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Doctorate in Business Administration Thesis Title

A Manual Guide to Healthcare Innovation Success

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A Manual Guide to Healthcare Innovation Success

Abstract

Background
The UK has a well-developed healthcare research and clinical trial portfolio and has demonstrated significant activity over the years. However, research outcomes do not always translate into clinical practice change, despite research being most often driven by front line clinical leaders who are the professional experts of the clinical services and pathways. Similarly, healthcare innovation which involves the design of new services and products to meet healthcare needs or the improvement of existing services, is often initiated by front line clinical innovators, who are committed to finding solutions to common healthcare problems. But when it comes to innovation adoption, diffusion and implementation, there are often limited capabilities in the UK public healthcare system to turn ideas into sustainable improvements in clinical practice. Consequently, healthcare innovations often stall at the adoption stage and do not diffuse beyond a local hospital pilot stage.

Leadership within healthcare organizations is considered to be a key driver for all stages of innovation, from ideation to adoption, diffusion, implementation and innovation sustainability. The role of individual and organizational leadership in driving the different stages of innovation needs to be further explored and understood so that systems and frameworks are put in place to enable innovation success. In the current volatile, competitive and unpredictable external environment, healthcare organizations need to think and operate differently and more collaboratively, in order to improve outcomes at a population and system level, whilst delivering cost efficiencies. The introduction of Integrated Care Systems in April 2021 has already started to challenge the current status quo of the UK National Health Service. Innovation is high in the government healthcare agenda, evident from the publication of a new national strategy for innovation, the introduction of global digital exemplar and digital aspirant NHS Trusts, the launch of innovation accelerator and technology funds as well as other national initiatives to boost innovation.

The purpose of this manual is to provide a practical and strategic approach to initiating, implementing and diffusing innovation in the healthcare sector. This manual is the product of the researcher's doctorate in business administration program. It defines the factors that enable innovation success in healthcare, with reference to all stages of innovation and with a particular focus on the role of clinical and organizational leadership in effecting innovation success. The manual is aimed for doctor leaders, clinical innovators, researchers and strategists working across the public and private healthcare sectors. It is also relevant to healthcare executives, system leaders and commissioners.

The manual provides practical guidance on how clinical leaders, healthcare managers and other stakeholders can apply leadership capabilities effectively at different stages of innovation, in order to enable innovation to move from ideation, to adoption, diffusion, implementation and be sustained long-term. The researcher does so by presenting three real life healthcare innovation processes, the interaction between innovation stakeholders, the challenges that innovators faced as well as the influence of internal and external stakeholders in the success and failure of those innovations.

Methods

The researcher reviewed the theories of innovation and leadership that exist in the literature and related the learnings of those with the real-life experiences from three contemporary healthcare innovation case studies. A combination of ethnographic observations of innovation processes and participant interviews, were all led by the researcher and healthcare leader in all the three case studies. The studies took place in two separate healthcare organizations, one being an acute NHS University Hospital in UK and the other being a UK and global based private healthcare organization.

The researcher took different leadership roles within each innovation process, from a front-line clinical leader in case 1 (NHS digital innovation), to the executive medical director in case 2 (private healthcare transformation program) and the meso-level clinical director in case 3 (NHS transformation program).

An in-depth interpretive case study approach which includes ethnography and interview-based methods has been proposed as the optimal methodology when studying complex healthcare systems and in particular, the methods of innovation spread. The researcher used a realist evaluation approach which enables the evaluation of complex healthcare innovations with spread capabilities. The approach involves the understanding of what has worked or hasn't worked, for whom, under what circumstances, the how and why it worked, by relating the clinical and organizational leadership capability with the innovation outcomes. Such a realist approach is appropriate, as research on healthcare innovation spread is an unmet need and questions around 'what works' and 'what doesn't work' in healthcare innovation processes, are key to explore from a leadership perspective.

Results

Our preliminary cyclical innovation model using data from the first two innovation case studies, represents the dynamic and complex process of innovation within complex healthcare organizations. It reveals that innovation is a continuous process within healthcare organizations and that leadership is essential across all stages of innovation. Healthcare organizations need to invest on innovation in terms of senior leadership, operational management and supportive resources (finance, commercial, technical).

The ingredients for innovation success in our preliminary model included a flexible top-down and bottom-up leadership at different stages of innovation, early opinion leader engagement and knowledge mobilization, partnership creation (clinical networks), clinician incentivization and engagement, early evaluation of the innovation implementation benefits. Knowing about those ingredients of innovation, we proceeded to the study of the third innovation case study which helped enrich and refine our proposed innovation model.

The unstable political, socio-economical and technological environment played a very important role in the innovation outcomes of case 3, unlike cases 1 and 2. A useful learning point in case 3 is the important role of the healthcare context and the power of commissioners within integrated care systems, as drivers of the overall vision for innovation within NHS organizations. A shift in culture from procurement solutions to more sustainable service solutions based on patient outcomes required strong commissioner leadership at a system level.

The three case studies have demonstrated that there are 8 key ingredients in making healthcare innovation a success, based on essential individual and organizational leadership behaviors. Those are summarized below and incorporated into our new model of leadership in innovation:

1. **Integrated Care System (ICS) leadership:** integrated care represents a shift in the mindset of commissioners in terms of putting long-term outcomes for patients and populations first before short-term organization outcomes. The need for strong leadership at system level and not just at organizational level is now stronger than ever. Close working between commissioners of healthcare services and the end users of services, primary and secondary care providers, the voluntary and private sectors, academia and the industry, is essential in order to agree on commissioning services that really matter to patients. Clinical leaders should take more active role in ICS leadership positions to be able to mobilize resources and drive healthcare innovation.

2. **Early Key opinion leaders (KOLs) involvement:** KOLs are the legitimate and respected clinical representatives and champions of innovation, who need to work together with top managers and commissioners to embed the clinical evidence for innovation into healthcare organizations. KOLs are the people who can mobilize knowledge within and across organizations as well as healthcare systems. They represent the agency that enables the voice of their peers and non-peer clinicians to be heard, they can influence their peers and non-peers and can catalyze the adoption, diffusion and implementation of innovation.

3. **Meso-level clinical leaders** working collaboratively with the operational management team can bridge the gap between executive sponsors, commissioners and front-line clinicians, acting as agents and facilitators of innovation.

4. **Healthcare innovation adding societal value:** innovation should benefit the society as a whole and not just individual patients, based on shared vision and goals that promote better population health. The benefits from innovation implementation can be financial or non-financial, the evaluation of those benefits should start early on in the innovation process and be used as vehicle for communication and championing innovation.

5. **Clinician incentivization and engagement** is critical in the innovation process in order for front-line clinicians to engage consistently throughout the process. A robust benefit analysis with a clear benefit evaluation and communication plan that starts early in the innovation process (ideation and adoption stage), can help sustain clinician interest and engagement. Matrix working in a multidisciplinary approach between clinicians, managers, executives within an organization and across clinical networks creates a sense of common purpose, removes the power conflict between clinical innovators and non-innovators and cultivates compassionate leadership.

6. **Partnerships are essential throughout all stages of innovation**. To be able to achieve this, internal and external partners may need to combine forces so that they offer a truly personalized care and patient experience.

7. **Top-down directional support (ICS leaders, commissioners, executives with power to commission innovation) is essential in setting the common vision and purpose of any innovation and transformation strategy.** This is particularly important in the early (ideation) and late stages (sustainability) of innovation. Without such executive support and investment on innovation, clinical innovators

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often struggle to see their innovative ideas taking off, resulting in them becoming disillusioned or demotivated along the way.

8. **A flexible top-down and bottom-up approach in leadership is needed at the diffusion and implementation stages of innovation**, because those stages require significant clinician engagement and clinical agency for change (bottom-up) as well as executive investment and direction (top-down).

Summary
The innovation model of the future for healthcare organizations, is a harmonious combination of top-down leadership and bottom-up agency aiming at transforming organizational processes and innovation behaviors in order to maximize innovation success. Clinicians, managers, commissioners, patients and the industry should work closely together to prioritize and work out innovative solutions to healthcare problems. Organizations and systems who embark into their innovation and transformation journeys will benefit from our model for leadership in innovation. Our model can help create the framework for maximizing innovation success within healthcare organizations.

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Foreword

I am very proud to be submitting this piece of work which is more than a piece of research trying to solve an organizational issue. It is the result of a huge personal effort to develop and establish myself as a healthcare leader and follows my diverse career path over the last four years.

I am extremely privileged to have lived and breathed two different healthcare organizations during their innovation and transformation change, as an employee with multiple roles within same organizations. The experiences I gained as a healthcare leader enacting, effecting and facilitating innovation are of huge value, which I have tried to capture and put into a narrative which makes up this manual.

The COVID 19 pandemic had been an unfortunate and difficult time for everyone and the healthcare system changes that so far have followed the pandemic have been disruptive. This manual captures the pre pandemic and the post pandemic state and has evaluated innovation processes and leadership taking into account the changes in the external environment.

For that reason, I feel this manual is probably the most contemporary piece of qualitative research on innovation and leadership within healthcare organizations.

Content

Chapter 1.0/ Introduction

1.1 Why Study Healthcare Innovation

Global healthcare systems are currently facing challenging times in an effort to sustain financially and reputationally in a continually changing, volatile and unpredictable environment. The adoption, implementation and diffusion of innovation in complex healthcare organizations is considered the prerequisite for success, bridging patient care, funding and wellbeing gaps (Bessant, 1999).

Innovation has always been at the top of the National Health Service (NHS) sustainability agenda (Dixon-Woods, 2011, NHS Confederation, 2021, NHS England 2019) but more so recently and following the global pandemic in 2020. The private healthcare sector has traditionally paved the way to innovation and entrepreneurship with its commercial business nature, but even the private sector has been challenged during the recent pandemic. Both the UK NHS and the private healthcare sectors are now undergoing an intense period of service recovery as well as service transformation which is characterized by innovation acceleration.

Our manual of healthcare innovation success comes at the right time when global healthcare systems are striving to return to their pre-pandemic operational state whilst at the same time designing and implementing innovative ways of working.

The definition of innovation may differ between organizations, depending on the individual organizational methods of innovation. However, the principles that define innovation are similar and can be summarized as 'the activities of an organization that help improve its performance' (Rogers, 1998). Those activities may include the development of new products or services, the improvement of existing products or services, knowledge creation, training program development, the creation of new technology or intellectual property (Rogers, 1998). Innovation in healthcare involves the process of idea creation, diffusion and implementation which could be a linear or a cyclical process, sometimes described as a 'messy' process due to stakeholder complexities. Innovation adoption and diffusion is influenced by several enablers and barriers, which may differ depending on the organizational context. It is the balance of enablers and barriers which sometimes leads to a differential adoption and diffusion of innovation within complex healthcare organizations, even in the same healthcare environment.

Healthcare innovation is often initiated by clinical leaders on the front line who are the subject matter experts and who can suggest and drive solutions to common and emerging healthcare problems. Innovation is also often driven by leaders higher up in the organizational hierarchy, who have the power and political influence to make innovation happen within a healthcare system. The interaction and ongoing relationship between front-line clinical leaders and executive leaders will be explored in this manual.

Following idea creation, the next stage involves idea adoption and realization which is about converting the idea into a product or a service (Waldman, 1991). Innovation diffusion involves the stage when innovation is embedded into the organization processes (innovation success) and starts to spread to the market (Waldman, 1991). Before it reaches the diffusion

stage, innovation can go through a series of trial-and-error events, further refinement and finally acceptance or refusal by the wider clinical community. Clinical leadership throughout all stages of innovation is key to innovation success and may be the differentiating factor between innovation acceptance and refusal by clinicians. Similar to the term 'innovation', the term leadership has multiple definitions depending on the organizational context. Silva (2016) attempted to find a definition for 'leadership' that could be applied to all contexts, so he defined leadership as 'the process of interactive influence that happens when people accept someone as a leader to drive forward common goals'. The role of leadership in healthcare needs to be better defined in the context of healthcare innovation, in terms of the optimal leadership style, leadership dynamics and relationship between clinical leaders and the wider organization (Bass, 1998).

It has been suggested that innovation is key in driving continuous improvement, operational efficiencies and better clinical outcomes (Bessant, 1999, Waldman, 1991). It is therefore imperative that doctors and other clinical leaders as well as healthcare managers are equipped with leadership capabilities which they can utilize to achieve the organizational innovation goals. The relationship between clinical and organizational leadership in terms of power dynamics is complex and needs to be further explored. Such exploration can help us understand better, the complex interrelationships between front line clinical leaders and organizational management, which may determine the success or failure of innovation.

Leadership and innovation are also considered essential prerequisites for the implementation and scaling of large public health programs. Leadership in the context of public health innovation and large transformational projects, is key in engaging clinicians, patient and public communities and commissioners. An effective engagement and communication strategy with multiple stakeholders can lead to better chances that innovation and change will diffuse, sustain and have a positive impact in populations (Frieden, 2014).

Organizational culture may influence the success of innovation diffusion and it may help explain the differences in entrepreneurial capabilities between the public and the private healthcare sectors. For example, an external facing organizational culture encourages employees to innovate routinely and often as a network or with other business partners, so that they gain competitive advantage. Such organizations are much more successful in innovating than internal facing and hierarchical organizations (Rostain, 2021), which are often characterized by professional silos. Such external facing organizational cultures are often seen in commercial or voluntary healthcare organizations rather than the NHS.

The NHS has traditionally been considered an internal-facing organizations with little or no employee control over innovation ideation and implementation. The introduction of Integrated Care Systems in April 2021 has already started to challenge the current status quo of the NHS with the development of a new strategy for innovation (NHS Confederation, 2021). The purpose of Integrated Care Systems is the achievement of the population Triple Aim which is about improving patient quality of care, people care experiences, optimizing population health outcomes and reducing healthcare costs (DoH, 2021). The implementation of the national innovation strategy should bring the NHS closer to its partner organizations, in the private and voluntary sector, who have enriched their innovation processes and capabilities in order to sustain themselves financially.

The NHS Integrated Care reform has come at the same time as the NHS is recovering and restoring services after the COVID 19 pandemic. The pandemic has resulted in a healthcare crisis, rapid change and innovation disruption. The NHS is now in the unique position of having the knowledge of innovation successes and failures during the global pandemic to be able to drive the healthcare innovation agenda. Healthcare leaders have experienced examples of effective as well as ineffective system leadership to draw upon in leading on the national healthcare innovation agenda (Currie, 2021). Harnessing the leadership knowledge and skills acquired during the pandemic, working across systems, will enable the NHS to innovate faster and safer, meeting the Triple Aim. The international standards organization has published the new innovation management standard in 2019 which states (Brady, 2020): 'An organization can innovate more effectively and efficiently if all necessary activities and other interrelated or interacting elements are managed as a system'. The role of system leadership as opposed to individual clinical leader and individual organizational leadership, will also be explored in this manual.

1.2 The purpose of this manual

This manual of innovation is inspired by the UK healthcare sector and attempts to describe and evaluate innovation processes within organizations through the lens of the researcher who is also a healthcare leader. The researcher is using an ethnographic approach and an in-depth case study methodology to evaluate the role of leadership in innovation adoption, diffusion and implementation, through her leadership roles within two healthcare organizations. The four-year period between 2017 and 2021, which is the period of intense ethnographic observations, data collection and analysis, represents a time of rapid social, political, economical and technological change. The conclusions and final recommendations reflect the current environmental context and can be applied to contemporary healthcare organizations.

The purpose of this innovation manual is to provide a practical and strategic approach to initiating, diffusing and implementing innovation in the healthcare sector. It is aimed for doctor leaders, clinical innovators, researchers and strategists working across the public and private healthcare sectors. It is also relevant to healthcare executives, system leaders and commissioners who have the power to influence innovation strategy and implementation. The manual provides guidance on how clinical leaders and healthcare managers can apply leadership capabilities effectively at different stages of innovation, in order to enable innovation adoption, diffusion and implementation success. The manual is part of the researcher's doctorate in business administration program. It defines the factors that enable healthcare innovation success, with a particular focus on clinical and organizational leadership during all stages of the innovation process. There are different leadership skills which need to be deployed by leaders at different stages in the innovation process, depending on the type of innovation as well as the healthcare context (Oke, 2008).

To be able to define the optimal strategy for innovation adoption, diffusion and implementation success, requires a deep understanding of the innovation processes within organizations, starting from the innovation design (creativity stage), and moving through to the adoption, diffusion (success stage), implementation (realization) leading to innovation sustainability. The manual concludes with the presentation of the optimal strategic model for leadership in healthcare innovation to enable innovation success. The optimal strategic

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model for leadership-in-innovation is designed after the in-depth study of three healthcare innovation processes, within diverse healthcare environments.

A brief description of the three cases is included below:

- **The first case is a 'bottom-up' linear disruptive innovation process** which originated from front a line clinical leader, with some middle management support but no executive or commissioner involvement.
- **The second case is a 'top-down' cyclical disruptive innovation process** consisting of a number of different innovations, which were adopted, diffused and implemented with various degrees of success. This innovation model was led primarily top-down, with involvement of front-line clinical leaders at a later stage.
- **The third case is a mixed 'top-down' and 'bottom-up' disruptive innovation process**, involving multiple stakeholders in partnership, such as front-line clinical leaders, middle management, executives and commissioners.

The research methodology utilized is a combination of ethnographic observations of innovation processes and participant interviews, all led by the researcher and healthcare leader. The researcher took different leadership roles within each innovation process, from a front-line clinician in case 1, to the executive medical director in case 2 and the middle-level clinical director in case 3.

Chapter 2.0/ Description of the organizational problem

2.1 Introduction to the problem

The UK and global healthcare sectors are currently facing significant economical and workforce resource challenges, which could be addressed through the adoption and diffusion of innovation (Harris, 2016 and HM Government, 2020). Clinical leaders are called to think differently and innovatively in the way day to day business is delivered and managed. They are also called to action a strategy which can help sustain business processes and outcomes, so that healthcare organizations could not only survive market competition, but also gain competitive advantage in the market.

Although healthcare leaders are aware of the need to change their business strategy and innovate more, there is ambiguity as to what practical steps they could take to optimize innovation adoption, diffusion and implementation success. Innovation benefits and their translation into clear deliverables is a challenge for healthcare leaders and also how to achieve sustainable innovation.

More recently, integrated care system leaders have been called to identify and scale innovation, build a learning culture within systems and facilitate whole system change projects (SCIE, 2018). System leaders will need to change their mindset and focus on the collective outcomes rather their individual hospital objectives. Clinical leaders find themselves more and more working as part of a system and involving all user groups rather than just leading individual hospital departments and groups. Leading for innovation in this complex and unpredictable space can be daunting and leaders may find themselves lacking experience and practical innovation knowledge.

The purpose of this innovation manual is to define the strategic model for innovation adoption, diffusion and implementation success which can be delivered easily and effectively by leaders within healthcare organizations and within healthcare systems. This manual for innovation is created by a doctor researcher and contemporary healthcare leader and it is aimed for doctors and other healthcare leaders, to support them in their innovation journeys.

2.2 Exploration of the organizational problem

The adoption of a culture of innovation within complex healthcare organizations, can empower clinical leaders at all levels to find smart and sustainable solutions to healthcare problems, which don't overburden their budgets. Effective leadership can lead to the breaking of organizational silos (Van de Ven, 1999), thus enabling information exchange and knowledge transfer across clinical networks, NHS organizations and across integrated care systems. The outcome of such clinical and strategic collaboratives is the creation of organizational partnerships for the purpose of innovation promotion and interorganizational learning (Burgess, 2019).

The UK healthcare regulator (the Care Quality Commission or CQC) talks about innovation as being in the heart of high-quality care. It supports the idea that effective leaders should play the role of innovation enablers within healthcare organizations. In the State of Care

document published in 2019, the CQC refers to digital and workforce innovations as essentials for driving a culture of continuous improvement in the NHS (CQC, 2019).

The NHS has innovation at the top of its agenda despite its multiple conflicting priorities. Healthcare innovations in the NHS are often driven by front-line clinical leaders and are adopted locally but do not often get diffused beyond that point (Harris, 2016). Previous work has explored the negative impact of the NHS hierarchical system with its professional silos, in terms of stifling innovation diffusion (Dixon-Woods et al, 2011 and Barlow, 2013). Such hierarchical and siloed working environments are not conducive to open and honest discussions within and between organizations around innovation. On the contrary, when healthcare organizations collaborate, share knowledge and ideas (open innovation), they are more likely to develop together and sustain positive change (Burgess, 2019).

Innovation diffusion is defined as the replication of innovation that has been adopted and implemented in one area, into other areas within the same system or outside a system. In the context of healthcare organizations, innovation diffusion requires unique organizational leadership capabilities and considerable organizational change capability (Greenhalgh, 2019), which is why healthcare lacks behind other industries when it comes to innovation (Bates, 2017). Despite attempts by some NHS organizations to promote innovation through multiple stakeholder engagement (open innovation), there is often lack of an organized implementation strategy for innovation in the NHS. Innovative ideas may not become diffused beyond local adoption and innovation champions who are usually front-line clinicians often become disillusioned as a result (Kerridge, 2019).

Healthcare innovation involves an ongoing interactive state between a flexible strategic direction and operational execution (Boer, 2003). Successful organizations sense market changes and customer demands and act in an entrepreneurial way, implementing new services or differentiating their products and services (Bessant, 2013). The commonest triggers for disruptive innovation in healthcare include competition from new market entries, technological developments and changes in political, legal and social rules, all potentially leading to new customer demands (Bessant, 2013). To be able to respond to those triggers, healthcare organizations need to be in a state of 'innovation alertness' driven by internal inspirational leaders, who manage the innovation agenda effectively. In addition, healthcare organizations need to proactively build their innovation infrastructure and capabilities in order to respond to external contextual triggers (exploration). At the same time, they need to be able to continue with their business-as-usual activities (exploitation) whilst innovating, avoiding conflict between those two processes. The leadership styles required to balance exploration and exploitation activities within organizations may vary and they are key to innovation success (Oke, 2008).

Some healthcare organizations have moved towards platform-based approaches to innovation implementation and diffusion, given the unpredictability and volatility of current healthcare environment. What this means for companies is that they can leverage their extended workforce knowledge and technological expertise to place existing products and services to other markets (Corso, 2007, Bessant, 2013). This is a good example of an exploitation activity which is less expensive and risk-prone than exploration (disruptive innovation) and which requires transformational leaders to be able to drive such product and service diversification (Oke, 2008).

Few healthcare organizations have continued to innovate disruptively as a means of differentiation and competitive advantage. Those that have managed to do so are often driven by leaders who exhibit unique entrepreneurial characteristics such as agility, bravery, autonomy, risk-taking behaviors and they have established robust reward and incentivization systems for their staff (Bessant, 2013 and Kuratko, 2014). The term 'entrepreneurship' is closely related to 'innovation' and in the context of existing organizations, entrepreneurship can be defined as the start of new and innovative ventures (Gartner, 1990).

2.3 The Leadership focus

Healthcare organizations operate in a dynamic and competitive environment which requires them to balance disruptive innovation and sustainable implementation (Bower, 2003).

Clinical and organizational leadership has been identified as one of the most important enablers for innovation success in the NHS (Jones, 2019 and Koryak, 2018) but the role of leadership at different stages of the innovation process needs to be better defined. Clinical and non-clinical leaders in both the public and private healthcare sectors would benefit from a clear guide to optimizing innovation adoption, diffusion and implementation.

This research manual aims to consolidate knowledge around leadership skills and styles, top down and bottom-up leadership approaches and their role in making innovation adoption, diffusion and implementation a success within complex healthcare organizations. It will attempt to do that through the study and analysis of three real-life innovation cases in the public and private healthcare sectors.

The manual is a practical approach to healthcare innovation which is aimed at clinical leaders of all grades and also relevant to executive teams, middle management, healthcare commissioners and system leaders.

Chapter 3.0/ Literature review

3.1 Background

Healthcare innovation involves idea generation and implementation to produce value-adding outcomes such as operational efficiencies, clinical effectiveness and quality improvement (Anderson, 2004). Unlike individual or group creativity, innovation has a purposeful nature which is to confer benefit to individuals, groups or organizations through its implementation (Anderson, 2004). Innovation in healthcare often follows a process (linear, cyclical or messy) which depends on the organizational culture and leadership structure. Similar to other standard operating procedures, innovation processes are structured and consist of stages: innovation ideation, adoption, diffusion, implementation and sustainability.

Healthcare organizations, such as NHS Trusts, usually have formal hierarchical structures for innovation acceleration, including research and development as well as innovation hubs. The aim of those hierarchical structures is for them to scrutinize all innovation proposals, prioritizing key innovations and ensuring appropriate governance around innovation. Such top-down control over innovation has the risk of innovation adoption and diffusion delays due to the slow movement of innovations from one stage to another. In addition, strict hierarchical structures within healthcare organizations may with time stifle innovation, resulting in stakeholder disengagement. Some more entrepreneurial organizations have less formalized innovation structures, with employees at all levels having greater autonomy in designing, implementing and owning innovative ideas – distributed leadership (Currie, 2018). In such organizations, innovation implementation begins earlier and often at the same time as idea generation and the innovation process often has a non-linear structure.

Healthcare innovations often follow a linear process from innovation ideation, to adoption, diffusion implementation and sustainability. A cyclical innovation model could represent the way healthcare organizations manage to continuously innovate, with one innovation leading to another. The innovation cycle continues indefinitely, as innovations are continually refined and improved. There may be new innovative ideas generated along the way depending on market pressures (disruptive innovations) and internal organizational needs (continuous innovation). Some innovation processes may not follow a linear or a cyclical structure, the so-called messy innovations. Messy innovation processes usually prevail when multiple stakeholders are involved at different stages in the innovation process (Corso, 2007). This occurs in the case of product and service diversification, which involves a large variety of external stakeholders and external partnerships as well as in the case of large-scale service transformation. Healthcare organizations which have innovation processes embedded within their culture are more likely to succeed and sustain financially and reputationally (Bates, 2017).

Clinical leaders which may be doctors, nurses or other healthcare professionals play a critical role in creating and sustaining a culture of innovation within complex healthcare organizations. Clinical leadership involves the engagement of clinicians for the purpose of driving continuous quality improvement through innovation (Doherty, 2013). Healthcare innovations often stall because of lack of stakeholder engagement and/or ineffective leadership. A collaboration between creative and unconventional clinical leaders who develop the innovative ideas with the leaders who are excellent innovation implementers,

can lead to healthcare innovation success (Anderson, 2004). Such collaboration could bring culturally diverse stakeholders together to transform innovative ideas into clinical practice, through the combination of creators and implementers (Bond, 1996).

A collaboration between clinical leaders and organizational management is also very important to ensure that there is alignment between these two culturally diverse groups (Doherty, 2013). Clinical leaders should set the vision and strategy for innovation and they are responsible for ensuring that there is scientific and technological alignment between proposed innovations, customer demand and organizational capability. At the same time, the management team should work with the clinical leaders to operationalize and implement innovations which have a value-adding potential. The role of organizational management is also to ensure that there is enough marketing, product management and service development capability built into the overall strategy and vision for innovation (Doherty, 2013).

Healthcare organizations often pursue a number of innovations at the same time, in the form of a whole system transformation (SCIE, 2018). This is done by engaging and motivating a wide range of stakeholders within and outside organizations (Baxter, 2018). The success of whole system transformation requires a strong organizational vision, a robust implementation program, a participative leadership style from innovators and clinical leaders, as well as organizational traits like bravery, unconventionality and intrinsic motivation (Anderson 2004).

Greenhalgh (2009) conducted a qualitative study looking at a series of transformation processes within two similar healthcare organizations. Her studies found that although both healthcare organizations had similar innovation processes, the organizations exhibited different leadership cultures and different individual or group aspirations. As expected, the organizations exhibited different degrees of innovation diffusion. The degree of success in innovation diffusion was directly linked to the strength and traits of the organizational leadership culture (Greenhalgh, 2009).

Healthcare innovations are complex social processes, in that the behavior of clinical and organizational leaders influences the potential success or failure of innovations (Horton, 2018). The complexity of innovation processes means that innovation diffusion cannot be taken for granted because it happened in a different healthcare context (Horton, 2018). Recognizing and managing innovation complexities is key for ensuring the effectiveness of innovation processes (Maylor, 2013). Financial resources alone cannot guarantee the success of innovations. Human factors including individual and organizational leadership are key in driving and supporting innovation (Greenhalgh, 2018).

Innovation in healthcare often refers to new ways of doing things using a quality improvement approach and it makes up one of the dimensions of clinical governance (Peak, 2005). The current healthcare market is competitive and healthcare organisations need to align with technological and digital innovations, in order to gain competitive advantage. Healthcare organisations also need to balance operational efficiencies with investment on innovation whilst assuring a culture of safety and continuous quality improvement (Trastek, 2014). A culture of patient safety is optimised through shared learnings from errors leading to the prevention or mitigation of errors and assurance of safe innovation processes (Silow-Carroll, 2007). It is important that healthcare innovations align with the governance

framework of the organization so that they become acceptable. Effective clinical leadership is key in the assurance of a sustainable safety culture within the context of healthcare innovation.

Healthcare innovations can be disruptive or non-disruptive and when strategically implemented within a business model, they offer value to customers and the business alike (Omachonu, 2010). Healthcare organizations are fast paced and need to adopt an entrepreneurial and creative culture, in order to radically innovate, gain competitive advantage and win market share. At the same time, fast paced healthcare organizations need to drive an agenda of continuous innovation and improvement, in order to refine their products and services, ensuring they are fit for purpose at all times. The balance between pursuing new ideas for radical innovation (exploration) and refining existing services (exploitation) requires different leadership skills (Bates, 2017). Organizations and their leaders need to have unique capabilities in order to manage this conflicting balance between the two types of innovation processes (Corso, 2007).

Healthcare organizations often have to balance disruptive innovation with non-disruptive or continuous innovation. Organizations are forced to consider disruptive innovations in response to or after pre-empting a sudden market change, political and technological changes (Bessant, 2008). The purpose of disruptive innovation is the radical change in the way care is delivered, with new models of care or care delivered in other markets (Christensen 1997 in West, 2017). The strategy to disruptive innovation includes the adoption of an entrepreneurial organizational culture, the mobilization of creative teams and the sharing of learnings from user experience leading onto change opportunities (Bessant, 2008). There is scope for more disruptive innovation in healthcare organizations globally and there are plenty of successful examples of hospitals which improved patient pathway quality and efficiency through disruptive innovation (Bessant, 2013). Disruptive innovations often challenge the status quo and the culture of healthcare organizations when implemented but can also be in conflict with the traditional way of doing things (Haritou, 2013).

Digital and IT innovations in healthcare are usually disruptive and often include automation tools to improve the accuracy and speed of diagnostic tests, supporting clinician decision-making (Young, 2017, Wilson, 2018 and Harwick 2018). Digital technologies which are increasingly adopted and diffused within public and private healthcare systems include robotics, artificial intelligence (AI), patient facing digital technologies, teleradiology, integrated care records, virtual clinics, and real-world data analytics (CresswelI, 2016). One good example of disruptive innovation which has been triggered by the global pandemic in 2020 is the establishment of Telecare and virtual healthcare solutions. Those systems are replacing old and inefficient practices which have previously led to overcrowding in hospitals or people not seeking healthcare due to distance from healthcare facilities.

One of the most disruptive healthcare technologies for 2020 is Artificial Intelligence (AI), with a predicted compound annual growth rate of 42% by 2021 (Das, 2016). Patients are likely to benefit from AI because when deployed as a diagnostic companion tool, it can improve the accuracy of diagnostic and predictive tests. For example, AI can be used to aid imaging reporting resulting in faster and more accurate diagnoses. In addition, it can be used to create treatment response predictive tools, hence paving the way to personalized medicine. Moreover, AI can support clinical prioritization algorithms, leading to reduced hospital

admissions and better caring for chronic illnesses through remote monitoring (Das, 2016). Finally, the deployment of disruptive digital technologies and AI could support the shrinking healthcare workforce and could result in revenue growth as high as 49% due to efficiency gains and reduction of errors (Wilson, 2018).

The UK ranks third globally, as a country with the most developed AI research portfolio but only 11th in the technical implementation and diffusion of AI innovations (UKRI, 2021). This ranking demonstrates the UK's capability for research and idea generation (*bench*) which unfortunately is not always deployed in practice (*bedside*). Innovative ideas are not always translating into sustainable clinical benefits, despite research evidence that demonstrates their value in practice. What needs to happen in order for UK healthcare to reap the benefits of AI research, is a more joined up working relationship between academia, technical experts, well trained clinicians and the industry, with adequate financial investment and a robust governance infrastructure – *translating innovation from bench to bedside* (UKRI, 2021). Similar conditions are necessary for any healthcare innovation to flourish as we will see later in this manual.

One of the strongest forces for the global change in practice from face-to-face clinic appointments to telemedicine was the global coronavirus pandemic in 2020. Global clinical leaders in collaboration with healthcare managers worked collaboratively with technological innovation companies to implement the change to telemedicine within a matter of weeks from first lockdown. Telemedicine would have previously taken years to be implemented and diffused at such as global scale. The success of such change has been variable and depended on the healthcare location. It can be attributed to a combination of managerial capability, organizational collaborations, communication and training rollout as well as effective relationships between organizations and commercial partners (Chen, 2021).

Unlike the adoption of disruptive innovations such as telemedicine, continuous innovation is applied by clinical leaders and healthcare managers on a daily basis. Continuous (non-disruptive) innovation leads to the refinement and improvement of current models of care, including the established telemedicine models. Some examples of how continuous innovation can lead to quality improvement, includes the design and delivery of robust data security measures, cloud-based tools for data collection and new electronic medical record capabilities. Given that healthcare has become more integrated, complex and expensive and we continue to face the pandemic challenge, healthcare organizations need to endorse and incorporate innovation within their as-usual business. Continuous innovation involves a whole system approach to change and it is usually done gradually and voluntarily. It needs visionary people to drive continuous innovation change and trainers on problem-solving within the context of a learning organization (Bessant, 1999, Waldman, 1991).

Dissemination of lessons learned from innovative activities in terms of what has worked well and what has not work as well, is a characteristic of learning organizations where innovation is at the top of the strategic agenda. Counte (2001) claims that continuous innovation in healthcare lags behind other industries, because of resource allocation issues, lack of clinician support and system reluctance to change status quo. Healthcare organizations often struggle integrating training on continuous improvement into their systems. As a result, they often fail to evaluate the implementation of innovation and share

lessons learned. This results in innovations often failing to diffuse and scale following local adoption.

3.2 Innovation models

Healthcare innovations are new ideas, processes or services aiming at improving performance such as achieving better healthcare quality, safety, clinical outcomes as well as reducing healthcare costs (SCIE, 1018). The process of innovation involves the communication and application of innovation within a population or system. Innovation processes aim at implementing new ideas or processes within organisations or systems, which in turn can benefit the organisation, population or system (West, 1990 within Omachonu 2010, Albury 2005).

The process of innovation usually begins with idea creation, followed by idea adoption and resulting in the innovation being implemented (West, 2002 and Fleuren, 2004), leading to innovation commitment (Greenhalgh et al, 2004). The Innovation Diffusion theory was introduced in 1962 by Rogers, was developed further in 1995 and the theory focuses on the rate of spread of innovations including technological innovations amongst populations (Wani, 2015). Innovation diffusion is a social process that involves multiple stakeholders.

The traditional ***Diffusion of Innovation theory (DOI)*** created by Rogers, consists of five stages in a linear fashion (Wani, 2015 and Martins, 2016) as described below; the focus of this theory is on the innovation itself rather than the context of innovation:

1. **Knowledge creation about the innovation;**
2. **Persuasion to adopt the innovation;**
3. **Decision-making to adopt the innovation;**
4. **Innovation implementation and**
5. **Confirmation or reinforcement of the innovation**

Out of those five stages, there are usually three stages that are most commonly used, as follows: – idea creation (corresponding to stages 1 and 2 above), adoption (corresponding to stage 3) and implementation (corresponding to stages 4 and 5).

According to Rogers (1995), successfully adopted innovations are the ones which bring a relative advantage over conventional practice, they are compatible with the wider organizational context and culture, have low complexity, can be trialled and have an observable impact.

Contextual conditions of the healthcare system where innovation takes place play some enabling role in the adoption and diffusion of innovation. For example, any prior innovation knowledge and experience, the degree of innovativeness in the system culture, the perceived need for innovation by the users and the adequacy of communication channels, are all important enablers for the successful adoption and diffusion of innovation (Rogers, 1995, Wani 2015). In the case of technological innovations, human factors and the organizational context play a key role in their adoption. The human factor element may involve customer engagement, training on the use and the monitoring of new technologies (Bjerke, 2017).

There are two other innovation diffusion theories which are particular pertinent in the adoption and diffusion of technological innovation and consider the organizational context as well as the external environment to a greater degree than the DOI theory; these are the TOE and the INT theories (Martins, 2016, Yang, 2015, Chen, 2021):

1. The *Technology – Organization – Environment (TOE) theory* of technological innovation diffusion considers the importance of the organizational culture and readiness for innovation internally in the organization and externally in the whole system – market forces, economy, social context, health inequalities. This theory focuses mainly on the *organizational context as an innovation enabler* (knowledge, training, expertise, leadership and management support, organizational size and business needs).

2. The *Institutional Theory of Innovation (INT) diffusion* supports that the internal organizational innovation decisions are influenced by the environment where the organization operates. This theory focuses mainly on *environmental factors as innovation enablers* (competitor and partner pressure, government support, socio-economical and technological factors).

Innovation adoption is a prerequisite to innovation diffusion. Innovation adoption makes the innovation idea legitimate at a small scale and innovation diffusion involves the spread of innovation through the population (Barlow, 2013).

Subsequent to the adoption of innovation, innovation diffusion relies on effective marketing and communication channels which enable innovation to spread within organizations and populations (Sahin, 2006). Innovation diffusion refers to the passive spread of innovation or the 'active' innovation dissemination which involves the activity of persuading others to adopt innovation (Greenhalgh, 2004).

The diffusion of innovations is influenced by the behaviour of adopters, which is in turn is influenced by interpersonal contacts and social interaction within and between communities (Valente 1995 and Rogers 1995 in Valente 1999). The implementation phase of innovation is complex, critical for innovation diffusion success and often requires considerable organization change (Counte, 2001).

According to Rogers (1995), there are five categories of innovation adopters – *the Innovators, the Early Adopters, the Early Majority, the Late Majority and the Laggards*.

There are certain leadership characteristics that early innovation adopters should possess in order to positively influence innovation adoption within healthcare organizations; those include (Greenhalgh, 2004, Waldman, 1991 and West, 2002):

- **A shared vision with the rest of the organization;**
- **The ability to influence and motivate people to challenge the status quo;**
- **The ability to work collaboratively with various stakeholders towards the shared vision, whilst navigating resistance to change.**

The above unique characteristics of early adopters – **shared vision, influence and impact, collaboration**, differentiates early adopters from the early majority and makes them more likely to succeed in moving innovation from the adoption to the diffusion phase (Wani, 2015).

The role of key opinion leaders and innovation champions in engaging and motivating stakeholders during the innovation diffusion phase is key; they are usually but not always the earliest adopters themselves. Their role in endorsing new ideas and influencing behavior change is a catalyst to the success of innovation diffusion (Valente, 2007). It is often the creation of a critical mass of supporters and advocates of the innovation that is required for innovation diffusion success (Ash, 1997).

Different leadership skills are required at different stages of the innovation process, ranging from creativity and transformational skills at the ideation phase (exploration), to coordination and transactional skills at the implementation (exploitation) and diffusion phase (Oke, 2008). The balance of exploration and exploitation in the case of innovation is likely to give healthcare organizations competitive advantage, by ensuring that great ideas are implemented safely and sustainably. Patients and customers are looking for excellence in service quality and organizations have to balance the high investment risk of disruptive innovation with the continuous quality improvement element of innovation. Fast-growing healthcare organizations often need to invest in disruptive innovation to gain competitive advantage (Oke, 2008), but this investment should not conflict with the clinical governance and quality aspects of care which features in continuous innovation processes.

Omachonu (2010) proposed that innovation can be a **complex and 'messy' process**, with a range of different stakeholders and stakeholder partnerships involved during innovation diffusion. Unlike Rogers' linear model (1995, figure 1), Omachonu' model supports the collaboration between partners in the innovation diffusion phase of the process, including clinicians and care givers, patients and consumer advocacy groups, innovator companies, universities and regulatory agencies (Omachonu, 2010, figure 2). The non-linear nature of the model offers to innovators the flexibility to start innovation work at different phases in the process and through various channels. Innovation success in such a complex model depends largely on a transformational leadership style of the healthcare leaders involved, which encourages a positive approach to change and creates a safe learning environment for innovation to thrive. On the other hand, a transactional leadership style is more suited in the case of innovation implementation, which needs structuring and policy development, as well as in the evaluation of innovation implementation (Waldman, 1991 and Oke, 2009). Incorporating an evaluation of innovation implementation into the process of innovation could support with validating the innovation, legitimising it and allowing the dissemination of innovation outcomes which can maximise innovation diffusion (Sahin, 2006)'

Berwick (2003) suggested that healthcare innovation ideation in much easier than innovation implementation and diffusion, because the latter two stages involve some degree of organizational change. He highlighted the role of clinical and organizational leadership as an important enabler in innovation change; clinical leaders should influence stakeholder perception of innovation and ensure they are aligned with organisational vision. Clinical leaders are just as important as their followers who could act as innovation champions, supporting and propagating their leader message about the role of innovation, increasing the

chances of innovation diffusion. The power of the early adopters of innovation is also as strong as the power of non-adopters who exhibit resistance to change. The presence of effective clinical leadership which collaborates well with the management team can be critical in converting non-adopters to innovation supporters. There are other factors that determine the success of innovation diffusion within healthcare organizations, which also rely on strong leadership capabilities. Those include: the development of scientifically and technologically sound innovative ideas, the presence of strong product management skills in the organization and the presence of an active marketing team who is fully aligned with the innovation vision and strategy (Berwick, 2003).

Van de Ven (1999) described a *Cyclical Innovation Model* unlike Rogers (1995) and Omachonu (2010). He described the dynamic interaction between innovation creation and innovation implementation, in the form of divergent behaviours (creation) and convergent behaviours (execution). Those behaviours exist interchangeably and shape the final status of innovation. Several enabling and constraining factors prevail during this process, interacting in a dynamic manner and influencing the outcome of innovations. The outcome is unpredictable but can be steered by organisational leadership (Van de Ven, 1999, figure 3).

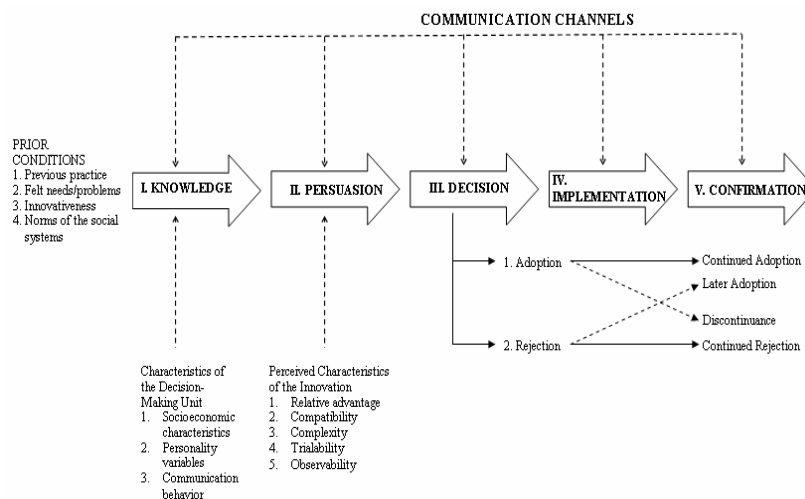Figure 1 – Linear Innovation process (Rogers, 1995)

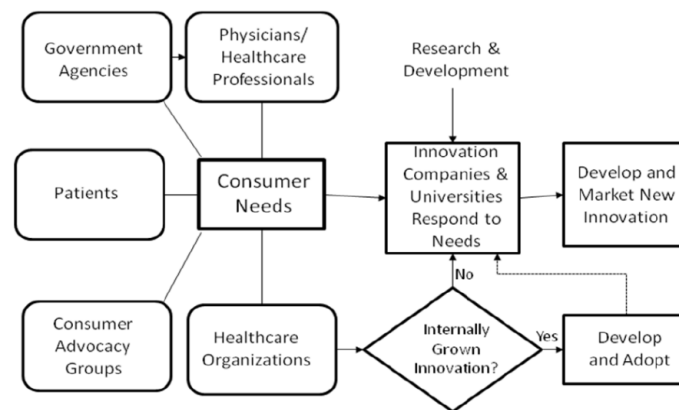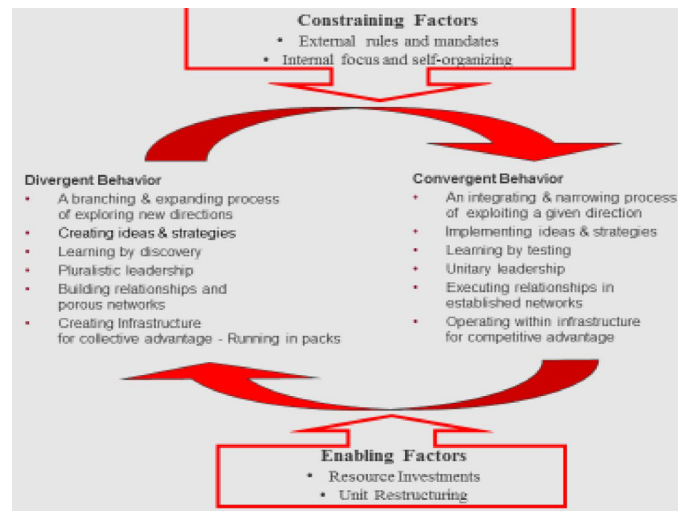Figure 2 – The Process of Healthcare Innovation (Omachonu, 2010)

Figure 3 – Cycling the Innovation Journey (Van de Ven, 1999)

The implementation phase of the innovation process is the period between the decision to adopt the innovation and the routine and consistent use within the organization by the majority of its stakeholders, which is a period of intense skillset and knowledge building (Klein, 1996 and Damschroder, 2009).

Strategic implementation of innovations is crucial to every business success and if badly executed, can have a catastrophic effect to the business bottom line and reputation (Pryor, 2007). The implementation stage in the innovation process can be seen as a catalyst stage, because it determines whether the innovation becomes routine practice or is dismissed (Fleuren, 2004). In addition, implementation is an active and social process, involving the interaction between individuals and organizations, the inner context (culture, structure, politics) and the outer context (social, political, economical). The interaction between the inner and the outer context is important in understanding and resolving barriers to innovation implementation (Damschroder, 2009 and May, 2016).

The implementation phase often comes later in the innovation process and is often seen as separate to strategic thinking within organizations. Van Limburg (2011) claims that innovation implementation should begin earlier in the innovation process and be considered at the strategic stage, when there is intense brainstorming, knowledge creation and persuasion (van Limburg, 2011). Technological innovations in healthcare are likely to influence a wider sociotechnical network (Greenhalgh, 2012 and Michailova, 2018) and their implementation should begin early into the strategic phase (May, 2016). By doing so, potential implementation threats can be addressed early such as resistance to adoption from clinicians and other key stakeholders.

Several authors have suggested the following enablers for the successful implementation of innovation within healthcare organizations (Greenhalgh, 2004 and Ross, 2016):

- **Supportive organizational structures;**
- **Visionary top leadership;**
- **Competent workforce;**

- **Ongoing funding sources;**
- **Key stakeholder communication and alignment with culture and values.**

Bourgeois (1984) proposed the ***Cultural Strategic Model*** to show that innovation implementation can be embedded within organizational cultures when staff at all levels are involved in the innovation design and implementation process. He concludes that when strategic implementation is part of the organizational culture, the effort spent implementing the strategy is much less (Bourgeois, 1984).

Van Limburg (2011) refers to ***Business Modelling*** as an effective innovation implementation strategy, enabling the evaluation of innovation at the early stages of the innovation process. Business modelling allows broad stakeholder involvement earlier in the innovation process, co-creation of solutions with key stakeholders and earlier problem-solving, which has positive influence on innovation diffusion success (van Limburg, 2011 and van Gemert-Pijnen, 2011).

Successful innovation implementation does not guarantee sustainable innovation diffusion (Klein, 1996). Global healthcare systems are in need of sustainable innovations, those that remain beyond the trial phase. To maximise innovation diffusion and sustainability in the healthcare sector and in different global systems, there are different factors that need to be considered to those that facilitate early adoption (Martin, 2012). These are:

- **The presence of supportive networks within and between organizations;**
- **The existence of active innovation champions;**
- **Robust mechanisms for innovation evaluation;**
- **Mechanisms for monitoring and responding to user feedback.**

The recruitment of an entrepreneurial workforce, who possess the clinical and technological expertise as well as the creative and leadership abilities would add significantly to the innovation capabilities of any healthcare organization (Hunter, 2012). Scaling healthcare innovations beyond a single system and in a sustainable fashion, often requires the set up and evaluation of innovation in a small scalable unit before moving into full scale. This process involves considerable amount of experimentation, robust data collection and analysis, strong organizational leadership and open stakeholder communication (Barker, 2016). Learning from other healthcare organisations who succeeded in implementing innovations is critical. Shared learnings can be achieved through publications, blogs, webinars, conferences and other forms of networking.

Compton-Phillips (2020) describes a model of innovation diffusion which aligns well with Greenhalgh's (2004) implementation theory and May's (2016) whole system approach to change theory: the essential model components include the creation of a Vision to solve a wicked problem *(the 'Why'),* the inclusion and trust on key opinion leaders *(the 'Who'),* the continuous collection, display and analysis of Data **(*the 'What'*),** the use of data to guide Capacity building (*the 'How'*) and the creation of Alignment between incentivisation and sustainable behavioural change (*the 'What's in It for me'*)**.** The same author described examples of US organisations who adopted the framework and have seen various innovations being spread and sustained. The learnings from this model include the

importance of a shared organizational vision and strong transformational leadership in influencing stakeholder engagement in innovation. The transformational leadership style needs to be balanced with a transactional leadership style, which will ensure a reward and incentivisation system for achieving innovation goals.

The application of innovation diffusion models in healthcare organizations requires a supportive organizational environment, described as ***Organisational Resilience***. Kantur and Iseri-Say (2012) refer to organizational resilience as a combination of employee and organizational qualities which create a robust and resourceful environment during periods of uncertainty or crisis. When those qualities are expanded further to include aspects of organizational behavior such as trust, employee autonomy and authentic leadership, there seems to be a positive correlation between those qualities and organizational resilience (Fukofuka, 2015).

Resilience engineering refers to the organizational attitude to change and incorporates strategies that prevent system failures and resistance, which can be applied to innovation processes as well (Nemeth, 2008). The strategies suggested for prevention of system resistance and failure are dependent on team working, challenge recognition, resource reallocation, collective response to change and learning from errors (Nemeth, 2008). Innovation processes within healthcare organizations involve considerable change and the risk of failure is high which makes the theory of resilience engineering very relevant. Organizational leadership supporting a resilient culture of innovation is likely to have a positive effect towards innovation diffusion success.

3.3 Leadership models for Innovation

Leadership in the context of complex organizations is defined by Yukl (2006) within Weintraub (2018), as an influencing and facilitating process for achieving shared objectives. This is very similar to the definition given by Silva (2016) and which we described in the introductory chapter (chapter 1).

Research and development as well as marketing and product management capabilities are important enablers for the adoption and diffusion of innovation, however organizational leadership is being regarded as the key driver for all stages of innovation, from ideation to realization and diffusion (Oke, 2008).

In terms of individual leadership traits and their link to innovation diffusion, there is evidence to suggest that transformational leadership within healthcare organizations plays a key role throughout the five stages of the diffusion of innovation process, but particularly in the early stages of ideation and the intention to adopt (Carreiro, 2019 and Martins, 2016).

The aspects of transformational leadership that are particularly helpful in driving the adoption and diffusion of innovation include the following (Carreiro, 2019):

- **Articulation and communication of a shared vision** for innovation by senior managers and leaders - the 'Why', also described in Compton-Phillips, 2020;
- **The intellectual stimulation of followers** around innovation by leaders and senior managers – the 'How' can we do things differently;

- **Follower incentivisation and support** from senior managers and leaders that drives internal motivation and investment on the common vision from the followers- the 'What's in it for me'.

Organizational behaviour plays a critical role in the behaviour of individual leaders and followers as well as the attitude of teams towards innovation. Aspects of Organizational behaviour that determine the success of innovation, include structures and hierarchies (power dynamics), experts (champions, training, human resources), supportive leadership, communication and a culture of experimentation (Ash, 2017).

The *Crescive Strategic model* has been proposed by Bourgeois (1984) and gives power to middle managers within organizations to become strategic champions, ensuring that strategy implementation begins as early as strategy formulation. If we apply this model to the case of innovation adoption and diffusion, early innovation implementation is likely to maximise the chances of successful innovation diffusion. The other important lesson from Bourgeois' model is that middle managers are best placed to facilitate communication channels between top managers and front-line people within organizations, with the aim of effecting innovation success. When it comes to innovation implementation, developing and preserving a culture of openness and transparency amongst organizational stakeholders may facilitate strategic implementation (Birken, 2011).

Front line staff work at the core of every business and are best placed to drive strategic innovation. *Distributed leadership in the context of innovation, moves power from top down to bottom up and can lead to a more effective and faster innovation adoption*, with less risk of employee resistance as well as more sustainable benefits (Martin 2012). Although top managers may have little technical knowledge compared to front line leaders, they have the available resources to make innovations happen. Front line leaders are technical experts but without resources to makes innovations happen, which could lead to innovations stalling at an early stage without any top manager (executive) support (McKee, 2013). A collaboration between top managers and front-line leaders has been suggested as a potential model for innovation success (McKee, 2013) for the reason that the combination of skills, knowledge and power from the collaboration is more likely to lead to the desired innovation outcomes. Helfirch (2007) also advocates that innovation implementation should be an organizational rather than an individual priority in complex healthcare organizations. In order for innovation to be effected, there is a need for collaboration between innovation champions (front line leaders) and top down management support (alignment with organizational values).

This combined top-down and bottom-up leadership model has also been represented as the *Tight-Loose-Tight model* (Crompton-Phillips, 2020). The latter model supports a bottom-up approach to innovation strategy and a top-down influence for creating the vision and promoting a system-wide approach to change. This alignment between top managers and front-line leaders can mitigate against any cultural differences between those two groups which can hinder innovation outcomes. This cultural conflict is particularly prevalent in healthcare and occurs because clinical staff focus mainly on individual patient outcomes and top managers focus mainly on organisational benefits (Mannion, 2018). Cultural alignment amongst healthcare teams, respecting each other's innovation goals, responding to triggers

in a synergistic way and sharing common values, increases the chance of innovation diffusion (Mannion, 2018).

The *Triple Helix innovation model* was developed in the 1990s (Etzkowitz, 1993, Etzkowitz and Leydesdorff in 1995, in Ranga, 2013) and describes the unique partnership between government organizations, academia and industry in an effort to accelerate innovation diffusion. The helix is characterised by its triad components (state, industry and academia) working together in partnership and with the aim of achieving knowledge transfer, whilst managing key interdependencies (Ranga, 2013). The concept is very similar to Omachonu's innovation model (2010), which incorporates partnerships between public organizations, industry and academia to develop and accelerate innovations. According to Etzkowitz (2013), the interactions between different institutional spheres promotes a self-sustaining innovation culture and a state of innovation synergy. The application of the triple helix innovation model in healthcare results in the combination of resources, skills and knowledge which facilitates the implementation and diffusion of innovations. Innovation can be seen as a form of co-creation between the innovators (healthcare organizations), the developers of the technology (industry, university) and the customers (Nilsen, 2016). Interorganisational partnerships are considered to be a prerequisite to successful dissemination of innovations and can be catalysts for innovation diffusion and sustainability (Barnett, 2011).

Collaboration and shared leadership are the two dimensions of the *Distributed Leadership model*, both being enabling factors for innovation diffusion in healthcare organizations (Currie, 2018). The actors involved in this leadership model are usually top managers who lead on resources and culture, doctors who lead on resource allocation, commissioning and peer motivation and nurses who lead on front line staff motivation and awareness. This innovation model escapes from the traditional top-down hierarchical healthcare model: a senior manager or executive initiates the innovation strategic direction which is then driven by front line subject matter experts (nurses/doctors), but there is shared leadership amongst the three parties (executives/doctors/nurses). Shared leadership between executives and front-line clinical leaders becomes more prominent with time. Doctors play the facilitator role for innovation delivery as well as the essential link between front line staff and top managers (Currie, 2018).

Distributed leadership is a characteristic of the *Open Innovation model*, defined as the inflows of knowledge from external networks into the organization and the outflow of knowledge from the organization to external stakeholders. The purpose of open innovation is the acceleration of innovation processes and capabilities as well as the diffusion of innovations to other markets (Chesbrough 2006 in Chesbrough, 2013). In healthcare systems, open innovation allows the boundaries between public and private organizations to be lifted. Ideas and knowledge transfer become easier amongst innovators, leaders and followers and internal and external capabilities join up to maximise innovation diffusion (Chesbrough, 2013).

The *Cyclical Innovation model* (Berkhout, 2006) recognises that innovation is not a linear process, it can be triggered at any point and is so influential that one successful innovation can drive more innovation. This model is applicable to young and entrepreneurial organizations which aim at creating multiple differentiators which if put together, can create a unique service proposition for customers. This is a social innovation model which is

characterised by a strong sense of organizational vision, a risky organizational behavior, and one that values partnerships within and between organizations (Bessant, 2013).

The literature review on models of innovation and leadership reveals a gap in leadership research and in particular, how leadership can positively impact and promote innovation adoption, diffusion and implementation in healthcare. Looking at leadership from the individual, organizational and system perspective is key. The 'what works' and 'what doesn't work' in healthcare innovation adoption and diffusion from a leadership perspective, is an unmet research area and the focus of this innovation manual (Weintraub, 2018).

3.4 Enablers and Barriers to Innovation adoption and diffusion

Innovative ideas are produced daily within healthcare organizations, mostly through clinically-led small projects, which tend to get adopted locally but not diffused beyond the local level (Kerridge, 2019). Some barriers to successful innovation diffusion include the presence of professional silos, the lack of available clinical and managerial time and the lack of innovation funds (Cresswell, 2016). According to Greenhalgh (2017), there is also the lack of effective networking and information sharing within and between teams that disables innovation implementation and diffusion.

Greenhalgh (2018) and her team have developed and published the NASSS technological innovation model, which refers to the non-adoption, abandonment, spread, scale-up and sustainability model, addressing enablers and barriers to technological innovation diffusion. The NASSS model has been applied to six technology-enabled programs and explained why some innovations succeed in being diffused and others fail (Greenhalgh, 2017; Greenhalgh, 2018, figure 4). The components of the model co-exist interdependently and include:

- **the clinical unmet need addressed by the innovation;**
- **the value-added effect of the innovation;**
- **the perceived ease of use;**
- **the degree of organizational readiness for implementation;**
- **the characteristics of early adopters and champions of innovation;**
- **the degree of organizational resilience to change and**
- **the effects of the socio-political context in innovation adoption and diffusion**

Figure 4 The NASSS framework (Greenhalgh, 2018)
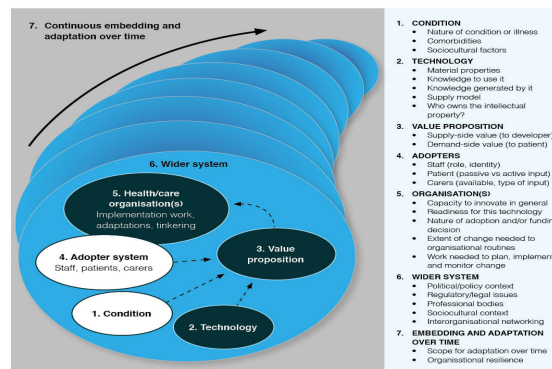
The NASSS framework is relevant to our research but also differs in the sense that is limited to technological innovations and does not address the role of leadership in the innovation process. Our research is exploring the role of organizational leadership as an enabler for service and product innovation adoption and diffusion success and is not limited to technological innovation. On the other hand, the NASSS framework addresses all three components of innovation which will prove useful for our study: the individual innovator, the innovating organization and the wider political and regulatory context. We will be referring to this model once we have collected further evidence from our case studies. It will be interesting to see to what degree our innovation model agrees with the NASSS framework.

Borins (2002) in Micheli (2015) described three barriers to adoption of technological innovation in the public sector and those include:

- **resistance to change due to conflicting stakeholder priorities;**
- **risk aversion towards innovation failure and**
- **strict hierarchical structures**

Van Limburg (2011) emphasized the importance of stakeholder interaction in the development and implementation of healthcare technologies. One particular stakeholder who is often neglected in the early stages of innovation is the patient and public community. Patients are often the end users of healthcare innovations and they have the power to advocate for and against innovations, enabling those which can have the highest value and impact to them.

Llewellyn (2014) described the wider socio-political issues faced by the public healthcare sector that may hinder technological innovation diffusion, even when there is clinical evidence of benefit. Such factors can lead to poor innovation implementation, through reducing the chances of innovations being funded, creating misalignment between clinicians and managers and resulting in further innovation stifling. The factors include:

- **organizational power relationships;**
- **the political stance of top managers;**
- **innovation reimbursement issues and**
- **non-innovator resistance**

Some authors support the presence of quantitative evidence of innovation benefit as an enabler for innovation adoption and diffusion (Ferlie, 2005 and Barnett, 2011). Barnett (2011) explored the views of clinicians and found that the presence of quantitative evidence could make innovations more likely to diffuse. There is a risk of early over-adoption of an innovation without enough evidence, which can make stakeholders lose trust on the innovation and leaders may lose their credibility. The role of inner organizational and inter-organizational relationships is key in making sense of the available evidence leading most likely to innovation adoption rather than abandonment (Ferlie, 2005).

Albury (2005) suggests that there are considerable learnings to be derived out of studying innovation processes that have succeeded but also those that have failed. Learning from what

has worked well and what has not worked well can help guide future innovation processes to success (Albury, 2005). This is the approach that we have taken in our research manual.

We have summarized the key innovation diffusion barriers and enablers from the literature review in table 1; The key enablers for innovation diffusion include:

- **organizational leadership and culture;**
- **stakeholder engagement and cross system collaborations;**
- **concurrent strategic innovation ideation, implementation and evaluation;**
- **organizational vision and innovation champions;**
- **funding streams and internal organization capabilities**

Similarly, we have identified the following key barriers which do not just represent the absence of the above enablers:

- **lack of clinician incentivisation;**
- **resistance to change and lack of effective change management process;**
- **lack of scientific evidence;**
- **organizational risk aversion;**
- **lack of middle management support**

Table 1: Enablers, Barriers and opportunities for Innovation diffusion

Enablers	Barriers	Opportunities	Author(s)
Cross sectional collaborations	Service based tariffs Low per capita spending Privacy & security directives Clinician time for innovation Low risk-taking behaviour	Move to value-based innovation Launching national innovation centres	**Cresswell, 2016**
Organisational capabilities, behaviour and culture	Low patient motivation Lack of champions Low clinician acceptance Interoperability issues Inadequate IT support/staff Data protection concerns Inadequate policy/ implementation strategy No plausible business case		**Greenhalgh, 2017**
Stakeholder participation Co-creation	Poor evaluation of innovation impact	Business modelling Persuasive tech design Human-centred design	**van Gemert-Pijnen, 2011**
Stakeholder participation Co-creation	Financial structures Legislations lagging behind Reluctance to use Poor scalability Complex interdependencies		**van Limburg, 2011**
Block grants for innovation Learn from other industries	NHS architecture (silos)	Learning collaboratives Innovation hubs	**Collins, 2018**
Early physician involvement Emphasizing patient benefits Investment in IT Board support			**Blumenthal, 1998**
Educate teams to change Evaluate health outcomes Economic analysis	Discontinued funds/stalled pilots No cross-border collaboration Knowledge not shared/power politics Unwillingness to scale up		**Verma, 2013**
	Large datasets and MDTs Poor evaluation of impact		**Cresswell, 2016**
Clinician engagement/training Local champions Funding and policies Patient experience			**Mair, 2012**
Clinician engagement Competent IT project team System usable/little training needed Potential for development	No time in job plan for implementation Unstable internal environment, High cost		**Ovretvbt, 2007**
Stakeholder alignment Scientific evidence Training		Learning from other centre experience	**Denis, 2002**
	Lack of vision, low risk taking History of poor implementation No middle manager support		**Conner, 2004**
	No funding/available time/internal incentives		**Bloch, 2013**
	Short-term budgets and planning horizons Poor skills in risk and change management Few rewards or incentives, admin burden, cultural constraints, risk aversion		**Albury, 2005**

3.5 Resistance to innovation

Healthcare organizations exist within complex and dynamic systems and consist of many stakeholders with conflicting interests. Due to the dynamic nature of healthcare systems with their conflicting forces, there are barriers and risks to innovation adoption and diffusion, (Braithwaite, 2018) which may lead to innovation resistance and avoidance.

Resistance to innovation is defined as a reaction to new products and services which brings about a change or upsets the status quo. The degree of resistance depends on how threatening the change is perceived by consumers (Heidenreich and Spieth, 2013, Ram and Sheth 1989, within Mani, 2018).

Ram and Sheth's model (1989) explain resistance to service innovation by consumers in terms of five barriers:

1/ innovation is perceived as complex to use and/or highly priced (perceived value);
2/ innovation is perceived as a security risk;
3/ there is image incongruence with the organization or system;
4/ there is perceived lack of human interaction

Mani and Chouk (2018) added three more barriers to the model, including technological vulnerability and overdependency, skepticism about new technology and individual resistance to change in status quo. Braithwaite (2018) addresses resistance to change in healthcare from a systems leadership perspective, including the presence of bureaucracy, a top-down decision-making process, a blocking political culture and a lack of clinical leadership to influence change.

Judson (1991) saw resistance to change as a continuous process leading eventually to commitment to change. Coetsee (1999) described resistance to change as progression from aggressive (high resistance) to passive (low resistance) before reaching commitment. The model of resistance - acceptance differs from Ram and Sheth's model of innovation resistance, the latter focusing only on barriers to innovation with no eventual commitment.

Herscovitch and Meyer (2002) subsequently described commitment as a continuum from compliance to cooperation and finally championing, the latter being one of the most important enablers in implementing and spreading innovation. Coetsee's latest theory (2011), states that people are initially apathetic when it comes to change and they move down a resistance or commitment path according to their impressions of the contextual situation. The downside of the above models of resistance to change when applied to innovation, is that they are looking at the individual level, ignoring the group, organization and system level. Lewin's research around group dynamics demonstrated the positive impact of group behaviors in the change process, through engagement, communication, motivation and conflict resolution (Burnes, 2004).

Lapointe and Rivard (2005) later supported the theory that individual behaviors need to be considered together with group behaviors (system resistance) and that resistance to change needs to be managed early in the innovation process. They identified five interdependent components of resistance, including:

1/ individual resistance behaviors from passive to aggressive;
2/ group resistant behaviors;
3/ the value of the object or content of resistance;
4/ the perceived threats to change;
5/ the internal environment, including power relationships and routines

More recently, Nilsen (2016) supported the theory of resistance to innovation implementation as being multifaceted and 'expected', existing at the organizational, cultural, technological and ethical level and being a prerequisite to acceptance. This theory is an antithesis to Lewin's theory which considered resistance to change as a barrier to change (Cunningham, 2009).

We conclude that resistance to change is an expected reaction towards innovation in the healthcare sector, especially from the side of the non-innovators. Resistance to change is also an essential step towards acceptance and adoption of the innovation and it is the leaders' duty to continually motivate the early adopters whilst exploring the behaviors of the non-adopters. Having a shared vision and purpose amongst organizational teams is the key in moving innovations from early adoption to diffusion stage. The engagement of early adopters (champions) is as valuable exercise as the late adopter and laggard engagement.

3.6 Integrated Care Systems and the state of the NHS innovation readiness

The newly formed integrated care systems (ICSs) in UK involve collaboration between NHS organizations, local councils and other providers including the private and voluntary sector, for the purpose of managing resources and using innovative pathways and services to improve population health (Timmins, 2019 and NHSE, 2019). Cross-organizational collaboration is breaking traditional service and specialty silos and could result in the promotion of innovation activity leading to more personalized care (targeted therapeutics), technological advancements (digital innovation) and safer patient care (service improvements).

Integrated care partnerships are about organizations working together to achieve better and more joined up care for individuals and the whole population. To achieve this, funding and other investments are shared between primary, secondary and community services (therapists, nurses, mental health staff) who take a shared responsibility for using resources to improve care and population outcomes (NHSE, 2019). Investment in digital technology including the recently introduced integrated care record aims at better understanding of population health needs, reducing health inequalities and improving day to day care experiences for healthcare users.

Despite the NHS being the 5th biggest global employer, employing 1.7 million front line staff, there has not been a strong innovation culture within the NHS. This is due to organizational characteristics such as poor risk-taking behavior and inadequate resource allocation. There are also conflicting demands within public healthcare organizations which often arise due to misalignments between scientific priorities and financial pressures imposed by managers (Bunduchi, 2015). The organizational culture towards innovation is important for minimizing those misalignments whilst finding a common ground, otherwise innovations will struggle to be diffused.

Adoption and diffusion of innovations can be considered as forms of organizational change within all healthcare settings, whose primary purpose is to ensure patients have access to safe and effective treatments. A strong innovation narrative, which refers to employee belief of the company's ability to innovate, is a prerequisite to any organization leading on innovation

Day and Shea (2018). Day and Shea's (2018) strategy for organizations to improve their innovation narrative, include: **1/investment in talent and resources;**
 2/adoption of a reasonable risk-taking behavior to change;
 3/innovation process that meets customer needs.

A prerequisite to organizations succeeding in innovation is the ability to engage employees in innovation activities. To achieve this, healthcare organizations need to relieve employees from the day-to-day operational activities in order to avoid conflicting priorities. Strong organizational leadership should enable front line leaders drive high value innovation, whilst balancing business as usual activities (Bates, 2017). The involvement and voice of internal and external stakeholders and key opinion leaders (Barnett, 2011), is a great enabler in the diffusion of innovation within complex healthcare organizations. Apart from communicating their vision about innovations, key opinion leaders are best placed to describe the legitimate scientific reasons for innovation (Bunduchi, 2015). For any healthcare organization to succeed in innovation diffusion, there are some key common ingredients which are described in Barker (2016):

1/ the innovation has a high societal value;
2/ knowledge on innovation is widely shared;
3/ stakeholder engagement and expanding social networks;
4/ strong leadership and sponsorship;
5/ adequate project management;
6/ strong partnerships based on trust;
7/ innovation outcome evaluation plan;
8/ dissemination of benefits and lessons learned.

Innovation diffusion issues often arise within public healthcare organizations because the culture, norms and values are not equally shared and endorsed by all staff members. The organizational culture is often not the one that supports and encourages innovation (Cunningham, 2009). To be able to implement innovation in the public sector, Cunningham and Kempling (2009), suggest five essential steps to public organizational change. Their approach is very similar to Kotter's eight principles of cultural organization change (Kotter, 2005 in Reissner, 2011), namely urgency, change team, vision and strategy, empowerment, communication, short term wins, end goal pursuit and new culture. It also complements the Day and Shea's (2018) strategic change approach and aligns well with Barker's (2016) key ingredients for innovation diffusion:

1. **developing and implementing the case for change;**
2. **forming a strong coalition and culture of change;**
3. **clearly articulating and demonstrating the need and vision for change;**
4. **responding to resistance by demonstrating innovation benefits;**
5. **creating a solution-focused continuous improvement culture.**

Cresswell (2016) drew from international examples of innovation successes, such as the Silicon Valley innovation hub model, suggesting that some key factors for innovation diffusion success need to prevail:

- **the existence of public-private partnerships;**
- **the fostering of collaboration and co-creation with front-line staff and patients;**
- **regulatory guidance that supports the fast commercialization of innovations**

In the private health sector, business innovation is the term used to describe the development of new products or services, which serve customer unmet needs and whose presence in the market adds new value for customers and a strategic advantage for the organization (Sawhney, 2006). The main difference between public and private health sector innovation is the lack of a profitable market in the NHS and the strong desire for innovation to diffuse and scale for the benefit of the wider society. Although the private sector seeks innovation exclusivity, it also strives to achieve innovation diffusion and scale within individual business boundaries (Bloch, 2013). Technological innovation diffusion in the public health sector can have a big impact on social wellbeing, such in the case of electronic appointments and remote patient monitoring, but the risk of failure is also high if the innovation is not executed well and in a timely fashion (Bloch, 2013). Similarly, if technological innovation is not executed well and timely in the private health sector, competitors will occupy the market gap, resulting in loss of business revenue and market share.

Innovation diffusion is thought to be easier in the private health sector, due to its efficient processes and less bureaucratic controls, but there are different barriers compared to the public sector, often due to different conflicting demands (Cunningham, 2009). Herzlinger (2006) mentions the variety of private stakeholders and their competing interests, issues with insurer reimbursement, regulatory limitations and technological obsolescence which are all potential barriers to innovation diffusion in the private health sector.

The public healthcare sector is often characterized by single organization initiatives, with the hope that if executed well can be scaled in other organizations, but often without a collaborative solution that can benefit the society as a whole (Winter, 2011). Public – private collaboration activities could be the key to change, including achieving and managing innovation diffusion that would benefit large communities. Such collaborations could be key in engaging whole healthcare systems in innovation rather than innovation limited to individual organizations, thus making it more likely to gain value out of important innovations (Bates, 2017).

Fourth generation innovation models are cyclical or messy and incorporate partnerships, entrepreneurship and the close interaction between science and business. They are also usually characterized by public and private sector partnerships with a view to innovation co-creation (Berkhout AJ, 2006). In a commercialization partnership, the private health sector provides business development and technological expertise, while the public health sector provides access to government assets including clinical data (Micheli, 2015). In such form of business partnership, the private provider can offer essential business and leadership skills to influence the culture of the public organization and reduce aversion to risk (Micheli, 2015). Technological innovations in the healthcare sector often have tangible outcomes,

such as cost reduction and service efficiencies, which can be used to measure the effectiveness of strategic partnerships between the NHS and private health sector (Winter, 2011).

Public-private partnerships (PPPs) in healthcare have traditionally been exploited for the purpose of building innovation infrastructures whilst avoiding upfront costs (Alonso, 2016). Healthcare PPPs represent a form of delegation between the government and the private sector, for the purpose of improving public management (Savas, 2005). The public and private sectors often collaborate in the delivery of short-term joint working projects, as in the case of the NHS and the pharmaceutical industry (NHE, 2019). Public services benefit from PPPs through a boost of capital funds, commercial and creativity skills, which enable staff to lead on innovative projects. Private companies can enjoy a long-term return on investment from enhancing their brand, evaluating the outcome of innovative interventions and scaling up interventions. Patients and the public also benefit from PPPs, as they are offered access to new therapies and high-quality services (KPMG, 2017).

Public-private partnerships are particularly important in promoting research and innovation, through assisting researchers with funding acquisition and accessing academic expertise (Perkins, 2010). In 2000, the UK NHS Plan proposed financial incentivisation to reward collaboration between the primary, secondary, tertiary sectors, the social and private sector for the purpose of enhancing public research capabilities (McNally, 2003). In 2006, the National Institute of Health Research (NIHR) was established which partners with universities, NHS institutions, private providers, patients and the public, for the purpose of delivering high quality research. Partnering between the public and private sector has been suggested as a means of sharing knowledge, skills, as well as enabling clinical training, networking and access to new therapies and technologies (Purification, 2015 and Lyerly, 2011).

Other forms of innovation collaborations include the NHS-academic partnerships, whereby universities partner with NHS Trusts for the purpose of stimulating innovation diffusion. NHS-Commissioner relationships are also important for getting technological innovation accepted for adoption and diffusion. In low and middle-income countries, public-private partnerships take the form of social enterprises, where private healthcare providers implement disruptive innovations and scale them up to improve public health (Bhattacharyya, 2010). It is important to leverage such collaborations in optimizing high-value innovation diffusion across healthcare systems; those innovations which could bring commercial value to organizations as well as better patient care and which can be sustained and refined over time (Bates, 2017).

There is a relative paucity of comparative literature about enablers and barriers to innovation in the private and public health sectors and how they can collaborate to promote innovation diffusion. This research manual will draw learnings from real organizational case studies from the public and private sector and will identify similarities, differences as well as potential synergies.

3.7 Conclusion

The literature review explored theories on innovation processes and innovation models, enablers and barriers to innovation adoption and diffusion, leadership models in innovation, as well as models of public and private partnerships. Innovation is a multi-stage process which begins with an idea followed by adoption and diffusion of innovation. Open innovation, resistance to change, public-private partnerships, organizational leadership and organizational resilience are all factors that can influence the success of healthcare innovations.

This innovation manual will evaluate the role of leadership in enabling innovation adoption and diffusion success within healthcare organizations, through the in-depth study of three different healthcare innovation processes. The outcome of the research is the development of a new leadership model for healthcare innovation success. Our study fulfills an identifiable gap in literature with regards to the impact of leadership in making healthcare innovations succeed in being adopted and diffused.

Chapter 4.0 Methodology

4.1 Introduction

The review of the literature suggests that more research into the role of leadership in the adoption and diffusion of healthcare innovation is needed. The purpose of this research manual is the in-depth exploration of the role of leadership in the adoption and diffusion of innovation within complex healthcare organizations including the UK NHS and the UK private healthcare sector. This research explores the enablers and barriers to innovation diffusion through participant observations in real organization innovation processes. It explores the role of leadership at different stages of the innovation process, with a particular focus on innovation diffusion success.

This chapter describes the methodology used in this study, including the research settings, the epistemological approach, the research design, data collection and analysis, details of the field work done as well as the benefits and limitations of the chosen methodology.

4.2 Research settings

The research approach used to understand the role of leadership in innovation diffusion within complex healthcare organizations, is qualitative and in the form of in-depth case studies. The in-depth study of contemporary innovation processes and leadership capabilities in different healthcare organizations, grounded in published models of innovation and leadership, could lead to the creation of a new modern model of leadership for innovation success. It will also serve as a means of understanding the role of organizational leadership behaviors and needs at different innovation stages. Learnings from the practice of innovation in different organizations can help develop a theory of innovation success which is linked to the organizational context (Beer, 2020).

The chosen two organizations include:

1. **A large University NHS hospital in the Midlands (UK)** with 9000 employees, an Innovation Hub, an active Research & Development (R&D) department and good academic connections with the local universities, primary care and academic health science networks. This is a highly hierarchical healthcare organization with a formal committee in place which assesses and selects internal innovation proposals based on value to the organization and the community it serves. At the time of the research, the organization had an outsourced commercial and intellectual property capability but no industrial or voluntary sector links.

2. **A private and entrepreneurial UK and global healthcare organization** which specializes in cancer diagnostics and treatments, with no formal innovation and R&D structure. The organization is characterized by a culture of innovation and experimentation, it is supported by well-developed commercial and marketing capabilities, excellent links to the industry and a long-standing collaboration with the voluntary sector.

There are two innovations of different nature studied in the NHS organization:

- **A digital innovation which followed a 'bottom-up' linear innovation process (Case 1)** including the initial ideation and adoption, followed by implementation and diffusion, as described by Rogers (Ash, 1977). The innovation was a digital remote cancer patient monitoring platform with AI embedded into it, but stalled before the adoption stage, due to the lack of available funding resources. There was strong front-line clinical leadership (the researcher and clinical innovator) and some middle management executional support but no top-down executive or commissioner support.

- **A non-linear transformation process (Case 3)** involving the organization's breast cancer surgical and oncological services. This transformation process followed the Tight-Loose-Tight innovation model (Crompton-Phillips, 2020) in that it involved a synergy between bottom-up ideation and top-down influence and resource allocation. The role of leadership in this model was prominent at all stages of the innovation process. It was particularly catalytical in the case of middle management because the meso-level clinical leadership (the researcher and clinical director) facilitated innovation through the connection between front-line leaders, executives and commissioners.

The innovation studied in the private sector is a **top-down cyclical transformation process (Case 2)** that involved the transformation of the breast cancer service offering for the organization. The service of the future model of care was the designated name of the innovation model, the latter consisting of multiple innovations being implemented at the same time. This innovation model is unique in that it proposes a series of innovations including service and product innovations in the context of a broad organizational strategic direction, with one innovation driving others in a cyclical process. The innovations are broken down into three categories, based on the organizational strategic model, namely Quality, Access and Efficiency. The researcher was the executive medical director who led the innovation program.

In the case of all three innovation processes, we examined the role of leadership in the success of innovation adoption and diffusion. We also categorized the innovations according to their successful outcome after 12 months, as follows:

1. **No implementation;**
2. **Adoption happened but diffusion was delayed;**
3. **Implementation and diffusion success**

The researcher has been a participant in all three innovation processes. The digital innovation process in the NHS (Case 1) and the cyclical transformation process in the private health sector (Case 2) were studied at the same time, because the researcher was an employee in both organizations and a participant in both innovation processes at the time. The evidence derived from those two processes helped the formation of a new model for innovation adoption and diffusion success that was subsequently applied to the third case study. The third case study involved a transformation process in the NHS and the researcher was again a participant in this innovation process. Through the study of the two innovation processes

at first and the creation of a preliminary model of innovation diffusion success, the researcher was better informed when evaluating the third innovation process.

The final outcome of the research is a new and contemporary innovation adoption and diffusion model that takes into account the individual, organizational and system leadership role in the innovation success. The new model was created through the in-depth understanding of all three innovation processes within the two distinct and complex healthcare organizations.

The proposed model of innovation is a guide for doctor leaders and managers on the organizational leadership strategies, behaviors and styles which are needed at different stages of the innovation process in order for innovations to be successfully diffused and implemented. The model provides a framework on which to base innovation practices within healthcare organizations for the purpose of maximizing opportunities for innovation success. The choice of a public and a private healthcare organization as the subjects of this research was intentional and with the aim of creating a model of innovation adoption and diffusion that is applicable to multiple organizational settings. The cultural differences between public and private healthcare organizations may influence the leadership styles and leadership roles during innovation processes. The different cultural factors that characterize the two sectors can be summarized as follows (Bloch, 2013, Cunningham, 2009 and Herzlinger 2006):

Public Healthcare sector
- Lack of profitable market.
- Desire to diffuse and scale up for wider benefit of society.
- Big impact on social wellbeing.
- Big failure risk if not executed well.
- Inefficient processes, bureaucracy high.

Private Healthcare sector
- Seeks innovation exclusivity, no collaborative societal approach.
- Strives to achieve innovation diffusion and scale up within company boundaries.
- If not executed well, competitors will occupy market first, resulting in loss of revenue and market share.
- Efficient processes, less bureaucracy.
- Competing stakeholder interests.
- Insurer reimbursement issues.
- Regulatory limitations.
- Technological obsolescence.

4.3 Epistemological approach, Research Design and Data Analysis

The researcher used an ***interpretive case study approach*** in order to study and understand the organizational problem in-depth. The in-depth understanding of the organizational innovation processes and the role of leadership in driving innovation success or failure, could enable the researcher to create a model framework for driving innovation success within healthcare organizations. The three case studies are qualitative and varied in context so that the impact of the organizational context is captured. A qualitative methodology is more suited to the study of leadership in innovation, which allows for the analysis of data and the

extraction of common themes, leading to the creation of a framework without necessarily having a pre-existing hypothesis. This would have been difficult or impossible with the use of a quantitative or factual approach.

For the purpose of evaluating the enablers and barriers to innovation success and the role of leadership in innovation, the researcher used a ***realist evaluation approach***, which enables the evaluation of complex healthcare innovations with spread capabilities (Westhorp, 2014). The approach involves the questioning and understanding of what has worked or hasn't work, for whom, under what circumstances, the how and why it worked, by relating the clinical and organizational leadership capability with the innovation outcomes (Westhorp, 2014). Such a realist evaluation approach is appropriate, as research on healthcare innovation spread is an unmet need (Weintraub, 2018). In addition, questions around 'what works' and 'what doesn't work' in healthcare innovation processes are key to explore from a leadership perspective.

The qualitative methodology consisted of an ***auto-ethnographic study*** of innovation processes, through ***participant observations*** (meetings, discussions) as well as ***semi-structured interviews*** from clinicians and other professionals practicing within and outside the organizations. The stakeholders included in the study were either participants in interviews or they were observed during day-to-day activities. Such stakeholders included front line clinical staff, middle managers and clinical leaders, as well as executive managers (Barnett, 2011). This is a ***contemporary and empirical research*** which studies participant interaction in their natural context rather than obtaining data through interviews alone. The risk of relying on interviews alone or for the majority of data collection, would be the potentially biased interpretation of innovation processes and leadership enablers. An in-depth interpretive case study approach which includes a mixture of ethnography and interview-based methods has been proposed as the optimal methodology when studying complex healthcare systems and in particular, the methods of innovation spread (Greenhalgh, 2018, Greenhalgh, 2019). This approach allows the study of human and organization leadership behaviors, how they interplay with external factors and how they influence innovation diffusion (Greenhalgh, 2019). Organizational leadership behavior elements can explain why some innovations are diffused and some are not within similar healthcare contexts (Greenhalgh, 2019).

Cultural immersion in the context of an autoethnography enables the researcher to study human interactions, group working and organizational leadership and how those factors facilitate or impede innovation diffusion. Autoethnography provides a dynamic study of behaviors within organizations focusing on organizational context, activities and actions as they unfold over time, but has been criticized as lacking objectivity (Anderson, 2006). The researcher mitigates bias by referring back to relevant literature and theories of innovation diffusion, thus validating participant observations and themes from semi-structured interviews.

Bate (2000) talks about ***action ethnography*** as a form of ***participative or cooperative inquiry*** (Reason 1994), in which, research is done with people rather than to people. The researcher, being an employee of both studied organizations at the time of writing, is completely immersed into the organizational cultures. The researcher recognized the limitation of the in-depth case studies, in terms of lacking generalizability. To mitigate that

risk, the research describes the learnings from three diverse auto-ethnographic case studies which followed a distinct innovation process, exhibited different leadership capabilities and took place in two different healthcare institutions. Waring (2013) talks about comparative design studies as being stronger than single descriptive cases and our research followed those principles of cross-case comparisons. The case studies included a combination of ethnographic data, participant observations, themes from meetings and interviews which all make up a picture of the leadership culture of the healthcare organizations under study. The learnings from successful innovations are just as important as the learnings from failed innovations and both represent opportunities for clinical leaders to develop their leadership capabilities, thus enabling future innovation success. Our research ensured that learnings from successes and failures were captured. In addition, the study of organizational leadership behaviours involves organizations being the subject of intense scrutiny over time to determine factors that have a positive impact on innovation success which is where the value of our research lies (Pettigrew, 1997 in Ferlie, 2015).

The first case study in the NHS, involved a digital innovation which followed a linear innovation process (January 2018 – January 2019) but failed to be adopted. The innovation team applied for a national UK innovation grant fund with the innovation succeeding to reach the final interviews, but unfortunately was not awarded the grant. The learnings from this failed innovation are key for the purpose of this research manual, which is to guide current and future leaders succeed in innovation. The contributory factors to this innovation failure were split into individual, organizational and contextual. The factors influencing the failure of the digital innovation in the NHS may help explain the outcomes in the two other innovation case studies.

The other two case studies involved a transformation process in a similar clinical service but in two separate healthcare sectors (NHS and private). The clinical service transformation studied in both cases involve the breast cancer pathway from patient diagnosis through to treatment completion and survivorship. The transformation process included a series of service innovations whose implementation aimed at transforming a basic service to a world-class service.

The NHS transformation process (case 3) can be described as complex because there were multiple stakeholders involved at different points in the process at any one time. It was led bottom up as well as top down, there were external partnerships involved and implementation happened concurrently with idea generation. The period of the case study was between April 2020 and April 2021, a year of rapid change driven by external environmental complexities including a global pandemic. The data collected included observations from informal and formal meetings and opportunistic discussions with clinical and senior leaders within the organization.

The private sector transformation process (case 2) was a top-down led service change which involved a whole system approach to change (Roberts, 2018). Senior organizational leaders including chief clinicians drove change and there was late involvement of front-line leaders who implemented and sustained the change. This case study included diary data from direct observations of innovation processes and stakeholder behaviors collected within a 12-month period (September 2018 to December 2019). There were also stakeholder interviews in an open-question format (Barnett, 2011). Leaders from all positions and grades were involved

in the interviews. The researcher, a senior clinical leader in the organization, was also the sponsor of the specific innovation strategy. The organization followed the whole systems approach to innovation and transformation, which is described by Roberts (2018) as a means of instituting successful change within healthcare organizations. Data about processes, people and behaviors were collected and linked to innovation outcomes using a researcher diary approach and supplemented with semi-structured interviews from clinical leaders and the (senior) management teams.

The researcher gathered and reflected on themes from her participant diaries and interviews, which she then validated using literature theories on innovation and leadership. The themes explored during semi-structured interviews and during all the informal discussions with key stakeholders are summarized below:

- Innovation process description, from ideation to implementation, the influence of organizational attitude and culture to the success of innovation adoption and diffusion (adapted from Barnett, 2011).
- Perceived enablers and barriers to innovation adoption and diffusion (adapted from Barnett, 2011).
- Pathways to innovation in healthcare (adapted from Ferlie, 2005).
- The role of scientific evidence to successful innovation adoption and diffusion (adapted from Ferlie, 2005).
- Key players at different stages of innovation.
- The role of external partners, who are they and what are potential conflicts, if any.
- The role of patient-public involvement.
- Research and Development, Clinical Governance and IT team roles (adapted from Koryak, 2018)
- The role of the innovation hub and its interaction with research and development processes (adapted from Koryak, 2018)
- Attitudes to innovation from senior leaders and front-line staff.

In case study 2 the researcher used the realist evaluation approach to establish what has worked or hasn't worked, for whom, under what circumstances, the how and why it worked.

In case 1, the researcher also conducted patient-public involvement focus groups and the themes explored during those sessions were as follows:

- The role of digital technology in patient interactions with clinical teams, including enablers and barriers to use.
- Patient and carer involvement in co-creating and testing digital technology that would allow remote consultations, online messaging to clinical teams through a secure portal, including remote surveillance.
- The role of digital technology in the design of virtual outpatient clinics and in enabling patient participation in clinical multi-disciplinary meetings.
- The role of Artificial Intelligence and deep learning algorithms in the context of a patient – clinician portal for remote interaction.

Data collection took place throughout a four-year period and the research itself forms the subject of a doctorate in business administration (DBA) program in which the researcher took part between 2017 and 2021. The following data were collected and analysed: Participant observations, note-taking (diary and immediate reflections), semi-structured qualitative interviews (immediate transcript analysis and reflection), participant quotations, common emergent theme extraction and analysis, linking with theories of innovation and leadership in order to interpret findings, cross case analysis for common enablers and barriers to innovation success. Outcomes of the case studies were presented as recommendations and lessons learned and were brought together in a form of a framework, a contemporary model for healthcare innovation success.

Below is a summary of the field work in hours and data collected between 2017 and 2021 and the details of the field work can be found in Appendix 1:

- NHS Digital Innovation (2017-2019) – Autoethnography, Grounded theories of innovation and leadership, Participant observations, meeting outcomes and learnings (65 hours)
- Private Healthcare sector transformation (Sept18 - De19) – 45 semi-structured interviews, participant observations, board meetings and learnings (109 hours)
- NHS Transformation (Nov20 - April21) – participant observations and testing of prototype model. Informal and opportunistic stakeholder discussions, board meeting observations, outcomes and learnings (38 hours).

4.4 Summary of method and reflections

The researcher was inspired to deliver this research project through her own leadership and strategic innovation roles in the NHS and the private healthcare sector. Her diverse leadership roles during the period of her DBA enabled her to evaluate innovation processes through the lens of a clinician, medical director (executive) and clinical director (middle manager). The role of leadership during innovation was explored in two different organizations, at different timelines representing different politico-economical situations and with the researcher leading at different hierarchical levels. An analytical auto-ethnographic approach consisting of participant observations, complete cultural immersion into the organizations (researcher), interviews, theme extraction and analysis, cross case analysis and grounded theory analysis, were the most appropriate elements of the research methodology for this DBA for the reasons described in the previous section.

A summary of the evidence and justification for the research methodology including our reflections on the methodology, is described below:

- **Interpretive case study approach** - An in-depth, interpretive case study approach which includes ethnography, has been proposed as optimal methodology when studying complex healthcare systems (Greenhalgh, 2018).
- **Realist Evaluation analysis** (Westhorp, 2014): what work or doesn't work, for whom, under what circumstances, the how and why it works – in terms of context, change culture, innovation processes, leadership.

- **Analytical auto-ethnography** combined with semi-structured and unstructured interviews, for in-depth exploration of innovation processes, individual and organizational leadership (Atkinson, 1995).
- **Grounded into theories** of leadership and innovation. Researcher extracted common themes from the cases, around enablers and barriers to innovation diffusion and she returned to literature to validate her findings. The cycle of data collection, analysis and literature-led validation occurred many times which led to the research conclusions and lessons learned which then helped the development of the innovation model.
- **Participative or cooperative inquiry** (Reason, 1994) – research done with people than to people and in their natural context.
- **The comparative case-based design** pays attention to the role of context and organizational process (Eisenhardt 1989; Langley 1999; Pettigrew et al. 2001) in determining innovation adoption and diffusion.
- **The risks of the chosen qualitative methodology** is the lack of objectivity because the researcher was a participant and employee in the studied organizations. This was mitigated through continuous reflections by the researcher and referring back to theory and published models (Pettigrew, 2002), as well as obtaining participant feedback through response triangulation (respondent validation).

The end-product of the research is an in-depth analysis of the innovation processes within complex healthcare organizations, the identification of enablers and barriers to innovation adoption and diffusion and the design of the optimal model for innovation success. The role of leadership during innovation is explored in detail and at different innovation stages, with the aim of creating a strategic model for innovation adoption and diffusion that is applicable in complex healthcare organizations. The role of leadership throughout all three innovation processes is explored with a focus on discovering the optimal leadership model that enables innovation success (embedding innovation into the organization; diffusion of innovation). This research manual is invaluable for clinical leaders at all levels during their journey to innovation success.

The findings of the research will benefit healthcare leaders and senior managers, commissioners, clinical directors and front-line clinicians, through the provision of a model of strategic innovation to guide individuals and organizations during their innovation and transformation journeys.

Chapter 5.0/ Case Study 1 – A Linear Innovation process in the NHS

5.1 Introduction

The first innovation case is a linear innovation process in the NHS that began with a clinical innovator and front-line clinician generating an idea. The idea was shared with the Trust innovation senior forum and was supported by the Trust 's executives and the Trust Board. The innovator partnered with key stakeholders in order to compete for a national funding innovation competition process, which would enable the innovator to move the idea into the adoption and piloting phase. The opportunity for diffusion and scale up of innovation depended primarily on the initial adoption phase and secondarily on the resources of the organization. Resources that were identified as essential for building the innovation included information technology (IT) system interfacing, data migration, Apps and other digital architectural capabilities. Commercial and marketing capabilities were also essential for the Trust to scale up the innovation. The clinical innovator was unsuccessful in securing the national funding for the pilot and the innovation stalled at the pre-adoption stage. The case will elaborate mainly on the enablers and barriers to innovation adoption from a leadership perspective and will also touch upon leadership aspects of innovation diffusion, implementation and scale up which need to be considered when planning the adoption of innovation.

5.2 Idea Generation

The innovator is a clinical consultant in the NHS organization under study and also the researcher of this manual. The innovator conducted an internal audit over a six-month period in 2017, of patients with cancer who were admitted to the accident and emergency department in the NHS organization under study, with febrile neutropenia (fever and low white cell count or low immune system). The audit revealed that 30% of those patients could have been managed in the community, if patients had access to a remote monitoring tool to be able to report their symptoms directly to their clinical team. Those patients ended up either being discharged from the accident and emergency department after spending few hours there or had a short length of stay in the NHS organization, between 1 and 3 days. The audit results generated an innovation idea, which was subsequently worked up to a formal innovation proposal and was presented to the Trust's Ideas Den forum (innovation senior forum).

The proposed innovation was a remote monitoring digital solution for cancer patients undergoing chemotherapy, which would enable patients to report their symptoms to their acute oncology clinical team remotely. By doing so, patients would alert their acute oncology clinical team to signs of clinical deterioration warranting urgent review. Symptoms such as high temperature and feeling chills may be the first signs of febrile neutropenia (fever and low white cell count) which could escalate to a full blown 'sepsis event' if not detected and treated early. Sepsis has a high mortality rate if patients are not treated promptly with intravenous antibiotics. On the other hand, such symptoms may also represent reactive symptoms to the chemotherapy, which if managed well in the community, patients can avoid being admitted to the hospital unnecessarily. It is very important that clinical teams have a mechanism for detecting such patients early and prior to them getting sepsis in order to deliver the right treatment to them.

The standard process at the time for when cancer patients developed symptoms of febrile neutropenia was for patients to ring a chemotherapy 'hot' line. As this process was patient-led, patients were informed at the start of their chemotherapy about the symptoms to look for in-between their hospital treatments. Patients were given the 24-hour telephone line and were told to ring the line if they got any alarming symptoms, such as fever and chills. What happened in reality was that most patients were advised by the person answering the line to come to Accident and Emergency, regardless of the severity of the symptoms on the telephone, in an effort not to miss any patient with true sepsis. As mentioned above, about 30% of those patients with presumed febrile neutropenia on telephone presentation, did not need to be in hospital.

> "Being admitted into Accident and Emergency with complications of chemotherapy is often worse than the chemotherapy; very stressful for the individual and the family; the hospital is a scary place when you have no control of what's going on with you"
> **Cancer patient carer**

The aim of the digital innovation was the early detection of deteriorating cancer patients in the community, prompting an early outpatient review, hence preventing 'sepsis' but also unnecessary acute hospital admissions. Patients would avoid the stressful experience of being admitted to the hospital and the disruption in their daily life that such admission brings.

The proposed digital innovation incorporated a patient portal with secure access for clinical staff in primary and secondary care (the clinician interface), a separate secure access for patients (the patient interface) and with interoperable capabilities for secure data sharing between the patient and clinician parties.

The purpose of the innovation was to provide cancer patients undergoing chemotherapy with a user-friendly and modern communication tool to be able to report their symptoms to their acute oncology clinical teams and get prompt advice directly without the need to visit the hospital or clinic. The communication platform was through the patient portal and it would enable the creation of an organised database comprising of: 1) patient symptoms (input from patients), 2) clinical advice (acute oncology intervention) and 3) patient outcomes (output) which could range from self-management information (Green), outpatient clinic attendance in 24h (Amber) or admission to accident and emergency (Red). Overtime and with the growth of data, the innovation team could train a chatbot on the algorithm (input – advice – outcome) using machine-learning and natural language processing. The chatbot would sit on the portal and give the most appropriate advice to patients, rather than utilising a member of staff to do this. The chatbot would eventually become the communication platform that sits on the patient portal and with which patients would interact. This would free time for the acute oncology teams to look after sick patients who are already in the hospital.

Patients would still have the choice to speak to a member of clinical staff if they wanted to. In addition to being able to communicate online with the clinical team and/or chatbot, patients would also be able to have a view of their treatment plan and clinic appointments through the portal. They would be able to cancel and reschedule appointments, as well as view their test results and scan reports.

The innovation idea was generated by a single clinician innovator, following the production of local evidence of need and an extensive literature review of the evidence of remote patient monitoring in healthcare.

The proposed benefits of the innovation that were drawn from the local audit and the literature review were the following:

1. To reduce unplanned admissions of oncology patients receiving chemotherapy.
2. To reduce Emergency department attendance of oncology patients receiving chemotherapy.
3. To extend survival time of oncology patients (no sepsis deaths).
4. To improve compliance with chemotherapy treatment.
5. To reduce non-attendance rates for clinics and tests.
6. To empower and activate patients to participate in their disease management.
7. To improve quality of patient care and experience particularly in terms of health care provider responsiveness to chemotherapy related patient problems.
8. To enable patients to live as normal lives as possible during their chemotherapy, particularly in terms to time spent accessing health care.
9. To facilitate participation of patients in research.
10. To establish how many times a patient contacts the hospital (particularly the acute oncology helpline) during chemotherapy and the outcome of the contact.
11. To reduce unnecessary cost for the health service including reducing the wastage of systemic anticancer treatment.

The stakeholders impacted were the following:

- **Patients** – no unnecessary admissions, increased trust in service, improved self-management, reduction in time spent trying to engage with service, more efficient chemotherapy provision, no travel time and costs, removal of need to take time of work to physically attend, no parking costs, no time wasted for relative or carer.
- **Patient/family/carers** – reduced anxiety about when and whether to engage with hospital, as easier to make contact and reduction in time trying to engage with service.
- **Oncology clinical team** – possibly increased workload at weekends; reduced burnout as job less frustrating; overtime, more remote working rather than physical review of patients on the wards or the emergency department
- **Emergency department** – reduced contacts with chemotherapy patients and improved flow.
- **Hospital wards receiving admissions** – reduced unnecessary admissions of chemotherapy patients.
- **Pharmacy at hospital** – reduced wastage of systemic anticancer drug therapy, as any changes to treatment (dose reduction, chemotherapy delay) can be predicted.
- **Hospital overall**: release resources that can be used for improving quality of care, reduction in footfall through the hospital, less congestion on site parking, freeing up clinic room capacity, potential reduction of clinic non-attendance rates.

The innovator's motivation for implementing the innovation was multifold:

- Improved clinical outcome and patient experience
- Potential to reduce waste and improve patient pathways
- Reduction in patient admission and readmissions
- Early detection and intervention of deteriorating patients
- Improved partnership and networking opportunities
- Provide a platform that could lead to flexible appointment dates for patients
- Reduction in spread of infection
- Encouragement of self-care for patients linked to the portal content
- Improve accessibility to care for patients who may struggle with work commitments

Patient involvement in the innovation

Cancer patient representatives found the idea of a digital platform positive for managing their cancer better. Their views were sought through two patient and public engagement events. There was general agreement amongst cancer patients that the platform provided opportunities to enhance existing cancer services.

"I value the opportunity to have virtual contact with my doctor or nurse between clinic appointments and have my symptoms dealt with in a timely manner, rather than waiting until the next clinical appointment"
Cancer Patient 1

Patient insights helped the digital innovation team understand what excellence looks and feels like for patients, what aspects of the existing services are important to them and several ways the digital innovation could improve existing services. Being able to keep track of their appointment schedule virtually, having access to their clinical team between clinical appointments and having the option of a virtual clinic through their mobile phone, were highly valued. In fact, evidence from the LYNC digital study (Griffiths, 2017) suggests that digital technologies can help reduce intrusion of cancer treatment into people's daily routines, as patients can check appointments remotely and contact their clinical team as required.

"The technology should be personalised and easy to use; a good mix of patients, some technologically savvy and some not should be involved in the implementation process"
Cancer Patient 2

All patients wanted to be involved in the design and trialing of the new digital technology. Patients thought it was important that the option of using existing cancer services remained for patients who may not be able or may not want to engage with digital platforms. The option of a 'buddy' system with other cancer patients for peer support, was also rated very highly by patients. The use of artificial intelligence was viewed favorably, as long as ethical issues were addressed, such as data privacy and confidentiality. Remote access to patient questions and answers when required was also rated high, even if the reply was done through artificial intelligence robot (chatbot). Patients were unanimously supportive of their information (medical record) being shared between clinical teams through the digital

platform, who absolutely needed to view the information. The capability of the system to allow remote access to a multidisciplinary team via the portal, was important to patients.

> "Remote access to my own treatment plan diary would be very helpful, it would remind me of my clinic appointments and all the tests and treatments I need to attend to so as not to miss any"
> **Cancer patient 3**

Patients were keen to be involved in the benefit realization plan of the digital technology and they accepted being interviewed throughout the implementation process. There was general agreement that the impact of the technology can be measures in patient terms (Quality of life, patient experience, mortality due to sepsis) and organizational terms (admission avoidance, length of hospital stay, 30day post chemotherapy mortality, chemotherapy waste reduction, chemotherapy unit bed-days saved, nursing capacity in the wards and the chemotherapy unit, reduction in clinic non-attendance rate).

> "The technology has the potential to improve speed of access to doctor advice and spare me unnecessary trips to the hospital, this is really powerful"
> **Cancer patient 4**

> "The ability to have my clinic consultation online would give me the opportunity to see the doctor from the comfort of my own home and my wife who is disabled can attend also"
> **Cancer patient 5**

The innovator was convinced that the idea was viable and could help patients and the organization in multiple ways, so proceeded in putting the idea forward for consideration at the Ideas Den. The innovator's idea was shortlisted and the innovator was invited to present at the Ideas Den. The next section talks about the Ideas Den, the feedback from the organization's executive team and the steps taken towards adopting the innovation.

5.3 The Ideas Den

A digital innovation proposal which involved the use of a remote monitoring technology in Oncology, was presented by the clinical innovator at a UK University Hospital, during the hospital's innovation competition (the Ideas Den), in December 2017. This was the first year that such competition for the best innovation was launched in the hospital. The innovator was the first to ever present an innovation idea at the Ideas Den. The purpose of the Ideas Den was for the Trust executives to prioritize innovations based on clinical and organizational value; value would be measured as improvement of specific clinical outcomes and as a return on investment.

> "The 'Ideas Den' is a great initiative to enable front line innovators to share their ideas and compete for the chance to receive resources, which would support them to develop and implement their innovation"
> **NHS Organization Executive 1**

The Innovation and Transformation teams had received the Trust's commitment to support the implementation of the shortlisted innovations in terms of offering industry partnerships, dedicated project management support and funding to build innovations that would add value to the organization.

> "It is expected that the Trust will invest in the best innovation ideas voted by the Den, that's the whole purpose of it"
> **Innovation Manager**

At the Idea's Den, the Executives and non-Executive Directors got interested in the proposed digital innovation which they subsequently shortlisted, because of its perceived value. The front-line innovator presented real world data from a recent audit within the organization which showed that 30% of cancer patients being admitted with a post-chemotherapy temperature (febrile neutropenia) had an unnecessary admission and could have been managed in the community if they were remotely monitored. The audit demonstrated a potential reduction in accident and emergency admissions for presumed febrile neutropenia, if patients had access to the proposed remote monitoring solution. The cost to the hospital from the unnecessary hospital admissions was significant and preventable through the use of such technology. At the same time, the value for patients in terms of their quality of life and well-being was high with the use of the proposed digital innovation.

In order to strengthen the case for adoption of this innovation, the researcher and innovator presented a study from the Memorian Sloan Kettering Hospital to the Ideas Den, which demonstrated the value of remote patient monitoring in Oncology, as applied in a different healthcare system. In specific, the study revealed that if cancer patients reported their symptoms to their clinical teams during and between chemotherapy treatments through the use of remote monitoring tools, they lived 5.2 months longer than patients who didn't (Basch, 2017). The innovator presented her audit outcomes and the quantitative evidence of the innovation (mortality reduction, cost reduction, admission avoidance), which backed up the qualitative benefits (better patient experience, improvement in Quality of Life) as described by patients around the proposed innovation. Similar benefits have been documented in the literature about clinical specialties other than Oncology, such as cardiology, diabetes and respiratory medicine (COPD). The presence of such comprehensive evidence on the value of the innovation, validated its proof of concept and convinced the Ideas Den that the innovation would be something valuable to apply in the NHS organization under study.

The vision of the innovator was the adoption and diffusion of the remote monitoring model of care in all Oncological specialties within the studied NHS organization. In addition, if the model proved successful in Oncology and within a single NHS Trust, it could be scaled up across other medical specialties (rheumatology, hematology, pediatrics) as well as other NHS organizations. The benefit realization plan from scaling up such innovation in the NHS, in terms of improving patient safety and patient experience whilst reducing healthcare costs, was the attractive factor in the Ideas Den innovation selection process.

The researcher and innovator transferred knowledge to the Den from the existing pool of quantitative and qualitative evidence of similar innovations in same and different healthcare systems. She also supplemented such knowledge with data that were applicable to the

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organization under study and demonstrated that the innovation could actually add value to the organization and beyond. The innovator used local, national and international data to increase buy-in from the hospital senior management team, in order for them to endorse the innovation. The same tactic was subsequently used to engage other front-line clinical leaders as we will demonstrate late on in the manual. By doing so, the researcher maximized the chances of local innovation adoption which would demonstrate the effectiveness of the innovation.

A successful adoption pilot study, accompanied by the evaluation of the pilot outcomes in terms of quantitative and qualitative outcomes, would support the innovation being diffused to other clinical specialties within the organization. This is in line with the theory of innovation adoption and diffusion supported by Ferlie (2005) and Barnett (2011), who explored the views of front-line clinical leaders and found that the presence of quantitative evidence could make innovations more likely to diffuse.

5.4 The Innovation project team

The innovator, a front-line senior doctor specialising in cancer, led a team of 14 people from within and outside the organization, in the preparation of the innovation bid for the purpose of receiving the necessary funding to get on with the adoption pilot. The pilot of the remote monitoring digital technology (patient portal) would be for 18 months, during which time the innovation team would build a conversational platform (chatbot) using machine-learning technology. The portal would also support cancer clinic appointment management, a virtual clinic set-up, an online treatment diary for patients, clinical test result sharing between clinical teams and patients and the recording of patient reported outcome measures (treatment toxicity, patient wellbeing and quality of life outcomes).

The patient portal would have to connect with the existing oncology electronic health record (Mosaiq) which captured all patient demographics and treatment details (source of truth). For that reason, the innovator engaged a local senior radiographer specialising on Mosaiq functionalities and able to configure the system to maximise accurate data capture. The second stakeholder whose engagement was critical, was the patient portal vendor. Both the innovator and the senior radiographer searched the market for the best patient portal and found one which would integrate with Mosaiq and would offer all the required capabilities for patients and clinicians. They both pitched the project to the vendor who was very attracted to the innovation and accepted to become part of the innovation team for the whole duration of the project and beyond. If the technology was adopted and diffused to other organizations too, this would also open up opportunities for the vendor to scale up their own technology in the UK market.

"Remote patient monitoring is utilised to enable patient schedule their appointments more efficiently and also gain access to their records; the innovation team will exploit all capabilities of the portal including interacting with patients and proactively managing their condition which will translate to better cancer patient outcomes"
Portal vendor

The innovation project plan included the co-design of the patient portal functionalities with the support of cancer patients and clinicians, in order to meet the needs of the desired remote

Oncology care model. The portal would integrate with the cancer electronic health record (Mosaiq), in order to enable a remote patient monitoring model of care. The interfacing between the portal and Mosaiq meant that the full repository of clinical information about cancer patient visits, test results and clinical outcomes could be securely shared between patients and their clinical teams. The addition of a conversational platform (chatbot) represented an additional disruptive innovation to the proposed remote patient monitoring model of care.

"The addition of the bot onto a patient portal which integrates with the patient health care record, the latter used by 50% of the cancer hospitals and clinics nationally and internationally, gives the innovation its unique service proposition and makes the innovation scalable and sustainable"
NHS Senior radiographer 1

The implementation phase of the innovation would include the integration of the portal to Mosaiq and a robust evaluation process of the portal engagement platform, in terms of patient and clinician acceptability. The benefit realization plan of the innovation would be measured following the innovation launch and various parameters would be measured 6-monthly for the first year and then yearly thereafter and until year 5. Financial benefit realisation included the return on investment (ROI) in terms of cost efficiencies achieved from the reduction of hospital admissions and length of stay, reduction of outpatient clinic appointments, non-attendances in clinic and lost to follow up costs. In addition, pharmacy waste would be reduced due to the prompt alteration of the chemotherapy regime when needed (dose reduction or cancellation prior to ordering).

"If we know early that a patient is not well enough to attend next chemotherapy cycle, we could offer the treatment space to another patient and pharmacy staff would not waste any expensive chemotherapy drugs on the day because of patient non-attendance"
NHS chemotherapy senior nurse

Non-financial benefit realisation included the improvement in patient quality of life, reduction in mortality and morbidity from chemotherapy complications, improvement in patient and staff experience.

"The patient experience with patient portal will determine if patients continue to use it, so clinical teams operating the portal need to be responsive from its launch"
Academic partner

When putting the business case together for the bid, most of the innovation costs were due to the portal license and the integration between the portal and the Oncology electronic health record (Mosaiq). The integration between the portal and Mosaiq required investment from the Trust in terms of expert time and also commitment from the Trust, in terms of maintaining the innovation beyond the adoption pilot, following the demonstration of the predicted benefits. However, following the Ideas Den approval of the innovation, it became apparent that the organizational budget could not support the license costs. In addition, the internal organizational infrastructure could not support the integration between the portal and the Oncology EHR.

"There are not enough technical people in the organization to support this innovation without delaying or disinvesting in other projects"
Lead IT architect

After discussions between the innovator and the hospital management teams, it became apparent that the execution of the system integration required specialist IT workforce time which was not included in the Trust budget for the financial year. As a result, the innovator's expectations of an organizational support for the implementation of the innovation, did not actually materialise. Despite the fact that innovation benefits would be realised within the first 3 years of the innovation's deployment including an ROI of 20% at year 3 of deployment, the Trust was not prepared to invest financial and workforce resources for the deployment of this technology.

"The organization runs on a deficit and there are no funds to support Apps or other digital development from scratch; all investment on digital needs to be devoted to the procurement on the future Trust-wide. Electronic Health Record"
NHS Organization Executive 2

Another reason behind the organizational reluctance to invest in a remote patient monitoring system at the time, was the Trust strategic plan to acquire a Trust-wide EHR system in the near future, which would include a patient portal as well. This made the proposed integration cost of the portal and engagement platform with the existing Oncology EHR look wasteful.

Although the innovator and the organization shared the same vision for a remote patient monitoring model of care for all outpatient medical specialties, there were barriers to the implementation of such model of care, as described below:

- **the lack of funding for the purchasing of the patient portal;**
- **the lack of internal IT workforce capacity and expertise;**
- **the cost of system interfacing between the portal and the oncology HER;**
- **future plans to purchase a Trust-wide EHR including its own portal**

Despite those innovation barriers, the Ideas Den approved the innovator's proposal and gave the 'go-ahead' to the innovator to prepare for submission to a national innovation funding competition. The external funding would cover the purchase of the portal for 18 months (adoption pilot), the integration costs including workforce time and the evaluation of implementation piece, for a total time of 18 months. The latter was suggested as the proposed timeline for this innovation to become adopted and diffused within the oncology specialties.

There was an ethical dilemma as to what would happen to the innovation once the external funding finished and whether the Trust would be in a different financial position and be prepared to fund the portal licence or the innovation technology would stop altogether.

"It is concerning to think that an innovation which proves to be beneficial to patients gets withdrawn after the end of the pilot period"
Research & Development staff member

For the purpose of the innovation fund competition submission, the innovator together with an IT project manager, co-chaired an innovation steering committee the members of which were as follows:

- The clinical innovator, key opinion leader and sponsor of the project
- An NHS IT project manager
- Two senior therapeutic radiographers and oncology Mosaiq experts
- Two senior NHS acute oncology nurses
- A lead IT architect from the NHS organization
- An academic professor with previous experience on leading remote monitoring studies (LYNC study), who would lead on the evaluation of implementation
- Two commercial business partners (portal vendor and machine-learning expert)
- An NHS commercial lead responsible for the intellectual property aspects
- A member of the academic health science network who led on the patient and public involvement element of the programme
- A member of the Research and Development team
- A research fellow from the local university who observed the innovation process from a leadership perspective

The committee met on a weekly basis between January 2018 and July 2018, the duration of the Innovate UK application process, in order to monitor performance and ensure stakeholder actions were delivered on time. Meetings were well attended and resulted in the timely completion of both stages in the application process.

"The culture of the meetings was collaborative and inclusive and
there was good leadership throughout"
Academic fellow

The project team was led by the innovator with the help of the IT project manager. The innovator engaged with the academic partner in the first instance given her previous work on remote monitoring in young adults with chronic illnesses (LYNC study). The collaboration between the academic partner, the vendor of the portal and the AI partner was strengthened by further engagement meetings which the innovator led, outside the weekly project meetings. It was important that the three external partners to the organization had a trusting relationship with each other and were aligned with the vision of the organization. Building a strong relationship between the NHS organization and the three partners was important to the innovator who looked at the bigger picture and beyond the 18-month project; her vision was the diffusion and scale up of remote patient monitoring in the NHS and the provision of a sustainable team who would deliver this.

Interorganizational partnerships are key for the successful adoption and diffusion of innovations (Barnett, 2011). The collaboration between industry, academia and government organizations is key in maximising innovation success (Nilsen, 2016). However, cultural differences between industry and academia may sometimes compromise user acceptance by compromising the communication of innovation outcomes to end users (Lundvall, 2016). In the digital innovation case, there were conflicted interests amongst the various partners

which the innovator attempted to iron out for the purpose of delivering on their common goal which was the digital technology implementation.

5.5 Stakeholder engagement and the evaluation process

Prior to the final grant submission, the innovator led two patient and public involvement (PPI) group forums, where patients had the chance to comment on the digital innovation concept and functionalities from a patient and end-user perspective. Their response was positive and supportive regardless of their age which ranged between 40 and 75 years old. The innovator's concern was that elderly patients would find the digital tool impractical, but this was not the case. Patients favoured the remote monitoring aspect and their opinion was aligned with a recent global mobile consumer survey which supported the use of mobile phone technology in patients receiving chemotherapy; utilisation of mobile phone technology in this study was 92% for ages 35-44, 86% for ages 45-54 and 71% for ages 55-75 years (Lee, 2018).

"I would have liked to be able to reach my clinical team and let them know how I felt in-between my clinic appointments; the portal would have enabled me to do that and I would use it for that purpose"
Patient 6

"I am a bit old-fashioned and I want to see my doctor face to face; saying that, it feels isolating when you only see them every 3 weeks; the portal is good for some people but not for me, I would have liked to be able to speak to the doctor on the phone instead"
Patient 7

Although there was strong support from the majority of patient representatives, it was clear that the innovation team had to provide for patients who wouldn't be able or wouldn't want to use the digital technology. Digital exclusion was a risk and therefore ensuring that patients also had access to the clinical team on the phone rather than just the portal – chatbot interaction, was extremely important.

The academic partner who recruited the evaluation team had already published extensively around digital communication tools for young people living with long term conditions (Griffiths, 2017). There was strong evidence already published about the fact that timely digital communication between chronically ill patients and their care provider improves engagement with health care, empowers patients and activates them to self-manage their health concerns Griffiths, 2017). Again, the provision of the standard service for patients who wouldn't use digital technology was key.

The academic partner and her team would lead the evaluation of the innovation implementation which included service use data and interviews with all innovation stakeholders including patients. The data collection would be around the acceptability of the innovation, barriers and enablers, as well as the perceived impact (figure 5). The evaluation was planned to start early in the innovation process and as soon as funding became available. By doing so, the evaluation would capture the engagement aspect with end users, the recruitment of participants and the end – to – end experience of patients, staff and carers.

Figure 5 User involvement in the evaluation of the innovation process
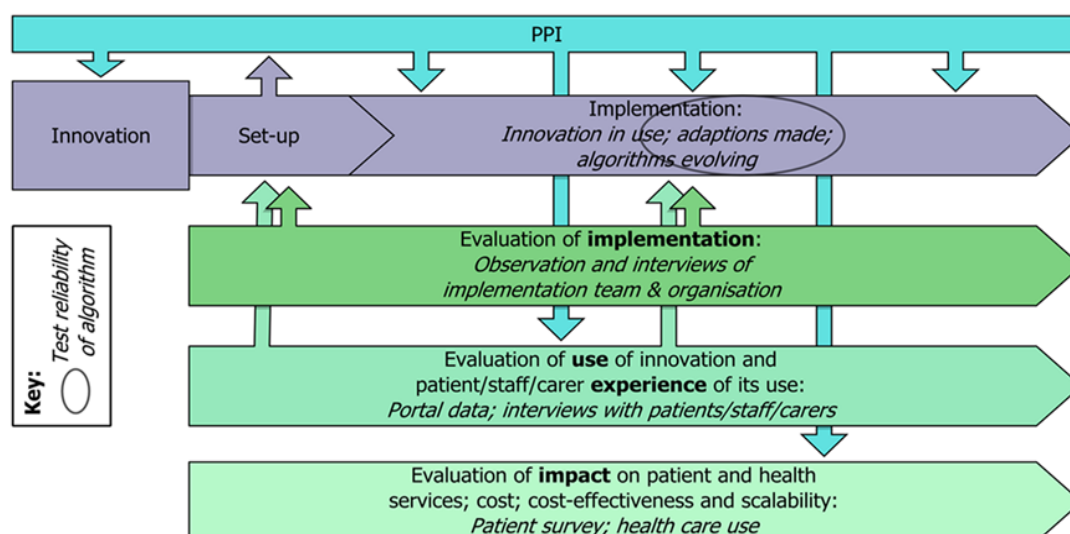
The objectives of the evaluation from an end user perspective were the following:

1. Understanding the user experience of the intervention from the patient perspective and that of their carer or family;
2. Measuring the use of features of the intervention by patients and the acute oncology team;
3. Evaluating which patients use/do not use the intervention and understand whether or not the intervention changes equality of access;
4. Understanding from the perspective of the acute oncology team how the intervention is implemented, barriers and facilitators to implementation and how they are overcome and the experience of using the intervention;
5. Assessing the impact of the intervention on patient pathway compliance, A&E attendance and unplanned admissions;
6. Costing the new innovation and estimating its cost-effectiveness compared with current practice in reducing A&E attendance rates, mortality rate within 30 days of cancer treatment, unplanned hospital admissions and inpatient length of stay whilst improving treatment compliance (i.e. reduce non-attendance rates);
7. Compare clinical team and Artificial Intelligence (AI) based decision-making (chatbot);
8. Explore the social and ethical implications of the use of AI;
9. Health economics to evaluate the economic impact of the service.

The success of innovation projects, as with any change management process, is highly dependent on the degree of end user acceptance of the innovation (Dillon, 1996). An approach to innovation adoption and diffusion similar to Taylor's autocratic management theory, whereby employees follow their director's orders and focus only on performance, is unlikely to fit well in today's competitive organizational environments (Martinez-Cardoso, 2014). Studies of user involvement in medical device innovation have shown that users have to be involved at different stages in the medical device lifecycle including scoping, validation, design and evaluation (Martin, 2010 in Money, 2011). In case of the digital innovation in the NHS, end user involvement in the design and implementation of the

innovation would ensure that it meets user needs and that any changes would be justified and driven by end users (Vincent, 2011). There were two main end users in this case, patients and NHS staff. Carers were also included, especially if patients were relying on carers to use the innovation. The evaluation of the implementation would include all end user experience.

Although the external environment may stimulate the decision to innovate, the internal organizational leadership and culture plays an important role in the adoption, implementation and diffusion of innovations. In particular, the attitude towards innovation from organizational leaders, their influential and motivational skills and the degree to which they include staff and other end users, determines the success or failure of innovation (Damanpour, 2006). There are multiple types of users who needed to be involved in this innovation process and cancer patients, the end users of the innovation, were engaged early on in the innovation process. Patients were not involved in the design of the portal as the latter was already marketed for clinical use, but they expressed opinion through focus groups, around the functionalities they would find useful in the portal and the ones less useful to them which could be switched on and off.

Patient-public involvement in the early scoping stage of the innovation process was perceived as an important component of the project by the Innovate UK panel. On the other hand, the lack of a wider clinician network involvement including Oncology doctors, GPs and commissioners in the early stages of the project was seen negatively, because it did not support the scalability of the innovation. Other staff such as nurses and radiographers were receptive to the idea and its implementation and were engaged well from the start, unlike medical staff.

There are clear strategic, quality, cost and operational benefits from user involvement early on and throughout the innovation process (Shah, 2007), including leveraging user experience and knowledge in improving innovation functionalities and reducing costs. Early user involvement can validate the innovation and offer some security that the innovation is likely to be adopted if other stakeholder factors are met. In the NHS innovation case study, early patient user involvement validated the proposed innovation as a viable and effective means of patient-clinician interaction with clear patient and organizational benefits.

There is a risk with not putting the voice of the end user first, which could result in lack of user buy-in and ineffective marketing, leading eventually to poorer market share (Cooper, 1999). There is some evidence that lack of user involvement may be the result of lack of education and training of how to perform and measure user engagement (Money, 2011). In the NHS innovation case, an expert academic partner supported the innovation team during the patient and public user involvement work. Similar engagement work should have been done with internal medical staff as well as external stakeholders (GPs and commissioners) in order to maximize user acceptance.

A stakeholder group that was not involved in the conception of the innovation, was the oncology consultant body. Unlike oncology nursing staff who were supportive of the innovation and engaged early on during the conception of the innovation, there was significant resistance to the innovation idea from the rest of the oncology clinicians (the non-innovators). The resistance came primarily from the perceived increased workload, which trumped any enthousiasm around the innovation being of good value for patients. Exploring

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the resistant behavior a bit more, it became apparent that a mobile application was piloted few years previously to try and engage patients remotely but the latter failed to be adopted and diffused. It transpired that the remote monitoring device which was piloted in the past, was not as intuitive as the proposed innovation. In addition, the threshold for patients contacting the clinical team was set too low which meant that patients were calling the clinical teams unnecessarily (false alarms). This created more waste in terms of workforce time.

"We have piloted this before and it didn't work; it was a disaster, as patients kept ringing us based on the traffic light system on the App but there was no clinical reason to ring; this new system would not work either and we have so much work to do anyway"
Consultant Oncologist 1

Once the previous innovation technology was abandoned, oncology consultants lost confidence to digital remote monitoring technologies. As a result, they were reluctant to pilot the proposed innovation even if the latter involved a more sophisticated system that would potentially improve patient care and experience. In the long term, the innovation would likely reduce clinician workload, due to fewer hospital admissions and fewer outpatient clinics. In the short-term and during the pilot phase, the innovation would likely be set to be risk-averse and ensure that patients who needed advice got hold of their clinical team straight away. By doing so, doctors' workload would be expected to go up initially as they would be responding to more patient calls. Eventually, the doctors' workload would reduce as end users would gain more confidence in the chatbot system.

The oncology doctors resisted the change from current model of care to the remote model, despite the presentation by the innovator of short-term and long-term benefits for patients, the organization and staff. The innovator failed to attract a second doctor to co-lead the innovation steering. The perceived lack of usefulness of the innovation by the doctors and the unwillingness to pilot the technology meant that the innovator had no support from peers.

There was also an element of power difference and control between the innovator and the rest of the doctors (non-innovators). The past attempt by another clinical innovator within the department to design and implement a similar technology failed to be adopted beyond a small pilot. The decision of the oncology doctors not to support the current more refined idea may have been influenced by the past failure, as a means of being loyal to the previous innovator. The lack of support may also be explained by a somewhat antagonistic behaviour amongst clinical colleagues. The lack of available funding and clinician disinterest in developing the past digital technology further may have led to the lack of current clinician support. Even though the Trust supported the innovation implementation, the oncology medical team were not keen to be involved. An attempt by the clinical innovator to secure some funding from the charitable funds by engaging the fellow clinicians in the oncology department also met with lack of support.

"We didn't progress the 'old' innovation and that was a unanimous decision, so why should we support the same innovation two years later"
Consultant Oncologist 2

The lack of clinician engagement was subsequently viewed negatively by the external innovation fund committee panel, in terms of hindering the innovation diffusion process. This is discussed further in section 6.6.

The objectives of the evaluation from an innovation implementation perspective were the following:

1. Understand the process of designing the innovation and evaluation and extent to which delivery was in-line with design;
2. Assess whether the innovation delivered in line with the proposed plans;
3. Understand and evaluate the governance arrangements for the innovation;
4. Explore how the partnership arrangements worked, level of engagement and effectiveness of arrangements;
5. Understand whether and how the partnership with the NHS has or has not resulted in improved technology pull-through and the benefit to the NHS in terms of quality of the innovation;
6. Explore benefits to the innovation partners of engaging with the NHS;
7. Identify modifications made to the innovation during implementation to ensure effective delivery of the innovation and explore why these are made;
8. Identify barriers and facilitators to effective delivery and uptake of the innovation and how they were overcome;
9. Identify unintended consequences of the innovation for the partner organizations and explore how these were managed;
10. Identify learning from the acute oncology innovation used for other innovations in the NHS Trust;
11. To develop new theory on innovation and implementation in the health sector through comparative analysis across stakeholder groups and innovation case studies.

The 11 evaluation points above would serve as 'lessons learned' for future innovation implementations and would also give the team the necessary tools to succeed in future implementations. For other internal and external stakeholders to the Trust, it would give them the confidence that the innovation team can deliver complex projects and would motivate them to support the innovation team in future projects.

The next section describes the final adoption decision by the innovation commissioners and how the leadership with the innovation team help shape next steps.

5.6 The final interview and adoption decision

The national innovation panel interviewed the project team in August 2018 and scored the innovation favourably in terms of fulfilling an important gap in clinical care of cancer patients. The innovation offered tangible benefits to the Trust and the local community, adding value through patient pathway efficiencies, better patient experience and improvement in clinical outcomes (prevention of deteriorating patient and reducing mortality and morbidity from chemotherapy).

The judges supported the fact that the team run two successful patient and public involvement forums and received positive feedback from patients who perceived the

technology to be useful for them. Although the project team were not the final winners of the innovation fund award, they came very close to be awarded.

The main reason for the decision of commissioners not to allocate the fund to this innovation, was the lack of a robust strategic plan to diffuse the innovation beyond the local NHS and scale it up to other NHS organizations. In addition, the lack of an organised engagement plan with the local clinical commissioning group (CCG) meant that the innovation team had not considered a system-wide implementation of the innovation which would support its diffusion and sustainability. Moreover, the panel had concerns regarding the business leadership and commercial capability of the NHS Trust. They identified a risk in the technical implementation of the innovation, as well as the ability of the NHS Trust to sustain the innovation beyond the funding period. Given that the benefit realisation plan was so compelling, it almost felt unethical to set up a remote patient monitoring model of care and then withdraw the model once the pilot period ended. Furthermore, the panel commented on the patients less able to possess and/or utilise digital technology who would be potentially excluded from the service. This would create health inequalities in the access of care for oncology patients. The concerns were addressed well by the team who presented a clear action plan about keeping current process whilst improving digital literacy of patients. Finally, the panel were concerned about the lack of internal peer support for the innovator. Without clinical doctor support, it would be difficult for the innovation to be diffused and sustained.

One of the reviewer comments was the following:

"There is a concern about less able patients, or patients with mild cognitive impairment (MCI) and dementia accessing the technology"
Commissioner 1

The innovation team response to this comment was the following:

"We will work closely with our patient partners to ensure that our methods for data collection are appropriate"

"Patient information within the portal is written at a 9th grade level. Where possible, we will provide support for patients in participating. The clinical staff involved in the project, are all trained to work with less mentally able patients. Those patients are in any case selected carefully by their clinical team for chemotherapy treatment"
Patient and Public Involvement lead

Another comment by the Innovation Panel around the sustainability of the innovation was the following:

"There is no clear strategic plan of how the innovation will be scaled up and sustained; a discussion with the local clinical commissioning group to secure their support would have been reassuring"
Commissioner 2

The decision of the innovation commissioners not to fund the innovation was disappointing for the innovation team, especially as the commissioners recognised and verbalised the positive value of the innovation for patients, the organization and the community. The team took on board the feedback from the commissioners and met together in order to reflect and make plans forward. The dedication of the leadership team and their belief in the innovation benefits led them to look for alternative funding streams. The next session outlines the timeline of events and the further engagement of stakeholders in an effort to get the innovation to the adoption stage.

5.7 Timeline of events, stakeholder interactions and leadership exploration

- 20th October 2017 and following a meeting between the researcher and the UHCW innovation lead at the time, an external App company was approached to explore remote patient monitoring. Several meetings took place to scope the project between the innovation team, the researcher and the App creator.

- Between October and November 2017, several meetings took place between the innovator and the Innovation and Transformation teams about scoping the development of virtual clinics to support remote patient monitoring.

- The evidence behind the idea for using digital technology to remotely monitor cancer patients was presented to the innovation and transformation teams in November 2017.

- The innovator received an invitation from the Innovation Manager to present the innovation idea at the Ideas Den in December 2017 in front of the Trust Executives and non-Executive directors. A preparation meeting was held with the innovation team prior to the presentation.

- The App creator and the researcher developed a user questionnaire to gage clinician and Trust interest in the innovation but also get ideas for the design of the App. The App creator was informally engaged in the project as a partner (under a non-disclosure agreement), pending the Ideas Den outcome. A formal contract would be agreed thereafter.

- The researcher run an engagement session with the oncology department including the oncology clinical lead, prior to the Ideas Den presentation in December 2017.

- A successful presentation and useful discussion about the proposed innovation took place at the Ideas Den in December 2017. The outcome from the presentation was positive and the researcher was given the 'go ahead' to apply for the innovation grant.

- A team to take the project forward was developed in January 2018, through engagement meetings with the local university, people from ICT, oncology and project management. Everyone was prepared to heavily invest their time, knowledge and skills in the project.

- A series of further presentations with the oncology department took place, led by the innovator and in the context of the department governance meeting (January 2018). The scope of the project was presented, together with plans to implement the innovation in the

months to follow. The project was met with resistance from the doctor group but it was supported by the nursing and radiographer groups.

- Two new business partners were engaged for the purpose of the patient portal implementation and for the machine-learning component of the innovation. A decision to apply for the Innovate UK grant was made in collaboration with the research and development team, a member of which joined the project team as well. Weekly Meetings of 1 hour each took place between January 2018 and July 18 which included representatives from the academic institution, business partners and the NHS organization.

- In March 2018, there were concerns expressed by the steering committee and the Trust's chief officers around the Trust's commitment to this innovation. Resources were scarce to support the implementation even if the innovation fund was awarded. There was also limited commercial expertise to deal with intellectual property issues. An executive decision to proceed with the project application was made and a research fellow from a local university was onboarded to the project team to evaluate the innovation process.

- An intense period of preparation for the phase 1 application took place between January 2018 and April 2018, which included weekly project team meetings to co-develop the application sections and build a formal business case. In May 2018, it was announced that the project passed the phase 1 NHS Test Bed innovation phase. Project meetings continued after that to prepare for the phase 2 of the application, which was a longer and more detailed application. This was submitted in July 2018.

- Between May and July 2018, a series of separate meetings took place including: the patient and public engagement forum, commercial meetings to discuss intellectual property, engagement with a third-party provider for the machine-learning component, academic contribution meetings.

- Between July and August, the steering committee met to address the Innovate UK comments to the submitted application. The final interview took place in August 2018, the outcome of which was communicated to the team a month later.

- Meetings with the local university took place in September 2018 and following the announcement that the fund was not awarded, in order to explore alternative ways to support the innovation adoption. There was also further engagement with new business vendors to gage their willingness to invest in the innovation between October and December 2018.

- A combination of internal facing and external facing engagement meetings took place between January and April 2019, including with charities and the local academic health science network. The purpose of those meetings was to find alternative ways to implement the innovation, but the issue of paying for the portal, IT and AI costs was always the blocker.

- Between April and December 2019, there was an intense engagement schedule with a pharmaceutical partner who expressed interest in investing on the proposed innovation. Although the case was compelling in terms of financial and non-financial benefits, the

investment plan fell through because of concerns around the complexity of contractual arrangements amongst all partners. The idea was dropped after that.

Table 2 below contains a summary of all stakeholders involved in the innovation study and their roles in the process. All quotes included in the description of the case are from the pool of those stakeholders. The interaction between those stakeholders and aspects of leadership are discussed below.

Table 2 - Case 1 Stakeholders

Stakeholder	Role in the process	Leadership aspects of the role	Engagement
NHS Executives X2	Set up Ideas Den	Articulated the Den's vision and Shortlisted the innovation	Direct question observations
R&D manager	Innovation committee member	Business case formation	Feedback/Meetings
NHS Commercial Staff Member	Innovation committee member	Business case formation, IP Advice; NDA drafting	Feedback/Meetings
Academic professor	Innovation committee member	Programme evaluation	Discussions
AHSN lead	Innovation committee member	PPI lead and patient advocate	Feedback/Meetings
NHS radiographer x2	Innovation committee members	Mosaiq experts; contributed to Innovation application and built relationship with portal vendor	Discussions Pitching to doctors
AI partner	Innovation committee member	Business case formation	Feedback/Meetings
Portal vendor	Innovation committee member	Business case formation	Feedback/Meetings
NHS IT architect	Innovation committee member	Business case formation	Discussions
IT project manager	Co-Chair of innovation committee	Project Management	Feedback/Meetings
NHS acute oncology Nurse x2	Innovation committee member	Application, portal monitoring, Innovation implementation	Discussions
NHS senior chemo nurse	Chemotherapy unit manager	Business case formation	Direct question
Chemo pharmacist	Unit manager	Business case formation	Direct question
Research fellow	Evaluation of leadership in Innovation	Observation of meetings	Discussions
Research nurse	Cancer Research Unit lead	Implementation and evaluation	Feedback/Meetings
Patient volunteers x10	Patient-public involvement group	Co-design of digital tool and Advisory role; PPI group	Forums
Innovation Commissioners x6	Innovate UK panel	Review of application, interview and final decision to adopt	Feedback from interview
Oncology Consultants x15	Stakeholder engagement sessions	Resistance to change	Engagement events
Clinical Innovator	Idea generation, stakeholder Engagement, co-Chair of innovation committee	Clinical expert, medical advisor Clinical governance	Ethnography Participant observations

The NHS Executive team's intent to support front-line clinical innovators in their journey to innovation implementation was the correct one but they relied solely on the innovation and transformation teams in the Trust to do that. Innovation was not included in the budget plan and therefore not adequately invested on. There was also no innovation strategy, no vision or roadmap for innovation and no innovation deliverables. The innovation and transformation teams were managed by motivated and engaged managers but they lacked clinical leadership within the teams. This made the clinician engagement for innovation adoption difficult across the Trust. In addition, the research and development (R&D)

department worked independently from the innovation department, which made it more difficult to leverage the R&D resources for innovation.

The specific project innovation team's leadership was perceived as collaborative and effective, however the innovation failed to be adopted. The researcher and innovator attempted to explore enablers and barriers to innovation with reference to leadership.

The innovation already had proven value through trial-based clinical outcomes, this is a prerequisite for innovation adoption according to Rogers, Barnett, 2011 and Greenhalgh (2018). The remote monitoring model of care proposed through this innovation, had led to a 45% reduction in cancer patient mortality in one study based in U.S (Newman, 2011). In another study conducted at the Institute Inter-régional de Cancérologie Jean Bernard in Le Mans, in France, advanced lung-cancer patients were randomized between remote symptom monitoring through a smartphone App and standard care. The patients who submitted weekly symptom reports to their doctors via the app lived significantly longer (75% vs 49% at 1 year, Winslow, 2016). Basch (2017) showed in their randomized study of 766 cancer patients, that those patients who were monitored remotely for symptoms during their treatment, had >5 months improved survival than the controls. This level of survival advantage is comparable to phase III drug therapy trials, but the cost of this approach is significantly less than drug costs (Basch, 2017).

The evidence behind this digital innovation in terms of improving clinical outcomes for cancer patients was the key value proposition for patients and the organization. Further evidence around remote cancer patient monitoring systems suggested a 15% reduction in Accident and Emergency visits through proactive symptom management, a 20% reduction in emergency admissions, a 14% reduction in elective admissions, a 14% reduction in bed days and an 8% reduction in tariff costs (Newman, 2011). An internal audit of presumed febrile neutropenic patients secondary to cancer chemotherapy in the Trust, showed that 30% of cancer patient admissions are unnecessary and could have been prevented if patients were monitored remotely.

Cancer patients could be better managed in the community, offering significant savings for the NHS and with significantly scalable cost-saving potential. The digital innovation proposal would enable that. However, the organization lacked organizational readiness and leadership for innovation (Greenhalgh, 2018). The lack of organizational resilience in terms of having the resources, early adopters, clinical champions (the doctors) and executive leadership for innovation, were key factors in the failure to adopt this innovation. A clear strategy plan to promote the implementation and diffusion of scalable innovations was not presented by the Trust which failed to impress the innovation commissioners.

We believe that for this particular innovation, it represented a missed opportunity for the Trust which chose not to commit itself in the procurement of the digital technology. A reflection on the lack of doctor engagement and support may also be due to the lack of a wider organizational response to innovation calls by front-line clinicians.

The clinical innovator engaged business partners with proven track record of successful implementations in large hospitals and with commercial and marketing capabilities which is a positive element in innovation diffusion success (Etzkowitz, 1993, Omachonu, 2010).

However, what the NHS Trust lacked is the technical, digital architectural and the commercial expertise to be able to implement the innovation. The lack of the Trust's technical and commercial capabilities resulted in the innovation commissioner losing confidence in the Trust's partnerships and the future innovation sustainability.

The presence of the business partners and their engagement by the clinical innovator played a very important role in the innovation being shortlisted by the commissioners. However, the relationship between the NHS and the two separate business partners (portal and AI partners) as well as the academic partner, posed some complexity when it came to the ownership of the innovation and future risk sharing. This made it difficult for other commercial partners to invest on the innovation following the failure to secure the innovation fund.

Apart from a single clinical champion and sponsor of the innovation and a dedicated project team, there was lack of key stakeholder engagement (Etzkowitz, 1993 and Chesbrough, 2013) in the innovation. On a positive leadership note, the clinical innovator applied Open Innovation principles, through the creation of external partnerships to the NHS organization, including academic institutions and the commercial sector. The champion and sponsor of the innovation (the clinical innovator) drove the knowledge sharing and partner engagement for the purpose of innovation acceleration. The innovator acted as a knowledge broker, engaging with clinicians, patients and other end users in order to apply evidence into clinical practice. However, the clinical innovator should have performed a more detailed stakeholder analysis to understand the power and influence of all stakeholders in driving the proposed innovation forward. The failure to perform this activity resulted in GPs and the CCG being left out from the engagement process. There were attempts to engage oncology doctors multiple times but unfortunately they were not prepared to support the innovation as discussed previously. As a result of the lack of broader stakeholder endorsement, the innovation commissioners were not sufficiently reassured that the NHS organization could diffuse and scale the innovation beyond the initial adoption phase. We believe that this was one of the main reasons why the commissioners did not fund the adoption pilot, alongside the lack of the Trust's commercial and technical expertise.

Finally, one of the biggest innovation benefits was the interoperability of the patient clinical record. The digital innovation (portal and conversational platform or chatbot) could be interfaced with the patient electronic health record (EHR), hence allowing access to primary and secondary care clinicians as well as patients, in a safe cloud-based data interface (Greenhalgh, 2017). One of the long-term positive impacts of this digital innovation would be the joining up of patient care, resulting in more effective integrated care. However, the Trust lacked the IT capability to perform such complex interfacing and therefore the impact of having interoperable systems in oncology could not have been realised.

Kerridge (2019) conducted an independent evaluation of a number of innovation processes in the NHS Trust under study, including our digital innovation process. The findings of his study demonstrate the key role of clinical as well as organizational leadership in driving the adoption and diffusion of innovation. He commented in particular on the important role of the Trust's innovation department in engaging clinical innovators and enabling them to act as knowledge brokers within the Trust. The purpose of the innovation department was to act autonomously, attracting innovators to come forward with their innovative ideas and being

able to compete for Trust resources. At the same time, the Trust leaders should honour their commitment to support the innovators with the necessary resources for them to implement and scale their innovations. The innovation and transformation departments acted as facilitators and as the link between clinical innovators, academics and the industry, supporting innovators with grant applications and intellectual property. However, it transpired that the innovation department could not act autonomously as it did not have the funds to support the procurement of digital technology or the mobilisation and allocation of workforce resources.

The fact that many different innovation ideas within the same organization stalled early in the process, was attributed to the lack of organizational resources in supporting the adoption and diffusion of innovations. The innovation and transformation departments were linked to the research and development department when it came to grant applications, but their activities were independent. For example, research funds from clinical trials within the Trust were not shared with the innovation department. In addition, the innovation department performance was not measured against any indicators, unlike the research and development department.

The lack of autonomy and resources in the innovation department to support the implementation of valuable innovations within the NHS Trust, shows the lack of organisational resilience with regards to innovation (Fukofuka, 2015). The lack of investment in the innovation department posed a risk, in that clinical innovators could stop coming forward with ideas or could find other means to develop their innovations, often outside the organization.

A significant leadership barrier to this digital innovation succeeding, was the oncology doctor stance (the non-innovators), who were unsupportive of the innovation being piloted. The perception of complexity and low value of the innovation by the rest of the oncology doctors, who would have been the end users of the innovation, posed a threat to the success of the adoption pilot. The reason behind the doctors' resistance to support the digital innovation was the concern that it would potentially require significant time investment from them and that it would increase their daily workload. The latter was due to the fact that clinicians would need to respond to a higher number of patient queries online but on the other hand, they wouldn't need to review patients in clinic or on the wards. There was a shift of workload to a more efficient work plan and to a more acceptable way of caring for patients who would otherwise have unnecessary admissions and visits to the hospital.

Clinicians were also concerned that patients and clinicians needed to be trained to use the technology and such model of care did not form part of their standard clinical practice. There was also an element of mistrust in the digital technology given poor experience with a similar technology in the past. Moreover, power differences between innovators and non-innovators may have played a role in the decision not to adopt the innovation. The ownership of innovation fell exclusively on the clinical innovator who sought support from her peers in making it happen. A similar innovation whose pilot was unsuccessful took place some years before and was led by another clinician in the oncology department. That might have influenced the willingness to support the new innovation. Finally, there was an element of mistrust on the organizational capabilities to support and invest on innovation which may have led to doctor disengagement.

The reasons presented by individual stakeholders (front line oncology doctors and oncology middle managers) favouring the non-adoption of the innovation included the lack of time to be trained and work on a new system, the perceived lack of staff and patient benefit, the lack of a good reason to change clinical practice, the distrust on AI and concerns AI will take over clinical practice, the risk of multiple IT and other technical issues requiring ongoing support, the high cost solution with inability to see the benefits and finally, the competition with other projects for investment and resources.

"No clear evidence to change my clinical practice"
Consultant Oncologist 3

"I can see the benefit to patients straight away and long-term will have a huge impact in the way we care for patients,
but requires significant consultant buy-in to the new model of care for this to succeed"
Acute Oncology nurse

"Standardisation of data collection is a prerequisite for the chatbot to succeed and this needs doctor engagement; variable quality of data collection would make the vision of an AI-based advisory tool non-attainable"
NHS Senior radiographer 2

"There is no time for me to spend innovating, as there is no remuneration associated with it and only the Trust will benefit"
Consultant Oncologist 4

We have identified some organisational issues that might have led to the non-adoption of the innovation:

- The Trust did not have funding, workforce resources or the industrial relations to support this digital innovation project either as a pilot or beyond the funded pilot stage. The Trust's limited technical and commercial capabilities made the project 'high risk' in terms of its sustainability after the funded pilot.
- The organization lacked a culture of experimentation and risk-taking which was perceived as a lack of organizational support amongst clinicians and other internal and external stakeholders. There was also no overarching strategy for innovation across the Trust and as a system.
- There was a degree of misalignment between the Trust vision to promote innovation and the resources available for innovation execution.
- There was a perceived lack of a coalition between the Trust's innovation department and its Research and Development department, which meant that any innovation project being proposed by the innovation department was not necessarily backed up by the organization's R&D infrastructure and resources.
- There was lack of a structured engagement strategy between the commissioners and the Trust when it came to innovation, despite the fact that the commissioners would be required to support the diffusion of innovations.

"If the Trust wants clinical innovators to continue to come forward with improvement and disruptive ideas that can have a financial and quality value for the Trust, it needs to invest on innovation resources to support front-line innovators, otherwise these people will leave us"

NHS innovation manager

Collins (2018) talked about the professional and managerial silos in the NHS which stifle innovation and this is clearly observed in the digital innovation case: a clinician front-line leader collaborated with middle management for an innovation project which had theoretical but no tangible support from the Trust's executive team. There was a gap between what front line leaders and middle management envisaged as innovation process and deliverables and what the hospital executives could actually support. The two fronts did not seem to work in partnership to support the change management process. Middle management felt unable to support front line clinical leaders with their innovation ideas and also felt disconnected with the executive team who lacked innovation resources.

Collins (2018) set the context of research and innovation in the NHS and talked about the fact that the NHS has set aside <0.1% of the available funds for innovation, which is not enough to support innovation adoption and diffusion, unlike the private health sector which has set aside 25% of the turnover to innovation. There is a large disparity between the NHS and private sector prioritisation when it comes to innovation, which may explain the negative outcome of this case study.

Deep diving into the barriers to innovation adoption in this case, we identified the lack of protected clinician time for innovation work. In addition to that, there was lack of clinician incentivization in terms of time, space and pay to encourage innovation. Clinician incentivization was deemed to be an important factor for clinical leader motivation to lead on innovation. There was lack of protected time in the clinician job plan for innovation work, lack of sessional pay for innovation and recognition of the work clinicians were prepared to put in to making innovation happen. Moreover, there were few or no opportunities for networking with other innovation leaders across the country or with the industry and no opportunities for promotion. Adding to the above disincentives, there was resistance from doctors to adopt a new technology even as a pilot, because it could potentially alter the routine work structure and introduce significant change to the department.

Collins' (2018) research stated that in order to deliver on innovation and change, there is active work needed from clinician champions, such as pitching the vision of innovation to other clinicians, including the benefits for patients and the organization. The innovation team had a strong vision and determination to perform such change but lacked the capacity to support those activities. Despite data from global studies suggesting that remote patient monitoring improves overall survival, there was reluctance from doctors to actively support this innovation. In addition, there was discouragement from doctor leaders to pursue any innovation in the department because this would conflict with everyday workload. Successful clinician incentivisation (time, pay, reward) could have helped create a critical mass of support which could have increased the chance of the innovation being adopted at least. This could have included opportunities for paying another supportive professional activity to those clinicians who were keen to drive the innovation forward. This action would have demonstrated the commitment of the Trust to developing innovation capabilies,

training clinicians to think innovatively and offering opportunities for research and publication.

In summary the innovation project could positively improve the model of cancer care delivered in the NHS Trust but stalled before the adoption stage, primarily due to lack of funding and secondarily due to lack of organizational readiness for innovation. Even if the innovation grant was awarded, the innovation would have stalled after the initial pilot, because there was no strategic approach to innovation adoption and diffusion.

Following the unsuccessful innovation bid and given that the Trust had no funding to support the project, the innovator had three choices:
1/ to drop the idea;
2/ to seek alternative funding sources;
3/ to re-apply for the innovation after addressing panel's comments.

The idea was finally dropped which led to members of the innovation and transformation department leaving their roles in the organization for other external roles. The discussion that was held with those people revealed a consistent message as to what drove them to pursue roles outside the organization: the complexity of the NHS meant that there was an urgent need for innovation and change, but the consistent lack of resources for innovation, led to conflict. The poor business capabilities of the organization and the competition for limited resources, represented major barriers to innovation and a continuous burden to people who were motivated to produce and implement innovative ideas.

The next section concentrates on the lessons learned in this case which could help the innovation model we are trying to develop.

5.8 Lessons learned from Case 1

The lessons from this innovation which failed to be adopted are multiple. The researcher gathered feedback from all stakeholders such as the innovation project team, the innovation commissioners, the research & development team and other stakeholders in the NHS Trust, as shown in table 2.

The key learning points are the following:

- **The implementation of innovation including stakeholder engagement is the critical step in the innovation process which needs to be planned early and led well, even at the stage of idea generation.** The implementation plan should be robust enough to support early innovation adoption and subsequent diffusion and should include a well thought stakeholder engagement plan. Innovation in healthcare has multiple benefits associated with its implementation, financial and non-financial (quality, effectiveness, responsiveness, efficiency) and those need to be well-defined. A clear evaluation strategy of the innovation implementation needs to be built into the implementation plan in order to evaluate the innovation benefits. The evaluation needs to start early on in the innovation process in order to capture the effectiveness of the preparation and engagement phase. This case illustrates a good example of an evaluation strategy which was commended by the innovation

panel. Academic involvement with rich expertise on program and research evaluation provided the leadership required for the evaluation piece. However, the strategy for innovation diffusion had not been thought through which was the key blocker in the commissioner decision to fund the innovation. The evaluation plan should have included a clear engagement plan to enable not just the adoption but also the diffusion of innovation. The clinical innovator could have led a stakeholder mapping exercise to ensure that all stakeholders were considered and engaged appropriately and throughout the stages of innovation.

- **Innovation adoption is the first step in the innovation journey, a prerequisite to innovation diffusion and requires strong clinical leader engagement.** The role of the clinical innovator is key for ensuring there is enough critical mass of people (followers) who support the innovation. Having such critical mass enhances the chances of the innovation moving beyond the pilot stage. The researcher attempted to engage a number of staff from the oncology department including acute oncology nurses, radiographers, acute oncology and research nurses and she was mostly successful. However, the lack of a wider oncology doctor commitment and support, made the case for adoption of new technology less convincing to the Innovation panel.

- **It is not enough for an innovation to reach the pilot phase, because without an organised implementation plan (funds, people, capability, partners), the innovation is unlikely to move beyond the pilot phase.** A short-term implementation pilot should have been supplemented by a long-term sustainable plan to diffuse the innovation and scale it up in other clinical specialties and partnered Trusts. An early engagement of the local clinical commissioning group (CCG) and other system partners could have exposed the innovation to a wider supportive network. It could have led to other sources of funding in case the Innovate UK grant was unsuccessful. In addition, the financial ask could have been shared between Innovate UK and the clinical commissioning group in a more collaborative approach. Such a gesture could have given the confidence to the Innovate UK committee of the innovation's sustainability, which could have led to winning the grant.

- **The identification and engagement of early adopters is key, including commissioners and providers.** A comprehensive stakeholder engagement strategy at an organizational and system level needs to complement the entrepreneurial approach of local innovators (Martin 2012, Hunter 2012, Barker 2016). This includes the selection and engagement of business partners. In this case, a combination of international (patient portal vendor) and local medium enterprises (AI partner) were selected to work on the innovation. It is important that due diligence is done to support the choice of business partners. A lack of commitment and trust can be detrimental to the innovation adoption and diffusion.

- **The application of the business modelling approach to innovation** by Van Limburg (2011), through the presentation of a clear and structured strategy for the evaluation of innovation was positively perceived by the innovation fund panel. This

approach ensured a broad local stakeholder involvement early in the innovation process, co-creation of solutions with key stakeholders and earlier problem-solving (van Limburg, 2011 and van Gemert-Pijnen, 2011). However, the evaluation was not supplemented by a comprehensive stakeholder engagement strategy and the innovation run the risk of not been supported by commissioners in the long run and after the funded pilot ended. In that scenario, the NHS Trust would have to bear the costs of continuing with the innovation which would have been financially unsustainable.

- **The implementation and diffusion of innovations can be financially complex, especially when they involve collaborations between different organizations.** There is a requirement for good commercial capabilities from the part of the leading organization (Williams, 2008). The innovation collaborative between the NHS, industry and academia, needed a better clarification and agreement of shared risks and rewards. In this case, even if the innovation fund had been awarded, the handling and distribution of funds across the lifetime of the project was a risk which was also expressed by the innovation panel. The power dynamics between the three large stakeholders (NHS, industry, academia) were challenging and conversations around ownership of the intellectual property were not effective. As a result, there were issues around trust, commitment and integrity amongst the stakeholders regarding the innovation implementation timeline and the future beyond the funded pilot.

- **Early executive engagement and commitment in the innovation process**. The NHS Trust commitment to innovation should have gone beyond a top-down decision to adopt innovation through the Ideas Den. NHS endorsement of the innovation should have been accompanied by the necessary resources to support the implementation of the innovation beyond the pilot. This would have helped with the change management process, with clinician incentivisation and with the researcher and innovation team confidence on the value of the process. A quote from a senior member of the innovation team at the very start of the process, regarding the Ideas Den purpose and the Trust obligations, was the following:

> "There will be an expectation for resource to make it happen, or mandate to work with an external company if our ICT department cannot support"
> **NHS Transformation Manager**

The NHS Trust innovation process turned out to be not robust enough in terms of realising innovation following the Ideas Den vote of confidence. Although the Trust supported the idea and gave the 'go ahead' for the implementation, there was no spare resource to devote for neither the funded pilot nor the continuation of the innovation beyond the pilot stage. The ICT workforce had conflicting priorities given the Trust preparation to procure an electronic patient record (EPR) and other ongoing projects, with no time to devote to innovations. In addition, the Trust had no plans to invest in any new technology given the large investment they had to make on the EPR program. Finally, there was not enough capability to build and support Apps in the Trust which made it impossible to continue with App vendor engagement in this case.

- **Early and continuous involvement of patients and the public is key in the adoption and diffusion of innovations in healthcare**. In this scenario, there was good engagement of patients and the public who expressed their views on the innovation and its benefits. It is important that healthcare innovations with multiple benefits for patients and staff are supported by a robust implementation and scale up plan to ensure they are sustained beyond adoption. It would be unethical in this case to withdraw the innovation following the end of the pilot due to the lack of sustainable resources to support it. This was also a concern expressed by the innovation commissioners.

- **Consideration needs to be given to prevent widening the gap of health inequalities in terms of access to healthcare.** Digitising healthcare services bears the risk of depriving access to care for patients who are less technological savy or they can't afford the wifi and/or digital devices. A comprehensive innovation strategy should incorporate a population health component within its benefit realisation.

- **Healthcare innovation adoption and diffusion is more likely to happen in the context of an autonomous and empowered workforce.** The top-down control of the innovation process in this case meant that that the innovator's internal motivation to experiment and change model of care was not met with the respective support from the organization. It is documented that a centralized approach to innovation decision-making can stifle creativity and innovation (Damanpour 1991 within Jung, 2003).

5.9 Conclusion

The digital innovation case in the NHS demonstrated the need for fundamental leadership ingredients so that healthcare organizations succeed in the innovation adoption stage. An autonomous innovation department within NHS organizations that links clinical innovators to the resources required to adopt and diffuse innovation within the organization, is key. Clinical innovators need to be incentivised so that they could continue to come forward and pitch their innovative ideas. Time, space, the opportunity for innovators to network with industry and academic partners, the provision of rewards and recognition for innovation implementation are some incentives that Trusts can offer to clinical leaders to keep them engaged in the process. In turn, clinical innovators should exert their leadership skills to engage other clinician peers in the innovation process, through acting as knowledge brockers, sharing information, articulating the innovation benefits and through the co-designing of innovation. The development of a viable innovation strategy which includes a complete stakeholder mapping and engagement and looks at the diffusion and scaling up capabilities can maximise opportunities for innovation adoption success. Finally, end user involvement including patient and public engagement is key to ensure that innovation is ethically viable and patient needs are met.

Following the innovation bid rejection, there was some reorganization within the Trust, with the majority of the innovation and transformation teams leaving the Trust including the project manager of the innovation project. The Innovation department started to collaborate

much more closely with the Research & Development department and a business partner was appointed on a permanent basis to advice on intellectual property issues.

In addition, a new clinical lead for innovation was appointed to provide strong clinical leadership and engage more constructively with clinicians during their innovation journey. The clinical lead had strong partnerships with the local universities and he also led a surgical research fellow program within the Trust. He also worked closely with industrial partners as clinical advisor and he was well respected in the industry as a clinical leader which helped in getting industry support for innovation. A new Research and Development lead was also appointed who also had a professorial position in the local university and was well respected in the local community and nationally for his research work.

These organizational changes gave a positive signal to clinicians and potential innovators who continued to come forward with their ideas. The organization started to attract industry partners who engaged with the Trust seeking possible collaborations.

Although the innovation project did not receive the funding award and did not progress, the Trust reflected on the barriers to this innovation succeeding and made positive steps forward to restructure the innovation and transformation teams. The constructive feedback offered by staff who were involved in the innovation project as well as the feedback from the external innovation funding committee, has helped the NHS Trust made the necessary changes to raise its innovation profile and consequently, raise the overall reputation of the organization. A new innovation and research strategy was written and supported by the newly appointed Innovation and R&D leads.

Innovation in the NHS is often initiated by front line clinicians (Harris, 2016) who are highly self-motivated and is important that they operate in an environment that nurtures their competencies and autonomy to innovate (Ryan, 2000). Such environments are more likely to stimulate clinician internal motivation and innovations are more likely to take off (Ryan, 2000). The failed digital innovation gave the impetus to change the way the Trust viewed Innovation and put the necessary resources to boost innovation in the years to come. The joined innovation and research strategy which was put forward had short, medium and long-term performance targets with the vision for the NHS Trust to become the leading UK organization when it comes to research and innovation. The joined innovation and research strategy was linked with the Trust's human resource and recruitment strategy to support the recruitment and retention of high caliber clinicians and innovators.

Bottom-up innovations need appropriate infrastructure, top-down support and strategic partnerships if they are to be adopted, diffused and sustained (Williams, 2016). Shortage of those organizational capabilities may lead to innovations failing to become adopted and implemented. Innovation can be viewed as a change process within organizations and communication of a shared clear vision for innovation is key. Involvement of end users early in the innovation process may also lead more often to the desired change (Al-Haddad, 2015). End user involvement in the design, implementation and evaluation of innovation is essential and often guides innovation teams about which aspects of innovation to measure in the evaluation process. End user involvement in the data analysis is crucial in making sense of the outcomes of the evaluation as well as in the dissemination of the outcomes to the wider community.

Chapter 6.0/ Case 2 - A cyclical innovation model in the private sector

6.1 Description of the innovation model and its purpose

In the private health sector, innovation happens because of the need to continually improve services (continuous innovation) or due to the need for differentiation and disruption, through the delivery of new product and services and/or expanding to new markets (Bolwijn, 1990). The competitiveness of the external environment including the reduced barrier to entry and reimbursement challenges, makes innovation a necessity for the financial sustainability of private organizations.

The private healthcare organization under study is young and entrepreneurial with the vision to expand its services and products to other markets, hence becoming the global provider of choice for cancer care. The innovation model adopted to expand its service offerings globally is cyclical and involves a number of innovations which are implemented at the same time, with one innovation driving the other (Berkhout, 2006). This model suits the organizational culture and vision, which includes the creation of multiple differentiators for the purpose of developing a unique service proposition for its customers (Berkhout, 2006). The strong organizational vision together with the entrepreneurial and risky organizational behaviour, align well with the cyclical innovation model (Bessant, 2013). The success of one innovation can be very influential and often one successful innovation can drive more innovation. This is also a social innovation model which is characterised by a strong sense of organizational vision, a risky organizational behavior and one that values partnerships within and between organizations (Bessant, 2013). On the contrary, the digital innovation project in the NHS followed a more linear approach (Roger, 1995), through knowledge gathering, clinician persuasion and patient involvement. It stalled in the 'decision to execute' phase, due to lack of top-down leadership and business capabilities, lack of involvement of commissioners (early adopters) early in the process and the inability to fully exploit existing resources and industry partnerships to produce a scalable strategic plan.

The studied innovation model is characterized by multiple innovations which serve the company mission pillars - Quality, Access and Efficiency. The model was applied for the purpose of transforming the company's breast cancer service across the whole patient pathway, from diagnosis through to treatment and survivorship. The transformation process was triggered by external forces, including the following:

- Competition with other private providers;
- Competition with the single most powerful competitor – the NHS;
- New entries to industry competing for same clinical workforce;
- Technological advances in cancer diagnostics and radiotherapy treatments;
- Old Clinical protocols needing an update;
- Year on year poor growth in patient referrals;
- UK has the lowest survival in breast cancer compared to other European countries, with cancer waiting times standards often not being met (Papanicolas, 2019);
- There is wide variation in the access and quality of breast radiotherapy in UK with poor progress in clinical protocol development and innovation (Livi, 2015).

All the above triggers led the company to create new and innovative services and blueprinting them through the breast cancer service transformation program. The program represented a whole system approach to change, involving a number of innovations across the whole patient pathway, from diagnosis through to survivorship. Innovations ranged from purely technical ones to service and digital innovations. The learnings and the 'know-how' from the breast cancer transformation program would be used to transform other clinical services within the organization and the group as a whole. This was an opportunity for the company to make a real difference to patient outcomes and improve its reputation at the same time.

The diffusion of innovations within a network of private centres was optimised using a whole systems approach to change. This approach started with the top-down creation of the vision for change, the description and measurement of future desired outcomes, followed by stakeholder engagement internally and externally (Blizzard, 2012 and Crompton-Phillips, 2020). On the contrary, there was no shared vision amongst stakeholders in the NHS digital innovation case and there were important stakeholders that were not engaged, such as doctors, commissioners and integrated care practitioners such as GPs. We believe that the bottom-up only approach to the digital innovation process in the NHS, without the top-down leadership and support did not result in the adoption of the innovation. The private organization utilised the principles of the tight-loose-tight model by Crompton-Phillips (2020), ensuring there was a right balance between setting the direction for change (top-down) and allowing front line leaders to lead the implementation of individual innovations (bottom-up). The combination of bottom-up innovation implementation and top-down leadership support can ensure that front line staff have a sense of autonomy and freedom to experiment whilst feeling supported in taking risks when innovating (Fukofuka, 2015).

The breast cancer service innovation program involved a top-down strategy at first, unlike the digital innovation in the NHS which was driven solely by a front-line clinical innovator with no decision-making powers. The sponsor of the innovation program was an executive member of the UK leadership team and the creator of the program was the medical director and also member of the UK leadership team. The medical director was the same individual as the clinical innovator in case 1. However, in case 2, the innovator had the decision-making power to drive strategy top-down as well as the clinical knowledge to support the strategy bottom-up. The high-level strategy was shared with all the UK centre managers and front-line staff but without much involvement of them in co-creating the innovation strategy. The expectation was that middle managers and front-line leaders, as well as clinical leaders, would be heavily involved in the implementation of the strategy through the different innovation workstreams, which is where they would have the opportunity to shape and influence the innovation process.

Obtaining internal support and buy-in on the strategy was helpful in the creation of a shared internal organizational vision and purpose. The internal people engagement piece ensured that the innovation strategy was well supported by the whole organization. By doing so, the organization could maximize the external engagement piece, targeting the main end users, patients and doctors (referrers to the service). End users such as consultant doctors, clinical directors and patients were not consulted in the proposal early on, because of the urgency of producing a plausible strategy ahead of other competitors. Revealing the strategy too early meant that they would be introducing an unnecessary risk of the strategy being replicated by

other providers, gaining competitive advantage and competing for the same clientele (doctors referring to their service). The doctors and referrers were not employees of the organization, which meant that there needed to be a strategic approach to clinical engagement and a requirement to keep the strategy confidential until an implementation plan was formulated and under way (Shah, 2007).

The forecasted financial gains from the strategy implementation were significant which also led to the swift implementation of the strategy before an extensive engagement piece with end users. The opportunity to improve patient outcomes by introducing service innovations was a plausible strategy, as there was enough clinical evidence behind the proposed innovations. The specialized technological nature of the innovation portfolio meant that patients would not be in a position to be involved in the co-creation of the innovation strategy. Patient engagement in the form of patient experience forums came at a later stage in the innovation process and particularly during the implementation and diffusion stage rather than the initial knowledge creation and adoption stages.

Primary and secondary care clinicians (GPs, Oncologists, Surgeons) were the main stakeholders to take on board during the adoption stage of the innovation process. Although the tactic of late end user involvement in the innovation process deprived the innovation team of a broad clinical and patient intelligence in the creation of innovation, at the same time it eliminated the risk of the innovation program being resisted by end users. The innovation process involved significant internal cultural change in the way care was delivered by the organization. There was also a significant digital transformation component which would enable more efficient and safer clinical workflows. The focus was therefore given to ensuring that the internal workforce was engaged well at the start of the process as everyone within the company would then work together to engage the external stakeholders. Executive managers and commissioners of the innovation program had complete buy-in because of the expected improvement in care outcomes and also the forecasted significant revenue to the business in the following 24 months (Money, 2011).

The organization applied a nationally approved change management model in order to transform its breast cancer service offering. The change management model followed quality improvement principles: the implementation of the six steps to quality improvement change (Jones, 2019). Utilising a whole system approach to change, the innovation process began with vision creation, scope building and outcome definition, led by the medical director (Blizzard, 2012). This was followed by a series of presentations to the wider organization and various engagement events with all staff members (front line to executives) on a national, but also a global scale where the company operated. What followed the engagement events was an internal recruitment strategy for subject matter experts (SMEs) who would form workstreams to implement the innovations. In addition, there was a detailed operational strategy formed to enable all UK centres get ready for the implementation and diffusion stage of the innovation process. Finally, there was an intense education and engagement program during the adoption stage and devoted to clinical end users, namely the oncologists, surgeons and GPs. This educational program also aimed at identifying innovation champions who would work with the organization workforce (SMEs) in the piloting, evaluation, refinement, diffusion and scaling up of innovations (Jones, 2019).

The types of innovations included in the program were technological (radiotherapy), digital (virtual platforms), research and development, whole service transformation (one stop clinics) and external partnerships (integrated care). Based on the whole system change theory, the program was planned robustly in terms of scoping and strategizing, shared vision formulation, financial and non-financial benefit realization planning and an evaluation process was embedded in the program. Monitoring of program milestones was performed by the executive program board led by the medical director and other members of the UK leadership team including the executive sponsor. The executive program board was supportive of the internal workforce taking part in workstream activities and some staff members were also seconded to new roles to support the innovation program. The fact that the UK leadership team created the safe space as well as new roles to support the innovation program, motivated front-line staff to pursue innovation as business-as-usual.

Internal and external stakeholder workshops supplemented the formal executive board meetings and informed the board of any refinements needed to the innovations through the workstream leads. Clinical staff with various positions within the organization, including doctors (end users), nurses, radiographers, physicists, pharmacists and healthcare assistants participated in the workshops which had an engaging, learning and knowledge disseminating nature (Glew, 2002). Feedback from those meetings was used to refine innovation implementation, ensuring robust implementation and future innovation sustainability. Patients did not participate in the workshops but were informed of the progress of various innovations through newsletters and patient experience workshops (end user testing of innovations). Patients were not present in the project board either, but they were represented by a dedicated patient experience lead who also facilitated the patient experience workshops. Internal and external stakeholder engagement and feedback were all part of the innovation process. The participatory nature of the innovation process made it more likely for staff to become engaged and the programme to lead to positive outcomes quickly and within one year of strategy conception.

The organisation took the risk to change the status quo in breast cancer care, whilst learning from experimentation (Van de Ven, 2017). **The breast program innovations were executed by exploiting existing resources and networks and ensuring execution was replicated and scaled across the UK network**. The innovation program in the private sector managed to exploit existing resources without a heavy investment in technologies and workforce, ensuring operational efficiencies. For example, front line clinical and non-clinical staff had their role extended and were incentivised to take on extra roles within the innovation process, by offering space in their working day to perform their new roles. There was also protected time for them to be internally trained on new skills to be able to perform new roles, which opened up future new permanent roles for them within the organization. Some staff were offered a secondment role to support with specialised areas of interest to them such as IT, digital, research and data analytics and some people moved permanently into innovation positions to support specialised interest roles such as IT. Other exploitation strategies include the expansion of an existing virtual platform to perform remote multidisciplinary consultations, the creation of an internal breast cancer clinical reference group (CRG) from existing doctor (referrer) pool who championed the innovations and the use of the existing electronic health record (Mosaiq) to record patient reported outcomes. In the NHS digital innovation case, the Trust did not exploit its existing IT business

partnerships, workforce capacity and existing electronic health record to drive innovation. We believe that this represented a missed opportunity for innovation for the NHS Trust.

By blueprinting the innovation process, the company could make further plans to scale the innovations to other countries where the company operates. The next section outlines the methodological approach used to evaluate leadership in this innovation process.

6.2 Methodological approach

The innovation strategy was conceived by and its implementation was led by the medical director of the UK part of the organization. The timeline for the innovation program benefit realization was 12 months from the start of implementation. The measurable performance benefits at end of year one were mostly financial: EBITDA and the number of referrals to the breast services. A year after the innovation strategy concept and implementation, there were 24 innovations at a variable level of diffusion within the organization. Those innovations fell into one of the three strategic pillars including Access, Quality and Efficiency (table 3).

We wanted to evaluate the role of leadership at all stages of the innovation process, from adoption to diffusion and in preparation for scale up. Apart from ethnographic observations, the researcher and medical director of the UK company, conducted a series of semi-structured interviews from internal and external stakeholders. The purpose of the interviews was to gage views on the innovation strategy enablers and barriers with a particular focus on the role of leadership in making innovations a success (Barnett, 2011 and Ferlie, 2005). Because the series of innovations involved a whole system change approach, all interviewees had some involvement in all innovation stages. The interview participants were presented with a summary of the innovation program 12 months after its conception, with 24 innovations at variable stage of implementation and diffusion (table 3).

There were 45 people interviewed including the CEO of the company, the executive sponsor of the strategy, a senior medical leader from Spain, 4 centre leaders from across UK centres, 4 business development and commercial directors, 2 clinical directors, with the rest being middle managers and front-line staff within centres (10 radiographers, 10 chemotherapy nurses, 3 physicists, 3 dosimetrists, 1 head of radiotherapy, 1 head of nursing, 4 clinicians).

The questions posed to all the participants included:

- Their title and role in the company including their role in the innovation process;
- The factors which made the strategy acceptable leading to its implementation;
- The degree of organizational readiness to a whole systems approach to change;
- Stakeholder perceptions of the overall success of the program;
- Barriers and enablers in the innovation implementation process; what worked, what didn't and for whom (critical realist approach, Westhorp, 2014)
- The success of implementing the quality improvement change steps (Jones, 2019);
- The role of leadership at different stages of innovation and any lessons learned in terms of supporting or hindering innovation success;
- Any changes needed to be made to the program leadership structure and function for the future blueprinting of the innovation process.

All internal interview participants were presented with the same background information and summary of the innovation program. The individual innovation outcomes were split into three categories, as follows (table 3):

1/ No implementation of innovation at 12 months;
2/ Innovation adopted but delayed diffusion at 12 months;
3/ Innovation implemented and diffused at 12 months.

Table 3: Innovations through the Breast Service of the Future

Innovations around Quality of care - insights into what worked well and less well, for whom, how and why and what can be done better	- Exercise Medicine and Wellbeing program (3) - Patient reported outcome measures (2) - Cardio Oncology service (1) - Clinical trials in Breast cancer (1) - Big Data and registries (1) - Genetics and Genomics (2) - Clinical Nurse specialists (2) - Care Navigation (2) - Personalized survivorship/surveillance (1)
Innovations around Access to care - insights into what worked well and less well, for whom, how and why and what can be done better	- Tattoo free radiotherapy treatments (3) - IMC VMAT radiotherapy (3) - Partial breast irradiation (3) - SGRT and IGRT (2) - DIBH technique (3) - SIB technique (3) - MRI pathways for diagnosis and staging (3)
Innovations around service Efficiency - insights into what worked well and less well, for whom, how and why and what can be done better	- One Stop Clinics (3) - e Referral (3) - e MDT (3) - Peer review of complex techniques (3) - Referrer support (3) - Sequence reversal trial (1) - Planning and QA automation (3) - Remote patient monitoring via portal (1)

1. Delayed/No implementation 2. Implemented/delayed diffusion, 3. Implemented/diffused

Participants were asked open-ended questions on strategy development and implementation, organizational readiness and on perception of overall innovation success with a particular focus on the role of leadership during the process.

Open questions were also directed to specific innovations and their outcomes and in specific: what's worked well, what didn't work well, for whom and what context, the how and why of what's worked. This is the critical realist evaluation approach, mentioned in Chapter 5, which enables the evaluation of complex healthcare innovations with spread capabilities (Westhorp, 2014).

In the next couple of sections, we will look at the enablers and barriers to innovation diffusion for the access, quality and efficiency components of the innovation strategy.

6.3 Enablers and challenges to innovation diffusion – leading the 'Access' component of the innovation strategy

The breast cancer innovation program experienced delays in certain innovations becoming diffused, whereas others were diffused quickly and within 12 months of the strategy conception. The 'Access' component of the innovation program was the most successful; it mostly involved the technical radiotherapy innovations which were adopted and diffused across the network within 12 months.

> "The diffusion success of those innovations can be attributed mainly to the
> intense education program for clinicians which the organization
> delivered early on during the adoption phase"
> **Head of Radiotherapy Services**

This was led by the medical director of the organization who is also an oncology consultant doctor and understood the gap in clinician education around modern radiotherapy techniques. The educational strategy required considerable clinician training and behaviour modelling and involved mainly three innovative and complex radiotherapy contouring techniques, namely VMAT IMC (volumetric modulated arc therapy for internal mammary chain radiotherapy), SIB (Simultaneous integrated boost) and PBI (partial breast irradiation).

Partial breast irradiation (PBI) unlike standard whole breast irradiation, is a particularly disruptive breast radiotherapy technique for selected patients which was diffused and implemented across the network after an intense time of clinician education and knowledge building. There is clinical evidence supporting the role of PBI in breast cancer radiation treatment, but UK oncologists had not adopted it before that time. The process of planning such treatment requires technical skill and expertise, so it is more complex than standard whole breast radiotherapy. VMAT IMC and SIB are more widely known and accepted techniques with clear evidence of patient benefit but their adoption across the clinician network had been poor up to now, due to their technical complexity and time constraints for the doctors to plan the treatment.

Below are the steps taken by the medical director with support from the organization in order to change clinician behaviour and promote the adoption and diffusion of innovative radiotherapy techniques:

- Presentations of the clinical evidence to clinicians (active, in-person strategy), through the delivery of key opinion leader workshops;
- Distribution of an innovation journal to clinicians including all quantitative evidence of patient benefit from those techniques;
- Clinician credentialing program through a targeted educational strategy;
- Establishment of a peer review process for clinician radiotherapy planning;
- The offering of a 24/7 technical/IT support for clinicians during planning;
- Clinician engagement in the deployment of an auto-contouring radiotherapy tool;
- Creation of a virtual cancer multidisciplinary forum for case discussion;
- Utilisation of Clinician champions of the innovations through the creation of a breast clinical reference group;

- Engagement of an international key opinion leader as an advocate of the innovations to the UK oncological community;
- Internal recruitment of a trained advanced practitioner, expert in advanced breast radiotherapy planning to support clinicians during their planning.

The above tactical steps aimed at maximising innovation implementation and diffusion, compared to simple dissemination of clinical evidence (Gorman, 2004). They mostly achieved the desired outcome of the 'Access' innovations being implemented and diffused within 12 months.

"The breast cancer strategy for Access has improved the quality of radiotherapy techniques and made it more personalised to patient needs"
Radiographer 1

The challenges that the leadership team faced during the adoption and diffusion of the technical innovations were mainly due to the mixed opinions amongst clinicians regarding the usefulness of the innovations. Despite the fact that there was clear clinical evidence suggestive of the beneficial role of such innovative techniques over the standard technique, most clinicians were initially not convinced that a change in practice was worth it at the time. The existing evidence was also interpreted differently amongst clinicians, leading to a non-uniform endorsement of the techniques and limited to a minority of clinical innovation champions. This hindered the initial adoption and spread of the innovations across the network. One of the most successful tactical strategies was the involvement of the international key opinion leader who led on the educational sessions for the UK clinician network.

"The move to bring over to UK the single doctor who has revolutionised breast radiotherapy globally was smart and the right thing to do"
Consultant Oncologist 1

The role of clinical leadership through the medical director (oncologist), the few clinician champions and the international key opinion leader, was critical for the ongoing education, encouragement and clinician support in the adoption and diffusion of those innovations. In other words, the medical director and oncologist, clinician champions and key opinion leader acted as Knowledge Brokers (Sousa, 2008 and Cillo, 2005) by bringing external knowledge and linking this knowledge with the internal innovation capabilities of the organization. An open innovation approach was followed with clinicians from different practices and centres collaborating for the creation of new protocols and workflows to improve the breast cancer service proposition (Sousa, 2008). The extensive experience of those leaders and the sharing of such knowledge in the form of educational events with regular knowledge reinforcement, resulted in the increase in patient referrals for those techniques. As shown in figure 6, the peak of referrals coincided with the timing of the educational sessions. Those sessions not only gave clinicians the opportunity to enhance their knowledge and skills but also enabled them to network with their peers on a regular basis. The sessions also brought clinicians closer to the organization management team and improved their trusting relationship with the company.

Other challenges to the radiotherapy innovation adoption and diffusion and the ways those were addressed through leadership, were as follows:

- The **lack of robust and pre-existing clinician training in radiotherapy planning** using those innovative techniques - this was addressed through knowledge brokers, clinical championship and information transferring via means of educational events and workshops. The technical innovation training enhanced clinician specialised skills, led to knowledge spread across the national oncology network, increased the interaction with international key opinion leaders and ultimately increased the confidence of clinicians to take risk and adopt innovation in radiotherapy.

- The **lack of clinician incentivisation** in terms of available time spent planning compared to more standard and less complex radiotherapy techniques - addressed through the provision of an advanced radiotherapy practitioner, 24-hour IT support and through the deployment of an auto-contouring software tool.

- The **lack of a peer support process for clinicians** to gain confidence in advanced radiotherapy planning, which was addressed through the provision of internal digital and technological tools to enable clinicians to peer review their radiotherapy plans with other colleagues.

- **Clinician remuneration** was not higher to compensate for the technique complexity and clinician time consumed to deliver the techniques. The organization managed the resistance from clinicians to adopt the new techniques through the provision of advanced planning support and the deployment of an auto-contouring radiotherapy tool which reduced clinician time to plan.

- The **lack of a cohesive, early adopter breast group to guide on protocols and guidelines** – mitigated through the creation of a breast clinical reference group consisting of innovation champions. They led the adoption of new guidelines and clinical protocols, peer reviewed from international experts in the field.

It became clear that turning challenges into enablers required strong leadership, clinical and managerial leadership. The medical director and members of the executive leadership team used tactics such as smart investment in AI-trained tool to improve process efficiencies, the use of existing digital platforms and workforce in order to support process and drive clinicians to adopt practice change.

Despite the fact that there was clinical evidence behind the proposed innovative radiotherapy techniques, the UK clinical community had been late adopters of those techniques. There were many individual clinicians who did not want to take risk and adopt those techniques and vocalised their view strongly, hence influencing their peers. It became easier for them to adopt when an internationally renowned expert clinician worked with the few clinician champions and early adopters of those techniques. The set-up of a clinical reference group for breast cancer which included those early adopters, the development of new guidelines and the provision for peer review support for radiotherapy planning, gave the confidence to the late adopters and sceptics of the techniques to start using them.

The catalyst to changing clinician behaviour leading to the adoption and diffusion of the radiotherapy techniques, was the targeted educational strategy that was designed by the medical director. There were three workshops strategically planned to happen every few months to ensure regular clinician knowledge reinforcement.

> "The workshops gave the opportunity to clinicians nationally to credential themselves through being taught by an international expert who teaches and credentials oncologists around the world"
> **Operational Middle Manager**

The educational workshops were designed by clinicians for clinicians and there was less top-down power in those sessions. The power was redirected from top-down to bottom-up, and clinicians felt in control of the clinician networking and credentialing process. They also felt empowered and valued by the organization, as the management team listened and addressed their concerns which were putting barriers to the adoption of those techniques (incentivisation, upskilling, supportive planning team, peer review digital tool, IT support).

Success was measured by the number of referrals for complex breast radiotherapy sent after the workshops.

It is evident from figure 6 that the educational workshops led to an upward trend in referrals, especially shortly after each workshop.

Figure 6: Clinician referral behaviour in relation to workshop events (●)
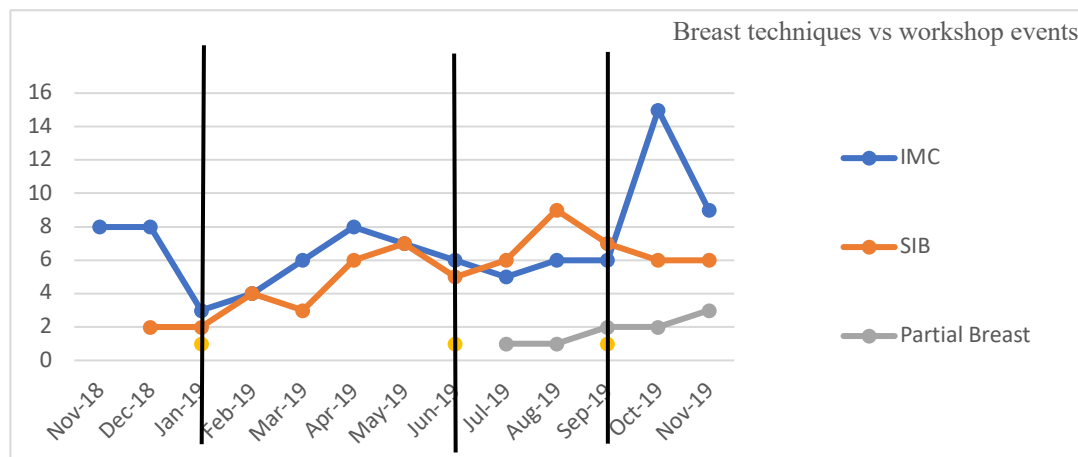
Referrals for complex breast radiotherapy such as IMC and SIB took off after each of the three events, run in January 2019, June 2019 and September 2019. The success is likely due to the fact that those techniques had more established evidence and there were more clinician champions who believed in their role but would not use them without peer and planning support. The adoption and diffusion of partial breast irradiation (PBI) was slightly delayed compared to the other techniques and only took off after the third workshop. This was likely because of the perceived technique complexity from clinicians. Clinicians reported being risk averse when it comes to changing their radiotherapy technique because of the old technique (whole breast irradiation) being well established and leading to good patient

outcomes. The presence of new evidence which suggested that partial breast irradiation is equivalent to the whole breast irradiation in terms of long-term outcomes was not enough to convince clinicians to adopt initially.

> "Even if the clinical study shows PBI is better for reducing toxicity, I will still continue to refer for whole breast irradiation to ensure I don't get the 'odd' recurrence"
> **Consultant Oncologist and Clinical Director 1**

Looking at those innovations more closely, the IMC technique was adopted by clinicians early, with referrals maintained throughout the workshop events. IMC radiotherapy is a technique mostly familiar with clinicians in their NHS practice, but takes a long time to plan and peer review in the NHS. The innovation strategy took those barriers away through the implementation of the above internal tactics (AI auto-contouring tool, advanced radiographer support, digital peer review tool, breast CRG), which differentiated the private service versus the NHS one. The more efficient and higher quality process adopted by the organization resulted in the IMC technique becoming widely diffused in the network within 12 months.

In the case of SIB, the technique was disruptive for many reasons:

1. It was not widely adopted in the NHS due to clinical evidence still maturing at the time;
2. It is less complex that the old technique for radiographers and clinician to plan;
3. It is beneficial to patients because it shortens the overall treatment period by a week;
4. The shorter treatment pathway would benefit patient outcome from treatment and more patients could be scheduled in the radiotherapy machine, hence improving operational efficiencies.
5. Clinician workload was less, as clinicians had to plan once instead of twice in the case of the old technique, with a similar remuneration package.

SIB was therefore widely adopted and diffused and referrals were boosted after each workshop, because it really ticked the boxes for: disruption in patient pathway, less clinician planning effort but same remuneration (clinician incentivisation), training provision and peer review online, likely improved clinical outcomes.

> "SIB is a no-brainer, why would oncologists not adopt this, better treatment biologically, less time on treatment for patients in weeks, more conformal plan"
> **Radiographer 2**

With partial breast irradiation (PBI), the picture was completely different due to the slow initial adoption of the technique. The technique is disruptive, as not widely adopted in the NHS, has a clear clinical benefit for patients in terms of fewer toxicities compared to the standard technique, but requires considerable clinician technical expertise and training as well as a robust multi-disciplinary team discussion to be able to produce a high-quality radiotherapy plan. Clinical leadership and clinical endorsement have been paramount for PBI adoption, with regular knowledge reinforcement and support by clinician champions who had the vision to see the technique being adopted and diffused. A series of roadshows for clinicians and internal staff working in partnership were run alongside other educational and technical support strategies described above. There was some reliance on clinician

internal motivation to adopt the technique and also on clinician risk-taking behaviour. The technique was eventually implemented by all the centres with clinicians referring patients across the country. The key enabler to the innovation diffusion in this case was the multidisciplinary peer review process which was led by the breast cancer clinical reference group.

> "The creation of an endorsing community of clinicians was important as any perceived risk was shared amongst a body of professionals"
> **Business development manager 1**

Gotham (2004) suggested that individual professional cultural differences such as in case of clinicians, directors and policy makers can affect the spread of innovations. This theory aligns well with that of Williams (2008), who talked about stakeholder complexities preventing innovation spread in the NHS. In the case of partial breast irradiation, the business had recognized the differentiation potential for implementing this innovative breast technique through the link with international centres of excellence. UK clinicians did not share the same vision as the organizational leaders, which delayed the diffusion of the innovations, especially partial breast irradiation. The misalignment between clinicians and the organization was manifested as resistance to change from the side of the clinicians. The latter was eventually overcome through the strategic approach the company took and supported by the medical director.

The perceived increased workload by clinicians was one significant barrier to the adoption and diffusion of the techniques, similar to case 1. The perception of workload demands careful consideration when healthcare organizations look to implement innovations. The organizational leadership team addressed clinician concerns by investing in the training of advanced practitioners internally to support clinicians during planning and by investing in a radiotherapy planning tool that enabled auto-planning through the use of machine-learning technology. The company's response to clinician resistance demonstrates the importance of an entrepreneurial organizational culture and a risk-taking behavior from its leaders when it comes to innovation. Such organizational response was not evident in the digital innovation case in the NHS which resulted in the innovation idea stalling. The company's response was also key in bridging the gap between the top-down strategic approach and front-line clinical leader involvement. The risk of not responding to the clinician resistance the way they did was the loss of clinician clientele and becoming worse-off financially.

All the above treatment techniques represented the 'Access' component of the breast service strategy and continued to be practiced beyond January 2020. The innovations were implemented and sustained within the organisation with the continuous supportive measures described above. The outcome of their implementation and diffusion led to the year-on-year increase in breast cancer referrals and the provider marketed itself as the preferred provider for offering such innovative radiotherapy techniques. The techniques were also adopted by other countries were the company operated.

6.4 Enablers and challenges to innovation diffusion – leading the Quality & Efficiency component of the innovation strategy

Looking at the innovations around 'Quality' and 'Efficiency', there are some distinct differences in the degree of diffusion amongst them. For example, innovations were implemented and diffused early if significant clinician involvement was required. Clinicians were mostly motivated to implement those for reputational, professional and financial benefits. Those successful innovations included:

- The **establishment of One Stop breast clinics** across the network, which provided easy access for patients to be seen by a specialist on demand, have a full work-up of tests and receive rapid diagnosis;

- The **e-referral process** which enabled general practitioners, patients (self-referrals), surgeons and other clinicians from across the UK to refer patients to the One Stop clinics and other services, quickly and accurately;

- The **virtual e-MDT** (cancer multidisciplinary team) tool which enabled the breast clinical reference group and others to meet up anytime there was a need to discuss patient cases or for treatment peer review purposes.

Those three innovative services were interdependent in the sense that one innovation brought the next and they were all hugely disruptive to the market. They led to the expansion of clinical services, the recruitment of an increasing number of doctors as a result, which in turn brought a higher number of patient referrals and greater reputation for the organisation. Clinicians were in full control of the service innovation developments and the business utilised its internal operational capabilities to the maximum in order to support the quick implementation of those services, which ultimately brought an increased profit within 12 months from the strategy conception.

In contrast, the adoption of other innovations which did not require clinicians, they did not confer immediate benefits to the doctors and were mostly management-led, did not take off as quickly. Those included patient registries and clinical research including clinical trials. The reasons behind this are multiple:

- Clinicians are risk-averse by nature and are motivated by quick-win results, therefore did not see a flourishing opportunity for them in the clinical trial space;
- The delivery of clinical trial results can take considerable time and effort as well as research expertise, which the majority of clinicians lacked;
- Clinical trial delivery depends on a robust clinical trial governance infrastructure to oversee the implementation of trials. In turn this requires considerable investment in a research and development workforce. In this organisation, trial delivery heavily relied upon the principal investigators which were the clinicians treating the patients. The time and cost associated with setting up a robust research and development team meant that clinicians had to give up sessions in their clinical practice in order to devote themselves to clinical trials. Although the organization was prepared to bear

the cost and investment in research and clinical trials, clinicians were not prepared to compromise their high volume standard clinical practice.

One of the ways to encourage clinicians to lead on clinical trials including setting up clinical registries, was the set-up of collaborations between the organization and research active teams based in academic institutions. By the end of the study period, the senior leadership team had created some partnerships with two academic institutions in UK and started working on some collaborative trials. Having the support of academic institutions in terms of trial governance and responsibility, the clinicians could then focus on recruiting patients which most were willing to do.

"We need the universities to work with us on the registry and clinical trial front, to support us in NIHR applications but also ensure a robust governance process along the way"
Commercial Director 1

The lack of strong clinician incentivisation in terms of time and space to grow the clinical trial and registry portfolio, as well as the lack of immediate clinician rewards from such strategy, meant that clinical trials were not adopted during the time of the study. However, the senior medical leadership and executive team developed a favourable environment for clinicians to still be engaged in clinical trials through external partnerships.

The creation of **remote patient monitoring (RPM) system** capabilities was part of the innovation strategy to improve efficiency of communication between patients and their clinical teams. Several benefits would result from establishing such a solution, including prompt access to personal records by patients and their GP, prevention of patient deterioration whilst on treatment, fast re-entry to service after patients had completed treatment. Although this was a top-down strategy, clinicians were involved in the choice to 'buy' the service or 'make' the service. The decision to create a bespoke RPM system, which could be used by all three countries where the company operated, meant that the innovation could not be adopted and diffused at the time of study. The preliminary scoping exercise of what the system could look like and the definition of the global vision around this new model of care, was made collaboratively between the senior leaders of the three countries with clinician representation from the breast clinical reference group. The innovation was subsequently moved to a dedicated global team for implementation and moved away from the breast service transformation portfolio.

Exercise medicine and wellbeing services were implemented and diffused across the network pretty quickly, but they required a significant investment by the organization in terms of building gym facilities and hiring wellbeing consultants across the centres. The implementation of integrative oncology facilities such as exercise and wellbeing services was innovative and aligned with the purpose and values of the organization. Those innovations were highly valued by clinicians and patients alike due to the benefit that they brought in terms of improving patient outcomes, the reputation of the centres and attracting more patient referrals. Clinical leaders' role was mainly supportive and they were not heavily involved in the implementation of the innovations in their individual centres.

"This is a service 'nice to have' which will attract patient referrals and clinicians won't have to put any effort on it. Everyone loves that service"
Centre leader 1

Consequently, there was no resistance to those innovations by the vast majority of clinicians. There were very few clinicians who were concerned with their patients exercising during treatment. However, patient voice was so positive and strong around exercise and cancer, that even the most sceptical clinicians were eventually convinced.

Such investment was made at risk because it was the right thing to do for patients, with plenty of clinical evidence suggesting the positive benefits of exercise and wellbeing in making cancer treatment more effective and also reducing the risk of cancer recurrence. The purpose of the organization was to ensure best possible life outcomes for patients and such a movement gave the right message to clinicians and patients. The organization also gained through increasing its reputation as being the world's biggest integrative oncology provider which resulted in the onboarding of more clinician referrers. The introduction of such health and wellbeing facilities attracted more patients who wanted to be treated in those facilities. Finally, the pursue of an integrative medicine approach led to strategic partnerships which helped raise the profile of the organisation at a global scale.

Other innovations like **patient reported outcome measures (PROMs) and genomic testing** were adopted but variably diffused across the network.

- The idea around PROMs was that they would be collected during treatment and post treatment from patients and facilitated through an App which patients would have access to. The collection and evaluation of PROMs could help evaluate and refine aspects of service. It would also support future research and quality improvement initiatives.
- Genomic testing for patients enables clinicians to individualise patient treatments and know the risk of cancer recurrence for their patients. This involves testing an existing tumour sample or doing a blood test and checking for specific mutations.

Both innovations needed to be clinically driven due to their specialised nature. Clinical leadership heavily influenced the implementation for those innovations. Different doctor leaders advocated for different PROMs and genomic test tools. A significant proportion of doctors, felt those innovations were not important elements in the overall breast cancer service quality. The availability of genomic testing and patient reported outcome measures did not have a direct impact on patient treatment and were therefore not viewed as immediate priorities for clinicians. Other factors contributing to the resistance to consider the adoption of genomic testing were the multitude of genomic tests in the market, combined with the immature knowledge of clinicians around genomic testing.

"There are so many tests to choose from and frankly, it is very confusing for us all"
Chemotherapy nurse 1

There were also no clear guidelines of when and how to use them and the process of requesting and reporting the tests required some effort from clinicians. Moreover, testing

would delay patient treatment slightly which often made clinicians uncomfortable. Finally, the genomic service was thought to be a highly specialised area which required significant clinical control into the decision-making. The company was ambitious to make a change and a breakthrough into the genomic space, through engaging with key business partners and attempting to arrange an educational conference around genomics. Clinicians did not share the same vision though and were not ready for such change, especially in such a debatable and ethically challenging subject as genomics.

Few clinicians were individually approached by testing companies who engaged them well. It therefore became difficult to direct clinicians towards one test over another. It was therefore left to clinicians to make the choice of the right test for the right patient, often in consultation with their colleagues, breast clinical reference group and in the context of multi-disciplinary meetings. It is likely that the genomic testing service will mature in the future and become more uniformly diffused, as clinicians grow in confidence and trust on the use genomics in personalising care.

The case for change around PROMs was not met with resistance given the clear benefit for patients. However, there were similar issues as with genomic testing, in terms of the lack of national and international guidelines and no agreed process on how to collect and analyse them. In addition, the process needed clinician oversight and a clear patient engagement plan by clinicians to ensure patient reporting compliance. The organization attempted to standardize PROM collection through the involvement of a global clinical leader forum who agreed on standard PROMs to collect. In addition, the UK company invested on an App for patients to access and report their outcomes remotely. Not all clinicians were in favour of that approach, but an initial pilot showed that at least 50% of patients were compliant in their PROM reporting, a result which made clinicians feel more encouraged and motivated about it. The alternative solution which was also piloted was a PROM survey at the time when patient attended the centre or through a facilitated phone-call. Although this option ensured near 100% patient compliance, it was time consuming for centre staff. At the end, both options were kept according to centre, clinician and patient preference. Data quality was variable which led to the company decision to incorporate PROM collection and analysis into the future remote patient monitoring system.

Finally, **the cardio-Oncology service did not take off as a new service unlike the One stop Breast clinics.** Some suggested reasons from various stakeholders were the following:

- "The cardio-Oncology service involved the introduction of a new clinical specialty in the organization, which was outside the UK expertise" (Service development manager);
- "The cardio-Oncology service was considered by doctors as a non-essential service to have in-house and one that could be outsourced if and when required" (Head of diagnostics);
- "Cardio-Oncology is not much developed as a specialty in the NHS practice and managers are not very familiar with operationalising such service, unlike the One stop diagnostic service" (Consultant Oncologist and Clinical Director 2);
- "We want to do a pilot in our centre but the investment on the service exceeds the financial returns" (Centre leader 2);

- "Maybe we need to outsource the service if and when required rather than providing the service in-house" (Head of diagnostics).

6.5 Perception of the Innovation process and Leadership by stakeholders

The overall perception of the innovation process by the various stakeholders was that the organization was very ambitious in trying to implement 24 innovations in 12 months. The vision was to adopt and diffuse all of the innovations in 12 months, creating a unique service proposition, which was more like a 2-3 year transformation plan.

Stakeholders who were involved in the innovation process described the process as cyclical and dynamic; the model enabled the diffusion of innovations at different times. Couple of innovations were temporarily dropped with the plan to be re-introduced at a later stage, as in the case of the remote monitoring solution and the cardio-oncology service. Cyclical innovation models or 4th generation models like the one described in this case involve whole systems, include product and service innovations, are flexible and agile, and reflect the organizational creativity and entrepreneurship. They also respond to the ever-changing demands of the competitive market, scientific knowledge and societal demands (van der Duin, 2007, Berkhout, 2006).

> "The innovation model is uniquely disruptive, taking
> the breast cancer offering into a different dimension"
> **CEO**

> "The company is leading the way globally in terms of breast cancer innovations"
> **Medical Director Spain Business**

The innovation model became a company strategy, with plans to complete this cycle of innovation and start another in a year's time (version 2). Stakeholders involved in the innovation process bought into this model which became something like a blueprint for innovation execution, with plans to scale the program in other countries and other cancer specialties.

> "Innovations which succeeded in being diffused would be dropped after the 12-month
> period and others would be introduced, in a continuous cycle of innovation"
> **Business development manager 2**

The innovation process would become a continuous journey of improvement for the organization in the years to come. Succeeding in at least half of the innovations in year 1 being diffused, represented a great success story and most stakeholders' opinion was that the process was partially successful after 12 months.

> "The innovation program was at least 'partially-successful' but
> some innovations were not diffused within the timeline"
> **Commercial director 2**

In terms of the leadership capability and leadership styles during the innovation process, there was a variety of views from the various stakeholders which will be explored in more detail in the next section.

"Leadership was mainly top-down and driven from a position of power"
Consultant Oncologist 2

The medical director supported by the UK leadership team defined the innovation strategy and its various components before presenting the strategy internally first and then externally. The vision for the innovation strategy aligned well with the company's vision and values, which resonated with internal staff, hence they bought into the strategy. However, the strategy was not co-created with the involvement of internal staff or external clinicians. What followed was an intense 12-month period where staff had to balance their day-to-day operational pressures with innovation implementation. The feedback received from people on the front line was the intense pressure they felt to deliver the strategy, especially as they strongly believed in the vision and purpose of the project.

"The leadership style from senior management was
directive and ambitious, focusing on the outcomes rather
than the innovation journey itself"
Physicist

Such a directive approach from senior leaders was somewhat performance driven with the achievement of financial outcomes at the end of the year. This performance driven approach went against what clinicians valued most, which is making the process of innovation open, transparent and clinically driven, with focus on clinical outcomes (bottom-up leadership).

"The process of innovation involved more people in management positions
who added little value to the delivery of the products and services"
Business development manager 1

"The management team should have stepped back and acted as
the enablers for clinicians to run the innovation process themselves"
Head of Radiotherapy

Neither the clinicians nor the patients were included early enough, in the creation stage of the strategy. The consequence of this was that there were certain innovations that were met with resistance and failed to be universally diffused, such as genomic testing, PROMs and cardio-Oncology. Clinicians were more likely to be involved in innovations which had direct benefit to their patients and to the growth of their practice. They also looked for innovations which are easy to implement, not time-consuming, there were national or international guidelines supporting their implementation and key opinion leader expertise they could draw from.

"Leadership during the program was tenacious and kept going with
different tactics despite resistance to change from clinicians"
Business development manager 2

Keeping going enabled transformational change in the organization to happen quickly and efficiently. The articulation of a vision by the medical director which was based on long-term business growth and improvement in patient care stimulated employees to engage in innovation and commit themselves to the long-term goals (Jung, 2003). The support from the executive and global teams also maximized the effects of the stimulation provided by the medical director and increased performance (Jung, 2003).

Leadership was considered to be key in achieving the required clinician behavioral change and leaders had a clear vision and strategy that resonated with all levels within the organization.

"Leaders established clear but ambitious goals and worked
with the people to bring the required change"
Dosimetrist

Good leadership meant that there was honest recognition that the innovation process was imperfect; there were innovations which worked well and were likely to be sustained following some investment from the organization and others which wouldn't diffuse because perhaps the market was not ready for them. One example was the breast key worker scheme that was initially proposed in order to act as patient navigators.

"Leaders were honest about the proposed innovations that needed to stop as they didn't fit
with the culture of the organization, as in the case of the breast key workers"
Senior nurse leader

This breast key worker service was never implemented in the way that was intended because the centre teams were small and completely immersed into patient journeys from diagnosis through to survivorship. There was therefore no need for separate key workers for patients. This proposal would have been removed from the innovation program if this was co-created with front-line staff.

Other aspects of leadership which were thought to be important in the innovation process include the quality and frequency of communication with all stakeholders, the continuous request from leaders for stakeholder input during implementation, the good dissemination of progress updates and the continuous education and improvement of innovations. In addition, there was a strong alignment between the commercial, marketing and referrer engagement teams and the innovation strategy which meant that product and service innovations moved quickly from the design to implementation to commercialization (van der Duin, 2007).

The strong entrepreneurial nature of the business meant that there was a risk-taking behaviour from the leadership of the organization who invested in workforce, IT and digital tools in order to gain the trust and confidence of the clinicians. The leadership team had a strong vision and stress tested the innovations with the market before devising the strategic direction. This led to company investing on the delivery of the innovations first, followed by clinician engagement and getting clinician buy-in subsequently. Without the top-down leadership, sensing the opportunity and valuing of the innovations as well as the changing

needs of the society and the market, it is unlikely that the innovations would have been diffused as quickly as they did.

6.6 Deep dive into the Leadership themes from participant interviews

6.6.1 Innovation concept and adoption stage

Jones (2019) described the organizational improvement and innovation journey as a whole system approach to change. The prerequisite of a successful improvement journey is the senior leaders in the organization setting the vision and purpose which then translates into an organization-wide strategy. An inclusive, supportive and nurturing leadership style from top leaders is what is needed to keep the internal motivation of the people who will deliver the innovation agenda (Wakdman, 1991). Compassionate leadership which involves the inspiration for a long-term vision, the creation of an empowering culture of autonomy and safety to experiment and the promotion of distributed leadership for innovation are key leadership elements for innovation success (West, 2017).

The cyclical innovation process was set up by senior leaders in the organization whose vision was to make the organization the best integrated care provider globally when it comes to the breast cancer service proposition, drawing from excellence around the world. This vision which resonated with all grades within the organization was built up to become a defined and ambitious strategy which was designed top-down but subsequently became part of the day-to-day practice for all staff. Everyone in the organization, from the front-line clinical to middle management to executives had a leadership role during the implementation of the strategy (figure 4). We believe that distributed leadership was enacted during implementation of the innovation, but few stakeholders were of the opinion that the innovation program was more directional from top-down management than it was driven from the bottom-up.

Table 4 Stakeholder statements about leadership during concept and adoption stages

Key Leadership behaviours during Concept and Adoption of Innovation	Stakeholder role title who made the statement
"Strategic alignment, direction and shared vision top down is key and that was well-led"	Medical Director Spain, Service Improvement manager
"Doctor/referrer engagement and championship – the 'what's in it for me' could have been addressed earlier for the doctor/referrer workforce"	Commercial directors and Business Development managers
"Communication strategy ensuring regular updates and celebrating quick wins"	Centre leader 3, radiographer 2, Centre leader 3
"Clinician champions need to be selected well – passion prevails, courage and risk-taking qualities are essential"	Service improvement manager, UK leadership team director 1
"Education and Credentialing is the right tactical approach - knowledge mobilisation/transfer and peer to peer networking and support can help overcome resistance to change"	Radiographers 2,3,4, Physicist, Head of Radiotherapy, Commercial Director 2, Centre leader 4

"Measure end user benefit (clinicians, patients, society)"	Clinical Oncologist 4
"Clear project structure and responsibilities"	Operations Middle Manager
"Clinician incentivisation (CPD, training, capability, revenue, professional brand)"	Clinical Oncologists and Clinical Directors
"Bring innovations together in a package – something for everyone"	Service improvement manager
"Key opinion leader engagement – knowledge brokers"	Business development manager 1 and 2

The top-down approach in setting the breast service of the future innovation was supported by the medical director in the organization who took the link role between the creation of the breast innovation strategy and the implementation in clinical practice. The innovation strategy was completely aligned with the vision and mission of the organization and resonated well with internal staff.

Innovations are more likely to diffuse and be implemented if they are supported by the end users and in this case, the doctors who would refer patients for treatment in the organization (Currie, 2018). They are also more likely to be diffused if they fit the context and the environment within which they will be implemented (Currie, 2018). In this case, engagement of key opinion leaders (KOLs) from outside the UK healthcare systems who had succeeded in the diffusion of those innovations, was a brave and risky move due to the probable resistance from UK clinicians. The risk was the disengagement of the UK doctors who could have considered the innovations irrelevant to the UK practice. However, the opposite happened, UK doctors became very engaged to the process of change and took an active part in educational and training workshops and events. The bravery exhibited from the senior medical leader through bringing international expertise into the organization rather than leading the whole education and clinical change herself, demonstrated that distributed leadership is powerful and can cross organizational boundaries.

Distributed leadership in this case is represented well through the whole system approach to change (Jones, 2019) which was used to implement the strategy. Leadership was devolved to multiple people (clinical and managerial) who belonged to workstream groups and who led individual aspects of the strategy, rather than being the responsibility of a single heroic leader (Crevani, 2007). Innovations were packaged well and there was something for everyone to work on. By doing so, there was more ownership amongst clinicians and managers on innovations, which increased motivation and got rid of siloed working.

The senior medical leader flexed her leadership style between command and control and a visionary and empowering style, according to the circumstances. The majority of stakeholders through that a directional and tenacious leadership style was necessary in order for the project not to be derailed and for the senior medical leader to work with people's resistance. Harris (2008) in Hao (2017) support the flexible directive leadership style of the principal leader during innovation, in terms of playing the person accountable for innovation success and ensuring alignment of leaders with shared vision and goals when required.

The influence of international clinical leadership was welcomed by the organization staff including doctors, for two reasons: one of the KOLs was the leader in Radiation Oncology for breast cancer in Europe and the Ex-Chairman of the European Society of Therapeutic Radiation Oncology, whose guidelines are practiced by most UK clinicians. The other KOL was a renowned international exercise physiologist who has led the world-known Exercise Medicine program and has created the most developed model of exercise medicine and the data to support its impact. They were both leaders in their fields and there was no competition or power exerted between them and the UK clinicians, due to their leadership been practiced in different healthcare systems to the UK.

The combination of a top-down visionary approach by the senior medical leader of the organization and the engagement of international KOLs in Radiotherapy and Exercise Medicine early in the innovation process, meant that the specific innovations were the first to be diffused in all UK centres. We also believe that the reason for this is the fact that the education and training engagement of doctors created the passion and the vision to bring those innovations to practice, sooner than it would have normally taken them in the NHS to do. The social networking, the peer review support and the continuous knowledge reinforcement sessions which brought the doctor community together, worked in favor of the innovation process more so than the clinical evidence per se (Dopson, 2002). Clinical champions who showed passion, bravery and agency early on in the engagement events came together to form the breast clinical reference group who advised the company and led the multidisciplinary peer review meetings.

Some of the technical and digital innovations could have been diffused faster following adoption, with the identification of local key opinion leaders or clinical peers. Distributed clinical leadership at all levels and earlier on in the process, would have potentially engaged more clinicians earlier on in the innovation process (Dopson, 2002). The need for early and shared leadership amongst clinicians was even more critical in the UK business, because clinicians were not employees of the organization. As a result, there was no direct incentive for them to engage in the change process. In addition, the majority of the doctors had no devoted time to drive the engagement strategy and pursue the education of their peers. Early and targeted clinician engagement would have helped understand the 'what's in it for me' aspect and target those clinicians with specialist interests. By doing so, some innovations such as genomic testing, clinical trials and cardio-Oncology may have reached the adoption stage.

The role of the clinician peer opinion leader was played by the medical director, who was also an oncologist and early adopter of innovations and with vested interest in promoting the innovations. With the support of the UK management team, the medical director led a number of roadshows whereby internal and external clinical teams, from local NHS hospitals were invited to engage in open conversation about the purpose of the innovations, the evidence behind them and the different product and service developments. The medical director played the role of the leader who initiated the innovation strategy and inspired people to follow, but also played the middle-person and facilitator who bridged the gap between strategy and operational execution (Burgess, 2013). The operational execution was led by the centre teams in collaboration with clinicians and the clinical reference group, who all took part in our or more workstreams. There was often a differential workstream engagement response from clinicians based on what innovations were important to them,

their existing clinical practice, vested interests and their organizational context (Dopson, 2002). Regular project communication updates and celebrations for achievements took place during the roadshows to keep clinicians and internal staff motivated.

The engagement of the internal workforce early on in the strategy formulation demonstrated the inclusive and nurturant leadership behaviour of the senior medical leader. The fact that people were given leadership roles at different innovation workstreams projected a sense of autonomy and trust to the people across the organization, some of whom were seconded or permanently moved to new positions of interest. The innovation vision and purpose created a swift change in the culture of the organization and united people for the purpose of the common goal (Jones, 2019).

The execution of the innovation strategy became the focus of the front line, middle managers and senior leaders and was aligned with the commercial and marketing strategy which helped the dissemination of innovation products and services as they were launched. By the end of year 1, the breast service transformation strategy had led the foundations of an organizational culture where innovation was part of the day-to-day business and not a one-off activity (Millar, 2018). This was achieved through shared leadership and ownership of innovation diffusion within the organization, for the purpose of changing care models to improve patient outcomes.

End user (doctor) involvement did not take place early on during the strategy formulation and innovation conception stage, instead the agenda for innovation in the breast practice was set top-down by the medical director. The reasons for not including them early on in the strategy formulation was to avoid early resistance to change and prevent the strategy being disseminated outside the organization before its adoption. There was more managerial control (top down) and less clinical control (bottom up) of the strategy concept and adoption stage, but with a clear clinician engagement plan at the diffusion stage. The latter included external and internal clinician championship, knowledge transfer (brokering) from inside and outside the organization (Sousa, 2008 and Cillo, 2005).

6.6.2. Innovation Diffusion stage

The innovation diffusion stage is considered the stage when power dynamics are shifted from top down to bottom up. Senior leaders continue to lead on the strategic vision, but they should also share the leadership with clinical/doctor leaders; the latter could then play the role of middle-managers (clinic directors/leads/facilitators), subject matter experts and strategy implementers (Currie, 2018).

Table 5 Stakeholder statements about leadership during innovation diffusion stage

Key Leadership behaviours during Innovation Diffusion	Stakeholder role title who made the statement
"Bottom-up leadership prevails over top-down"	Senior nurse leader, Dosimetrist, Head of Radiotherapy
"Try not to be so ambitious and do not rush timelines Aim 100% but expect 75%"	Business development managers

"Avoid project creep, if projects are added, alter the Timelines"	Business development manager 1, Physicist
"Inclusive leadership spanning front-line, middle Management and referrers"	Service improvement manager, Commercial directors
"Learn as you go, be prepared to drop innovations if they don't kick off and add others"	Business development manager 2, UK leadership team director
"Keep the cycle going, cannot win with everything, add project and drop others"	Service improvement manager
"More clinician control and less executive management control"	Operations Middle Manager, Head Of Radiotherapy
"Break down innovations into workstreams and project manage those"	Centre leaders, Head of Imaging
"Agility of workstreams is key – not too many people"	Service improvement manager
"There is no perfect solution – start small, think big"	Business development manager 1 and 2, Service improvement manager, MD Spain

Organizational senior leaders were persistent in their leadership and supported the innovation movement to the diffusion stage, including offering project management, commercial, marketing and investment support (Waldman, 1991). The latter was important so that the clinical leaders could focus on implementation and diffusion of innovations, peer engagement and driving more business through.

One great example of that synchrony between management and doctors is the design and delivery of One stop breast clinic services which constituted the third most rapidly diffused innovation out of the 24 innovations. However, managerial over-involvement in the clinical decision-making with the purpose of driving commercial and growth outcomes often conflicted with clinician ambitions. The clinician interest was to treat more patients at the right time and with the right treatment modality, which would also bring them practice revenues. They had less interest in the reputational growth of the company or its financial position at the end of the year. Good communication and inclusive leadership is key in order for clinical stakeholders to view the bigger picture rather than their siloed practice.

The speed that innovations were expected to be delivered by the organization was considered to be over-ambitious by the doctors. Doctors needed more time for some innovation ideas to mature, they wanted to see a general buy-in consensus from peers, some wanted to pilot innovations followed by their adoption. This resulted in some innovations being delayed or not diffused at the time of the research. Representative innovation examples included the patient reported outcome measures and the patient registries. Doctors struggled to agree on the type of patient reported outcome measure (PROM) to adopt and they also struggled to see the value gained from the registry adoption. In both of those scenarios and in the case of clinical trials and digital remote monitoring, the time was very rushed to achieve full implementation and diffusion. The decision was made to move those innovations to version 2 of the strategy in the year to follow.

The innovation project was characterised as too ambitious with 24 proposed innovations to be adopted and diffused within 12 months. There was a degree of top-down transactional leadership in the diffusion stage including direct, doctor to doctor approach. This approach aimed at ensuring alignment between doctors and the organization's strategy. For example, doctors were often challenged by scientific or management staff about the radiotherapy technique they chose to use if the latter fell outside the suggested innovation techniques. When there was reluctance to adopt a technique that was agreed for adoption, the senior medical leader would have a conversation with the doctor and invite to discuss with the breast clinical reference group.

The speed of innovation was so rapid at the diffusion stage that required strong managerial and senior medical leadership support. The latter helped guide doctors and internal staff during the implementation process. Good and stable leadership was demonstrated through staff engagement. Staff were kept motivated, inspired and on track to deliver the innovations in the required time frame. It also avoided scope creep which is a key risk in complex innovation processes. The bravery and agility of the senior leaders was shown in that certain innovation were moved to phase 2 of the program (year 2/version 2), in order to have more time to co-create with front-line clinicians.

The difficulty that doctors and internal staff faced was the lack of protected time to train in the delivery of the innovations. They also struggled with ambidexterity in terms of being able to deliver on the innovation strategy at the same time as dealing with business as usual. A solution to the complex and chaotic innovation process was the formation of workstreams which had a operational and middle management support, tracing the actions and project managing the workstreams. There was agile working between workstreams (matrix working) to ensure there was enough capacity and support at all times. Leadership was shared with middle management who had the overall responsibility for their workstream. There was also a diverse collection of stakeholders in each workstream who brought unique skill sets and leadership capabilities so that they have a positive impact on innovation outcomes.

Clinical leadership was distributed and strengthened in the middle of the program year, with the formation of a breast clinical reference group (CRG), consisting of 6 clinicians including breast oncologists, breast cancer surgeons and a radiologist specialising in breast cancer. The CRG continued the education and knowledge reinforcement of peers around radiotherapy techniques, initiated radiotherapy plan reviews, and set up a weekly breast multidisciplinary meeting for any doctor who wanted to refer patients for discussion. The surgeon and the radiologist supported by the management team, delivered the 1st One stop service in the centre of England. This service was so successful that it got diffused and scaled across the country.

There were innovations which were not ready to be diffused at the 12th month mark such as genomics, registries, clinical trials, PROMs and the Cardio-Oncology service. However, the foundations were created and service aspects were adopted, with the prospect of developing further through more national and international collaborations. Given that those innovations were naturally complex, they required more networking and peer support before an implementation plan was drawn. Some feedback received from the clinical reference group and other middle managers was the following:

"Certain innovations should have been labelled as
phase 2 innovation from the beginning, with phase 1 being
the immediate priorities or 'low hanging fruit"
Business development 1, Centre leader 2, CRG Director

"As phase 1 innovations got diffused, they would naturally fall off
the wheel and others would be added (phase 2)"
Service improvement manager

"By keeping all innovations on the wheel at the same time, was
counterproductive for some, it didn't give enough
opportunity for people to learn as they went along"
Centre leader 1, Radiographer 1, Physicist

Members of the clinical reference group (CRG) were remunerated in order to perform the key opinion leader role and innovation champion work. Although the doctors expected a financial return for the work they did, they also developed a sense of loyalty and belonginess through the program work. The vision of the program resonated with them and they felt autonomous and valued by the company through their involvement in innovation. The doctors who accepted to become members of the CRG were the ones whose values were totally aligned with those of the company. They were also strong advocates for the proposed innovations (Waldman, 1991). The CRG members were selected for their unique agency skills and for their work as hybrid doctors, meaning doctors who could also lead and manage change at large scale. There is evidence that hybrid doctors can bridge the gap between innovation and healthcare delivery and can drive innovation which is scalable and sustainable (Siribadanna, 2019). Medical doctors in leadership positions can enable better healthcare outcomes, engage clinical teams and improve organizational culture (Clay-Williams, 2017).

There is a need to train and develop more doctor leaders who can cross their professional boundaries and lead within complex healthcare organizations. The positive impact of clinical leaders lies in knowledge brockering, maintaining resilience within teams and inspiring innovation across healthcare organizations and systems. What this innovation case demonstrated is that healthcare systems which are clinically well-led, are led 'bottom-up' with top-down support and are more able to align their business strategy with clinical need. Doctor involvement in senior leadership teams can ensure the delivery of high-quality care in a compassionate and holistic way.

6.6.3 Innovation Implementation success

The stage of innovation implementation is a key stage which needs to be treated with same urgency and importance as the adoption and diffusion stage.

When innovations are implemented such as for example the exercise and wellbeing program for patients, it demonstrates that the strategic and contextual vision of leaders, the scientific evidence behind the innovation, the technological execution of the innovation and the upskilling of people have come together in harmony (Waldman, 1991). The role of

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leadership is critical in maintaining the same vision and values as when the innovation concept began and also in ensuring that the innovation implementation is sustained.

Table 6 Stakeholder statements about leadership during innovation implementation

Key Leadership behaviours during Innovation implementation	Stakeholder role title who made the statement
"Serve strategic gap and clinical unmet need gap – be a novelty and think what's next"	Commercial Director 2, UK Leadership team director
"Pilot innovation in one area, evaluate, then scale"	Centre leader 1 and 4
"Market disruption is key but community must be Prepared to change"	Head of Radiotherapy, Clinical Directors 1 and 2
"Balance bottom-up power with top-down power/ support"	Service improvement manager
"Maintain shared vision, purpose and passion, align With strategic and watch organizational readiness"	Operations Director
"Commercial importance: what's in it for people"	Commercial Director 1
"Aim high but start low, accept that version 1 may struggle but version 2 will be better"	Business development manager 2
"Organizational culture dictates result"	Centre leaders 1 and 2
"Clinician workload to watch – keep simple and Invest in supportive services"	Physicist, Dosimetrist
"Whole system change, requires full time leadership And tenacity – ignore distractions and carry on, never lose focus"	Business development manager 1 and 2
"Prepare to drop innovations every 18m and add more – keep cycle going"	Service improvement manager
"Clinician training and credentialling should be an ongoing process"	Consultant Oncologists and Clinical Directors, most Radiographers, most chemotherapy nurses

Piloting the innovations in one or more areas followed by a plan to scale up the innovations was a tactical approach to protect the organization from risky innovations. Leaders ensured that they shared the learnings from the innovation process, celebrated the successes and created a culture of continuous innovation within the organisation. By the end of the 12-month period of intense innovation implementation, the innovation process was embedded in the day-to-day business across the organization (Millar, 2018). Innovation was no longer a siloed activity; instead, a framework for innovation implementation was constructed and supported by all stakeholders including the doctors. The implementation framework was also utilised in other markets where the company operated.

Innovation commercialisation and marketing became more pronounced at the implementation stage of innovation and required a different leadership style (Oke, 2009). A more transactional leadership style was more appropriate at this stage to ensure the desired

performance and outcomes, which contradicts the inspirational and transformational leadership style required in the earlier stages of innovation.

Clinician incentivisation also featured in the implementation phase. Clinician champions were incentivised to deliver on certain innovations through the form of financial reward (bonus) based on the number of patient referrals who would be treated with a specific technique or through a specific service. Clinician incentivisation also included ongoing training in radiotherapy techniques (CPD) and the use of resources to increase their work efficiency and accuracy.

The senior leadership oversight was critical in this stage of intense implementation which helped to manage and roll with people's resistance to change; target individual doctors with education, training and exposure to key opinion leaders and champions; establish champions and innovation advocates; advertise and publish benefits through literature, interviews and adverts; present the innovations at conferences and events; representing key national and international meetings. The leadership team remained persistent to the innovation agenda. Their perseverance paid off and pushed more doctors to come on board and adopt the innovations.

The other important role of the senior leadership at this stage of innovation is to ensure that innovations are constantly challenged and refined according to the needs of the patient population, the market and the organization. The clinical teams sometimes experienced some conflict between what the management leaders pushed as innovation agenda and what the patient population actually needed. The key opinion leaders and the breast CRG were the link between the company and the patients (end users). Patient experience was evaluated through multiple formal and informal patient forums within the centres. This is a good example of how the organization top-down leadership tried to meet population needs through a bottom-up leadership approach. A balance of leadership power, with a more top-down directive / transactional approach earlier on in the innovation process and a more bottom-up transformational / compassionate leadership later on in the innovation process helped push the successful implementation of most of the 24 innovations in 12 months.

6.7 Innovation Risk Management and the role of Leadership

The Healthcare market is competitive and healthcare organizations are forced to innovate often disruptively in order to gain competitive advantage. Within such a volatile and unpredictable environment, healthcare organizations need to balance the risk of innovation with being responsive enough to patient needs (Trastek, 2014). At the same time, clinical leaders should ensure that innovation is done with patient safety in mind and there is no conflict between innovation and business as usual. People we spoke to described the difficulty to achieve balance between innovation for business growth and continuous Quality Improvement, which is a trade-off amongst many fast-paced organizations (Corso, 2017 and Lavie, 2010).

We asked an open question about balancing innovation and risk to the 14 centre leaders and the UK leadership team in order to gage an understanding of:
1/how people perceived innovation and risk and
2/how can leadership support manage risk in the context of innovation

There were three aspects of leadership which stood out from the majority of stakeholders:

1) **A strong sense of purpose and alignment with the organization values was a unanimous feeling amongst people, with innovation being one of the organizational values.** This is important as it means that innovation is a 'business as usual' activity whose process is embedded in the workplace and every day. The organization's own model of care is about innovation for improving patient quality of care and patient outcomes.

Different innovations will have different requirements and may start from a single centre at first as pilots before being diffused and fully implemented. Given that all centres had a standardized operational and governance framework, it made innovations easier to diffuse and scale. However, the local context for each centre made a difference in terms of the speed and the degree of innovation implementation. For example, some strong environmental influences including competition from the local NHS Trust and other private providers in the area, drove a faster implementation in some centres compared to others. In addition, the prosperity index in the area and the population socio-economic status, triggered the degree of demand for higher quality services, new technologies and innovation. Finally, the commitment and loyalty of the doctors in each area, who also worked in the NHS and other private providers, was dependent on the strength of their relationship with the company and other providers. The desire of the local NHS Trust and other private providers to partner with the company and maximize cross-provider innovation also influenced doctor engagement.

2) **The second leadership aspect that was deemed very important by people was the strong and agile team working amongst front-line teams, middle managers and centre leaders**. This was partly due to the fact that the teams within centres were small and all reported to one centre manager. However, the whole UK leadership team played a role in supporting middle managers and front-line leaders in the innovation process. Matrix working between the quality and human resource teams ensured governance and performance oversight respectively. Regular stand-up type of reporting and longer Kaizen type of events enabled people to brainstorm for innovation within their teams. There was clear accountability for innovation outcomes and people had an opportunity to reach out for resource support and mentorship. Standardized quality and patient experience dashboards meant that people had access to the same data at all times, to be able to monitor innovation deliverables, refine and continuously improve services.

Communication between staff members in the same centres and between centres was important in sharing learnings from innovations, what worked well for one centre compared to others and what aspects of the innovation process could be improved. This was often the opportunity to share resources between centres to support innovation implementation. Innovation adoption and diffusion was as much a commercial responsibility as well as a philosophy within the organization, with everyone having the same collective desire to innovate for better patient outcomes.

Risks where often taken and were mostly related to the ambitious goals of the company to have a quick turnaround time to the delivery of innovations. Innovation adoption and diffusion started at the same time as idea generation, facilitated by matrix working between

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the marketing, commercial, finance and legal teams. The speed of innovation implementation put the operations and quality teams under pressure to ensure that innovation was delivered safely and effectively. Great team working ensured that any new patient service or product was seamlessly embedded within patient pathways. One downside to this is that the same people were working on multiple project implementations at the same time which added to the work pressures for local teams.

The overall responsibility and accountability for the safe innovation implementation fell onto the centre leaders and the UK leadership team, respectively. The true performance of the innovations was measured through the number of patient referrals received for each clinical service, which was ultimately translated into the balance sheet gains. Other measures of performance included the recruitment of new doctors as well as reputational benefits leading to indirect financial benefits for the organization.

3) **Doctor leader engagement with innovation adoption, diffusion and implementation within centres was recognized as being immature and needing to improve.** Doctor leaders tend to be more risk-averse when it comes to innovation implementation in healthcare. The company's competitive entrepreneurial and risk-taking behavior often conflicted with doctor leaders' philosophy of maintaining status quo as long as possible. The vision of the company's leaders was to engage clinicians more widely into a thorough review of innovation types and timeline for implementation, as well as establishing a pipeline of innovations with them. This could only be achieved through a mutual trusting relationship and through a rewarding culture, hence the development of clinical reference groups within the company.

Centre leaders and the UK leadership team felt that disruptive innovation and patient safety are not mutually exclusive and that a well-led leadership approach can mitigate safety risks whilst innovating. For example, information governance and data stewardship were tasks that relied heavily on centre leaders and a whole company approach would have been more desirable. Training on quality improvement methodologies and creating the space to share learnings from successful and failed innovation processes between centres was key for the majority of stakeholders interviewed. The need for some workforce slack was also identified by the centre leaders as key, to enable people to work on innovations without compromising their day role. Finally, running parallel projects with the same leads although financially attractive, it was unsustainable, whilst sharing projects between leads was a better approach.

6.8 Lessons learned on leadership and innovation from case 2

The overall perception of the innovation strategy adoption and diffusion by the various stakeholders, was that it was partially succeeded. This is because not all innovations were diffused and implemented 12 months after the strategy creation. What the organization has definitely succeeded in creating, is an effective model of innovation diffusion success that could be replicated in other specialties and in other markets – something like a blueprint of innovation.

"The innovation strategy was a 100% success because it created a movement and brought clinicians much closer to the executive and middles management teams than ever before"
Service improvement manager

Drawing from stakeholder interviews and from observations made throughout the innovation process, we have summarised the lessons learned from this case and split them into: 'what's worked and why, for whom and under what circumstances' and 'what did not work and why, for whom and under what circumstances':

What works

1. **Management and clinicians working closer together using a balanced top-down and bottom-up approach at different stages in the innovation process**. In particular, a top-down directional or transactional leadership style was appropriate at the concept formation and adoption stage of innovation. This is due to innovation complexity which clinicians find difficult to navigate and which often conflicts with their standard way of practice. Market threats and opportunities are also commercial aspects which clinicians are not usually involved with and need direction. Senior leader top-down support can maximise the chance for innovation being commissioned. On the other hand, a more bottom-up or transformational leadership approach is more appropriate in the later stages of innovation when clinician champions of innovation drive innovation diffusion and implementation. An agile leadership style shifting between transactional and transformational leadership can optimize adoption, diffusion and implementation of innovations and can pave the way to scaling up innovation.

2. **Ownership of innovation within teams** can boost sense of achievement and satisfaction, combined with appropriate celebratory events.

3. **Organizational culture is essential in driving risk-taking behaviour and optimising peoples' courage and psychological safety to consider the adoption of disruptive innovations.** A relationship of trust between clinical leaders and the organization builds on the clinical leader perception that they would be rewarded for their efforts. Such perception is likely to motivate clinical leaders to adopt innovation and support their diffusion (Asgari, 2008).

4. **Data analytics should be embedded in the innovation process** in order to capture the voice of the customer and the end – user experience.

5. **Clinical engagement** needs a combination of visionary leadership (what can be achieved which will make care better for patients) and appropriate incentivisation, especially if clinical leaders are not typical employees of the organization (what's in it for me).

6. **Greater clinical leader involvement in day to day running of centres**, would make clinicians appreciate the operational and governance aspects of the business and also help them re-align their values with those of the organisation.

7. **Clinician perception of the innovation** based on their knowledge and experience could determine whether clinical leaders will be 'early adopters' or 'laggards'. Targeting the early adopters and provided that there is strong leadership from their part, is a good tactical way of creating positive peer pressure hence achieving the required outcome from innovations.

8. **Innovation in healthcare needs to be clinically led and delivered** and the aim should be the earlier engagement of key opinion leaders into the strategy formulation and communication.

9. **Clinical reference groups comprise a critical mass of clinical leaders** in a specific subject that can be tasked with knowledge transfer, training and education of peers; advocating for innovation, driving the evaluation of innovation implementation and publishing the results.

10. **Integrated care should be maximised** with the involvement of different clinical leaders including nurses, doctors, therapists and other professionals in a multidisciplinary team working style (distributed leadership).

11. **Platform – based innovations** whereby a standardized innovation process can be applied to other healthcare areas and markets can enable innovation diffusion and sustainability. The economic benefit of scale is maximised and the risk is minimised by doing so.

What does not work

1. **Lack of clinician internal motivation** to make changes in practice can be a significant blocker to innovation diffusion success. Alignment between clinical and management leaders is key in terms of values and purpose of innovation, but clinician incentivisation still needs to be considered. Although this means financial rewards for some people, others would value the opportunity to receive training and credentialling in innovations and also engage with commercial partners for the purpose of clinical research.

2. **Scope creep and change in the innovation narrative** are potential barriers to innovation diffusion and implementation, which can result in management and clinical leader disengagement. The diversity of innovations and the pressure to implement them all within a short period of time created pressure within the operational teams and resulted in some innovations not being implemented or their implementation being delayed.

3. **Innovation silos in healthcare** without the power of internal and external partnerships or the integration of clinical specialties could have a negative impact in the diffusion of innovations. This was observed in the case of the more complex innovations such as genomics, where there was lack of standardised practice amongst clinicians.

4. **Innovation which is not linked to quality outcomes** and the improvement of patient experience poses risks to the organization and the sustainability of innovation. A clear benefit realisation plan with specific and measurable clinical quality outcomes which go beyond the innovation financial benefits is likely to entice clinician leaders to support. There was no detailed quality benefit metric plan unlike the clear financial benefit plan which may have demotivated the clinicians.

5. **Evaluation of innovation implementation** should be embedded in the innovation process and be introduced early on the process. Healthcare innovation which is not outcome focused and is not evaluated in terms of its impact to end-users, staff and the organization may not sustain. The success of the innovation program implementation was only measure on the revenue and number of referrals and did not include any quality improvement outcomes.

6. **Power differences** between the medical director and the frontline leaders could have had a damaging effect in the diffusion of innovation. The use of positional power rather than motivational power by the senior leaders(s) to achieve innovation spread, can result in front-line leader disengagement. The role of the senior clinical leader is to act as the facilitator of innovation and change, learning from experimentation, sharing the learnings, distributing leadership and being the 'interpretation' agent between front-line and senior management when it comes to the change agenda (Edmonstone, 2009). The medical director mitigated against that risk through the inclusion of international key opinion leaders and through leadership distribution to the clinical reference group.

6.9 Conclusion

The first and second innovation cases have a lot of difference in the leadership approach and the engagement process which led to a different outcome. However, there are also key similarities which help us build our preliminary innovation model, the latter is explored in the next chapter.

Chapter 7.0 The proposed Leadership in Innovation model

7.1 The model

In order to design a theoretical model of leadership for innovation success, we drew from innovation practices from the previous two innovation case studies and in particular, what's worked well in terms of leadership, what could have been done differently, the barriers and enablers to innovation from a leadership perspective. For the innovation case 1, we collected the lessons learned from autoethnographic data of a digital innovation study in the NHS which failed to become adopted (chapter 5). For the innovation case 2, we collected the lessons learned from stakeholder semi-structured interviews and from autoethnographic data using a number of innovations implemented in a private healthcare organization, with different degrees of diffusion success (chapter 6).

The data collected from both innovation cases have been broken down into themes, summarizing barriers and enablers to innovation diffusion from a leadership perspective. From the themes, we drew the commonalities from both case studies in terms of leadership enablers and barriers to innovation success, which are summarized in the table below. It is particularly interesting to note that certain barriers to innovation in case 1 were actually present as enablers in case 2. Examples of those are highlighted in table 7.

Table 7 Enablers and Barriers to Innovation Success

	Enablers	Barriers
NHS Case	Clinical evidence/quantitative data. Public - Patient involvement and end user acceptance. Proven clinical unmet need. Partnerships with universities, industry and academic health science networks. Plausible business case with clear evaluation of implementation plan. Basic Stakeholder mapping and engagement.	**Lack of shared vision and purpose** Scarcity of clinical champions. Lack of commissioner involvement. **No clear scalable strategy to innovation** Technical/IT resource scarcity. Lack of internal commercial capability. Innovation hub had no resource to support innovation implementation. **No internal culture of experimentation** **Lack of clinician incentivization** No broad stakeholder mapping. **Staff autonomy / empowerment lacking** **No executive alignment with innovation** **Organizational readiness immature**
Private Case	**Shared Vision and Purpose** Key opinion leadership and tenacious executive medical leadership. Plausible business case / financial evaluation on implementation plan. Peer and non-peer endorsement. **Clear scalable strategy** Use of existing resources/scale economies **Staff autonomy / empowerment** **Entrepreneurial culture** **Clinician incentivization** Platform innovation solutions. Knowledge agency and transfer. **Executive alignment & organizational readiness**	More Top-down direction with late clinician involvement. Power difference between management and clinicians. Technical complexity leading to variable user acceptance. Clinical leaders' late adoption of innovation. Operational execution capacity. Ambitious and rigid project threatening staff motivation. The evaluation of implementation plan in terms of non-financial benefits not clearly defined and communicated.

The first commonality in both case studies, is the importance of a **shared vision and purpose within healthcare organizations** which is driven top down primarily, from the executive team to the front-line workforce. A shared vision is accompanied by organizational values which should resonate with all employees. Both organizations have 'innovation' high in their agendas; the NHS organization has 'innovation' in its mission statement and as part of its key objectives for delivering its vision to be a national and international leader in healthcare; the private organization features 'innovation' as one of its values. The difference between the two organizations is the fact that the private one had embedded 'innovation' into its culture and featured in its day-to-day business. On the contrary, the NHS organization had not invested on developing a more entrepreneurial culture, despite the fact that it truly believed that 'innovation' was the way forward. This key difference played a critical role in the innovation outcomes in both studies, as discussed further below.

Once a clear organizational vision and purpose is defined which features 'innovation', a clear and plausible innovation strategy needs to be co-designed with key stakeholders. In case 2, the medical director defined and designed the innovation strategy which was quickly endorsed by the organization with no resistance. The strategy was aligned with the overall purpose and mission of the organization and was shared with the front-line workforce and clinical leaders in a top-down approach. The strategy was plausible and had clear financial benefits which were well-defined and with a plan to measure at regular intervals. The quality benefits of the innovation strategy were certain and therefore the medical director and leader of the program did not explicitly designed an evaluation plan of those benefits. Innovation was promoted within the context of the organizational broader strategy (Service of the Future) and therefore became acceptable from the internal workforce very quickly. The doctors and referrers to the organization made up the external workforce and the majority if not all of the leadership efforts were spent to involve and empower clinical leaders into the innovation program. There was a whole organizational response to this effect.

The private organization could have done better in terms of scoping the innovation strategy with front-line staff, to ensure that the innovation strategy aligned with the operational capabilities needed during its implementation. The vision to implement 24 innovations in a space of one year was too ambitious and it conflicted with business-as usual activities. In addition, the lack of clinical leader involvement at the start of the innovation process may have resulted in the lack of diffusion or delayed diffusion for some of the innovations.

The innovation strategy was less clear in the NHS case study which hindered the implementation of the specific innovation. There was also no defined digital data strategic roadmap where the proposed innovation could have been part of. As a result, people within and outside the organization (industry and academic partners) found that the purpose of the proposed innovation did not align with the broader organizational purpose. This made it more difficult for external commissioners to buy-in to its usefulness and long-term sustainability. The learnings from the failed innovation in the NHS led to the re-definition of the Trust's innovation strategy, enhancing the chances of future innovation success.

Clinical championship was essential in both innovation cases. Both innovations were well championed by a medical leader, who managed to articulate a compelling vision for the future model of care. In the private sector case, the senior medical leader ensured that the

strategy was plausible and that it met a clinical unmet need as well as a gap in the market. In addition, the medical leader secured executive support and resources before proceeding to the implementation of the strategy. In the NHS case, the medical leader articulated a compelling case for change which was theoretically supported by the executives but there was no secure execution plan and resources for the strategy implementation. The lack of a broader stakeholder involvement, including more clinical leaders, made the case for change even more difficult to execute. This resulted in the innovation being perceived as an extra workload, on top of business-as-usual activity, lacking facilitation from management in terms of offering discretionary time and space for clinicians to innovate.

Clinician incentivization was an enabler in getting clinical leaders closer to the innovation program in the case 2 and eventually making them key members of the innovation strategy moving forward. It required a degree of investment from the executive leadership team in terms of offering technological tools and dedicated workforce to support clinician workload. It also meant that clinicians were rewarded through a bonus-based scheme for the innovation work they did, as innovations brought more patient referrals into their clinical practice. The lack of an incentivization plan for clinicians in case 1 was a barrier to getting them invest time and energy in supporting the innovation. Clinician incentivization in this specific case would have taken the form of dedicated time in clinicians' job plan to work on the innovations and dedicated organizational resources to implement and scale their innovations. If the latter was provided, clinicians would have been more likely to support the adoption of the innovation for the purpose of improving patient care. The lack of clinician incentivization in the latter case contributed heavily to the lack of innovation endorsement and adoption.

Business case plausibility in terms of the presence of quantitative data for evidence of the innovation benefits was an important enabler for achieving stakeholder buy-in in both cases. In case 2, a plausible business case meant that there was a forecasted and clear financial benefit as early as one year after strategy implementation, which made it easier for the company to invest into the strategy straight away. On the other hand, there was no robust evaluation of non-financial benefits which hindered the initial clinician endorsement. A good example is the case of partial breast irradiation, which unlike the other radiotherapy techniques which took off early, it only took off after multiple knowledge reinforcement sessions. The culture of experimentation that characterized the private organization meant that they were more likely to bear the investment risk in the prospect of a higher prospective financial gain. Organizational leaders promoted learning through experimentation and failure, which made it easier for staff to become engaged in innovation activities. The culture of psychological safety and the acceptance of failure by senior management, meant that people consistently brought forward new ideas for implementation and there was already a track record of innovation diffusion within the organization.

The NHS business case also had a clear long-term financial as well as non-financial benefit evaluation plan, which demonstrated a healthy return on investment. However, the organization was reluctant to bear the risk and invest on the innovation. The absence of a culture of experimentation and risk-taking behavior in the organization, led to the lack of investment for the proposed innovation despite its long-term and sustainable benefits. The innovator had to compete for a national innovation fund instead. The application was unsuccessful which led to the innovation idea being withdrawn.

The private organization engaged **key opinion leaders** early on in the innovation process and using a repeated knowledge transfer and reinforcement strategy to make the case for change and remove resistance to change from clinical leaders. In the NHS case, the digital innovation had a plausible business case but there were no key opinion leaders engaged to share their knowledge and experience on the proposed innovation. The lack of key opinion leaders, peer and non-peer support, in combination with the lack of Trust resources to support innovation implementation and commercialization, meant that the innovation did not receive commissioner support and failed to be adopted.

End user acceptance was perceived as an enabler in the digital innovation case in the NHS and was rated highly by commissioners. However, end user acceptance alone and without top-down support did not drive success. On the other hand, end user acceptance was variable in the case of the private sector innovation model but there was strong top-down support. This example demonstrates the importance of top-down leadership in changing clinician and patient behavior but only when end users are willing to lead and champion change at the same time.

Patient and public involvement (PPI) was well embedded from the early stages of innovation in case 1, unlike case 2. PPI was highly rated by NHS commissioners and was greatly appreciated by patients and the innovation team alike in case 1, as it brought very useful insights into the project implementation plan. In the private sector case, PPI did not take place during the creation of the innovation strategy in case 2 or during its implementation, but this was not detrimental to the innovation outcomes. The technical nature of many of the innovations made them hard to explain to patients and get their understanding. Other innovations were 'nice to have' additions to the existing services which none of the patients would object to. A good example of those were the exercise and wellbeing facilities in the centres. Innovations to improve the technical aspects of treatment delivery were again not appropriate to share or negotiate with patients. The set-up of a patient experience forum with the task of measuring and reporting patient experience outcomes following the diffusion of innovations, compensated for the upfront lack of patient and public involvement in case 2.

Partnerships were very important in the NHS innovation process, consisting of academic and industry partners. It was important for the NHS organization to have trusted partners early on in the process, because it meant that the risk was shared amongst partners and made the case for change more likely to be sustained if all partners were ready to commit to transforming care. Within the partnership, the NHS Trust would offer useful data around the 'before and after' state of care, which partners would use for the technical execution and the evaluation aspects of the model. The partners offered commercial and academic expertise which strengthened the case for change and inspired confidence in terms of the innovation's scale up capability. Partnership working was well received by the commissioners of the national innovation funding competition. However, there were concerns around the business and technical capabilities of the NHS organization under study, which would have been necessary in order to execute the innovation. In the private healthcare case study, partnerships were formed between organizational executives, clinical leaders and international key opinion leaders for the purpose of delivering the innovation program. In addition, the company sought a number of industrial partnerships in order to deliver the digital aspects of the innovation program. The company operated with 'partnership' as one

of its core values, so the involvement of several vendors in the execution of the strategy was part of day-to-day activities. Partnerships were key in the early adoption of radiotherapy automation tools (commercial partner), the spread of exercise and wellbeing services (commercial and charity partners), the development of the patient portal (consultancy partners) and the spread of One stop clinics (technical partners; mobile diagnostics). Partnerships had already been built into the internal innovation capability of the organization rather than being done as an exception, which was more so the case with the NHS case study. The strong partnering culture of the organization was catalytical as much in the early stage of innovation adoption as in the later stages of innovation diffusion and implementation.

Medical leaders as enablers of innovation may have different backgrounds, clinical and non-clinical and are often best placed to facilitate communication channels between executive boards and front-line clinicians within organizations (Bourgeois, 1964). Our experience in case 2 (private healthcare) is that the senior medical leader in the organization initially took the role of the executive top-down strategist, spearheading the innovation program and gaining organizational support. This **transactional leadership style** led to the innovation model being launched and implementation starting at pace and across all centres simultaneously. Subsequently, the senior medical leader took the role of the **meso-level manager and facilitator** of communication between front-line staff, clinical leaders and the executive team during the intense implementation phase. At that stage, the senior medical leader used a more **transformation leadership style** in order to inspire change. The driving of key opinion leader and clinician engagement happened at the same time as the strategy was implemented rather than sequentially. Roadshows, conference events and literature development by the senior medical leader strengthened the argument for change. These activities were used as a means of showcasing the strategy and its outcomes in order to motivate clinicians to adopt the innovations across all the centres. What was also observed at the later stages in the innovation process is that the senior medical leader reverted back to the initial transactional style of leadership in the effort to achieve clinical standardisation across the board and address any residual resistance to change. We also found that the role of the non-clinical middle managers in the centres became critical at the later stages of innovation. They supported the continuous clinician engagement and offered support to their front-line teams so that they could sustain innovation.

In case 1 (NHS), the medical leader played the role of the front-line clinical innovator as well as the meso-level clinical leader. The clinical innovator spearheaded the innovation, led an innovation team, the partnership model for innovation and the patient-public involvement. However, the innovator lacked the **hierarchical power** within the organization to make innovation happen. Unlike case 2, where the senior medical leader was also a member of the executive team, in case 1, the medical leader was a clinician with no senior management duties. As a result, the leadership style of the innovator was mostly transformational, in order to enable clinician motivation and engagement rather than transactional and directional. It is important to note, that the lack of top-down support in case 1 in terms of internal resource allocation, clinician incentivization and commercial capabilities, made it difficult for the medical leader to convince clinicians to enact change. Similarly, the lack of top-down support was perceived by the commissioners as one of the biggest risks for the spread of the proposed innovation. Without spread, the innovation would not have delivered on the return of investment as suggested in the business case. We

can argue that the lack of spread capabilities in the NHS organization at the time of the study, actually made the innovation business case implausible.

Power relationships played an important role in the final outcome of both innovation case studies. The private case study demonstrated the need for the senior medical leader to have an agile leadership style using a top-down transactional approach in the early phase of innovation (top-down senior medical sponsor during ideation and adoption), a more transformational and engaging style during the middle stages of implementation (post-adoption), reverting back to the transactional style in the late phase of implementation and diffusion. The medical leader's formal role within the executive management team, in combination with her clinical role, made it possible for her to flex between leadership styles and be effective in delivering the innovation outcomes. Her meso-level leader and facilitator role during the early stages of implementation bridged the gap between front-line clinicians and executive management, in terms of clinical communication, shared understanding, shared learning and alignment to same goals. A collaboration between front-line clinicians and organizational management is very important to ensure that there is alignment between these two culturally diverse groups (Doherty, 2013). The senior medical leader was the enabling agent between the entrepreneurial executive team and the operational front-line, which pushed innovations from ideas to execution, at pace. This occurred primarily through the senior medical leader's strategy of engaging key opinion leaders, the development of clinical networks (clinical reference group) and matrix working involving centre staff, clinicians, international experts, innovation partners and the executive team (Arena, 2016 and Uhl-Bien, 2009).

In case 1, the medical leader had no executive positional power but she had power over her other clinical colleagues (the non-innovators). The fact that the innovator designed the innovation herself without any co-creation from her colleagues, shifted the ownership of the innovation to the innovator alone. Any effort from the innovator and her team to engage other clinician medics failed to result in any supportive engagement from them. Unlike medics, the nurses and radiographers in the department were supportive of the innovation and willing to pilot the new model of care.

Van de Ven's (2017) **cyclical innovation model** aligns closely with the complexity of contemporary innovation processes in healthcare organizations, what he describes as 'messy' processes. We decided that the learnings from the two innovation cases can more optimally be represented in a cyclical rather than a linear model, similar to Van de Ven's model (figure 3, chapter 3). The latter shows the continuous innovation processes within healthcare organizations, the enabling and constraining factors as well as the impact of different leadership styles and approaches, from unitary (directional, transactional, execution and goal-focused) to pluralistic (relationship focused, exploratory, transformational). This flexible leadership style between unitary and pluralistic approaches is also supported by other authors (Edmonstone, 2009). Each innovation stage from ideation and adoption through to diffusion and implementation requires different leadership strengths, which are illustrated in figure 7. Van de Ven (2017) also speaks about the optimal innovation model as increasing the odds of innovation success rather than securing success, given external and contextual factors which are out of the control of the innovators and organizations. The environmental context and the power of the healthcare system in driving or opposing innovation was not explored in these two case studies.

Our proposed leadership in innovation model below is a preliminary model that represents the leadership enablers and barriers from the two case studies.

According to Van de Ven (2017), innovation process studies like ours are essential for organizations to understand and manage the innovation journey, from the original idea to its implementation. Understanding the complexities around the innovation process and the leadership behaviours that support or hinder innovation success can be valuable to individual innovators, managers, senior leaders, healthcare organizations and the integrated healthcare systems.

Figure 7: Leadership and Innovation Diffusion model of success
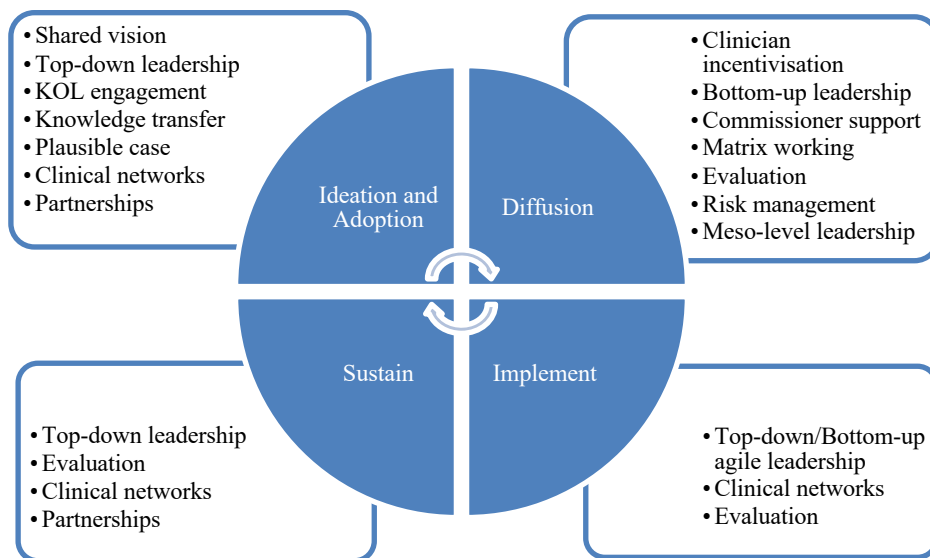
Currie and Spyridonidis (2018) have proposed a leadership in innovation diffusion model which takes into consideration the innovation actors, the stages of innovation process and the degree of shared leadership throughout the innovation stages (figure 8). Their proposed model is linear and derived after a 3-year period of participant observations and interviews within an organization which was supported to develop 12 innovations simultaneously. The context was the NHS but the concept was very similar to our private organization case. The studied organization was led by an executive leadership team, responsible for setting its strategic vision, very similar to our private organization case study. The executive leadership team put in place new structures, people and initiatives to encourage innovation projects oriented towards improving patient outcomes. The authors' length of study was longer than our private case study (3 years vs 12 months in our case) which may be seen as a limiting factor for our case study, in terms of the breadth of observations and interviews obtained. However, what we experienced in our case study is an intense transformation process with all the stages of innovation happening at pace, which we think is a more realistic representation of the current competitive healthcare market and pace of change. In addition, we incorporated the learnings derived from the NHS innovation case into our model to make it more robust and more representative of current innovation processes in healthcare.

We followed up our private case study innovations a year later to establish if the innovations which were not spread during the time of the case study, have been implemented and spread 12 months later. Examples of innovations which were spread 12 months after the time we set for, included clinical registries, research and clinical trials and the patient portal. What we have concluded is that the leadership model during the 12-month intense transformation program prepared the ground for the development of those innovations which were more complex and needed longer time scales to be implemented. Although they were not implemented at the time of the study, they represent success stories as they have subsequently been implemented and spread. For us, that demonstrates the strength of the proposed leadership in innovation model.

The three different leadership actors in Currie and Spyridonidis (2018) were managers, doctors and nurses. In our model, we primarily observed senior management and doctor leaders and we explored the flexible leadership role of the medical leader and researcher as an executive, meso-level and front-line leader.

Figure 8: Leadership in innovation diffusion
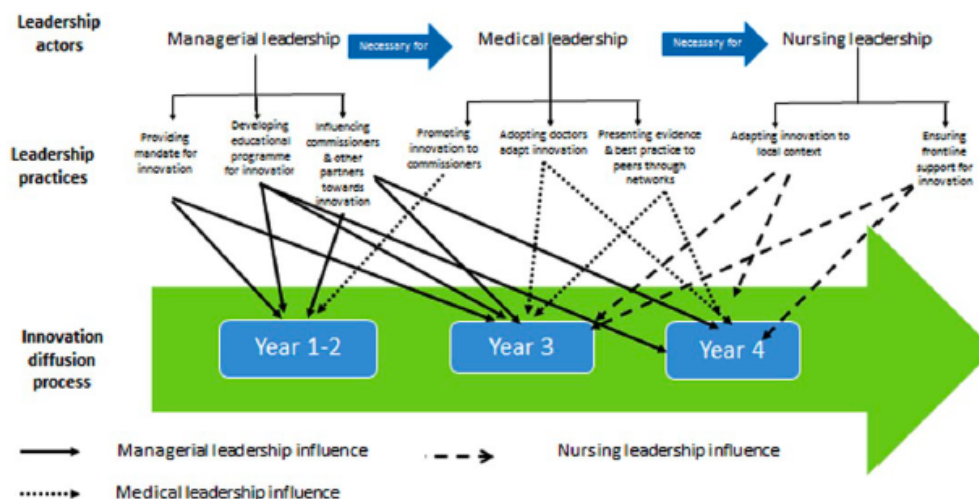
The commonalities between ours and the other authors' model include the following:

- The role of **top-down leadership** in driving the innovation agenda, developing the strategy and engaging with partners including commissioners.
- Medical leaders investing in **peer-to-peer education and support** through **clinical networks** and educational programs.
- As innovations move to late stages of diffusion, **transformational medical leadership** is essential in driving wider clinician engagement, developing strong clinical networks and embedding innovation as business-as-usual.
- A **multidisciplinary and matrix working** approach to innovation prevails at the later stages in order to ensure implementation and sustainability of innovation.

In our model, we have also incorporated specific aspects of leadership that would support this seamless process from innovation ideation to implementation so that the chances of innovation diffusion success are maximized. On a practical level, our model brings together

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two years' worth of observational experience of two distinct innovation processes, taking into account enablers and barriers to innovation, aspects of leadership and the challenges that clinicians and leaders face when designing and implementing innovation.

We have made some new discoveries which has helped us shape our proposed model of leadership in innovation:

I. We have shown that **key opinion leader engagement starting earlier in the innovation process and supported by top-down senior medical leadership** promotes clinical network engagement. The early introduction of a non-peer key opinion leadership perspective who can present the research evidence around innovation as applied in a different context, may motivate clinical leaders to accept and adopt innovation quicker. Selecting the right key opinion leader (KOL) fit is important, avoiding the conflicting power differences that may exist in the case of peer-to-peer key opinion leadership (case 1). A non-peer to peer approach can address resistance to change from front-line clinicians and can act as change agent (Cain, 2002). Non-peer KOLs who are highly regarded in their field and within the clinical community they operate, who can inspire others and have collected useful experiential data to drive change, are more likely to influence other clinical communities to change.

II. The **role of the senior medical leader in reinforcing KOL knowledge, investing in wider clinician education and forming internal clinical champion groups** can increase the chances of clinician endorsement of innovation. In our private innovation case, a series of knowledge sharing events within a period of 12 months showed positive behavior change and increased innovation adoption from clinicians. The frequency of educational events resulted in knowledge reinforcement which led to the diffusion of innovations. Doctors who were 'early adopters' came forward and were mentored by the KOL to the extent that they increased their skills sufficiently to teach and train their peers. They eventually formed a clinical reference group who were tasked of being the agents of change for anything to do with the company's breast cancer services. Very quickly, a peer-to-peer support network was created which speeded up the adoption and diffusion of innovations across all the UK centres.

III. **Commissioner involvement early in the innovation process** and the presence of resource support (commercial, financial, technical) can increase the chance of innovations becoming adopted and diffused. It also increases the confidence of commissioners and clinical leaders to support current and future innovations.

IV. **The creation of clinical networks** for dissemination of evidence and promoting best practice can help innovations becoming diffused and sustained. In our NHS innovation case, the lack of clinical network creation was a major obstacle to the adoption of innovation. If we invested in key opinion leader engagement and the creation of networks upfront, we could have given the confidence to the commissioners that the digital innovation was a scalable and sustainable service. In our private innovation case, the early creation of clinical networks supported a speedier innovation diffusion process. Our model has put clinical networking and

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forming strong clinician relationships early on in the innovation process, which in turn can result in a more effective commissioner engagement strategy.

V. **Clinician incentivization** is an essential leadership component for innovation diffusion. Healthcare leaders need to have a tactical approach to clinician incentivization. Strategies may involve direct financial rewards with the successful delivery of innovation or indirect rewards such as dedicated work time for innovation, continuous professional development, training and resources to improve work efficiency. As clinicians get more engaged into the innovation process, healthcare leaders need to ensure that matrix working is maximized to ensure that innovation is aligned with the operational and quality framework of the organization.

VI. **The evaluation of innovation** needs to be clinically led and should start as early as possible, from the ideation and adoption stage. The evaluation of innovation benefits requires leadership commitment, robust data collection tools and analytic capabilities within healthcare organizations. Clinical leaders and the management workforce need to have the space and time to evaluate data, refine and improve innovations as well as continually brainstorm new ideas.

Our cyclical innovation model represents the dynamic and complex process of innovation within complex healthcare organizations. It represents innovation as a continuous process which the organizations need to invest on in terms of senior leadership, operational management and supportive resources.

Healthcare organizations exist within a complex and volatile context of financial, technical and market instability. What this means for organizations is that they need to constantly evaluate their innovation strategy, drop innovations if they don't deliver value and introduce new ones. The ambiguous and unstable political, social and economical environment of the last three years has taught healthcare organizations that there is an urgent need to innovate and transform in order to disrupt and gain competitive advantage.

The more recent Healthcare Reform paper (NHS Confederation, 2021), has set the direction for change towards an integrated care model for innovation, consisting of a more joined up care model between primary, secondary, community care and involving the third and private sectors in a truly collaborative model. At the same time, the shift from payment-by-results as organizations to block payments as systems, means that the strategic focus of healthcare needs to shift towards more disruptive innovation, value-for-money and building provider collaborations.

The building of new organizational capabilities requires strong strategic leadership top-down, an entrepreneurial organizational culture of risk-taking and a suitable organizational leadership structure. Senior medical leaders working with operational management and front-line leaders in a matrix style of working can lead to an agile way of working. There is also an emerging need to predict the future of healthcare, forecast clinical unmet need and demand of customers through data analytics and be one step ahead in terms of strategy and leadership to be able to survive at unpredictable times (Millar, 2018). Complex healthcare

organizations need to be data driven organizations and be close to the end users to understand and be able to influence user behavior.

We believe that innovation adoption and diffusion cannot materialize without partnerships including clinician networks, patients, academia, commercial and other charitable partners. The type of partnership will depend on the organization type, whether public or private and whether the innovation strategy is about new products, new services or both. Academic partners are key actors whatever the organization or innovation strategy due to their skillful resources in evaluating innovations. Patient and public involvement should be an integral component in any healthcare innovation process. Measuring patient experience and other innovation outcomes is key to ensuring that innovations add value to patients and the wider population, innovation benefits are shared, and innovation benefits are maximized and sustained. The evaluation of innovation outcomes was academically and clinically led and well embedded in the NHS innovation process (at pre-adoption stage). In the case of the private innovation process, the non-financial evaluation of innovations was considered later in the process and once innovations were diffused and implemented within the organization; the financial evaluation at the end of the 12-month innovation period demonstrated that the innovation program met its financial target.

The next chapter is devoted to the application of the proposed leadership in innovation model in a new innovation process in the National Health Service.

Chapter 8.0 The Application of the new Leadership in Innovation model

8.1 Introduction

The private sector case study involved an entrepreneurial organization which implemented the six steps to organizational improvement (Jones, 2019) in order to transform its breast cancer services. It utilised its existing model of care (service of the future) designed around company values and deliverables (quality, access, efficiency) in order to develop a breast cancer model of excellence. The breast care model was built around 24 proposed innovations with a time frame of 12 months between conception and implementation. Looking at a whole system approach to change and service transformation, the case study explored the enablers and barriers to innovation diffusion through the lens of organizational leadership. The whole systems approach to change (Jones, 2019) was used to deliver the breast cancer service transformation in the organization, including scoping and strategy design, vision formulation and dissemination, information sharing on progress and milestones, internal and external training on innovations, stakeholder engagement, evaluation of innovation implementation (Blizzard, 2012).

Clinical staff with various positions within the organisation, including consultants, nurses, radiographers, physics, pharmacists and healthcare assistants participated in the project workshops which had an engaging, learning and knowledge disseminating nature (Glew, 2002). Feedback from those meetings was used to improve on innovation processes. There were 24 different innovations in the agenda for change and those involved one of the following three areas: 1. Speedier Access to diagnosis through on stop services, 2. Workflow efficiencies from referral to treatment, including quicker patient treatment schedules and patient-specific care navigation, 3. Quality metrics including technological improvements, protocol and clinical practice standardisation, data analytics.

The NHS case study was a linear innovation process which began with a single clinical innovator having an idea, with good evidence base and existing proof of concept. The case description involves the pre-adoption phase and the steps taken by the clinical innovator to engage the right stakeholders and develop innovation partnerships, in order to succeed in the innovation funding application. The innovation was not funded and therefore failed to be adopted, because unlike case 2, there was no organizational response to the call for innovation. In particular, the NHS organization at the time of the study was not ready to embed innovation in day-to-day practice, there was no clear innovation strategy and not enough resources to ensure innovation diffusion beyond a local pilot. There was also no clinician endorsement in order to proceed with a pilot and very importantly, the NHS Trust would not invest in the pilot even though there were clear financial and quality benefits from the innovation.

Leadership plays an important role in enabling innovation adoption and diffusion within healthcare organizations. In healthcare settings, innovation diffusion depends on individual leadership behaviours and organisational culture, as demonstrated in Brown (2014). Innovation leaders have a great role to play in empowering teams to share ideas and knowledge, through ensuring trust and collaboration, work autonomy and through incentivization methods such as salary recognition, training and/or internal promotion opportunities (Kremer, 2019).

Innovation behaviour within organizations depends as much on individual characteristics such as internal motivation, as on group support, top management support and the organizational culture of creativity and entrepreneurship (Kuratko, 2014). Strong managerial and clinical leadership which is aligned with the broad vision of the organization (front line to board) constitutes a powerful enabler for innovation (Schonfeldt, 1997).

Our new model of innovation diffusion considers the leadership characteristics and activities that help innovation move from the adoption to the diffusion stage within complex healthcare organizations and through the lens of two real innovation case studies. We found that top-down transactional leadership is probably dominant in the ideation and adoption stage, when the innovation strategy is created and innovations need to get adopted. On the other hand, bottom-up clinical leadership and greater matrix working amongst stakeholders is required in the diffusion stage, leading the way to the implementation and scale up of innovations. An agile leadership approach with a combination of top-down power and bottom-up agency, including the expansion of clinical networks, prevail in the stages of innovation implementation and sustainability.

There are known bottlenecks in the NHS as to why innovations don't get diffused and our experience with the technological innovation in case 1 reveals the same. Those bottlenecks are summarized below and reflects other research work on the subject (Castle-Clarke, 2017):

- Bottom-up approach to innovation and disconnection with the wider clinical strategy; no alignment with the organizational vision and purpose;
- Poor resources for front-line clinical innovators to innovate and no collaboration between executive teams and front-line clinicians in terms of securing resources for innovation;
- The evaluation of innovation benefits does not start early enough in the innovation process, in order to engage key stakeholders more effectively;
- The pursue of short-term financial benefits from organizations instead of the long-term value of innovation, leads to the lack of full implementation and innovation sustainability.

We have also found tension between the day-to-day business operations and entrepreneurship in the NHS, whilst the current hierarchical leadership models of the NHS, which consist mainly of disconnected clinical groups from the senior management function, may not be conducive to innovation acceleration.

Complexity Leadership Theory (Uhl-Bien, 2009) supports the close interaction between administrative (management function) and adaptive forces (clinical leaders) within organizations. The adaptive forces are the agile clinical leaders who respond to crisis innovatively. According to this theory, there is often the need of enabling forces who are the agents of innovation to bridge the gap between administration and entrepreneurship (Uhl-Bien, 2009). The analogy for this enablement in our leadership model is the presence of the agile medical leader and agent of innovation, who drove several aspects of the innovation process on both cases. The role of the medical leader was that of a figurehead, agent and champion who drove innovation acceleration through being strategic, evidence-based and influential. Arena (2016) also described the conflict between operational and entrepreneurial

systems within complex organizations. They described the situation we faced in Case 1, whereby front-line staff and operational managers faced tension between the day-to-day business performance and innovation. The lack of agency for innovation could risk stifling innovation, especially if combined with lack of shared vision and purpose amongst healthcare staff. The medical leader attempted to reconcile that gap in case 1 in order to get innovation adopted but her proposal never took off. There were different power controls assigned to the senior medical leader in case 1 compared to case 2, which may explain the different outcomes between the two cases. The leader had a dual role as an executive and a senior clinician in case 2 and could therefore set the direction of clinical strategy, make the case for change through presenting the evidence, as well as engage peers and non-peers in the process. This dual leadership position led to the leader flexing her leadership style and experimenting with what works, based on the needs of each innovation stage. In case 1, the medical leader exerted her clinical positional power, having first identified a gap in clinical practice and led the movement bottom-up, engaging higher management levels along the way. However, she did not have the power to make higher level strategic decisions about resourcing the innovation and she relied solely on the Trust's executive team to make those decisions.

Apart from the hierarchical position of the medical leader and agent of innovation, the context of the cases was different as well. Based on the NASSS framework Greenhalgh, 2017), the organization in case 2 had innovation embedded into its culture, it was a working philosophy for everyone. In addition, there was urgency to implement innovation and improve service proposition for breast cancer patients whilst the organization's state of innovation readiness was strong. There was also a healthy investment capability to support innovation as well as autonomy within the executive, middle management and front-line teams to initiate and implement innovation. The organization's technical capability and the number of existing external partnerships gave the organization a unique innovation advantage. On the contrary, in case 1, the organizational culture was not supportive of innovation adoption and spread, the proposed technology was new for staff and the business partners were new to the organization as well, having purposely come together for the purpose of the innovation fund application. In addition, the state of organizational innovation readiness was less strong compared to case 2 and the organizational capabilities for innovation were poor at the time, in terms of technical, commercial, investment and marketing capabilities.

In terms of the external environment, the same complex regulatory and political environment prevailed in both cases. with the difference being that in case 1, there was a need for a more robust commissioner engagement. Unlike case 2, where commissioners were the same people who invented the innovation, case 1 relied on NHS England's clinical commissioning groups to support. Without their endorsement it was difficult for the innovation to be adopted, spread and sustained.

The next section describes the method we used to test our leadership in innovation model during a new innovation process, which took place within the same organization as the one studied in case 1. We used this opportunity to test all aspects of our model, whether our model works, how it works, refine and finalize the model. We focused in particular on the impact of the external environment, individual, organizational as well as system leadership in the innovation adoption and diffusion process.

8.2 Application of the new model in a new context

To test and refine our leadership in innovation model, we have applied this to a new case study of innovation within the context of an NHS Trust strategic transformation. The NHS Trust is the same organization where the digital innovation process took place three years before and is one of the three acute NHS Trusts within the integrated care system. Members of the Trust's executive team had moved on since then and the innovation hub has had new leadership. In addition, the hub started to work much closer with the research and development team whose leadership also changed. Research and innovation leads had connections with local academic institutions and academic health science networks as well as commercial vendors. The strategic direction of the organization has been revised and the Trust's quality improvement methodology has become more embedded into the day-to-day operational management.

In terms of the new context, following a pandemic year, the NHS Reform strategy (NHS Confederation, 2021) has recently been published which advocates for more joined up care between secondary care providers, primary, community and social care as well as voluntary services. Partnerships amongst care providers is the key to the delivery of a more patient-centred care, aimed at improving population outcomes whilst reducing health inequalities. The establishment of Integrated Care Systems in April 2021 is also challenging the financial and political status of NHS organizations. ICSs are collaborative networks, involving commissioners, providers, primary care and local authorities and they focus on delivering the right care for the right patients, closer to home, as well encouraging health promotion, population health and disease prevention (SCIE, 2018).

Integrated Care Systems are advocating and supporting investment in innovation adoption, diffusion and sustainability. Recent national innovation schemes which have being implemented include the NHS innovation accelerator, digital aspirants, integrated care records and global digital exemplars amongst others. Digital innovations alongside digital literacy and inclusion are also priorities of the government which collectively can help dampen the demand for acute hospital care and ensure that the NHS aligns well with the more developed and invested on private healthcare systems. Organizational partnerships and strategic collaborations between ICSs, voluntary, commercial, health science, academic and research institutions could further promote inter-organizational learning and innovation. UK Research and Innovation was established in 2018 to enable high quality and high valued research and innovation through partner collaborations and listening to population needs (UKRI, 2021). One of the UKRI goals is to implement artificial intelligence (AI) in the UK, leveraging the country's strong academic and research status on AI. The wider implementation of AI is likely to increase productivity, attract high caliber workforce, bring new technology and improve health for the populations. The post-pandemic uncertain and at the same time competitive environment has made the need for AI implementation more urgent and applicable to healthcare and other sectors.

Leadership during the pandemic has allowed for critical decision making around infection prevention and control, vaccination, digital communications, telecare, test and trace and has given rise to several digital and other innovations in healthcare. Some of those include remote monitoring solutions, virtual wards, lifestyle applications and rapid technology deployments including shared medical records. At the specific NHS Trust level, clinicians

stepped up to support the peaks of the pandemic with modifications in their clinical protocols to ensure patient safety and equity of care. The pandemic has spearheaded a culture of innovation and an acceleration of the innovation process from idea to implementation happening at pace. The post-pandemic phase has found most NHS organizations financially depleted, with a tired workforce and a surge of physical and mental illness across populations. The uncertainty around the financial sustainability of NHS providers alongside the need to return to pre-pandemic state of services, has sparked innovation at place (hospital Trusts) and at pace.

In such a period of crisis and intense change, the essential first step for organizations to achieve innovation adoption and diffusion is to develop and communicate a clear vision which is understood by staff and resonates with people within and outside the organizations (Hodgetts, 2020). Same authors advocate that apart from a shared vision, having supportive and decisive teams and transformational leaders, who are also advocates of innovation, is key. Team members could then collectively help to make innovation work and overcome resistance to change (Hodgetts, 2020). Transformational leaders can ensure that vision is well communicated and that connection and collaboration amongst stakeholders around common goals is more likely to lead to the successful delivery of those goals.

Diverse and relevant stakeholder partnerships is important for innovation diffusion to succeed (Stoller, 2020). Distributed system leadership which is based on the combined strengths of organizations within a system rather than individual leaders (Currie, 2021) has also been effective during the pandemic, as in the case of mutual aid, elective hubs and workforce mobilization. Collective leadership at the system level is also currently observed in the case of digital transformation efforts, including the establishment of integrated care records and the procurement of electronic patient record systems.

We have applied our leadership in innovation model to a new innovation process which is led by an integrated care system, with leadership distributed to individual NHS Trusts (places) within the system.

8.3 Method used to test and refine the proposed model

The method that we used to evaluate the proposed model of innovation in Case 3 was qualitative and involved observations and meeting notes as well as opportunistic discussions with executives, group clinical directors, group director of operations and group directors of nursing from the NHS Trust under study.

The meetings that were included in the observations were the following:
1. The monthly chief officer forum, led by the chief medical officer and attended by the clinical directors and specialty clinical leads from across the Trust (Nov20-April21).
2. The monthly strategic delivery board led by the chief strategy officer and attended by the chief officers and the group clinical directors (Nov20-April21).
3. Two strategy meetings regarding restoration of surgical services post-pandemic.
4. Weekly Group Clinical Director meetings (Nov20-April21).

All aspects of the proposed innovation model (figure 7, chapter 7) were explored including vision and strategic alignment, the relationship between the executive sponsor and clinical

leaders, the role of the clinical network and champions of innovation, the method and timing of clinician engagement, the role of the meso level clinical leader / key opinion leader / enabler of the strategy, the fitness of clinical leadership within the complex environment of the NHS organization, the impact of the current political and economical context in the acceleration of innovation, aspects of resistance to change, other barriers to the innovation diffusion process, as well as the role of healthcare commissioners in the current context.

8.4 Innovation Case 3

The NHS Trust under study has refocused its strategy post-pandemic to work as part of an integrated care system with primary care, commissioners, partner organizations, community and social care. The new strategic leadership and governance structure consisted of multiple workstreams covering urgent and emergency care (vertical integration), tertiary care and networks (horizontal integration), people and culture, finance and estates, supportive services and digital transformation.

Each workstream had a senior responsible officer (SRO) who is accountable to the system and who manages the workstream clinical leads. The SROs were all members of the Trust's Chief Officer Group. The purpose of the workstreams was for them to design the new integrated model of care and restore service function post-pandemic. Innovation in this context was encouraged to improve service access, quality, efficiency, effectiveness and equity of access to healthcare.

The workstream clinical leads were elected from the existing seven group clinical directors (GCDs) of the Trust. The GCDs are members of the group triumvirates, which also included a group director of operations and a group director of nursing for each of the seven groups. The link between front line staff and the Chief Officers was through the triumvirate groups who managed the communication messages between the two parties.

The researcher was one of the group clinical directors who happened to lead on two groups, surgery and emergency medicine. As part of her role as group director for surgery and inspired by the success of the case 2 transformation process, she spearheaded an innovation strategy for the Breast cancer service in the Trust. The similarities of the service with the private sector case (case number 2) was such that made sense for her to apply the proposed leadership in innovation model. The only difference was in the context, with case 3 being a complex NHS organization with significant system influence and which competed for part of system funding to develop its services.

The Breast cancer service had consistently overperformed over the years but the pandemic had caused strain in the service. There was an opportunity to restore and transform the breast cancer service into one of the most profitable, innovative and sustainable services in the Trust. On the back of that vision, the NHS Long Term Plan advocated for early diagnosis of breast cancer, improvement in cancer care outcomes and the use of genomics and genetics to deliver personalized healthcare. The use of advanced diagnostic technologies (including AI) to improve the speed and accuracy of breast mammograms and the development of community diagnostic hubs to increase patient access to diagnostic tests closer to patient communities, were on the top of the innovation agenda. Advancement of radiotherapy techniques such as stereotactic radiotherapy, radiotherapy hypofractionation (fewer

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sessions, same effectiveness) and personalized surveillance were also key priorities, alongside the use of digital technology to boost patient self-management and virtual consultations. Breast cancer innovations in the private healthcare sector (case 2) spanned the whole breast cancer pathway, from diagnosis through to treatment and survivorship and were implemented in their majority; the NHS now followed with the same innovation themes and strategic direction.

> "Breast cancer two-week wait and 31-day breast cancer standards were met during the pandemic due to the hard work of the teams on the ground, who flexed their working time and space to be able to deliver"
> **Clinical Lead Breast Surgery**

> "We had to adapt to a new working environment in the private sector facilities, our equipment was not in the same place and there was a whole new IT infrastructure built for us that we had to learn as well"
> **Breast care nurse**

> "It would be good to have a permanent home as a breast team that also includes radiology and pathology, at the moment we all work at different places and never see each other or talk to each other"
> **Breast radiologist**

> "We need more investment to create a world-class breast cancer service that people can access easily, without having to travel to several places to receive care"
> **Consultant Breast surgeon**

> "Access to genomic testing for all breast cancer patients who benefit is a 'must', there is huge variation in the genetic offerings across the country and is not fair for our patients"
> **Consultant Clinical Oncologist**

The group clinical director had the vision of expanding and developing the end-to-end breast cancer pathways from patient diagnosis through to survivorship, using a whole system approach to change, similar to case 2. The trigger for the movement was the change in the political environment, with the development of the integrated care system (ICS) and the dependence on the system for funding. There was considerable scope for innovation which would earn the Trust competitive advantage as the bigger NHS Trust in the system and also as a tertiary cancer provider for the ICS. Becoming a lead Trust provider of regional breast cancer services would potentially attract more commissioner investment for research, innovation and technological development. Those triggers were similar to case 2 but the environment was different:

- the NHS Trust is a public body and employs its doctors and clinical leaders, unlike the private organization (doctors on practicing privileges);
- the NHS Trust was financed with block payments at the time of the study, whereas the private organization was financed through private equity;
- there was more secured funding in the private organization as long as innovation business cases delivered on the investment.

The proposed series of innovations in case 3 were similar to case 2 (figure 9), represented the end-to-end breast cancer pathway from diagnosis through to survivorship and consisted of the following:

- Diagnostic Hub facility in the community, including One stop breast cancer diagnostic services;
- Personalized Oncology pathways incorporating genetics and genomics for decision-making about treatment;
- An expansion of radiotherapy treatment offering including hypofractionation and advanced planning techniques (partial breast irradiation, IMC, SIB);
- Surgery at place and flexible workforce between system partners to increase surgical capacity and so that surgeons could operate without delays;
- Expansion of the breast surgical workforce at place to meet the flexible and agile workforce model requirements;
- The development of a combined online multidisciplinary team meeting (MDT) including a complex MDT to discuss difficult cases, shared between system partners;
- A health and wellbeing offering for patients at any stage of their illness;
- A systematic collection of patient reported outcome measures and long-term outcomes through a patient portal;
- A collection of supportive services including cardio-Oncology, lymphoedema, bone health, psychological support, menopause;
- A private service unit provision within the organization;
- A surgical training program;
- Dedicated e-referral pathways for suspected female and male patients.

Figure 9: Breast@UHCW strategic innovations

The NHS Long Term Plan and UHCW Breast Service Proposition on a page

The NHS Long Term Plan Cancer Strategy
- Diagnose 75% of cancers at stage 1 or 2 by 2028
- Roll out new Rapid Diagnostic Centers across the country so patients displaying symptoms of cancer can be diagnosed in a One Stop Clinic.
- Introduce Faster Diagnosis Standard so that patients receive a definitive diagnosis or ruling out of cancer within 28 days.
- Design pathways that deliver Personalized Cancer Care, giving patients more say over the care they receive, improving population health with demonstrable clinical outcomes.
- Promote clinical research and offer genomic testing to all cancer patients who would benefit, leading to the adoption of evidence-based and personalized cancer treatments.

UHCW Breast cancer proposition
- Establish pan Warwickshire One Stop Breast Diagnostic Centre (NHS & private), co-locating radiology, surgical clinics, GPs, care navigators, breast CNSs, genetics, wellbeing facilities* and incorporating cutting edge technology including tomosynthesis, ultrasound (ABUS), stereo biopsy, CT and MRI suite, tumour localisation (Magseed), surgery taking place at individual sites (GEH, UH, RSX, SWFT, with NHS and private package options if self-funded or insured)
- Expanding our Genetic and Genomic test offerings to include core biopsy Oncotype DX testing to enable patient streaming into personalised care pathways (surgery, primary endocrine, neoadjuvant chemotherapy)
- Patients to receive a personalised, evidence based and peer-reviewed care plan within 21 days from referral.
- UHCW/GEH single expert virtual MDT platform which accepts referrals from other providers.
- Establish a virtual complex/metastatic Breast MDT using e-platform to discuss local, national and international patients (medical tourism), including access to our clinical trials at UHCW.
- Work with local and cancer charities and CCG to establish health and wellbeing facilities* (exercise suite, nutrition and psychological support) starting from diagnosis through to survivorship (prehab and rehab).
- Systematic collection of Patient reported outcome and experience measures & long term clinical outcomes (service evaluation embedded into service implementation), using digital tech (patient/clinician portal & App).
- Incorporate Health promotion, primary/secondary prevention clinics into personalised survivorship plan* (GP led/Cardio Oncology – Echocardiogram and cardio risk factors/Integrated care); include menopause & lymphoedema services

Enablers :
-Optimize surgical and radiology workforce
-Access to private care at UHCW
-Marketing and Comms
-Digitisation of PROMs/PREMs
-UHCW owned e-referral pathway
-Surgical and Diagnostic training program

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The leadership and governance structure for the innovation Case 3 was as follows:

- Two executive sponsors, the Chief Medical Officer responsible for the professional standards and the Chief Strategy Officer.
- The enabling middle-level group clinical director who was part of the Group Triumvirate for Surgery, together with the Director of Operations and the Group Director of Nursing and who reported to the Chief Operating Officer. The group clinical director bridged the gap between executive sponsors and front-line leaders.
- The Breast surgical lead who led the breast surgical department, including all surgeons, trainees, advanced practitioners and clinical nurse specialists and who reported to the group clinical director.

The Senior Responsible Officer for the tertiary workstream was the Chief Strategy Officer for the Trust and accountable for the delivery of the Trust's strategic direction in the case of breast cancer services. The challenge to the status quo and the delivery of the strategic direction in breast cancer services was set top down, by the chief strategist and SRO in the organization, due to the pressing need to align with the NHS Reform strategy and expand this profitable and reputable service. The integrated care system also had a primary role to play in terms of defining the overall direction of the system and the SRO played a leading role in the ICS.

> "We need to work together as a system and utilize all our resource capacity
> smartly and efficiently"
> **Chief Strategy Officer**

The SRO's responsibility was to implement the direction at place by applying this innovative strategic approach. The enabler and agent of change was the group clinical director for surgery who played the role of the enabling link between the entrepreneurial and the operational aspect of the service. The clinical director in this case was the middle manager and facilitator of innovation who could translate the top-down strategic direction to a bottom-up clinical service proposition which resonated with front-line teams. There is a lot written about the tension between clinical directors and middle managers (operations) and also the ambiguity around the role of clinical directors in healthcare organizations in terms of personal development and progression (Powell, 2016). Group Clinical Directors are not often perceived as the agents of change and this often leads them to become very operationally focused. As a result, they become less involved in the strategic direction of the group (external focus) and instead they stay operationally focused (internal focus). By doing so, they often lead to disempowerment of middle operational managers whose role is operational implementation (Powell, 2016). In this case, the clinical director's role was more strategic and bridged the gap between innovation/strategy and operations.

In case 3, the group clinical director was clearly the agent of change, who managed to articulate a vision for the breast cancer service which was shared with other front-line clinical leaders in the breast surgical service. Her role was distinct to the middle manager role (operational delivery) but both collaborated closely in order to implement the strategy. The experience of the group clinical director was key, having sponsored one large transformation project (case 2), flexing between executive leadership and middle

management and enacting distributed leadership when necessary. Tactics that she used previously, she adapted in this case, which included local peer to peer key opinion leader engagement, timely front-line participation, commissioner collaboration. Her role as meso level manager had a bridging effect between chief officers and the front line.

In Case 2, this middle-level engaging clinical leadership role was played by the senior medical leader in the organization from the beginning of the innovation process. Very early and during the adoption stage, the senior medical leader engaged with key opinion leaders in order to reduce resistance to change and drive more front-line clinicians to join the change process. After overcoming initial adoption resistance, the medical leader recruited the breast clinical reference group (CRG), led by a clinical director for breast cancer services. The breast CRG consisted of breast oncologists, a breast surgeon and a radiologist and championed the innovations leading to the diffusion of innovations and their implementation. The CRG subsequently became the agent to drive change by engaging front-line clinicians and linking in with the company's executive team. This structure worked well in Case 2 and ensured that the power conflict between the medical director and the front-line clinicians was removed, through distributed leadership (CRG).

In case 1, the clinical consultant leader and agent of change spearheaded an innovation idea and managed to engage enough internal and external agencies such as nurses, allied health professionals and academics, business partners and patients. However, she failed to engage the wider clinical community internally, such as the doctors and end users of the innovation as well as the wider commissioning and system partners externally. At the time of case 1 study, the integrated care systems had not been formed and there was no sense of urgency to alter or develop further standard models of care. Funding streams were also different with payment by results prevailing and competition between providers being very strong in terms of showcasing their innovations and bidding for same funding (NHS Tests Beds).

During the post-pandemic period of the case 3 study (April 2020 – April 2021), when the first Integrated Care Systems started to form and develop their leadership structures, organizations such as NHSX have been given considerable investment in order to accelerate innovation. Commercial vendors of digital health solutions have come closer to the NHS organizations seeking collaborations to get their products off the ground. Innovation projects such as the remote monitoring solution in case 1 have started to be piloted across the country for chronically ill patients, such as in case of long covid patients, elderly patients in care homes and patients with long term respiratory conditions. The researcher has been again approached to re-ignite the remote monitoring solution from case 1, re-engage with old stakeholders and apply for new funding streams. This shows that the environment where the same NHS Trust in case 1 operated in case 3 had radically changed and now actively encouraged innovation. The purpose of commissioning for innovation in this context was to enable the restoration of services post-pandemic with particular focus on the use of technology to achieve operational efficiencies and manage the huge demand for healthcare.

A useful learning point in case 3 is the important role of the commissioners as drivers of the overall vision for innovation within integrated care systems. The commissioning role of shaping the culture of innovation and organizational behaviors was evident in case 3, as it eliminated the resistance to change and influenced competition between providers (Corrigan, 2013). It also drove collaborations between providers such as in the case of the community

diagnostic hubs (primary – secondary – social care integration) and the health and wellbeing hubs (third sector) which will be discussed below. We saw in case 1 that the lack of commissioner support worked negatively when competing for the innovation fund. In case 2, the commissioning was controlled internally by the organization and was therefore not an issue. In case 3, commissioner involvement drove the vision and direction of innovation which in turn shaped the culture of experimentation in the organization.

"Community diagnostic hubs is the future of care and will enable the NHS Long Term Plan's ambition to diagnose 75% of all cancers at an early stage"
Clinical Diagnostics Group Director

Another key learning point in case 3 is that the strong direction from the commissioner group, the ICS and the Trust led to the key opinion leaders and front-line staff (surgeons, oncologists, radiologists, nurses) very quickly becoming the followers of the innovation strategy, without a huge engagement effort. This is a good example of a top-down strategy, supported by resources and facilitated by meso-level leadership.

The group clinical director together with the breast surgery clinical lead and the chief strategy office agreed on the proposed innovation agenda which was then unfolded at different levels as follows:

- **Diagnostic Hub facility including One stop breast cancer diagnostics** > the Trust is currently working collaboratively and at pace with its internal diagnostic clinical leaders / key opinion leaders and with system partners (council, estates, local university), in order to develop community diagnostic facilities which will also host One stop Breast clinics. The strategic vision of the Trust has been completely aligned with that of the integrated care system and commissioners of cancer care: from 2028, an extra 55,000 people each year will survive for five years or more following their cancer diagnosis and three in four cancers (75%) will be diagnosed at an early stage (stage 1 and 2). Faster cancer diagnosis standards will be implemented to ensure that patients are told their diagnosis accurately and within maximum 28 days from referral, speeding up the time from what's currently 31 days. The timeline for completion of this project is longer-term, nevertheless the financial commitment and planning of the project started at the end of our study period. Matrix working between commissioners and service providers (multi-specialties) including a local university (for research purposes) and commercial partners increased the complexity of the project and justified its timeline for completion.

- **Personalized Oncology pathways incorporating genetics and genomics** > this is currently happening in the NHS partly (genetics) or ad hoc (genomics) and depending on consultant practice; greater service is provided in the private sector currently, due to the commissioning of personalized genomic and genetic service by the private medical insurers. In the NHS, there is no commissioning for personalized genomic services and a recent business case presented by the group clinical leader was not supported by the cancer board. This demonstrates that lack of available funding and commissioning support is a major factor in the diffusion of innovation. However, there is work that has started by the genomic medicine service alliance

(GMSA) in the region, with the vision of using genomics to guide therapeutic modalities in oncology. In the case of breast cancer, specialist commissioning is looking at risk stratifying patients according to their genetic and genomic profile so that a personalized diagnostic, therapeutic and surveillance approach is implemented. NHS England in collaboration with Health Education England and the GMSA are on track to implement a digital risk stratification tool for use in primary and secondary care.

- **Surgery at place and flexible workforce between system partners to increase surgical capacity for surgeon to operate without delays** > the learnings post pandemic have been reflected upon and included in the breast cancer strategy; the lack of surgical capacity both in theatre space and personnel led to a collaborative approach between the public and private sector during the pandemic. This collaboration resulted in the vast majority of breast cancer patients having no delays in their diagnosis and surgical treatment. The end of this collaboration in the post-pandemic phase meant that there was a need to employ the surgical doctor and nurse workforce flexibly as well as use theatre space smartly. Following a successful business case outcome, an extra breast surgeon was employed by the Trust with plans to work flexibly with other surgeons in the system, utilizing all available theatre capacity across the system. Although the flexible workforce model was not met with support across the system, the Trust invested in the development of new theatre capacity through the building of modular theatres. A combined top-down and bottom-up leadership approach prevailed here with the front-line staff identifying the problem (capacity shortage), the meso-level clinical director responding with a workforce business case and proposed new strategy and the executive team investing in further resources to meet the needs of the specialty. The expansion of the breast surgical workforce saw more senior level clinicians in post to help with the increasing demand of the service, deal with the backlog of operations due to the pandemic and create an agile and resilient workforce across the system.

- **The development of a combined online multidisciplinary team meeting (MDT) including a complex MDT to discuss difficult cases, shared between system partners** > a proposal for an e-MDT solution was proposed by the group clinical director and presented to chief officers and the chief clinical information officer of the Trust. The proposal was met with general support. However, the idea implementation was a system-wide one and linked with the development of the electronic health record (EHR). There was already a virtual MDT solution that served the Trust under study and the expansion of the service to include the rest of the system partners had logistical and governance implications, which were best met in the context of the EHR. As such, the innovation implementation was delayed until the time of EHR implementation.

- **A health and wellbeing offering for patients at any stage of their illness** > a task and finish group was set up through the Macmillan Cancer Information team who led on the Living Well Beyond Cancer program. The program was commissioned through the system and in association with local cancer charities. Members of the

breast cancer multidisciplinary group were invited to participate in the task and finish group in order to create a patient-initiated follow up program after patients completed treatment. This is an excellent example of a top-down, commissioner-supported program with distributed leadership for its implementation.

- **A systematic collection of patient-reported outcome measures and long-term outcomes through a patient portal** > similar to Case 2, this innovation would enable the breast cancer team to understand the patient perspective of their treatment plan and also help clinicians make data-driven quality improvements in service protocols and pathways. This was met with resistance from the front-line staff, due to the fact that there was no standard tool for data collection and also no available platform to assist with collection. As with Case 2, that innovation became a long-term project through the development of the patient portal, incorporated into the Trust's future EHR. The record will be shared with other providers across the system, to enable clinicians to have all the available information for patients wherever they are treated.

- **A collection of supportive services including cardio-Oncology, lymphoedema, bone health, psychological support, menopause** > The engagement of various clinical leaders within and outside the organization (system partners) resulted in a comprehensive service provision incorporating all the above supportive services. Matrix working and clinical networking helped to incorporate the right clinical champions with specialist interest in these specific clinical specialties. For example, a cardiologist with specialist interest in Cardio-Oncology led educational sessions for oncology professionals in the Trust and opened the referral pathway to his clinic. Equally, the recruitment of psycho-Oncologists and counsellors led to a comprehensive wellbeing offering for patients.

- **A private service unit provision within the organization** > the group clinical director initiated a private practice policy development that led out the operational, governance and legal requirements for any consultant to practice privately within the organization. That was the first step in incentivizing breast surgeons to offer private services and therefore, more treatment choices to patients out of NHS hours. The next step was to establish the private theatre provision which coincided well with the building of modular theatres on site at the time of the study. Assembling the right team to support the service needed the engagement of diverse professionals including surgeons, anaesthetists, theatre practitioners as well as supportive specialties such as radiology and pathology. The increasing workload of those supportive specialties needed to be worked through carefully to ensure adequate service resources. The private service provision therefore became a longer-term project and wasn't yet implemented by the time the study period finished (April 2021).

- **An innovative surgical skills training program** > a cadaveric training program was set up in the post-pandemic phase, led by a consultant breast surgeon and key opinion leader, in collaboration with other surgical clinical leaders. The collaborative nature of this program, championed by clinicians with a special

interest in medical education is the reason for this program success at its first round. In addition, all surgical clinical leaders had connections with the local universities and academic health science networks and others worked with commissioners or NHS England. The surgeon and key opinion leaders helped raise the profile of the program and secured funding and other resources to continue running the program in a sustainable way. Moreover, clinical leaders and the NHS Trust had strong connections with commercial partners that supplied the technological resources such as imaging, software and robotic technology who also had a vested interest in the education program. The strong academic and health science networking opened the doors for research opportunities with the Trust. Finally, clinical leaders ensured that the program was evaluated well in terms of user satisfaction and clinical effectiveness and the results were published. The ongoing evaluation activity of the program led to its continual review and refinement, ensuring its sustainability long-term.

- **A dedicated e-referral pathway** > an existing breast cancer 2 week wait e-referral existed pre-pandemic, so that GPs could refer suspected breast cancer patients to the hospital surgical team quickly and effectively. A presentation made by the group clinical director and the surgical clinical lead to the GPs regarding breast cancer pathways during the pandemic, revealed that the existing referral needed to be reviewed to ensure it covered all eventualities and patient presentations. The post-pandemic period which revealed a large backlog of undiagnosed cancer patients made the timely provision of an accurate breast e-referral more of a priority for the system. Area GPs with their commissioning power hat on, also pushed for the new service to be implemented quickly and effectively.

Out of the 11 innovations in the breast service transformation program, 9 were implemented or on track to be implemented. Those on track for implementation included the case of community diagnostic hubs and the electronic health record (EHR) capturing patient reported outcome measures.

The complexity of the community diagnostic hub project including the large investment and the diverse stakeholders involved (multi-specialties, estates, council, commercial partners, universities) led to the project having a longer timeline for completion.

The other innovation which was not adopted at the time of study was the patient reported outcome measures. Similarly with case 2, there was lack of clinician engagement in doing so due to the lack of accepted and mandated standards for collection as well as a means of collection. More importantly, a decision was made to include the capturing of PROMs and PREMs (patient reported experience measures) through the newly acquired EHR which was on track to be launched in 2 years down the line.

In terms of breast radiotherapy modernization, the group clinical director attempted to introduce new techniques and protocols within the department, using the same clinical evidence presented in case 2 and for the same advanced techniques. Although there was resistance from few of the other clinicians to adopt those, the pandemic brought a shift in clinical practice with the acceleration of key clinical trial publications for those techniques.

The endorsement of those protocols by the Royal College of Radiologists that governs radiotherapy practice was a catalyst for the diffusion of those clinical services.

8.5 Case 3 learnings and relating to previous case studies

8.5.1 Lesson 1 – The commissioners of innovation and system leadership

The unstable and competitive political and economical context played a very important role in the innovation outcomes of case 3 unlike cases 1 and 2. In the most recent post pandemic innovation case, the NHS Reform dictated the way of working in terms of outward thinking as a system and moving away from inward thinking (Trust-led). All services needed to demonstrate value for the population rather for a specific cohort of patients served by the Trust and there was an emergent need to allocate resources efficiently and based on adding societal value for better population health. One of the reasons for the need for allocation efficiencies and reduction in waste was the uncertainty in terms of commissioning of services and moving away from payment-by-results into block payments. This change would have normally made the appetite to invest in innovation less. However, there was recognition that innovation would bring more technical and technological capability, would incentivize the workforce to work smarter, leveraging available and emerging technologies and would result in more efficient allocation of resources. NHS Trusts working within an integrated care system had to compete for innovation resources based on the value associated with those innovation. This made the evaluation of innovation implementation in terms of benefit realization even more critical.

The question arises of what defines societal value, what outcomes and how they can be measured in order to demonstrate value. There is an understanding that a necessary shift needs to happen in the mindset of commissioners in terms of putting long-term outcomes for patients and populations first before short-term organization outcomes. This would require close working with patients, primary and secondary care providers as well as the voluntary sector, to agree on commissioning services that really matter to patients (self-management of chronic conditions, prevention of ill-health, health promotion, social prescribing) which are more often than less, community - based (Corrigan, 2013). A shift in culture from procurement solutions to more sustainable service / pathway solutions based on patient outcomes requires strong commissioner leadership at a system level (Corrigan, 2013)

Integrated care systems should learn from the pandemic which demonstrated the role of devolved leadership structures to the front-line leaders and meso level managers. Command and control was prominent top-down in terms of decisions to enact lockdowns and the stopping of elective surgical activity across the country whilst acute hospitals tackled covid. However, it was the combined effort of the front-line clinical leaders and middle management who enacted their business continuity protocols but also developed innovative care pathways, resulting in patients getting the right care at the right time.

Similarly, the role of system and network partnerships opened up new opportunities for collaboration to ensure timely patient care provision. A good example is the public NHS provider contract with the private sector for the provision of life-saving cancer surgery during the pandemic. Such collaboration which involved the diagnosis and treatment of NHS

patients in the private sector as well as the deployment of the NHS workforce into the private sector, was revolutionary and demonstrated the power of public – private partnerships.

Research and innovation acceleration became a prominent feature during and in the post-pandemic era. Breast cancer and other cancer pathways became individualised in order to ensure that the right patients were prioritised for the right treatment. In addition, innovations were introduced in the way surgery was performed which speeded up the time from diagnosis to surgery. Finally, the approval of new radiotherapy and chemotherapy protocols was accelerated, which would have otherwise taken months or years to be adopted. Such clinical trial evidence was published and disseminated within days or weeks and the clinical community adopted the new practices very quickly. The wide adoption, diffusion and scale up of those innovative techniques based on the need at the time of the pandemic, has demonstrated their positive outcomes very quickly. Evaluation outcomes were done at scale and gave the confidence to clinicians to continue using those innovative techniques in the post pandemic period.

8.5.2 Lesson 2 – Key opinion leader engagement and meso-level leadership

Another useful lesson learned from this case (similar to case 2), is that if key opinion leaders (KOLs) who are the legitimate and respected clinical representatives, worked together with top managers and commissioners to embed the clinical evidence for innovation to current processes, front-line leaders would be more likely to champion innovations leading to innovation diffusion and implementation.

What was also critical in both cases was the close relationship between meso-level management (clinical / medical director), operational managers and the KOLs, which is also highlighted in Powell (2016). The building of a trustworthy relationship between the group clinical director and operational management helped the implementation of innovations which were clinically led. The relationship between executive sponsors, commissioners and front-line clinical leaders in Case 3 was enhanced through the presence of a meso-level enabling team, led by the group clinical director.

The group clinical director for surgery found herself in the unique position of being closer to the front-line clinicians as member of the multi-disciplinary breast cancer team and also being part of the triumvirate group (meso structure), reporting straight to the executive team. She was also involved at strategic level with commissioner discussions and was able to communicate bottom up the needs of patients and clinicians. At the same time, she communicated top-down the strategic direction as set by the system and commissioning group.

Unlike case 2, the engagement with front-line clinical leaders and champions of innovation was less intense. There are various reasons for this including:

- The system had the power to set the direction for innovation change and the Trust had no alternative other than responding to this call.
- The Senior Responsible Officer and other Chief Officers were supportive of the strategic direction and the innovation plans.

- Funding was available as a system and commissioners were supportive, but there was still the need to prioritize innovations. Such prioritization was based on whether innovations served other group priorities as well, as in the case of diagnostic hubs in the community. Unlike the need to expand diagnostics, the expansion of genomic testing was not considered to be a priority for the system despite the presentation of a plausible business case prepared by the clinical director and other key opinion leaders. The need of this service was reinforced through the cancer alliance.

8.5.3 Lesson 3 - The role of the meso-level leader or clinical director makes a difference

The clinical director of the surgical group was the champion and key opinion leader of the innovation strategy, which was written along similar lines to Case 2. The clinical director worked across the whole patient pathway (surgery and oncology) and had experience of sponsoring a similar innovation model in the private sector. In case 3, the whole end to end breast cancer pathway redesign was aligned with the integrated care system (ICS) strategy, was SRO led and the leadership of its implementation was distributed at place (hospital provider under study). The role of the group clinical director was therefore best placed at the meso-level whereby she could be the collaborative link between front line leaders and the SRO / ICS as well as the expert enabler of innovation.

The group clinical director who previously led on the breast service of the future strategy in the private sector from the senior medical leader perspective, was now playing the role of the knowledge broker and the key opinion leader in the NHS. Following the proposed innovation model, the clinical director and KOL tried to engage doctors and nurses in the breast multidisciplinary team early on and ensure that the innovation and transformation strategy was supported as a vision for the department.

Early doctor engagement and enablement of the front-line subject matter experts took the strategy forward because it meant that there was a critical mass of clinician leaders who were empowered by the clinical director and KOL to push the innovation agenda forward. What's also important is that the group management team came closer to the front-line clinicians through the group clinical director to facilitate entrepreneurial ideas becoming operationalized. The clinical director and KOL also drove the top-down engagement between the executive team and the front line, which had a positive impact on other surgical service innovation strategies within the same organization. By doing so, the clinical director enabled the co-creation of the innovation strategy between the front-line clinical leaders and the executive team, ensured it was aligned with the Trust vision, values, the 5-year organizational strategy and reflected the ICS strategy. Same principles could be followed with other surgical specialties during their future transformation programs (platform based innovation).

It is interesting that the vision of breast cancer service excellence was the same in the public as well the private sector and the designing of innovative services and offers followed the same philosophy and similar values of partnership and innovation. It was important that both sectors had the same vision and worked towards the same innovations, because of the potential capabilities that such future partnership could bring:

1. **Patients could have more choice** of where they wanted their care delivered without their choice compromising the quality of care;
2. **Patients could be treated closer to home** or at home for some services such as chemotherapy;
3. **Flexible and shared workforce** across the public and private sector could increase capacity resulting in no delays to cancer surgery and other oncological treatments;
4. **Patients could have access to complementary therapies** such as psycho-Oncology, physiotherapy (lymphoedema), fertility and nutrition services;
5. **Research and innovations** could be co-designed, co-delivered and evaluated with scalable outcomes.
6. **Shared leadership capability between the sectors** to ensure robust and shared governance frameworks, referral policies and procedures, research and innovation frameworks.

The NHS Reform talked about joined up care and provider partnerships, including public-private provider collaborations forming big part of this joined up care. In fact, the national NHS – Independent sector collaboration which began in April 2020 and continued a year later, has proven effective for enabling breast cancer patients to receive their essential diagnostic and surgical procedure work whilst the NHS was focusing on the volume of sick patients due to the SARS-Cov-2 pandemic. It remains to be seen how public-private provider partnerships will unfold over the years to come.

8.5.4 Lesson 4 - Prioritizing innovations based on societal value

Going back to the breast service innovations, they represented a complete end to end pathway for breast cancer, from diagnosis through to survivorship. Unlike the case 2 strategy whereby the goal was to adopt and diffuse 24 innovations in 12 months, the focus on case 3 was limited to the services that would add most societal value in year 1 and 2.

Those innovations were around aspects of care that were either compromised during the pandemic (cancer diagnostics) or their implementation was delayed because of the pandemic (personalized care):

1/ Access to full range of diagnostic services 7 days per week;
2/ Efficiency through a Hub and Spoke model of surgical care and
3/ Quality of care through workforce expansion and use of innovative ways to personalize care such as genetics and genomics, surgical and oncological techniques, personalized survivorship plans.
4/ Equity of care through patient reported outcome measures and data analytics.

The narrow focus of the innovation strategy and the top-down drive of innovations meant that the project at year 1 was more achievable. In addition, the conflict between business as usual and innovation that we experienced with case 1 and case 2, given the lack of dedicated time for innovation in clinical leaders' job plan was taken away in case 3. Front-line Clinical leaders with the support of the group clinical director and group manager, sponsored by the chief officers and the ICS, broke down the innovations into time-limited chunks that were easily achievable. The involvement of front-line leaders and middle management in innovation was also factored in their job plans. This motivated clinical leaders further as

they had the space and autonomy to think innovatively, they worked with teams to implement innovation and they saw quick results being delivered.

For example, within a couple of months of the innovation strategy being co-created and presented to the executive team, the business case for breast cancer surgical consultant expansion was approved and recruitment began. This boosted the morale of the front-line leadership team and increased their trust to the process. The Trust's Chief officers, the meso – level group, its front-line clinical leaders and the system worked in collaboration. In addition, there was visible innovation accountability at the Trust executive level as well as ownership of those at the clinical level.

The relationship building between front-line and executive teams increased the confidence on both sides to enter regular and direct conversations. This was an opportunity for executives to give the system direction and vision and the clinical leaders would respond from a clinical evidence base, also sharing intelligence from other centres of excellence around the world. This gave the opportunity for the executives to understand the challenges on the front line, link with other groups such as diagnostics and oncology to understand the interdependencies and refine the strategic view of the breast service. The front-line clinical leaders also felt that their challenges were heard at the top level, they were understood and discussed within-group and between groups within the organization.

The Trust executives were accurately advised by the clinical leaders regarding the proposed innovative solutions and on how to improve and grow Trust services, in collaboration with system partners. The clinical leaders (clinical director and front-line) were encouraged by the executive team to connect with their counterparts from neighboring Trusts and engage in conversations about creating a single regional breast service. This led to open conversations on options around sharing theatre and outpatient capacity, working flexibly across organizations, developing a shared One Stop diagnostic service, streamlining multidisciplinary case discussions and incorporating genomic testing more effectively.

The complexity and the politics of the healthcare system at the time of study meant that relationships had to be built slowly and around the shared vision and system goals. In addition, it was important that the innovations produced value not only to the organization but to the system as a whole. This was a new shift in mindset from inward thinking and working in silos to outward thinking and working as a system. As a result, there was more complexity in the design of innovations and more stakeholder involvement that in case 2. The rationale was that with the right engagement between executives, front line leaders and key opinion leaders in the development of the innovations, there was a higher chance that the innovations would diffuse and become sustained over time, so that the organization and the system reaped the benefits from those.

8.5.5 Lesson 5 - Peer influence and Opinion leadership

Traditionally, clinicians based their decision making on evidence-based medicine which includes primarily complex and lengthy randomized clinical trials. What case 3 and case 2 have demonstrated is the influential role of key opinion leaders in embedding best practice when the evidence-base is not as strong (Greszczuk, 2018). Key opinion leaders are usually

credible individuals whose clinical and/or research work is well known to others is the field and used to influence clinical practice (Flodgren, 2011).

In case 2, a non-peer opinion leader shared his vision and experience from practicing in a different healthcare system. His work was credible and well-known across the UK and international community and he had led educational events for clinicians during the study period. Dissemination of his work was not deemed enough, instead a multifaceted approach was utilized to help engage clinical leaders to adopt and diffuse innovations: key opinion leader engagement, design and distribution of educational materials, service development workshops, promotional roadshows, knowledge sharing through educational events (Grimshaw, 2006).

In case 3, peer opinion leadership (Trust-wide, Royal College) was key for the decision to adopt new clinical protocols and to redesign breast cancer pathways during the pandemic. Without the support of the peer community, which was strengthened as a result of the pandemic, it would have been very difficult to adopt and diffuse new clinical practices as quickly as they have been.

8.5.6 Lesson 6 - Clinical leader incentivisation and empowerment

It is evident from all three cases that enabled clinical leaders who are given the autonomy, space and power to innovate and transform clinical practice can be catalytical in the successful implementation of innovation. The opposite is also true of clinical leaders who are not engaged enough in the innovation process.

Clinical leader incentivisation can take various forms, including financial or external incentives (more revenue) as well as non-financial or internal incentives (training, personal and professional development, time and space in job plan for innovation, ownership of projects, promotion). The question of 'what's in it for me' has come up many times and especially in the digital innovation (case 1) as well as the future of care model transformation (case 2).

In case 3, the initiatives proposed for the Trust were backed up by the Integrated Care System which had already worked through the benefit realisation plan. This enabled a consistent and clear message being communicated top down and bottom up. In addition, the presence of a strong meso-level leadership ensured that the top-down strategy was implemented and there was a culture of shared vision and followship overcoming any strong clinician resistance. The engagement of doctor champions ensured that doctor concerns were addressed along the way (Boonstra, 2014). Clinical leaders of all disciplines could visualise and also verbalise the benefits of the new strategic direction for them, their patients and the communities they serve, which kept their internal motivation high at all times.

In case 1, the evaluation strategy of the project was very comprehensive and included amongst all aspects, staff and end user experience, usability and acceptability of the new technology, work efficiencies and quality of care. However, the business case and stakeholder presentations and engagement sessions focused more on the ROI (return on investment) aspect rather than the QI (quality improvement) aspect. In large digital transformation projects, it is important to talk about the short-term improvements which are

usually quick wins on quality and safety, rather than the cost savings (ROI) which are more long-term (Wachter, 2016). The lack of clinical leader engagement and involvement in the case 1 met with resistance from the doctor front, as they could not see 'what was in it for them'. In addition, the lack of Trust's commitment to innovation meant that the necessary extra resources (time, space, funding, training) for clinical leaders to be involved with innovation, were unavailable. As a result, clinical leaders saw the project more as a chore which conflicted with the day-to-day operational challenges rather than an exciting new model of care to work on, despite the fact that the implementation of the proposed technology would benefit patients and staff in the long-term (Honeyman, 2016).

Case 2 specific evaluation criteria were used to engage the clinical leaders which included improvements in the access, quality and efficiency of services. The detailed measurement of those benefits though came later in the process and after 12 months, as the initial focus of the organization was on the financial evaluation of the transformation program early on in the process. The latter attracted some but not the majority of clinical leaders who were more focused on the quality outcomes for their patients. It was clear though that the improvement of those quality parameters would help the organization deliver a wider engagement activity internally and externally, which would improve the bottom line in the long-term.

8.6 Innovation Diffusion and leadership in non-healthcare industries

Given the contextual element of innovation within the healthcare organizations, we looked at the literature around innovation challenges in other industries (non-healthcare). The challenges faced during the adoption and diffusion of innovations in non-healthcare industries, in terms of leadership behaviours and stakeholder engagement, are very similar.

In the construction industry and project-based works, it is important that a stakeholder analysis is conducted early on in the project and throughout, in order to identify and engage the key stakeholders at the right time (Widen, 2014). We experienced in case 1 that end user engagement was key early on, but although patient engagement was done well, clinician engagement was poor which contributed to the non-adoption of the innovation. In case 2, there was gradual stakeholder engagement as the innovations moved from the ideation / adoption to the diffusion / implementation stage. There was also an innovation broker used to argue and make the case for the innovation, as in the case of the non-peer key opinion leader (Widen, 2014). In case 3, leadership and engagement was done at the system level and again, there was gradual engagement of clinical leaders and the front-line as innovations moved through from ideation to implementation.
In the technological and engineering industry, the pressure of innovation is thought to be due to internal factors (gain competitive advantage) as well as external factors because of other firms implementing innovation (Kale, 2010). In case 1, the push for innovation was mostly internally driven, whereas in case 2 and 3, innovation was triggered more by external competitive forces.

In another study involving the banking industry, it was found that organizational investment in forming external partnerships with similar and other industries, can increase their readiness and success to innovation diffusion (Pennings, 1992). By analogy, our healthcare organizations' relationship with technological companies and other external partners can maximise their knowledge and exposure to new technologies resulting in them becoming

early adopters. Over time, readiness to innovation and early adoption will make organizations more resilient to change and successful in innovation diffusion. This was particularly evident in case 2 and 3.

8.7 Conclusion

In the current volatile, uncertain, complex and ambiguous world, there is an urgent need to grow our future system leaders. New doctors and other clinical professionals in the NHS are expected to lead across professional boundaries and within systems not just within organizational groups. Healthcare systems which are clinically well-led, are led 'bottom-up' and are more able to align their business strategy with clinical need. The three case studies have demonstrated that there are some key ingredients in making innovation diffusion success based on individual and organizational leadership behaviors. Those will be displayed in the next section through our new model of leadership for innovation diffusion.

Chapter 9 Presenting the new model of leadership in innovation

9.1 The new model

The original model for leadership in innovation diffusion was presented in Chapter 7, figure 7, following the case 1 and case 2 healthcare innovation studies and it is illustrated again below in figure 10.

Figure 10 Preliminary leadership in innovation diffusion model
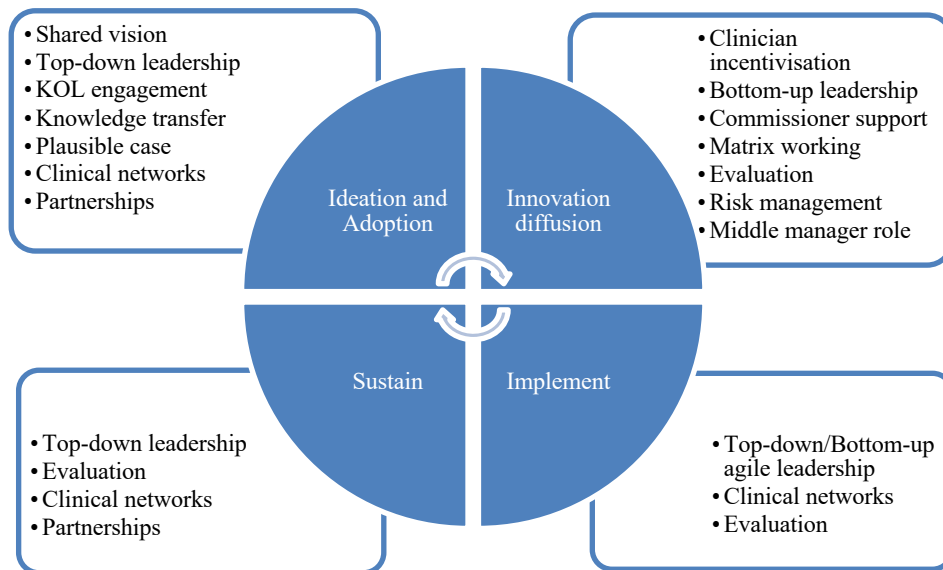
During case study 3, we attempted to test and refine the above model and by doing so, we learned some important lessons that have helped us to refine the model and make it more generalizable and more applicable to the present state of healthcare organizations. Those are summarized below and have been used to construct the new model of innovation:

1. **The introduction of Integrated Care Systems requires a shift in the mindset of commissioners in terms of putting long-term outcomes for patients and populations first before short-term organization outcomes.** To be able to do this, there is a need for strong leadership at system level and not just at organizational level. This would require close working between commissioners of healthcare services and patients (end users of services), primary and secondary care providers, the voluntary and private sectors, academia and the industry, in order to agree on commissioning services that really matter to patients. Some recent popular examples of such services include the remote monitoring of patients by clinical teams using digital technology, digital patient self-management tools for chronic conditions, the prevention of ill-health and health promotion as well as the expansion of social prescribing. What's common to all those services is the fact that they are all community - based services and services closer to patient homes which represents a value-adding societal benefit.

2. **Key opinion leaders (KOLs) are the legitimate and respected clinical representatives, who need to work together with top managers and commissioners to embed the clinical evidence for innovation into healthcare organizations.** Non-peer KOLs can work collaboratively with peer KOLs to inspire ideation, present the evidence and their experience, as well as assign innovation champions to support innovation diffusion and implementation. Early involvement of KOLs is key at the ideation and adoption stage of innovation. A supportive peer community is also key to innovation diffusion, which begins with a well led clinical engagement strategy based on shared vision and purpose. Power differences between peers may be mitigated through the inclusion of non-peer KOLs to influence the peer community.

3. **Meso-level clinical leadership working collaboratively with the operational management team can bridge the gap between executive sponsors, commissioners and the front-line clinicians.** In addition, the leadership of the clinical director (meso-level leader) can work as an agent for change, spearheading innovation potential and working closer with the operational management team to create innovation capabilities within healthcare organizations. The meso-level clinical leadership plays a key role in bridging the gap between operational delivery and entrepreneurship.

4. **Innovations in healthcare should benefit the society as a whole and not just individual patients, based on a shared vision and goals that encompasses the whole integrated care system.** The complexity and uncertainties of the current healthcare system means that stakeholder relationships have to be built slowly and around the shared vision and system goals. It is important that healthcare innovations produce value not only for individual organizations but also for the system and society as a whole. This represents a new shift in mindset from inward organizational thinking and working in silos to outward thinking and working as a system.

5. **Clinician incentivization is critical in the innovation process in order for them to engage consistently throughout the process.** No matter how small or large scaled the innovation process is, clinicians are driven by a strong sense of purpose and meaning in their activities which more often than not involves a better quality of care for their patients. A robust benefit analysis with a clear benefit evaluation and communication plan that starts early in the innovation process (ideation and adoption stage), can help sustain clinician interest and engagement. Matrix working in a multidisciplinary approach between clinicians, managers, executives within an organization and across clinical networks creates a sense of purpose and cultivates compassionate leadership. Time and space to think and innovate within organizations such in the case of the innovation hub (case 1), research and development department (case 1 and 3), access to commercial and marketing expertise (case 2) as well as access to application funds (case 1 and 3) can incentivize clinicians to embark into innovation. Others will be incentivized by the prospect of idea commercialization resulting in revenue acquisition and/or professional accreditation and promotion. The 'what's in it for me' has to be well thought through for key stakeholders involved in small or large scale innovation.

6. **What has been evident during the COVID pandemic, is that the UK healthcare system cannot work on its own and without partnering with other providers including the private sector.** Partnerships are essential throughout all stages of innovation. We need to do something differently moving into the future as an NHS because patients are expecting more responsive services and persistent high-quality services that can be accessed on demand, without queues and waiting times. To be able to achieve this, providers may need to combine forces so that they offer a truly personalized care and patient experience.

7. **Top-down directional support (ICS leaders, commissioners, executives with power to commission innovation) is key in setting the vision and purpose of the innovation and transformation strategy.** This is particularly important in the early (adoption) and late stages of innovation (sustainability), when there is a need for low resistance to adoption and leveraging of powerful networks, respectively. A flexible top-down and bottom-up approach in leadership is needed at the diffusion and implementation stage of innovation, which requires clinician engagement and investment (buy-in) in the innovation.

We also looked at our model in conjunction with other existing models and theories of innovation, in particular:

- **The NASSS framework which we applied to describe barriers and enablers to innovation for the cases 1 and 2 (Greenhalgh, 2017) in Chapter 8:** What we learned from the NASSS framework in case 3 is the importance of the organizational context, the competitive landscape and the environmental pressures for innovation in driving the organizational readiness to innovate. The system readiness for innovation added pressure to individual organizations to work collaboratively in developing their innovation strategy. Organizations working within the system had to compete for the same resources and provide system wide benefits through their innovation strategy implementation.

- **The Currie and Spyridonidis (2018) leadership in innovation framework which we used to compare with ours for similarities and differences in Chapter 7:** Our model proposed that an earlier key opinion leader engagement in the innovation process and supported by top-down leadership can optimize innovation diffusion. In addition, early commissioner engagement can maximize the chance of innovation diffusion and sustainability. Moreover, partnerships with key stakeholders including the industry, academia, third sector, public – private partnerships and end users can lead to a more collectively owned and sustained innovation outcome. Those partnerships need to be built early on and not left until late in the innovation process. This can be initially achieved through top-down, management-led or executive to executive relationships but they should be closely followed by clinically-led networking and peer-to-peer influencing.

- **The complex leadership theory (Arena, 2016) discussed in Chapter 8:** Explained the meso-level agent and the bridging role of the medical leader, between the entrepreneurial top-down strategic direction, people engagement and the operational delivery of innovation at the front-line.

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- **The Van der Ven's (1999) cyclical innovation journey which we discussed in Chapters 3 and 7):** this model of innovation supported the divergent and convergent factors influencing innovation success and dependent on the ambidextrous behavior of innovating organizations - exploration (outward thinking and strategic) versus exploitation (inward resourcing and implementing). Those forces need not be in conflict, instead organizational leadership should ensure that those forces exist in harmony.

Putting all the above parameters together, that is: our preliminary model of leadership in innovation (case 1 and 2), the lessons learned from case 3 and the relevant innovation and leadership models from other authors, we propose the following leadership in innovation cyclical model (figure 11):

Figure 11 Final model for leadership in innovation diffusion
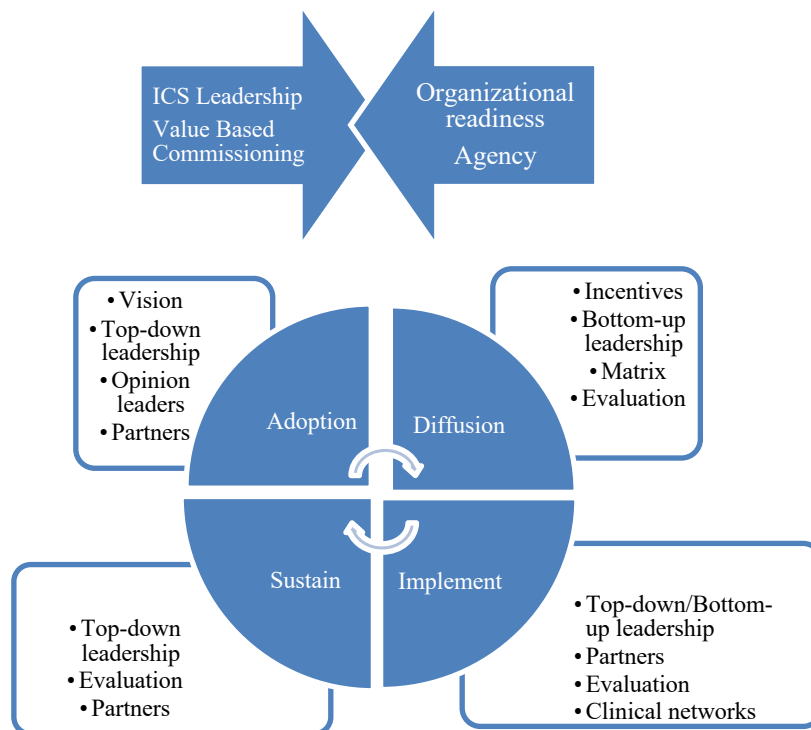
9.2 The future of innovation in the NHS

The NHS is facing significant demand and capacity challenges due to the ageing population and the higher cost of chronic illness (cardiovascular disease, diabetes, stroke and cancer) which is becoming more prevalent. The cost of chronic illness and ageing is due to expensive treatments, high emergency hospital admission rates, long length of hospital stays and increasing mental health costs.

Integrated Care Systems (ICSs) are well placed to promote innovation including digital transformation and drive improvements in population health as well as cost efficiencies (NHSE, 2019). Healthcare organisations currently exist in a state of 'innovation alertness'

driven by consumer demand and provider competition. Investing in research and innovation will result in new, patient-centred and more efficient services (Bessant, 2013).

The financial sustainability of the NHS depends on a clear shared vision for innovation amongst all stakeholders, including commissioners, patients and healthcare professionals. By engaging in innovation, the NHS can continue to attract an innovative and high caliber workforce who can implement innovation to achieve cost efficiencies and better models of care.

The collection and analysis of real-world data in the form of registries and national audits including long-term clinical outcomes, can lead to the establishment of personalized care protocols and plans. Personalizing care pathways will play a key part in the future. For example, every cancer patient will have their genome sequenced and a personalized genomic profile to accompany their diagnosis and treatment. People will have more knowledge about their risk for getting ill through specialised algorithms which will hopefully drive better lifestyle choices and behaviors.The systematic collection of real-world data can also inform about population health outcomes leading to improvements in population health. Organizations and whole systems need to become more data driven in order to understand what works and what doesn't and make the necessary healthcare improvements. Leveraging technology and the workforce in a more agile way as well as embedding innovation in the organizational culture is the way forward for the NHS to achieve its long term goals.

The key to achieving the vision for innovation is the strong system, organizational and local clinical leadership. Leadership should be an agile combination of top-down and bottom-up approach, driving clinician and patient engagement. Healthcare professionals should be more involved in leadership and power positions so that they can act as expert agents of change. The future NHS should be a clinically led healthcare system.

Developing the doctors and healthcare professionals (HCPs) of the future will require the breaking of the traditional organizational operational group silos and increase cross-provider collaborative working. Organizational and system leaders need to stimulate innovation and entrepreneurship at places and within systems, engage and motivate doctors and other healthcare professional to continuously improve standards of care through innovation and providing the governance framework for innovation implementation. In addition, senior leaders should spot talent in the healthcare workforce who will be able to bridge the gap between innovation (continuous and disruptive), operational execution and risk management. A critical mass of innovation champions within ICSs can help embed innovation and as business – as – usual within healthcare organizations in a scalable and sustainable way.

Training of the methods and approach to innovation, leadership and organizational behavior should be embedded in the undergraduate and postgraduate education of doctors and other healthcare professionals, with opportunities for specialist modules and secondments. Improving gender and ethnic diversity in healthcare leadership positions is critical for enhancing skill mix and improving organizational culture. The workforce of the future should be more innovative if we are to leverage the benefit of provider partnerships. It will be multi-skilled and agile, working between places and within ICSs, based on demand and capacity and driven by patient choice.

9.3 Conclusion

The innovation model of the future for healthcare organizations, is a harmonious combination of top-down leadership and bottom-up agency in order to transform organizational processes and innovation behaviors. Clinicians, managers, commissioners, patients and the industry should work closely together to prioritize and work out innovative solutions to healthcare problems. Organizations and systems who embark into their innovation and transformation journeys will benefit from our model for leadership in innovation. Our model can help create the framework for maximizing innovation diffusion success within healthcare organizations.

Chapter 10 Conclusion and evaluation of the study methodology

The case study is a method that when properly carried out provides an in-depth understanding of certain phenomenon such as healthcare innovation adoption and diffusion. In our research, the question is well-defined and it is about the role of leadership in the success of innovation adoption and diffusion within complex healthcare organizations.

The in-depth case studies are most suited to address the 'why' and 'how', what works and what doesn't, provide an explanatory analysis and also help with the induction of new theory or in our case, a new model for leadership in innovation (Gill, 2017). The ethnographic approach to the case studies helped to generate rich data to explain enablers and barriers to innovation as the researcher was completely immersed in the studied environments. Being a multi-site ethnographic study has its limitations in terms of study depth but is characterised by breadth of data collection. It also enables comparison between different innovation environments (Cresswell, 2011) and makes the study outcomes somewhat more generalisable.

The choice of three different and complex innovation case studies was deliberate as they were written at real-time and as innovation processes unfolded. As such, the innovation outcomes are real and the description of success and failure contributory factors is accurate, through the numerous observations, discussions, feedback and interviews of participants. Each case study includes a description of the organization and the context within which it operates, the roles of leaders in the organization and the methodology used to address the question. Successful and failed innovation processes have been observed and evaluated in order to offer the reader a realistic perspective and useful learnings from all of them.

Innovation in healthcare is a political process and influenced by external as well as internal organizational factors. It is important that the evaluation of innovation adoption and diffusion incorporates the in-depth study of innovation processes through the eyes of the participant and researcher, rather than evaluating the outcomes of innovation only. The role of leadership in innovation processes can be better studied through an interpretivist approach rather than a positivist approach (Takian, 2012), which is why we used this approach.

The inclusion of an NHS organization, studied at different points of time, has demonstrated the impact of the different politico-economical and social influences in the process of innovation. We took the opportunity to study case 3 in the context of a global pandemic and post pandemic period, when the NHS has been adjusting to its new normal state. The pandemic has spearheaded innovation acceleration across the UK and globally and emphasized the importance of certain outcomes in our research, such as the role of early top-down and visionary leadership, the commissioning involvement early in the innovation process, the role of middle-level clinical directors and key opinion leaders in the innovation diffusion stage and the role of local (matrix working), regional (integrated care systems) and national partnerships (clinical networks and partnerships).

The study of a private healthcare organization demonstrated that innovation processes are similar in public and private organizations. The impact of top-down visionary leaders, the role of peer and non-peer key opinion leadership, the importance of the clinician agent of innovation who sits between executive sponsorship and front-line clinicians and the

requirement for commercial and non-commercial partner engagement are key commonalities. What is different in the commercial sector is the role of commissioning, the organizational readiness for innovation and the internal resources and capabilities which are stronger in entrepreneurial commercial organizations. The lack of organizational resources and the lack of cultural readiness for innovation was evident in case 1 which led to the proposed innovation not being adopted. In contrast, case 3 show the same organization being able to progress a number of innovations at the same time, within a challenged and competitive environment. The large shift in the organizational readiness for innovation was triggered through the introduction of integrated care systems (ICS).

Although ICS leadership has not yet been defined and organised fully, system leaders have set a rich innovation agenda for the next five years. Inevitably, the delivery of the innovation outcomes will need dedicated clinicians working in positions of power and decision-making. A number of new clinical leadership roles are being currently created to engage the clinical community as a result. The clinician of the future will have a diverse role portfolio compared to what front-line clinician have at present, which is purely service provision. This will require leadership training that starts earlier in the clinician educational curriculum, even at the undergraduate stage and should be supplemented with postgraduate and on the job leadership training.

We have identified two limitations in our study which need to be taken into account by the readers, these are the following:

- The three case studies and the ethnographic approach used by the researcher did not allow for a large number of formal interviews to be done. The collection of information was done opportunistically and the researcher kept a diary of meetings, observations, events and shared learnings.
- The case studies took place in a single country and therefore the results and recommendations cannot be fully generalized for all healthcare organizations globally. However, any healthcare organization can use our model as a basic framework of leadership in innovation on which to build on their innovation and transformation strategy.

We believe that our innovation model can be applicable to any healthcare organization who is embarking or are already well into their journey of innovation and transformation. It offers useful insights into the process of innovation using real life data from public and private healthcare organizations and learnings from successful and failed innovation processes.

Appendix 1 – Field work details for Case studies

Diary of field work consisting of meetings, observations, interviews – Doctorate Business Administration – A manual guide to healthcare innovation success

<u>**Case 1: Digital Innovation (2017-19)**</u>

(20TH October 2017 - 1h) meeting between PK and the Innovation Team (including clinical director – RK) at UHCW, about PK's innovation idea, following which an App company was approached.

(October-November 2017 meetings - 3 hours) with Transformation Manager (AG) and Innovation director (RK) regarding the virtual clinic innovation idea and shaping the innovation proposal.

(November 2017 – 1h with Transformation Director DW) when PK presented the already collected evidence for remote patient monitoring (financial and non-financial benefits).

(Early December 2017 - 1h) preparation meeting with Innovation Manager (HT) to present the Innovation proposal at Ideas (late Den Dec17) in front of Executives and Chairman of UHCW.

(Meetings between App owner and PK - 3h/Dec17) to prepare clinical survey and project timeline in order to present proposal to clinical leads and the Trust.

(Dec17 – 1h) Presentation of innovation proposal by PK to cancer clinical lead (LF) as the innovation was concerned cancer services.

Ideas Den Presentation and discussion (Dec17 – ½ hour) following which the Idea was approved for further development.

(2h meetings - Jan18) with Warwick Medical School Professor (FG) to prepare proposal for digital innovation in acute oncology

(½ h presentation at Oncology QIPS – Jan18) Virtual clinic Innovation rollout.

(Weekly 1h meetings - Jan18 to July 18) with team to prepare and submit the Innovate UK proposal**.**

FG and PK introductory meeting with Skylark SME **(Jan18 – 1h)**

Face to face meeting with Skylark **(22/2/18 - 1h)** followed by further discussions UHCW Chiefs **(27/2/18 – 1h).**

March 2018 (1h) – meeting to discuss project commitment doubts with UHCW – Chiefs, commercial, RnD and clinical teams

Warwick Business School fellow starts observing weekly meetings 20/3/18

(1h - April 18) Presentation and discussion regarding the ethics and the development of an AI Chatbot in oncology – WMS Professor

(May 2018 – 1h) phase I NHS Test Bed passed – team meeting for next steps

(May 2018 – 1h) IP presentation

(May 2018 – 1h) Patient Public Involvement – workshop

(June 2018 1h -meeting) with Deep Mind re – AI component

(June 18 -1h) Analysis of contribution from all parties including JES forms

(July 2018 – ½ hour) Interview with GK research fellow re multi-stakeholder engagement with innovation.

(July 2018 – 2h) Meeting to address Response to Innovate UK reviewers' comments for phase 2.

(13/8/18 - 1h) Innovate UK final interview in London.

(September 2018 – 1h) Meeting with MS WBS Professor of Digital following the announcement that we have not been given the fund. Trying to find ways to proceed with the project implementation.

(October 2018 – 2h) IBM meetings and Medopad engagements to discuss project and find alternative partners.

(November 2018 – 1h) meeting with IBM and charity presentation (PK), revive project, break down into mini projects eg, portal etc.

(February 2019 – 1h) Meeting with Academic Science network at WMS to discuss project support resources.

(March 2019 - STP presentation on cancer remote eMDTs **– ½ hour)** and a similar innovation (remote patient monitoring presented at GenesisCare UK **– 1h).**

(April 2019 – 1h) Pfizer engagement and pitching the Innovate UK project to them and IBM.

(April19 – Dec19 – 5h total) Series of Pfizer engagement meetings including Innovation team and R&D AT UHCW. FINAL PROPOSAL AND ROI PAPER FALLS THROUGH DEC19 DUE TO COMPLEX 3-PARTY CONTRACT ARRANGEMENTS. Project stalls December 2019.

Case 2: September 2018 – December 2019
- 45 stakeholder interviews (1h each)
- Weekly (1h) Cancer Service of the Future innovation meetings between Sept18 and Dec19, discussing strategy and implementation of innovation program

Case 3 – Transformation program 2020-21

November 2020 – April 2021
- Weekly 1h clinical lead meetings discussing strategy, operational issues and opportunities for transformation.
- Monthly Chief Officer forum meetings discussing challenges and opportunities (2h per forum).
- Surgical Strategy Meetings – 2h
- Business care presentation for breast surgical consultant – 20min

Total Field work during DBA (hours): 212 hours

Chapter 11. References

1. Albury D (2005). Fostering Innovation in Public Services. Public Money and Management
2. Al-Haddad S and Kotnour T (2015). Integrating the organizational change literature: a model of successful change. Journal of Organizational Change Management 28(2):234-262
3. Alonso JM, Clifton J and Diaz-Fuentes D (2016). Public-private partnerships for hospitals: does privatisation affect employment? JSCAN 2(4):313-325
4. Amabile TL (1998). How to kill creativity. Harvard Business Review. 77-87
5. Anderson L (2006). Analytic autoethnography. Journal of Contemporary Ethnography 35(4): 373-395
6. Anderson N, De Breu CKW, Nijstad BA (2004). The routinisation of innovation research: a constructively critical review of the state-of-the science. Journal of Organisational Behaviour 25;147-173
7. Arena MJ and Uhl-Bien M (2016). Complexity Leadership Theory: Shifting from Human Capital to Social Capital. People and Strategy 39(2)
8. Ashworth, RE, McDermott AM and Currie G (2018). Theorizing from qualitative research in Public Administration: Plurality through a combination of rigor and richness. Journal of Public Administration Research and Theory, 1–16
9. Atkinson P and Hammersley M. Ethnography and Participant Observation. 1995. Pages 248-261
10. Asgari A et al (2008). The Relationship between Transformational Leadership Behaviors, Organizational Justice, Leader-Member Exchange, Perceived Organizational Support, Trust in Management and Organizational Citizenship Behaviors. European Journal of Scientific Research 23(2): 227-242
11. Ash J (1997). Organizational Factors that Influence Information Technology Diffusion in Academic Health Sciences Centers. J of American Medical Informatics Association 4(2):102-11
12. Ash JS and Lorenzi NM (2017). Organizational and Behavioural issues. Key advances in Clinical Informatics. Chapter 9.
13. Barker PM, Reid A and Schall MW (2016). A framework for scaling up health interventions: lessons from large-scale improvement initiatives in Africa. Implementation Science 11;12
14. Barlow JG (2013). Strengthening the spread of innovation in the UK's National Health Service. Handbook on innovation in public services. Chapter 35.
15. Barnett J, Vasileiou K, Fayika D et al (2011). Understanding innovators' experience of barriers and facilitators in implementation and diffusion of healthcare service innovations: a qualitative study. BMC Health Services Research 11(342).
16. Basch E, Deal AM, Dueck AC, et al (2017). Overall survival results of a trial assessing patient-reported outcomes for symptom monitoring during routine cancer treatment. JAMA
17. Bason C. Leading public sector innovation. Second Edition. Policy Press 2018.
18. Bass, B. M. 1988. The inspirational processes of leadership. The Journal of Management Development, 7: 21-31.
19. Bate P (2000). Changing the Culture of a Hospital: from hierarchy to networked community. Public Administration 78(3): 485-512
20. Bates DW, Sheikh A and Asch DA (2017). Innovative Environments in Healthcare: Where and how new approaches to care are succeeding. Health Affairs 36(3):
21. Batt-Rawden KB, Bjork E., Waaler D. (2017). Human factors in implementation and adoption of innovations in healthcare services: a longitudinal case study on the introduction of new technology. The innovation journal 22(3): article 3

22. Baxter S, Johnson M, Chambers D et al (2018). The effects of integrated care: a systematic review of UK and international evidence. BMC Health Services Research 18:350

23. Beer M (2020). Making a difference: Developing Actionable knowledge for practice and theory. The Journal of Applied Behavioural Science 56(4): 506-20

24. Berkhout AJ, Hartmann D, van der Duin P and Ortt R (2006). Innovating the innovation process. International Journal of Technology Management 34(3/4): 390-404

25. Berwick DM (2003). Disseminating innovations in healthcare. JAMA 289(15):1969-1975

26. Bessant J and Davis F (1999). Developing strategic continuous improvement capability. International Journal of Operations & Production Management, Vol. 19 No. 11, 1999, pp. 1106-1119.

27. Bessant J (2008). Dealing with discontinuous innovation: European experience. Int. J. Technology Management, Vol. 42, Nos. ½

28. Bessant J and Tidd J (2013). Managing Innovation. Accessed from www.innovation-portal.info

29. Bhattacharyya O, Khor S, McGahan A et al (2010). Innovative health service delivery models in low and middle income countries – what can we learn from the private sector. Health Research Policy and Systems 8;24:

30. Birken S., Lee SYD, Weiner BJ (2011). Uncovering middle manager role in healthcare innovation implementation. Implementation Science, 7(28)

31. Blizzard JL and Klotz LE (2012). A framework for sustainable whole systems design. Design Studies 33;456-479

32. Bloch C and Bugge M (2013). Public sector innovation – From theory to measurement. Structural Change and Economic Dynamics 27:133-145

33. Blumenthal D and Kilo CM (1998). A report card on continuous quality improvement. Milbank Quarterly,76(4)

34. Boer H and Gertsen F (2003). From continuous improvement to continuous innovation: a (retro)(per)spective. International Journal of Technology Management 26(8).

35. Bolwijn, P and Kumpe, T (1990). Manufacturing in the 1990s - productivity, flexibility and innovation. *Long range planning*, *23*(4), 44-57. https://doi.org/10.1016/0024-6301(90)90151-S

36. Boonstra A, Versluis A and Vos JFJ (2014). Implementing electronic health records in hospitals: a systematic literature review. BMC Health Services Research 14:370

37. Bourgeois LJ, Brodwin DR. (1984). Strategic Implementation: Five approaches to an elusive phenomenon. Strategic Management Journal, 5:241-264

38. Brady, A (2020). The Virtuous Circe of Innovation Management. ISOFocus.

39. Braithwaite J (2018). Changing how we think about healthcare improvement. BMJ 2018;361: k2014

40. Brown BB et al (2014). Clinician-led improvement in cancer care (CLICC), testing a multifaceted implementation strategy to increase evidence-based prostate cancer care: phased randomised controlled trial - study protocol. Implementation Science 2014, 9:64

41. Bunduchi R, Smart A, Charles K et al (2015). When Innovation fails: an institutional perspective of the (non)adoption of boundary spanning IT innovation. Information and Management 52: 563-576

42. Burnes B (2014). Kurt Lewin and the Planned Approach to Change: A Re-appraisal. Journal of Management Studies 41(6): 977-1002

43. Burgess N and Currie G (2013). The knowledge brockering role of the hybrid middle level manager: the case of healthcare. British Journal of Management 24;S132-S142

44. Burgess, N, Currie G, Crump B, Richmond J and Johnson M (2019). Improving together: collaboration needs to start with regulators. BMJ 367;367:l6392

45. Cain M and Mittman R (2002). Diffusion of innovation in healthcare. California Healthcare Foundation.

46. Care Quality Commission (2019). The State of Health Care and Adult Social Care. Accessedfromhttps://www.cqc.org.uk/sites/default/files/20191015_stateofcare1819_summary.pdf

47. Carreiro H and Oliveira T (2019). Impact of transformational leadership on the diffusion of innovation in firms: Application to mobile cloud computing. Computers in industry 107: 104-113

48. Castle-Clarke S, Edwards N and Buckingham H (2017). Falling short: Why the NHS is still struggling to make the most out of new innovations. The Nuffield Trust.

49. Chen H, Li L and Chen y (2021). Explore success factors that impact artificial intelligence adoption on telecom industry in China. Journal of Management Analytics, 8:1, 36-68

50. Chesbrough H and Bogers M. Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation (April 15, 2014). Henry Chesbrough, Wim Vanhaverbeke, and Joel West, eds. New Frontiers in Open Innovation. Oxford: Oxford University Press, (pp. 3-28).

51. Chuttur MY (2009). Overview of the Technology Acceptance Model: origins, development and future direction. Indiana University USA. Sprouts: working papers on information systems 9(37).

52. Cillo P (2005). Fostering market knowledge use in innovation: the role of internal brokers. European Management Journal 23(4):404-412

53. Ciuman RR (2017). Cochlea – A physiological description of a finely structured sense organ. Advances in Clinical Audiology. DOI: 10.5772/66316

54. Clay-Williams R et al (2017). Medical leadership, a systematic narrative   review: do hospitals and healthcare organisations perform better when led by doctors? BMJ Open 2017;7:e014474. doi:10.1136/bmjopen-2016-014474

55. Coetsee L (1999). From resistance to commitment. Public Administration Quarterly. 1999;23(2):204–22

56. Coetsee, LD (2011). Peak performance and productivity: a practical guide for the creation of a motivating climate. Potchefstroom: Ons drukkers

57. Cole, S (2005). Action Ethnography: participant observation. Tourism Research Methods: Integrating Theory with Practice. 63-72.

58. Collins B. Adoption and spread of innovation in the NHS. The King's Fund. 2018

59. Conner D (2004). White paper. How to be an effective sponsor of major organizational change

60. Cooper RG (1999). The invisible success factors in product innovation. Journal of Prod Innovation Management 16:115-133

61. Corrigan P, Craig G et al (2013). People powered commissioning. Nesta.

62. Corso M and Pellegrini L (2007). Continuous and Discontinuous innovation: Overcoming the innovator dilemma. Creativity and Innovation Management 16(4):333-347

63. Counte MA and Meurer S (2001). Issues in the assessment of continuous quality improvement implementation in healthcare organizations. International journal for quality in healthcare 13(3):197-207

64. Cresswell, Kathrin, Worth, Allison, Sheikh, Aziz. (2011). Implementing and adopting electronic health record systems: how actor-network theory can support evaluation. Clinical

Governance: an international journal. 16(4):320-336

65. Cresswell KN, Sheikh A (2016). Catalysing health information technology innovation in the NHS. Journal of the Royal Society of Medicine 109(12):439-440

66. Cresswell KM, Cunningham-Burley S, Sheikh A (2016). Creating a climate that catalyses healthcare innovation in the UK – learning lessons from international innovators. J Innov Health Inform., 23(4):772-782

67. Cresswell KM and Seikh A (2016). Undertaking sociotechnical evaluations of health information technologies. Journal of Innovation in Health Informatics, 21(2)

68. Crevani L, Lindgren M and Packendorff J (2007). Shared leadership: a post-heroic perspective on leadership as a collective construction. International Journal of Leadership Studies 3(1): 40-67

69. Crompton-Phillips A (2020). Spreading at scale: A practical leadership model for change. NEJM Catalyst, 1(1) January-February 2020

70. Cunningham B and Kempling J (2009). Implementing change in public sector organizations. Management Decision 47(2):330-344

71. Currie G, Gulati K, Sohal A et al (2021). Distributing systems level leadership to address the COVID-19 pandemic. BMJ Leader; 0:1-6. doi:10.1136/leader-2020-000280

72. Currie G and Spyridonidis D (2018). Sharing leadership for diffusion of innovations in professionalised settings. Human Relations 1-25

73. Currie G and Lockett A (2011). Distributing leadership in health and social care: concertive, conjoint or collective?. International Journal of Management Reviews 13;286-300

74. Damanpour F and Schneider M (2006). Phases of the adoption of innovation in organizations: Effects of the environment, organization and top managers. British Journal of Management 17:215-236

75. Damschroder LJ, Aron DC, Keith RE, Kirsh SR et al (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation Science, 4:50

76. Das R (2016). Five technologies that will disrupt healthcare by 2020. Periodical. Forbes. March 2016.

77. Day G, Shea G (2018). Grow faster by changing your innovation narrative. MIT Sloan Management Review.

78. Denis JL, Hebert Y, Langley A et al (2002). Explaining diffusion patterns for complex health care innovations. Health care Manage Review, 27(3):60-73

79. Department of Health (2021). Integration and Innovation: working together to improve health and social care for all.

80. Dillon A and Morris M (1996). User acceptance of new information technology: theories and models. Annual Review of Information Science and Technology 14(4): 3-32

81. Dixon-Woods M, Amalberti R, Goodman S et al (2011). Problems and promises of innovation: why healthcare needs to rethink its love/hate relationship with the new. BMJ Qual Saf, 20(Suppl 1): i47-i51

82. Doherty J (2013). Strengthening clinical leadership in hospitals. Municipal Services Project Policy Brief.

83. Dopson S, FitzGerald L, Ferlie E et al (2002). No magic targets! Changing clinical practice to become more evidence-based. Health Care Manage Rev, 2002, 27(3), 35–47

84. Duggal R, Brindle I and Bagenal J (2018). Digital Healthcare: regulating the revolution. Editorial. BMJ 360;k6

85. Edmonstone J (2009). Clinical Leadership: the elephant in the room. International Journal of Health Planning and Management 24:290-305

86. Etzkowitz H (2013). Innovation in innovation: The triple helix of university-industry-government relations. Social science information, 42(3):293-337

87. Ferlie E, Fitzgerald L, Wood M, Hawkins C (2005). Academy of Management Journal 48(1): 117-134

88. Ferlie E and McGivern (2013). Bringing Anglo-Governmentality into Public Management Scholarship: the case for evidence-based medicine in UK health care. JPART 24:59–83

89. Fleuren M, Wiefferink K, Paulussen T (2004) Determinants of innovation within health care organizations: literature review and Delphi study. Int J Qual Health Care. 2004 Apr; 16(2):107-23

90. Flodgren G, Parmelli E, Doumit G, et al. (2011). Local opinion leaders: effects on professional practice and health care outcomes. Cochrane Database Systematic Reviews CD000125.

91. Frieden TR (2014). Six Components Necessary for Effective Public Health Program Implementation. Am J Public Health 104:17-22.

92. Fukofuka S, Lokke DT (2015). OCTAPACE and organisational resilience: A correlational study. OJBMR 4(1):1-10

93. Gartner WB (1990). What are we talking about when we talk about entrepreneurship? Journal of Business Venturing 5, 15-28

94. Gill, R and Borycki EM (2017). The use of case studies in systems implementations within healthcare settings: a scoping review. Building capacity for health informatics in the future. Stud Health Technol Inform 234:142-149

95. Glew J (2002). Whole systems thinking in health and social care. Woodville consultancy.

96. Gotham H (2004). Diffusion of mental health and substance abuse treatments: development, dissemination, implementation. Clinical Psychology Science and Practice V11 (N2).

97. Greenhalgh T, Robert G, Macfarlane F et al (2004). Diffusion of innovations in service organisations: systematic review and recommendations. The Milbank Quarterly, 82(4): 581-629

98. Greenhalgh T, Humphrey C. Hughes J et al (2009). How do you modernize a health service? A realist evaluation of whole scale transformation in London. The Milbank Quarterly 87(2):391-416

99. Greenhalgh T, Procter R, Wherton J et al (2012). The organising vision for telehealth and telecare: discourse analysis. MBJ Open 2

100. Greenhalgh T., Wherton, J., Papoutsi C. et al (2017). Beyond adoption: A new framework for theorizing and evaluating nonadoption, abandonment and challenges to the scale-up, spread and sustainability of health and care technologies. Journal of Medical Internet Research, 19(11):e367

101. Greenhalgh T., A'Court C., Shaw S. (2017). Understanding heart failure: explaining telehealth – a hermeneutic systematic review. BMC Cardiovascular Disorders, 17:156

102. Greenhalgh T., Wherton J., Papoutsi C. et al (2018). Analysing the role of complexity in explaining the fortunes of technology programmes: empirical application of the NASSS framework. BMC Medicine, 16:66

103. Greenhlagh T and Papoutsi C (2018). Studying complexity in health services research: desperately seeking an overdue paradigm shift. BMC Medicine 16(95)

104. Greenhalgh T (2018). How to improve success of technology projects in health and social care. Public Health Research and Practice 28(3)

105. Greenhalgh T and Papoutsi C (2019). Spreading and scaling up innovation and improvement. The BMJ 365: I2068

106. Greszczuk C, Mughal F, Mathew R and Rashid A (2018). Peer influence as a drive of technological innovation in the UK National Health Service: a qualitative study of clinicians' experiences and attitudes. BMJ Innovation 4:68-74

107. Griffiths F, Bryce C, Cave J et al (2017). Timely Digital Patient-Clinician Communication in Specialist Clinical Services for Young People: A Mixed-Methods Study (The LYNC Study). J Med Internet Res 19(4);e102

108. Grimshaw J, Eccles M, Thomas R, Maclennan G, Ramsay C, Fraser C, et al. (2006). Toward evidence-based quality improvement. Evidence (and its limitations) of the effectiveness of guideline dissemination and implementation strategies. Journal of General Internal Medicine Suppl 2:S14-S20.

109. Hao B, Feng Y, Iles P and Brown N (2017). Rethinking distributed leadership: dimensions, antecendents and team effectiveness. Leadership and organization development journal 38(2).

110. Haritou C., Markides C. (2013). Responses to disruptive strategic innovation. Magazine. Sloan Management Review.

111. Harris M., Bhatti Y. (2016). The Global Diffusion of Healthcare Innovation: Making the Connections. World Innovation Summit for Health.

112. Harwich E., Laycock K. Thinking on its own: AI in the NHS. Nuffield Bioethics Council. 2018.

113. Helfrich CD, Weiner BJ, McKinney MM and Minasian L (2007). Determinants of Implementation Effectivenss: Adapting a Framework of Complex Innovations. Medical Care Research and Review 64(3): 279-303

114. Herscovitch, L and Meyer JP (2002). Commitment to organizational change: Extension of a three component model. Journal of Applied Psychology, 87(3): 474-487

115. Herzlinger R (2006). Why Innovations in Healthcare fail. Harvard Business Review. 2006 review.

116. HM government. UK Research and Development roadmap. July 2020.

117. Hodgetts BT (2020). Innovating at pace during crisis – military lessons for the COVID environment. BMJ Leader 4:105-108

118. Honeyman M, Dunn P and McKenna H (2016). A digital NHS? An introduction to the digital agenda and plans for implementation. The King's Fund. September 2016.

119. Horton TJ, Illingworth JH, Walburton WHP (2018). Overcoming challenges of codifying and replicating complex healthcare interventions. Health Affairs 37;2

120. Hunter ST, Cushenbery L, Friedrich T. (2012). Hiring an Innovative workforce: a necessary yet uniquely challenging endeavor. Human Resource Management Review 22:303-322

121. Jones B, Horton T and Walburton W (2019). The Improvement journey. The Health Foundation.

122. Judson A. Changing behavior in organizations: Minimizing resistance to change. Cambridge, MA: Blackwell Publishing. 1999.

123. Kania J and Kramer M (2011). Collective Impact. Stanford Social Innovation Review. Winter 2011.

124. Klein KJ, Sorra JS (1996). The challenge of innovation implementation. Academy of Management, 21(4):1055-80

125. Koryak O, Lockett A, Hayton J et al (2018). Disentangling the antecedents of ambidexterity: Exploration and exploitation. Research Policy 47 (2018) 413–427

126. Kotter JP (2007). Leading Change; Why Transformation Efforts Fail. Harvard Business Review

127. KPMG (2017). Re-thinking public-private partnerships for universal healthcare.

128. Kremer H, Villamor I and Aguinis H (2019). Innovation leadership: Best-practice recommendations for promoting employee creativity, voice, and knowledge sharing. Business Horizons 62; 65-72

129. Kuratko DF, Hornsby JS and Covin JG (2014). Diagnosing a firm's internal environment for corporate entrepreneurship. Business Horizons 57:37-47

130. Lapointe L and Rivard S (2005). A multilevel model of resistance to information technology implementation. MIS Q; 29(3):461–91

131. Lavie D et al (2010). Exploration and Exploitation within and across organisations. The Academy of Management Annals Vol. 4, No. 1, 109-155

132. Lee P (2018). Deloitte's global mobile consumer survey: the UK cut. Accessed at 29.12.19 from https://www2.deloitte.com/uk/en/pages/technology-media-and-telecommunications/articles/mobile-consumer-survey

133. Livi L, Meattini I, Marrazzo L et al (2015). Accelerated partial breast irradiation using intensity-modulated radiotherapy versus whole breast irradiation: 5-year survival analysis of a phase 3 randomised controlled trial. EJC 51(4):451-63

134. Llewellyn S, Procter R, Harvey G et al (2014). Facilitating technology adoption in the NHS: negotiating the organisational and policy context – a qualitative study. Health Services and Delivery Research 2(23).

135. Lundvall BA (2016). Product innovation and user-producer interaction in the Learning Economy and the Economics of Hope. Anthem Press. London 2016.

136. Lyerly HK, Abernethy AP, Stockler MR et al (2011). Need for Global Partnership in Cancer Care: Perceptions of Cancer Care Researchers Attending the 2010 Australia and Asia Pacific Clinical Oncology Research Development Workshop. J Oncol Practice 2011 Sep; 7(5): 324–329.

137. Mair FS, May C, O'Donnell C et al (2012). Factors that promote or inhibit the implementation of e-health systems: an explanatory systematic review. Bull World Health Organ 90:357-364

138. Mani Z, Chouk I (2018). Consumer resistance to innovation in services: Challenged and Barriers at the Internet of Things era. Journal of product innovation management, 35(5):763-807

139. Mannion R and Davies H (2018). Understanding Organizational culture for healthcare quality improvement. BMJ 2018;363: k4907

140. March JG (1991). Exploration and exploitation in Organizational Learning. Organizational Science 2(1):71-87

141. Martin JL, Norris B, Murphy E and Crowe J (2010). Design for patient safety: User testing in the development of medical devices. National patient safety agency.

142. Martin GP, Weaver S, Currie G et al (2012). Innovation sustainability in challenging health-care contexts. Health Services Management Research 25:190-199

143. Martin GP, Waring J (2012). Leading from the middle: constrained realities of clinical leadership in healthcare organizations. Health, 17(4):358-374

144. Martin JL, Norris BJ, Murphy E and Crowe J (2008). Medical device development: the challenge of ergonomics. Applied Ergonomics 39(3): 271-83

145. Martinez-Cardoso D (2014). Taylor's Scientific Management Principles in current organizational management practices. Organizational Behaviour and Leadership s141180

146. Martins R, Oliveira T, Thomas MA (2016). An empirical analysis to assess the determinants of SaaS diffusion in firms. Computers in Human Behavior 62:19-33

147. May CR, Johnson M and Finch T (2016). Implementation, context and complexity. Implementation Science 11;141

148. Maylor HR, Turner NW and Murray-Webster R (2013). How hard can it be? Actively managing complexity in technology projects. Research Technology Management 56(4):45-51

149. McKee L, Charles K, Dixon-Woods, M et al (2013) New and Distributed Leadership in quality and safety in healthcare, or old and hierarchical? An interview

150. McNally N, Kerrison S and Pollock AM (2003). Reforming Clinical Research and Development in England. BMJ 327:550-3

151. Micheli P, Schoeman M, Baxter D and Goffin K (2015). New Business Models for Public Sector Innovation. Research Technology Management. 51-57

152. Mikhailova O. (2018). Adoption and implementation of new technologies in hospitals: a network perspective. IMP Journal, 12(2):368-391

153. Millar CJM, Groth O and Mahon JF (2018). Management innovation in a VUCA world: challenges and recommendations. California Manag Review 61(1):5-14

154. Money AG, Barnett J, Kuljis J et al (2011). The role of the user within the medical device design and development process: medical device manufacturers' perspectives. BMC Medical Informatics and Decision making 11:15

155. Nemeth C, Wears R, Woods D et al (2008) Minding the Gaps: Creating resilience in Healthcare. In Advances in Patient Safety: New Directions and Alternative Approaches (Edited by Henriksen K et al Vol. 3: Performance and Tools). Agency for Healthcare Research and Quality.

156. Newman SP, Bardsley M, Barlow J et al (2011). Whole Systems Demonstrator Programme. https://www.city.ac.uk/__data/assets/pdf_file/0003/243066/WSD_Exec_Sum_28th_20Aug.PDF. Accessed on 2d of June 2019.

157. Nilsen ER, Dugstad J, Eide H et al (2016). Exploring resistance to implementation of welfare technology in municipal healthcare services – a longitudinal case study. BMC Health Services Research, 16:657

158. NHS England (2019). Designing integrated care systems in England.

159. NHS England (2019). Breaking down barriers to better healthcare.

160. NHS Confederation (2021). Integration and innovation: working together to improve health and social care for all. February 2021.

161. O'Connor S, Hanlon P, O'Donnell CA et al (2016). Understanding factors affecting patient and public engagement and recruitment to digital health interventions: a systematic review of qualitative studies. BMC Medical Informatics and Decision Making 16;120

162. Oke A, Munshi N and Walumbwa MO (2008). The Influence of Leadership on Innovation Processes and Activities. Organizational Dynamics 38(1): 64-72

163. Omachonu VK, Einspruch NG (2010). Innovation in healthcare delivery systems: A conceptual framework. The Innovation Journal 15(1).

164. Ovretvbt J, Scott T, Rundall T et al (2007). Improving quality through effective implementation of information technology in healthcare. International Journal for Quality in Healthcare, 19(5):259-266

165. Papanicolas I, Mossialos E, Gundersen A et al (2019). Performance of UK National Health Service compared with other high income countries. BMJ 367; l6326

166. Peak, M., Burke, R., Ryan, S., Wratten, K., Turnock, R. and Vellenoweth, C. (2005). "Clinical governance – the turn of continuous improvement?", *Clinical Governance: An International Journal*, Vol. 10 No. 2, pp. 98-105.

167.   Pennings JM. and Harianto F (1992). The diffusion of technological innovation in the commercial banking industry. Strategic Management Journal 13: 29-46

168.   Perkins M, Bauld L and Langley D (2010). Learning from the partnership literature. Implications for UK universities/NHS Relationships. Journal of Research Administration XLI(1): 49-64

169.   Pettigrew AM (1992). The character and significance of strategic process research. Strategic Management Journal 13: 5-16

170.   Porter ME, Lee TH (2013). The strategy that will fix health care. Harvard Bus Rev. October 2013. Accessed December 24, 2019. https://hbr.org/2013/10/the-strategy-that-will-fix-health-care

171.   Powell A and Davies h (2016). Managing doctors, Doctors managing. Nuffield Trust.

172.   Pryor MG, Anderson D, Toombs L and Humphreys JH (2007). Strategic implementation as a core competency. Journal of Management Research, 7(1):

173.   Purification SJ, French JG, d'Agincourt-Canning L (2015). Inequities in access to cancer care in Canada: an ethical perspective. Healthcare Management Forum, 28(6): 265–269.

174.   Ranga M. and Etzkowitz H. (2013). Triple Helix systems: an analytical framework for innovation policy and practice in the knowledge society. Industry and higher education, 27(3):237-262

175.   Reissner S, Pagan V and Smith C (2011). 'Our Iceberg is Melting': Story, metaphor and the management of organisational change. Culture and Organization 17(5): 417-433tn

176.   Roberts J (2018). Unlocking the opportunities for healthcare delivery transformation. NEJM Catalyst.

177.   Rogers EM. Diffusion of Innovations. Fourth Edition. 1995. New York Free Press.

178.   Rogers EM. The definition and measurement of innovation. The Melbourne Institute working paper No. 10/98. May 1998.

179.   Rogers, EM (2003). Diffusion of Innovations. 5th edition. Simon and Schuster.

180.   Ross J., Stevenson F., Lau R., Murray E. (2016). Factors that influence the implementation of e-health: a systematic review of systematic reviews. Implementation Science, 11:146

181.   Rostain M (2021). The impact of organizational culture on entrepreneurial orientation: A meta-analysis. Journal of Business Venturing Insights 15: e00234

182.   Ryan, RM and Deci EL (2000). Self-determination theory and the facilitation of intrinsic motivation, social development and wellbeing. American Psychologist 55(1):68-78

183.   Sahin I. (2006). Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Roger's theory. The Turkish online journal of educational technology 5(2): article 3

184.   Savas ES (2005). Privatisation and Public Private Partnerships. Adapted from Privatization in the City: Successes, Failures, Lessons (Washington, DC: CQ Press, 2005), chapter 1.

185.   Social Care Institute for Excellence (2018). Leadership in Integrated Health Systems. Future of care, Number 9.

186.   Shah SGS and Robinson I (2007). Benefits of and Barriers to involving users in medical device technology development and evaluation. International Journal of Technology Assessment in Healthcare 23(1): 131-137

187.   Shaw J, Shaw S et al (2017). Studying Scale-Up and Spread as Social Practice: Theoretical Introduction and Empirical Case Study. Journal of Medical Internet Research 19(7):e244

188.   Sawhney M, Wolcott RC and Arroniz I (2006). The 12 different ways for companies to innovate. MITSloan Management Review 47(3):75-81

189.   Schoenfeldt LF and Jansen KJ (1997). Methodological Requirements for Studving Creativitv in Organizations. Journal of Creative Behaviour 31(1):73-90

190.   Silow-Carroll et al (2007). HOSPITAL QUALITY IMPROVEMENT: STRATEGIES AND LESSONS FROM U.S. HOSPITALS. Commonwealth Fund.

191.   Silva A (2016). What is Leadership?. Journal of Business Studies Quarterly, vol 8 (1)

192.   Siribaddana P, Hewapathirana R, Sahay S, Jayatilleke A, Vajira HW. (2019). 'Hybrid Doctors' Can Fast Track the Evolution of a Sustainable e-Health Ecosystem in Low Resource Contexts: The Sri Lankan Experience. International Medical Informatics Association (IMIA) and IOS Press. *doi:10.3233/SHTI190448*

193.   Social Care Institute of Excellence. Leadership in Integrated Care systems. Future of Care number 9. November 2018.

194.   Sousa M (2008). Open innovation models and the role of knowledge brokers. www.ikmagazine.com

195.   Stoller JK (2020). Reflections on leadership in the the time of COVID-19. BMJ Leader 4:77-79

196.   Takian A, Petrakaki D, Cornford T, Sheikh A, Barber N. (2012). National NHS Care Records Service Evaluation Team. Building a house on shifting sand: methodological considerations when evaluating the implementation and adoption of national electronic health record systems. BMC Health Serv Res. 12:105.

197.   Timmins, N (2019). Leading for Integrated Care. The King's Fund.

198.   Trastek VF et al (2014). Leadership Models in Health Cared: A Case for Servant Leadership. Mayo Clinical Proceeding 89(3);374-381

199.   Uhl-Bien M and Marion R (2009). Complexity leadership in bureaucratic forms of organizing: A Meso model. Management Department Faculty Publications. 38.

200.   UKRI. Transforming our world with AI. February 2021.

201.   Valente TW and Davis RL (1995). Accelerating the diffusion of innovations using opinion leaders. Annals AAPSS 565

202.   Valente TW and Pumpuang P (2007). Identifying Opinion Leaders to promote behaviour change. Health Education and Behaviour 34(6):881-896

203.   Van de Ven (2017). The Innovation journey: you can't control it but you can learn to maneuvre it. Innovation Organisation and Management. 19(1):39-42

204.   Van Der Duin, P, Ortt, R & Kok M (2007). The Cyclic Innovation Model: A New Challenge for a Regional Approach to Innovation Systems?, European Planning Studies, 15:2, 195-215, DOI: 10.1080/09654310601078689

205.   Van Gemert-Pijnen. J., Nijland N., van Limburg M. et al (2011). A holistic framework to improve the uptake and impact of eHealth technologies. J Med Internet Res, 13(4): e111

206.   Van Limburg M, van Gemert-Pijnen J., Seydel ER. (2011). Why business modelling is crucial in the development of eHealth Technologies. Journal of Medical Internet Research 13(4): e124

207.   Verma JY, Rossiter M., Kirvan K. et al (2013). Going far together: Healthcare collaborations for innovation and improvement in Canada. International Journal of Healthcare Management, 6(2)

208.   Vincent C and Blandford A (2011). Designing for Safety and Usability: User-Centered Techniques in Medical Device Design Practice. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting Sage Publications.

209. Wachter RM (2016). Making IT work: Harnessing the powere of Health IT to improve care in England. National Advisory Group on Health IT in England.

210. Waldman DA and Bass BM (1991). Transformational Leadership at Different Phases of the Innovation Process. The Journal of High Technology Management Research 2(2):169-180

211. Wani TA and Ali SW (2015). Innovation Diffusion Theory. Journal of General Management Research 3(2): 101-118

212. Waring J, Currie G and Bishop S (2013). A contingent approach to the organization and management of public-private partnerships: an empirical study of English health care. Public Administration Review 73:313-326

213. Weintraub P, McKee M (2019). Leadship for innovation in healthcare: an exploration. *Int J Health Policy Management 3:138-144*

214. West MA. (2002). Sparkling Fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups. Applied Psychology: An international review 51(3):355-424

215. West M et al (2017). Caring to change: how compassionate leadership can stimulate innovation in healthcare. The King's Fund. May 2017.

216. Westhorp, G (2014). Realistic Impact Evaluation. An Introduction. A Methods Lab Publication, ODI. September 2014.

217. Widen, K, Olander S and Atkin B (2014). Links between successful innovation diffusion and stakeholder engagement. American Society of Civil Engineers 30(5):04014018

218. Williams R (2016). Why is it difficult to achieve e-health systems at scale? Information Communication and Society 19(4):540-550

219. Williams DJ, Wells O, Hourd P and Chandra A (2008). Feeling the pain: Disruptive Innovation in Healthcare Markets. Innovation in Manufacturing Networks

220. Wilson J., Daugherty P. AI will change health care jobs for the better. Periodical. Harvard Business review. March 2018.

221. Winslow R (2016). New studies rely on the internet for help treating cancer patients. [Blog]. The Wall Street Journal.

222. Yang Z, Sun J, Zhang Y and Wang Y (2015). Understanding SaaS adoption from the perspective of organizational users: A tripod readiness model. Computers in Human Behavior 45: 254-264

223. Jung DI, Chow C and Wu A (2003). The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. The Leadership Quarterly 14: 525-544