019). *'Industrializing Innovation: The Next Revolution'*, Cambridge: UK, Springer International Publishing.

Siggelkow, N. (2007). 'Persuasion with Case Studies,' *The Academy of Management Journal*, 50, 20-24.

Simons, H. (2014). 'Case Study Research: In Depth Understanding in Context', in Leavy, P. (Ed.) *The Oxford Handbook of Qualitative Research*. Oxford University Press: Oxford, 455-470.

Stebbins, R. A. (2001). *Exploratory research in the social sciences. Sage University Papers Series on Qualitative Research Methods, Vol. 48*. Thousand Oaks: Sage Publications.

Svensson, P. & Hartmann, R. (2018). 'Policies to promote user innovation: Makerspaces and clinician innovation in Swedish hospitals', *Research Policy*, 47(1), 277-288.

Tettegah, S. Y. & Garcia, Y. E. (2016). *Emotions, Technology, and Health*, Elsevier Academic Press: London.

Thune, T. & Mina, A. (2016). 'Hospitals as innovators in the health-care system: A literature review and research agenda', *Research Policy*, 45(8), 1545-1557.

Tietze, F., Pieper, T. & Schultz, C. (2020). 'To share or not to share – Exploring how sharing behaviour impacts user innovation', in: Tiwari, R. & Buse, S. (eds.) *Managing Innovation in a Global and Digital World: Meeting Societal Challenges and Enhancing Competitiveness*. Wiesbaden: Springer Fachmedien Wiesbaden, 159-182.

United Nations. 2015a. Sustainable development goals. In Department of Economic and Social Affairs (Ed.), Transforming our world: The 2030 agenda for sustainable development. New York, NY: United Nations. Available at https://sustainabledevelopment.un.org/sdgs Accessed 17/03/2025.

Van Der Ven, A. H. (1986). 'Central Problems in the Management of Innovation', *Management Science*, 32(5), 590-607.

Von Hippel, E. (1994). '"Sticky information" and the locus of problem solving: implications for innovation.' *Management Science*, 40(4), 429-548.

Waddington, D. (2004) 'Participant Observation', in: Cassell, C, and Symon, G. (Eds.), *Essential Guide to Qualitative Methods in Organizational Research*, SAGE Publications Limited: London, 154-164

Williams B. (2025). 'The British NHS at 75: Past, Contemporary, and Future Challenges', International *Journal of Social Determinants of Health and Health Services*. 55(1):76-87

Wolf, J. A. (2019). 'Reframing innovation and technology for healthcare: A commitment to the human experience,' *Patient Experience Journal*, 6(2), 1-4.

Yin, R. K. (2009). *Case Study Research: Design and Methods* (4th ed.). Thousand Oaks, CA: Sage Publications.

Zaitsava, M., Marku, E. and Di Guardo, M. (2022). 'Is data-driven decision-making driven only by data? When cognition meets data,' *European Management Journal*, 40(5), 656-670.