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Exploring and Explaining the Role of Boundary Objects in Implementation through the National Institute of Health Research's Collaborations for Leadership in Applied Health Research and Care (NIHR CLAHRCs)

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**Exploring and Explaining the Role
of Boundary Objects in
Implementation through the
National Institute of Health
Research's Collaborations for
Leadership in Applied Health
Research and Care (NIHR
CLAHRCs)**

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Bangor University

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ABSTRACT

Background

In healthcare, bridging the research-to-practice gap is a top priority. In 2008 the National Institute for Health Research (NIHR) funded nine Collaborations for Leadership in Applied Health Research and Care (CLAHRC); NHS-university partnerships seeking to accelerate the uptake of research into practice, a process referred to in this thesis as implementation.

Evidence suggests that implementation might occur more readily when there is collaboration across various stakeholder and organisational boundaries. Boundary objects are shared things and ideas that are thought to enable communication across boundaries and create an opportunity for stakeholders to work together productively. Despite being studied across a range of settings in which collaboration is key, the role and potential of boundary objects remains understudied in relation to implementation. This thesis fills this gap.

Methods

A case study of three CLAHRCs was conducted to explore the role of boundary objects in implementation. Phase 1, a document analysis, identified potential boundary objects (i.e. on paper) across the three cases. In Phase 2, in-depth interviews with people employed in boundary spanning roles in 3 CLAHRCs were conducted to investigate whether and how things and ideas were developed and used as boundary objects during implementation.

Findings

Despite high numbers of potential boundary objects identified on paper through the document analysis (defined in this study as *boundary objects-in-theory*), including care pathways, assessment tools, and disease registers, in practice participants reported that some of these operated to reinforce boundaries. The study showed that there were things and ideas that were shared between stakeholders and enable them to collaborate to varying degrees (defined as *boundary objects-in-use*), including shared ideas around implementation, clinical topics, and some tools and guidelines. However some of these were perceived as prescriptive and imposed, requiring extensive adaptation to

become meaningful to stakeholders. A process of creation and/or adaptation sometimes came about through unanticipated rather than planned processes.

The most effective *boundary objects-in-use* were those which were co-produced in partnership with stakeholders. These were generated through discussions during which boundaries were clarified and solutions were sought to meet stakeholders' needs, a process of collective endeavour identified as a type of *bricolage*. *Boundary objects-in-use* developed through *bricolage* possessed properties which were found to be lacking from those things that failed to make the transition from *boundary objects-in-theory*. Successful *boundary objects-in-use* were symbolically meaningful, resonant, and perceived as authentic by stakeholders.

Discussion

An understanding of boundary objects defined by action-based properties rather than structural features is proposed, updating the classic typology. The study showed that for *boundary objects-in-theory* to make the transition to *boundary objects-in-use*, all relevant stakeholders must be engaged throughout the development process. Individuals working in implementation, such as boundary spanners, were more likely to deploy boundary objects effectively by using the skills of the *bricoleur*, initiating the collective creation and use of such objects.

Implications

The findings from this study suggest that accepting and encouraging adaptation of those things that could in theory be boundary objects through a process of collective *bricolage*, instigated by credible boundary spanners, encourages the co-production of useful *boundary-objects-in-use*. These can represent an effective mechanism to enhance the appeal and relevance of outputs of research by providing a catalyst to align, engage, and accommodate multiple stakeholder perspectives.

CHAPTER 1: INTRODUCTION

Structure of thesis

The thesis comprises a series of chapters, which reflect the structure and progress of the study as a whole.

Chapter 1: Introduction

This chapter provides some background to the study and positions it within the wider context of implementation, the science and practice of accelerating the uptake of research evidence into improved clinical practice. It briefly introduces the overarching policy context against which implementation has developed, and gives an outline of some of the consequences as to why bridging the research-practice gap is important in both terms of efficiency and effectiveness of healthcare services.

Chapter 2: Literature review

The purpose of this chapter is to review the literature relation to implementation and compare and contrast this with bodies of research literature concerned with boundary objects. It provides a more in-depth exploration of some of the key issues highlighted in chapter 1, and sets the scene for the first phase of the study through the identification of common themes and cross cutting issues identified across both bodies of literature. The chapter concludes by articulating the gap in the research relating to the application of the concept of boundary objects to the context of implementation in healthcare.

Chapter 3: Methodology and Methods

This chapter details the way in which the study was conducted, and provided a rationale for the selection of the various data collection and analysis methods that are used within each phase of the study. It explores a number of different research traditions within qualitative research, and represents the grounds for rejecting or selecting each one. It then gives a stage by stage description of the two phases of the study, Phase one and Phase two, to explain how each phase differs in terms of its explanatory or explanatory function. In essence this chapter provides the recipe to show how the study was conducted and why.

Chapter 4: Findings Phase One – Document analysis

This chapter presents the finding of a document analysis conducted as phase one of the study. Phase one has been designed as an exploratory stage, during which things and ideas which could potentially operate as boundary objects are identified in publications produced by the three case study sites.

Chapter 5: Findings Phase Two - Case summaries

This chapter presents the findings from across the three case studies individually, using a framework informed analysis to identify key themes within data contributed by 21 participants in boundary spanning roles sampled from across the three cases.

Chapter 6: Cross case findings

The findings from across the three cases are synthesised in this chapter, comparing and contrasting findings from across each case to deliver an account of the various things and ideas that are used to span boundaries during implementation in the collaborative context of CLAHRC.

Chapter 7: Discussion

An updated typology of boundary objects is proposed as an outcome of the findings from across the three case studies. The way in which boundary objects emerge is explored, and a theory relating to collective bricolage is proposed as providing an explanation as to how some objects become symbolically resonant, remain sufficiently pliable to be adapted to the context of use and user, accommodate the multiple perspectives of stakeholders adequately, to become authentic *boundary objects-in-use*. An updated understanding of boundary objects is proposed, focused on action based properties which are generated through a process of collective endeavour.

Chapter 8: Implications

This chapter focuses on the role of boundary objects in implementation, exploring the implications of applying the insight gained through this study to capitalise on the cohesive properties of boundary objects. Using examples from practice, the chapter concludes that if the concept is to be applied effectively

then an approach which engages stakeholders and endorses stakeholder knowledge, accepts and encourages adaptation, and reflects the context of use and user must be adopted by bringing designers and users of boundary objects together to generate shared objects that are meaningful, resonant and authentic.

Background

Why? Research-practice gap

Globally there has been a move towards becoming more evidence based in healthcare. Despite the requirement for safe and effective practice, there have been challenges getting evidence in practice. This has led to what is known as the 'research-practice gap', a gap between 'what is known' and 'what is done' (Estabrooks, 1999; Davies and Nutley, 2001; Greenhalgh et al, 2004; Estabrooks et al. 2006; Graham et al., 2006).

Consequences of the gap

The length of time taken before new knowledge is applied, and evidence indicating that practitioners may not always practice using the best available knowledge, has serious implications for patients (McGlinn, Asch and Adams, 2003). It has been estimated that this gap has led to over half of all patients receiving suboptimal care (Lang, Wyre and Haynes, 2007). This has particular relevance in terms of the management of long-term chronic conditions (LTCs), which often require extensive and ongoing treatment and respond most effectively to early identification, interventions and self-management. LTCs represent a growing concern in terms of both research and practice due to the economic consequence of treating and managing an increasingly chronically ill patient population. LTCs represent a further challenge in that they are often correlated with high levels of co-morbidities i.e. the multiple vascular, metabolic and osteoarthritic conditions associated with obesity. LTCs also present another challenge, for example whilst much may be known about the increased risks posed by being overweight; the challenge of changing people's behaviour remains problematic.

In the UK, long term conditions (LTC) such a heart disease, diabetes, depression, and obesity, represent growing clinical concerns. The cost of managing these conditions is vast, with the majority of healthcare budgets and hospital beds being taken up by patients with LTC. However, much of the evidence around these conditions suggests that early intervention and self-management represent the most effective and efficient ways of managing LTC.

But despite what we know about the effective management of LTC, the problems associated with managing a growing population with increasing LTC continue to burden NHS. Getting evidence into practice, particularly in terms of changing patient and practitioner behaviour around LTC, has become a national priority (DH, 2013).

In the UK a series of publications highlighted the way in which the research-practice gap was hindering the delivery of safe and effective healthcare. The scene was initially set by the publication of a white paper by the UK Department of Health (DH, 1997), which called for a modernisation of the National Health Service (NHS). The rationale was that the post code lottery of mixed healthcare delivery would be resolved by promoting competition between healthcare providers (DH, 1997). The paper set out a vision of a modernised health service in which best practice guidelines would set the standard for healthcare provision across the UK.

One of the most prominent of these publications was the Review of Health Research Funding by Sir David Cooksey in 2006. 'The Cooksey Report' identified two gaps in the way in which knowledge was produced and subsequently used in practice. Cooksey's 'second gap in translation' pinpoints wasted opportunities in applying knowledge generated as an outcome of research to produce evidence-based products and services. The key point the report made was that exploiting the academic output of higher education had important implications in terms of both allocation and use of funds, and uptake of knowledge into practical products and services, which could be harnessed for both economic and consumer benefit. The report identified how generating a more research-friendly culture in the NHS would help bridge the gap, accelerating the rate at which research knowledge could be applied in practice.

The Cooksey report was followed by the publication of the High Level Group (HLG) on Clinical Effectiveness (2007) which suggested that a more targeted strategy needed to be taken if the UK was to reap the rewards of funded research. The review made the following recommendations:

- Aligning national activities and support
- Promoting local ownership

- Ensuring clinical engagement
- Harnessing the capacities of academia
- The research agenda.

These publications set the scene for a national drive to bring the parallel worlds of research and practice closer together by encouraging collaboration between universities and the NHS.

Collaboration has been described as a key part of getting research into practice, a process known as 'implementation'. Authors such as Greenhalgh (2004), Rycroft-Malone (2004), and Graham (2006) promote collaboration between stakeholders as essential in helping to ensure that the right knowledge is produced for the right purpose and is relevant to the context of application, thereby reducing the likelihood that a division arises between users and producers of research knowledge.

Collaborations for Leadership in Applied Health Research and Care (CLAHRC)

In 2008 the UK government responded to growing evidence that the research practice gap was unacceptable by calling for the establishment of multi-disciplinary research partnerships aimed at accelerating the rate at which research was translated into evidence based care. Named Collaborations for Leadership in Applied Health Research and Care (CLAHRC), these partnerships were intended to connect and align researchers, practitioners, patients and policy-makers to influence the NHS National Institute for Health Research (NIHR's) vision to "improve the health and wealth of the nation through research" (NIHR, p.1). CLAHRCs have been established to foster a collaborative environment and nurture bonds between users and producers, utilising people in boundary spanning roles to cultivate relationships and convey knowledge across the various boundaries that have historically defined the twin worlds of research and practice. The rationale was that bringing knowledge producers and users closer together would inhibit a gap from developing through the production of knowledge that was useful and relevant.

Global context

Globally there has been a move towards establishing similar partnerships intended to bridge the gap between 'knowing' and 'doing'. Canada has been a pioneer of collaborative approaches, where co-production combined with the principles of participatory, action-oriented research provides the back bone for the Canadian Institutes of Health Research (CIHR's) integrated knowledge translation (KT) strategy. Integrated KT involves the establishment of collaborative research partnerships in which researchers and practitioners work together to formulate the research agenda, decide on research questions, interpret study findings, and translate these findings into practice (Tetroe, 2011).

Other adopters of a collaborative approach to bridging the research-practice gap can be found in the Quality Enhancement Research Initiative (QUERI) of the US Veterans Administration, whilst across Australia and the Netherlands similar partnerships were created in the Advanced Health Centres and the Dutch Academic Collaborative Centres for Public Health. In the UK, CLAHRC follows in the footsteps of similar initiatives such as the Academic Health Science Centres (AHSCs), Academic Health Science Networks (AHSNs), Biomedical Research Centres (BRCs) and Units (BRUs) (Rycroft-Malone et al. 2015)

NIHR CLAHRCs typically consist of a regional university partnered with the surrounding NHS organisations. The rationale is that the gap between research and practice will be closed by bringing the producers and users of knowledge together to work collaboratively to address clinical priorities, particularly around the management of long-term conditions (LTC). In England 15.4 million people (over a quarter of the population) suffer from an LTC such as heart disease, diabetes, and depression, with comorbidities rising amongst this group (DH, 2013). The NHS estimates that the number of people with three or more LTCs is expected to increase from 1.9 million in 2008 to 2.9 million in 2018 (DH, 2013). The impact on NHS resources is vast with 50% of all GP appointments and 70% of hospital beds taken up by LTC patients. Overall 70% of hospital and primary care budgets in England are spent on the care and treatment of those with LTC (DH, 2013). Finding ways to improve the efficacy of treatment and enhance the efficiency of healthcare services around LTC is a top priority

amongst commissioners, managers, practitioners and patients. CLAHRCs aim to access the problem solving capacity of higher education by linking researchers directly with clinicians and other stakeholders to address the impact of LTC on NHS budgets.

The nature of the gap - the 'two cultures'

Historically, the division of research from practice has arisen as a consequence of the 'two cultures' of academia and healthcare. Recalling the famous 1959 Rede lecture by CP Snow, the 'two culture' analogy remains an apt description. Snow rallied against the inherent schism that meant the worlds of science and art were divided and apart, ensuring that members of each remained separated in opposing camps, unable to understand the relevance of either to each other. Whilst Snow decried the 'polarization' of art and science, a similar situation has split academics from practitioners, with knowledge producers historically separated from knowledge users. Snow's words remain relevant to this situation, more than 50 years on: "Much of it rests on misinterpretations which are dangerous." (p. 5, Snow, 1959).

The separation between research and practice has been sustained in part by the way in which medical research has focused on drawing participants from patient populations to take part in randomised controlled trials (RCTs), rather than working with patients, carers and practitioners to address stakeholder identified needs. This sense that pure research as an academic pursuit is separate from applied science has driven a divide which has effected both the way in which research is conducted, communicated, disseminated and used.

Evidence valued by researchers vs evidence valued in practice

The division between the 'two cultures' is evidenced by the way in which different forms of knowledge have been perceived, with a contrast between what is valued in theory in comparison to what is valued in practice. Historically there have been arguments about what constitutes valid evidence, where evidence from randomised controlled trials (RCT) has been seen as the 'gold standard' (Sackett et al, 1996). However, implementation scholars have moved

on from the 'paradigm wars' of the 1990s to expand the term 'evidence' to encompass a range of different types of knowledge, for example the work of Rycroft-Malone (2004), who widens the remit of 'evidence' to include research evidence, clinical experience, patient preferences, and knowledge of local context.

At an individual level practitioners value knowledge that is clinically credible, validated by peers and endorsed by opinion leaders; and are more receptive to knowledge reflecting their own practice values (Rycroft-Malone et al., 2004; Barley et al., 2008). At an organisational level, the type of knowledge valued is often that which impacts on cost, quality, and consumer satisfaction (Cain and Mittman, 2002). Power can also play a part in the knowledge validation process indicating a conflict in which knowledge producers inhibit translation of evidence as a means of controlling the process of knowledge legitimization (Ferlie and Wood, 2003). It can be shaped, moulded, and exploited to serve strategic, tactical and opportunistic purposes (de Leeuw et al, 2008). The nature of knowledge can thus be viewed as complex, contextual, and contested.

Why is the gap so difficult to bridge?

Conceptual ambiguity

Despite the drive to get evidence into practice, a persistent sense of conceptual ambiguity has hampered the progress of those seeking to bridge the research-practice gap. This has resulted in a disparate knowledge base which has inconsistently informed healthcare policy and practice (Estabrooks, 1999; Davies and Nutley, 2001; Greenhalgh et al, 2004; Estabrooks et al. 2006; Graham et al., 2006). The mixed terminology used across the field illustrates the depth of this ambiguity: Graham et al (2006) identified 29 phrases linked to the concept of getting evidence into practice, whilst others indicate the real figure is closer to 90 (McKibbon, 2009). However, the multitude of overlapping concepts including knowledge translation (KT), knowledge utilisation (KU), research utilisation (RU), and evidence-based practice (EBP) can be encompassed in the term 'implementation'. The science and practice of implementation is concerned with understanding the complex processes and

interacting mechanisms involved in getting evidence-based knowledge into practice (Eccles and Mittman, 2006).

The challenge of collaboration

The promise of collaboration as a way to build bridges and generate innovative answers has proved alluring across a range of public policy and practice domains, for example teaching and learning, health, and social care. However, in practice it has been harder to achieve. Despite what Williams and Sullivan (2010) describe as 'the collaborative imperative' (p.7), in practice collaboration can be difficult to achieve effectively, and can result in disappointing outcomes. One of the reasons is that in reality, collaboration actually requires more resources such as time, as well as a tolerance of conflict.

There are numerous barriers to collaboration which must be overcome if a partnership is to be successful. Hardy (2004) categorises these as structural, procedural, financial, professional and status legitimacy. Others suggest that collaboration is often hindered by being imposed on already overburdened staff, who struggle to provide the necessary energy and commitment to make partnerships work effectively (Dickinson, 2008; Williams and Sullivan, 2010).

Evidence from the environmental science literature also challenges the assumption of 'the collaborative imperative' (Williams and Sullivan, 2010). Instead Fedeeva (2004) opposes the notion that collaboration generates mutually acceptable solutions achieved in a non-confrontational manner through an efficient process capable of delivering rapid results at reduced cost. Fedeeva (2004) argues that despite universal endorsement of collaborative, multi-stakeholder strategies, queries persist regarding the distribution of the benefits and resource efficiency of such partnerships. For real solutions to be achieved, time, patience and the potential for confrontation must also be given.

Driven by Cooksey's identification of the second gap in translation of research knowledge into applied products and technologies, and further fuelled by popular policy rhetoric endorsing collaboration as a key mechanism for problem solving, there has been a government endorsed move to bring the 'two cultures'

closer together. However, whilst working in partnership as equal footed collaborators may be an ultimate goal of bringing researchers and practitioners together through CLAHRCs, the depth of this schism, both in terms of history and culture, could be difficult to bridge within the expected time scale. This study seeks to understand more about the collaborative climate promoted by CLAHRC on paper, to find out whether or not the closer proximity of researchers and practitioners does promote joined up working, and, if so, whether there are shared things or ideas upon which this process hinges.

Boundaries

Amongst implementation scholars there is agreement that the boundaries facing those who aim to get research into practice are diverse, complex, and contingent on context, requiring collaboration at an individual and organisational level to cross (Larson et al, 1980; Beyer and Trice, 1982; Estabrooks, 1999; Profetto-McGrath et al, 2003; Rycroft-Malone et al, 2004; Baumbusch et al, 2008; Strauss et al, 2009).

A range of boundaries have been identified by implementation scholars. These include professional and hierarchical boundaries distinguishing the various disciplines involved in healthcare delivery (i.e. Allen's 2010 recognition of the division of labour and power between nursing and medical staff), as well as the multiple individual and organisational boundaries which operate across a range of research and practice domains (such as the organisational boundaries which distinguish disciplines and departments in universities).

Whilst boundaries are often represented as barriers (for example Szulanski, 1996, describes how boundaries can hinder the sharing of knowledge between different groups), they can also provide an opportunity for learning through knowledge exchange (for example the work of education scholars such as Engestrom, 1995, describe this process in the context of learning and teaching).

In reality the research-practice gap is not one divide, but multiple complex, intersecting divisions which represent the various stakeholders and organisations involved in getting research into practice. CLAHRCs have been

established to bridge this gap by providing a partnership between universities and surrounding NHS Trusts. However, rather than simply bridging this gap, implementation through CLAHRC has highlighted the complexity of boundaries between the various stakeholders, who are involved in implementing evidence into practice. Some of these boundaries have been invisible or unanticipated, whilst the depth of the divide between the cultures of research and practice has been difficult to span effectively during the limited timeframe of the Collaborations.

Boundary objects

Boundary objects are things or ideas which are used to open up communication between different groups (Carlile, 2002). They possess strong cohesive properties, have multiple meanings, but remain recognisable across different settings (Star and Griesemer, 1989). The concept was proposed by the sociologist Susan Leigh Star in 1989. Star developed the concept following a study of the way in which the Berkeley Zoological Museum was operated during the early part of the 19th century. Using a case study approach based on accessing documents such as diaries and catalogues, Star found that a range of stakeholders were able to coordinate their work to collect, organise, and exhibit specimens, despite often having very different motivations for doing so. Star suggested that the way in which these different groups were able to work together towards achieving a shared task (populating and maintaining the museums catalogue of exhibits), was through the use of shared 'boundary objects'. Star argued that various things were shared between the trappers, natural historians, museum guides, and managers which allowed them to work together, despite having different reasons for doing so. Four types of objects were identified as an outcome of the study:

- Repositories
- Ideal types
- Coincident boundaries
- Standardised forms

Within this typology repositories are represented in the ordered 'piles' of information which can be accessed by a multiple users across different sites, for example libraries, databases, catalogues (p.140). Ideal types refers to the ability of an image or model to represent the key features of a thing, place, phenomenon, without displaying the full range of features or complexity (for example the way in which a model of DNA recalls the double helix structure to mind, but removes the viscerality of the actual cell nucleus).

Coincident boundaries are described as objects sharing boundaries but possessing different internal contents. According to the classic typology these "arise in the presence of different means of aggregating data and when work is distributed over a large-scale geographic area" (p. 410) thus providing a common referent shared between parties whilst preserving different perspectives. Despite working within the same boundaries, geographically or temporally separated parties can work autonomously towards the resolution of party-specific goals rather than a mutual goal. For example, both the trappers and the natural historians in Star and Griesemer's (1989) study both used the outline of the state of California, but emphasised data differently for different purposes: the trappers highlighted well located camping sites whilst the scientists indicated ecological information within the same geographic parameters.

Standardised forms is the most straight forward class of boundary objects, representing a shared format that is used to gather the same information despite being used across different localities. In its simplest guise, a standardised form is precisely that: a means for collecting the same information from every user thus enabling the production of a standardised index. Star and Griesemer (1989) proposed that the advantage of such a method is the generation of certainty through the deletion of local uncertainties.

The concept of boundary objects has become popular across a range of practice-based domains in which collaboration is seen as key. One of the key functions of boundary objects is that they enable "one group to speak to another" (Carlile, 2002). This function is important as it facilitates communication across boundaries, providing a shared language which is adequately meaningful to all stakeholders. Phelps and Reddy (2009) describe

the way in which this feature allows boundary objects to provide a framework for collaboration, around which the work of different groups can be coordinated in order to achieve a common goal. Examples include Phelps and Reddy's (2009) description of the way in which engineers, architects, project managers and construction workers are able to work together on civil engineering projects through the use of architectural plans, despite having different roles and understandings of these plans; or the way in which the members of an orchestra can cooperate to perform a piece of music, despite having different instruments and individual pieces to play (Winget, 2007).

Getting evidence into practice requires a similar level of collaboration amongst a diversity of stakeholders who may have different reasons for participating (for example a commissioner may wish to reach specific targets set out by ministers, whilst a patient may be more concerned about receiving the most effective treatment for their condition). However, despite this focus on collaboration as key element in implementing evidence into practice, boundary objects have yet to be fully investigated within this process (Barret and Oborn, 2010).

Applying the concept of boundary objects to implementation

Current thinking about getting evidence into practice recognises it as a complex, iterative process in which collaboration is key (Kitson et al, 1998; Rycroft-Malone et al, 2004; Graham et al, 2006; Baumbusch et al, 2008; Damschroder et al, 2009). Whilst a variety of artefacts and technologies have been identified as boundary objects operating in healthcare, for example clinical care pathways (Allen, 2010; 2014); the classification of various diseases (Star and Bowker, 1999); and the early exploration of the concept within the context of cancer care by Fujimura (1992), the concept remains understudied in terms of whether it could play a role in getting research into practice. However, the role of boundary objects in collaboration, matched by their function in providing a shared reference point between different stakeholders, indicates that the concept could be relevant to understanding, and potentially encouraging, the successful uptake of research knowledge into clinical practice.

How are boundary objects relevant to bridging the research-practice gap?

A review of both the implementation and boundary object literatures highlighted the potential relevance of boundary objects in bridging the research practice gap through their role in facilitating collaboration, as well as conveying research knowledge across boundaries. Allen's (2009) identification of clinical care pathways provided a starting point suggesting that other artefacts used to carry information and coordinate the delivery of evidence-based healthcare may also operate as boundary objects. Considering the range of intended shared objects that may be passed between different groups as they work together to get evidence into practice widened the possibilities of the types of things ideas that could operate as boundary objects during the implementation process.

The potential of almost anything to possess boundary spanning properties has been argued by authors such as Pennington (2010). Taking on board the implications of this debate, as well as Star's (2010) response that it is scale and scope which govern whether or not an object operates as a boundary object or not (i.e. that a thing's capacity to span boundaries is contingent on the conditions of use and context of user), it can be argued that the application of the concept to the context of implementation is somewhat overdue.

This study

The purpose of this study is to explore whether or not boundary objects play a role when evidence is implemented into practice through the collaborative context of CLAHRC. The study is nested within a wider evaluation of three CLAHRCs, named Ashgrove, Oakdown, and Hazeldean, conducted by Rycroft Malone et al (2015).

This study intends to take forward our understanding of whether or not boundary objects play a role in getting evidence into practice by addressing the following research question:

What do boundary objects mean within CLAHRCs (if anything), how are they represented (if at all), and do they play a role in implementing knowledge into practice?

A multiple case study approach has been taken, in which each CLAHRC represented a single case, within which people in boundary spanning roles ('boundary spanners') are the embedded units. The intention of taking a case study approach was to ensure that each case is studied in depth, without loss of context, to give a rich picture of whether or not there are shared things and ideas that are used by stakeholders who are working together to get research into practice.

The study had a two phased design, and began with an initial exploratory analysis of documents relating to implementation, through the three CLAHRCs, before moving into a second explanatory phase during which 21 participants in boundary spanning roles ('boundary spanners') participated in semi-structured interviews. Some of these interviews were conducted face-to-face (where possible); whilst others were carried out over the telephone. Each interview lasted between 45 and 90 minutes, and was transcribed verbatim using a professional transcription service. The subsequent transcripts were then investigated using a framework analysis influenced approach to produce a set of themes which were compared and contrasted across and between cases.

This study aims to provide a new insight into the way in which boundary objects appear to emerge as both a focus of implementation and, as a response to boundary spanning required for implementation activities to succeed. It suggests that there are many things and ideas which, despite their intention as shared objects, may not always succeed in bringing stakeholders to work together. Instead, a process of collective endeavour is required to generate shared things and ideas that are relevant and meaningful to all stakeholders.

Summary

Rejecting linearity, embracing complexity

The emerging realisation that getting the 'good idea' of research evidence into practice is a complex, inconsistent process with mixed levels of success has become increasingly evident (Greenhalgh et al., 2004; Graham et al., 2006). This gap between 'what practitioners know' and 'what practitioners do' has resulted in high numbers of patients failing to receive recommended levels of care (McGlynn, Asch and Adams, 2003; Lang, Wyer and Haynes, 2007). The

impact of the research-practice gap is clearly demonstrated by studies suggesting that as many as 45-55% of American adults currently receive sub-optimal care (McGlynn, Asch and Adams, 2003, Land, Wyer, and Haynes, 2007; Straus, Tetroe and Graham, 2009). Against this backdrop of failing healthcare systems, the growing recognition of complexity and the rejection of linearity, a growing interest in collaboration as a method to reconcile the research-practice gap has emerged. This is evidenced in the literature by a collective move towards an understanding of implementation as a complex, iterative and dynamic process involving collaboration between multiple stakeholders (Kitson et al, 1998; Rycroft-Malone et al, 2004; Graham et al, 2006; Baumbusch et al, 2008; Damschroder et al, 2009).

Boundary objects are shared things and ideas that have been found to play a role in collaboration by providing a reference point around which communication and cooperation can be coordinated (Star and Griesemer, 1989; Bowker and Star, 1999; Briers and Chua, 2001; Carlile, 2002; Levina and Vaast, 2005; Allen, 2010; Fox, 2011). The concept has been applied across a range of collaborative contexts to show how different stakeholders can work together, despite having different reasons or understandings of the task in hand (Winget, 2007; Phelps and Reddy, 2009). The role of boundary objects in enabling different groups to work together has implications for those seeking to get research into practice, because this process involves collaboration amongst a diversity of different stakeholders.

CHAPTER 2: LITERATURE REVIEW

Chapter overview

This chapter provides a review of the literature relating to the concept of boundary objects, set within the broader context of implementation research and practice.

The chapter begins with an overview of the impact of the research-practice gap on policy and practice in the context of healthcare in the UK. The historical context is discussed, exploring the emergence of evidence-based medicine (EBM) to describe the explosion of evidence-based practice (EBP) in the 1990s. The challenges encountered by those attempting to implement research evidence into practice are explored, examining the progression from traditional single-cycle, didactic approaches towards the current understanding of implementation as a complex, iterative social process requiring stakeholder engagement at an individual and organisational level. A number of theoretical models and frameworks designed to explore, explain and enable implementation will be outlined to highlight the existence of boundaries and the focus on collaboration to bridge these during the implementation process.

The literature relating to boundary spanning is then reviewed, focusing on the different types of boundaries, the characteristics of boundary spanners, and the nature of knowledge to be shared across boundaries. The concept of boundary objects is then introduced, highlighting the role these objects play in enabling different individuals and groups to work together collaboratively towards a shared goal.

Key messages drawn from both bodies of literature are highlighted in consideration of the conceptual overlap between the evidence base around boundary objects and current thinking in implementation. The chapter concludes by proposing that the concept of boundary objects can provide a fresh theoretical lens with which to explore the facilitation of collaboration during implementation in the context of the National Institute of Health Research Collaborations for Leadership in Applied Health Research and Care (NIHR CLAHRCs).

Purpose

The purpose of reviewing the literature is to articulate a gap in the research in terms of the question:

What do boundary objects mean within CLAHRCs (if anything), how are they represented (if at all), and do they play a role in implementing knowledge into practice?

The concept of boundary objects has yet to be explored within implementation. This review therefore also aims to identify the potential relevance of boundary objects to implementation by exploring these bodies of literature.

Approach

The aim of this review is to interpret and synthesise the literature related to implementation and boundary objects (Merriam, 1988). Polit and Becks (2004) strategy was applied to guide the literature search in a systematic manner. This approach can be summarised in the following way:

Box 1: Stages in the search process

- Identify a topic of interest
- Determine inclusion and exclusion criteria e.g. quality, relevance, bodies of literature to be reviewed/excluded
- Using keywords conduct a search
- Review all reference sources, apply inclusion/exclusion criteria to abstract, before retrieving a copy of relevant reference
- Read all relevant material and identify new references through citations, selecting those which meet inclusion criteria
- Organise material in preparation for synthesis

An initial set of exclusion and inclusion criteria was developed, based on the following questions:

1. Is the paper directly relevant to answering all or a part of the research question? For example: does the paper refer directly to implementation (or overlapping terms including knowledge translation, knowledge utilisation, evidence-based practice, quality improvement, etc.), boundary spanning and/or boundary objects within the title and/or abstract?

2. If not recently published (i.e. in the last 5-7 years), is it a seminal/classic paper without which context to the body of literature is lost (include); or is its contribution now out of date (exclude)?
3. Does it meet the Critical Appraisal Skills Programme (CASP) Qualitative Checklist quality criteria?

Despite the pragmatism of selecting these criteria it quickly became apparent that both bodies of literature spanned interlinked domains of knowledge, with overlap into expansive bodies of literature which were too large to be précised effectively within the remit of this study. For example, whilst it was acknowledged that current approaches to implementation were linked to the fields of innovation studies, knowledge management, organisational theory, management studies, a decision was made not to include a review of these bodies of literature as the breadth was too vast to review effectively, and lacked specificity in terms of the research question.

A similar rationale underpinned the decision to circumvent the twin literatures relating to boundary spanning for example the vast body of work around communities of practice, which despite close and intimate links with the concept of boundary objects, has generated an enormous volume of literature in its own right. However, the review highlighted key authors such as Aldrich and Herker (1977), and Tushman (1977) provide a good starting for those wishing to explore the intersection between boundary spanning and organisational studies in greater depth, whilst the work of Kislov et al (2011) as providing a comprehensive and up to date exploration of the role of communities of practice within implementation through the collaborative context of CLAHRCs. Again, the wider literature of collaborative practice was excluded due to the breadth and lack of specificity in terms of this study, although reference is made to authors such as Williams (2012) whose work on boundary spanners provides a helpful cornerstone to understand to the role of these individuals within a UK public policy and practice context.

An iterative approach was applied to ensure that newly accessible sources were reviewed and recent publications sought and found in an on-going manner throughout the conduct of the research years. The search cycle continued using multiple alternative search terms to investigate the implementation literature and the literature relating to boundary objects, specifically seeking items relating to knowledge exchange and collaboration in multi-stakeholder partnerships in healthcare. The search was conducted online, using the Google Scholar search engine to access multiple databases including Medline, Jistor, Emerald and Sage. Material was retrieved, organised according to topic, and key findings summarised and synthesised. These were then collated to generate a list of cross-cutting themes present across both literatures.

The rise of evidence-based practice: efficiency and effectiveness in healthcare

The implementation challenge

Closing the gap between research and practice has become a primary aim of the National Health Service (NHS) in the UK (Cooksey, 2006) and an occupation of healthcare scholars globally. Much has been published regarding the research-practice gap and its impact on patient outcomes (Greenhalgh et al, 2004). However, despite representing a 'good idea', the evidence-based practice (EBP) movement has struggled to transform practice behaviour (Greenhalgh et al 2004).

UK policy context

The policy context of implementation in the UK has been shaped by the publication of a number of key documents: the *House of Lords Select Committee on Science and Technology 1987-1988*, *The New NHS* (DH,1997), Sir David Cooksey's *A Review of UK health research funding (2006)* and *Liberating the NHS* (DH, 2010). The *House of Lords Select Committee* report highlighted the way in which research is often driven by researcher concerns rather than patient, policy-maker and practitioner needs. This creates a situation in which knowledge produced as an outcome of research can lack

resonance amongst knowledge users. The report led to the establishment of the NHS Research and Development Programme: Service Delivery and Operation (SDO), whose recommendations in turn informed the research agenda of the Department of Health (DH).

The publication of two white papers by the UK government placed additional focus on quality improvement and clinical governance in the NHS. Published in 1997, *The New NHS* set out a vision of a modernised health service founded on the principles of dependability and collaboration. For the first time health organisations had a statutory duty to seek quality improvement through clinical governance. The argument was made that the NHS must make better use of its resources, stating that: “Cooperation and efficiency go hand in glove. The proposals ... will produce a new drive on efficiency, quality and performance in the NHS” (p. 11). The report articulated the discrepancy between innovation and uptake acknowledging that whilst evaluation regarding the clinical effectiveness of new technologies was being undertaken, the up-take of research findings remained inconsistent.

In March 2006, Sir David Cooksey undertook an independent review of public funding of health research in the UK. Cooksey identified two gaps in the translation of biomedical science to healthcare. The first gap (T1) arises in the translation of research into ideas and products; the second gap (T2) relates to introducing those ideas and products into clinical practice (p. 85). A consequence of this second gap is that patients and public fail to reap the benefits of innovation in healthcare.

The healthcare policy and practice context again changed following the publication of *Liberating the NHS* in 2010. Whereas *The New NHS* sought to keep practitioners and local health boards at the centre of decision making, *Liberating the NHS* argued that in order to achieve world-class health outcomes the NHS should focus on reaching quality standards. These quality standards would reflect best evidence as published by the National Institute for Clinical Excellence (NICE) guidelines, to provide a benchmark for services commissioned by GP-led consortia working in partnership with local authorities, to ensure a more joined up approach to health and social care.

In 2008, against this policy backdrop characterised by a growing awareness of health inequalities, the impetus of the EBP movement, and driven on the government's strategy 'Best Research for Best Health' (DH, 2006), the NHS National Institute of Health Research (NIHR) launched nine Collaborations for Leadership in Applied Health Research and Care (CLAHRCs). These partnerships between universities and their surrounding NHS organisations possess a mandate to bring researchers and practitioners together to accelerate the rate at which research knowledge is translated into improved patient care (NIHR, 2008). Researchers, service users, managers, commissioners and clinicians work together within these partnerships, bridging historical disciplinary and organisational boundaries in order to generate knowledge which is relevant to and readily applicable within a clinical practice context. In essence the CLAHRC programme represents a consolidation of decades of research into EBP and a growing understanding that this can be achieved more easily by placing collaboration at the heart of the knowledge translation process. The CLAHRCs represent the culmination of bringing together theory and practice to engage multiple stakeholders in the research process and by doing so there would be a subsequent increase in research capacity across the NHS as stronger links between research and practice were established. The programme was given a life span of 5 years, with the NIHR contributing £90 million to be match funded by the hosting partnerships.

One of the most significant features of the CLAHRC programme is its underpinning principle of collaboration. The CLAHRC programme is founded on the understanding that getting evidence into practice is easier when it occurs within the context of collaboration. This underpinning principle is a world away from the earlier models which assumed that robust evidence would readily disseminate and applied in practice. Instead, CLAHRCs symbolise an evolution in thinking about the research-practice problem, moving from the linearity of EBM towards accepting the complexity of implementation as a social process in which multiple actors are engaged. Understanding this journey from linearity to complexity will be discussed in the next section.

Evidence-based practice (EBP)

The following section charts the rise of evidence-based practice (EBP) tracing its development from evidence-based medicine (EBM), as well as exploring the parallel rise of research utilization (RU) in nursing, before discussing current approaches to getting evidence into practice. The limitations of linear strategies are outlined before an overview of some of the main issues and approaches are discussed, exploring the emergence of collaboration as a method to reconcile the research-practice gap.

A well quoted definition of evidence-based practice (EBP) is the conscientious, explicit and judicious use of current best evidence in conjunction with clinical expertise and patient values to guide health care decisions (Sackett et al, 1996; Cook, 1998; Titler, 2006). Evolving from evidence-based medicine (EBM), EBP has dominated the policy and practice agenda of the 21st century (Trinder and Reynolds, 2000). Ellis (1996) describes EBM as a response to the revelation that “only 10-20% of all current...procedures used in medical practice have been shown to be efficacious by controlled trial” (p. 27, US Office Technology Assessment, 1978). In the last two decades, EBP has become synonymous with quality assurance, patient safety, accountability and clinical governance, embodied within the UK government’s vision of ‘a new NHS’ (DH, 1997). Briefly put, healthcare practitioners have a duty to provide care that is based on best available evidence, whilst patients as consumers demand treatment that is safe and effective (DH, 1998).

Historically the topic of EBP has provoked a lively debate within healthcare (Mitchell, 1997; Holmes, 1999; Welsh and Lyons, 2001; Lines, 2001; Franks, 2004; Rycroft-Malone et al, 2004; Hewitt, 2009; Fisher and Happell, 2009) most notably during the ‘paradigm wars’ of the 1990s (Woodhouse, 1996). Disagreement has centred on the ‘hierarchy of evidence’, within which randomised controlled trials (RCTs) are judged to be the ‘gold standard’ of high quality evidence (Sackett et al, 1996). However, whilst evidence represented by RCTs is useful in demonstrating some aspects of knowledge use, research reveals that clinical decision-making is often based on multiple, complex forms of knowing (Rycroft-Malone, 2004; Barley et al, 2008). Indeed Barley et al’s (2008) work highlights how some practitioners choose to override evidence

presented in best practice guidelines if it conflicts with personal practice style and experience.

Research utilisation (RU)

The challenge of getting evidence into practice in healthcare is not a new issue. Whilst EBM dominated the medical research literature of the 1980s and 1990s, scholars such as Weiss (1979) and Stetler (1985) focussed on the gap between knowledge production and knowledge use, popularising the term 'research utilization' (RU). Stetler (2001) defines RU as the "process of transforming knowledge into practice" (p. 272), involving two types of RU. The first refers to the use of research findings, whilst the second relates to the use of elements of the research process during problem solving. Stetler has continued to refine her model of RU, moving from a process focusing on the transfer of knowledge from bench to bedside at an individual practitioner level towards a latest iteration which integrates the concepts of 'evidence' and extends the model to reflect a group approach to RU (Stetler, 2001).

Estabrooks (2002) describes KU as founded on the rational assumption that using research improves clinical decisions made by individual practitioners better rational assumptions. However she critiques models of RU as limited to nursing rather than truly multi-disciplinary, and that such models are often quite prescriptive which does not reflect the diversity of factors and variables which influence the clinical decision making process in practice. Following a survey of 600 nurses, Estabrooks proposed that three type of RU were evident: indirect RU; direct RU; and persuasive utilisation.

Challenges of EBP in a real world context

EBM assumptions

Early proponents of EBP assumed that implementing evidence into practice would be rapid and automatic, reflecting the assumptions of EBM that the case for uptake was clearly evident (Dopson et al, 2009). However research has shown this not to be the case: despite the widespread popularity of the idea of

EBP, moving from rhetoric to reality has been challenging (Davies and Nutley, 2001). Regardless of multiple endeavours to improve evidence uptake there persists a global failure of health care systems to utilise evidence effectively (Straus, Tetroe and Graham, 2009). One of the criticisms of traditional EBP is the way in which it approaches implementation as a linear and passive process, beginning with the dissemination of research evidence by knowledge-producers and ending with the subsequent uptake by knowledge users, who are then automatically assumed to apply the new knowledge to their practice (Wilkinson, 2008).

Bridging the gap – bringing researchers and practitioners together

The ‘two cultures’ of research and practice remain divided by different customs, behaviours languages and values, a contrast seen most starkly during the ‘paradigm wars’ of the 1990s (Woodhouse, 1996). Some authors have suggested that if the gap can be closed right at the outset of knowledge production, for example by bringing knowledge producers and users, to work together, then the knowledge produced as an outcome of this close proximity will be useful, relevant and valued (Gibbons, 1994).

Co-production

There is growing interest across the social science around the way in which research can be conducted and knowledge can be generated which is both empirically sound and responds to the needs of encountered by individuals, communities, organisations, practitioners and policymakers (Lerner, Fisher and Weinberg, 2000). There is increasing recognition within the literature that getting evidence into policy or practice involves accommodating a range of stakeholder perspectives and an appreciation of multiple forms of knowledge. This recognition goes hand in hand with the realisation that traditional linear modes of evidence transfer such as EBM have failed to deliver on their promise of transforming healthcare, has led to a growing concern with the complexity of the implementation process, and the necessity to involve a range of stakeholders throughout.

A number of approaches which place stakeholders at the centre of the knowledge generation process are discussed below. A shared theme is that collaboration with stakeholders provides a way of managing a diversity of perspectives, whilst an acknowledgement that knowledge generation and uptake is a dynamic, multi-dimensional and iterative process shows a rejection of linearity and an acceptance of complexity.

Mode two knowledge

Gibbons (1994) proposes *mode two* knowledge production as an alternative to traditional researcher-driven, linear *mode one* approaches to knowledge generation. Gibbons (1994) suggests that *mode two* knowledge is generated via collaboration between knowledge users and producers resulting in knowledge that is tailored to the context of application, accepts heterogeneity, and is reflexive and open to different forms of validation. Gibbons argues that for *mode two* to be effective researchers and practitioners must transcend traditional disciplinary boundaries and embrace a collaborative approach to knowledge production.

Despite its popularity across a variety of applied disciplines including nursing and business management, the mode two thesis has been critiqued as over simplified, poorly evidenced, and absent in practice (Jacob, 2001; Gulbrandsen and Lanfeldt, 2004; Nowotny, Scott and Gibbons, 2003). Issues have arisen around the way in which the thesis has been conceptualised in practice, where the promise of socially distributed, transdisciplinary knowledge production is appealing but challenging to operationalise at an organisational level. Gulbrandsen and Langfelt (2004) describe the way in which the established division between basic and applied research can hinder the process of mode two knowledge production. Their investigation of mode two in Norway revealed that despite government incentives in terms of policies aimed at encouraging the production of knowledge which is useful across commercial and industrial domains, there remained persistent differences between sectors regarding the definition of 'relevance' and 'utility'. This hinged on the way in which practical utility is more often valued by applied researcher but overlooked by university researchers, who instead valued scholarly relevance. This tension between different domains of research can hinder the trans-disciplinarily upon

which mode two hinges. Gulbrandsen and Langfelt (2004) conclude that amongst researcher mode two is seen as 'nothing new', however it requires time, motivation and resources to transcend the established boundaries that define one type of research from another. However one of the original authors of the Mode two hypothesis recognises that developing trans-disciplinarity requires time and commitment from both researchers and organisations (Nowotny, 2002)

Mode two has also come under fire for over stating the boundaries between mode one and mode two knowledge production (Jacob, 2001). Rather than being seen as an entirely new or separate way of producing knowledge, Jacob argues that the boundaries between mode one and mode two are becoming increasingly blurred. Jacob's study investigates some of the issues around leadership which can arise during mode two endeavours. A lack of clear leadership can thwart mode two enterprise because this type of knowledge production seeks to dissipate hierarchies and encourage disciplinary diversity. However Jacob found that this diversity can make it challenging to develop leadership amongst mode two enterprises. This can lead to significant issues in the operationalisation and institutionalisation of mode two knowledge production. Instead, some mode two enterprises are no more than temporary networks that enable universities to reach out to society by engaging knowledge users in the knowledge production process.

This sense that mode two knowledge facilitates a dialogue between science and society is reflected in Nowotny's discussion of the hypothesis. Nowotny writes that to undertake mode two knowledge production is to engage a diversity of actors and perspectives. Engaging a wide range of stakeholders ensures that trans-disciplinarity is initiated. Trans-disciplinarity is achieved by engaging these people at every stage of the research process, listening to the needs of users, and considering implication alongside application. The crux of her agreement for mode two is that engaging in such a dialogue facilitates the production of socially robust knowledge, resulting in more effective scientific solutions.

Engaged scholarship

Engaged scholarship is a term that has been popularised through the work of Van de Ven (2006). Van der Van defines engaged scholarship as

“A participative form of research for obtaining the different perspectives of key stakeholders (researchers, users, clients, sponsors and practitioners) in studying complex problems. ” (p. 18).

Boyer (1990) and Pettigrew (2001) argue that the gap between research and practice gap can be bridged by a process of “engaged scholarship.” According to Van de Ven and Johnson (2006) engaged scholarship is a “set of reforms to break down the insular behaviours of academic departments and disciplines” (p.809). Engaged scholarship is reminiscent of Gibbon’s theories of mode two knowledge production, using multiple models and methods to co-produce knowledge within collective learning communities.

Like mode two knowledge production, the underpinning principal of engaged scholarship is that the knowledge produced in this way will be informed by a diversity of different forms of stakeholder knowledge and as such will be more insightful than knowledge produced by any group of stakeholders working alone.

Action research

Fundamentally collaborative, engaged scholarship has found a natural place within the tradition of action research (Small and Uttal, 2005). Action research is underpinned by an emancipatory philosophy which places value on the way in which engagement in research can empower and transform participants (ref0. Rather than approaching research as a process which is ‘done’ by researcher who seek participants as ‘subjects’, action research seeks to engage and empower participants and researchers as collaborators in the construction of new knowledge and skills.

Action research by its very principles has sought to dismantle the ivory towers of academia, and instead asks the communities and stakeholders who host it what it is that they need and require. This counteracts traditional science where researchers have historically imposed participation on ‘subjects’ who

have little or in some cases no knowledge of their involvement or the implication of such. Action research links the production and application of knowledge produced, simultaneously addressing problems in practice whilst expanding the body of knowledge. Its practice orientated, solution focused approach, and aim to develop the knowledge and competencies of all those involved means that action research has become popular amongst healthcare scholars.

Knowledge Translation

The term knowledge translation (KT) is increasingly used within the domains of healthcare research (CIHR, 2004; Davis et al., 2003). It is most widely defined as the:

“The exchange, synthesis and ethically-sound application of knowledge - within translation a complex system of interactions among researchers and users - to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system.” Canadian Institutes of Health Research (<http://www.cihr-irsc.gc.ca/e/29418.html> accessed October 31, 2010).

Gibbons (1994, 2008) ideas around a co-productive approach to knowledge generation dovetails with Davies and Nutley (2001) argument that ‘pull’ from potential end-users a more effective route to knowledge uptake. Adopting the principles of co-production and applying these to the context of health services research in the UK has the potential to reduce the criticism from practitioners that much research-generated knowledge is lacking in clinical credibility and unsuitable for the realities and rigours of clinical practice (Rycroft-Malone et al., 2004).

Implementation theories, models and frameworks

The following section outlines four theoretical models and frameworks that acknowledge complexity and are underpinned by a collaborative approach to implementation. An overview of Greenhalgh et al’s (2004) synthesis provides a comprehensive benchmark tracing the multi-disciplinary development of implementation. The Promoting Action on Research Implementation in Health

Services (PARIHS) framework demonstrates the evolution of an organisational approach in which change is sought at a collective level, whilst the Knowledge to Action (KTA) cycle emphasises co-production of knowledge in which the end user is involved at every stage of the research process (Graham et al, 2006). The collaborative model has been developed as a response to traditional top down approach by placing patient need at the centre of the implementation process (Baumbusch et al,2008).

Greenhalgh et al's synthesis

Greenhalgh et al. (2004) identify 11 major research traditions that have influenced the development of implementation in theory and practice, namely rural sociology, medical sociology, communication studies, marketing and economics, developmental studies, health promotion, EBP and guideline implementation, organisational studies, knowledge-based approaches to innovation in organisations, narrative organisational studies, and complexity and general systems theory. From these Greenhalgh et al (2004) distil seven key themes of innovation, adoptions and adopters, communication and influence, the inner context, the outer context, implementation and sustainability, and linkage between each. Greenhalgh et al's (2004) synthesis recommends a whole-systems approach to implementation that is theory-driven, participatory, collaborative, employs a multidisciplinary approach united through a single shared terminology, is meticulously detailed and methodologically pluralist. Clearly expansive in its aim, Greenhalgh et al's synthesis is deemed too complex to readily operationalise (Estabrooks et al., 2006). Despite its complexity Greenhalgh et al's work provides a useful synopsis of the development of implementation theory.

Promoting Action Research in Health Services (PARIHS) framework

The PARIHS framework proposes that implementation is determined by the dynamic interplay of three key factors: evidence, context, and facilitation (Kitson et al, 1998; Rycroft-Malone et al, 2004). The central premise of PARIHS is that implementation is more likely when all the elements are present at maximal levels i.e. when evidence is robust, facilitation is effective, and context is receptive. Interplay can occur between the multiple PARIHS elements in which

some may mediate but others can hinder. For example, the structural, system, and professional elements of receptive context may indicate that research is promoted in a particular team e.g. through the dissemination of best practice guidelines, access to online resources, explicit referral to EBP in job descriptions, and implementation of a continued professional development (CPD) programme; but evidence uptake may be fragmentary if the social and cultural contexts are unreceptive e. g. an absence of an effective leader to promote the relevance of research, or a cultural attitude resistant to change.

The PARIHS framework has highlighted the importance of an organisational approach to change and expanded the notion of evidence to include experiential and qualitative forms. However, it could be critiqued as overlooking the role of the end-user in the production and implementation of knowledge into practice, and fails to capture the dynamic interplay between and across boundaries and stakeholders.

Knowledge-to-Action (KTA) cycle

An alternative model is the Knowledge-to-Action (KTA) cycle developed by Graham et al (2006) is based on a review of 31 planned action theories to represent the implementation process as iterative, dynamic, and complex involving aspects of knowledge creation and action which can occur both simultaneously and in parallel. Boundaries are presented as fluid, reflecting the dynamic, intimate relationship between knowledge creation and knowledge action. Like PARIHS, the strength of the framework lies in its multidimensional approach in recognising that healthcare organisations are complex systems presenting multiple barriers operating at different levels (Straus et al, 2009). KTA widens stakeholder membership by endorsing close involvement of the end-user throughout the cycle to ensure a gap does not develop at any point. The impact of KTA's integrated approach has influenced health services research at a strategic level, driving the establishment of the Canadian Institutes of Health Research's (CIHR's) integrated knowledge translation partnerships and shaping the way in which health research is now designed, funded and implemented in Canada (Graham, 2012).

Baumbusch et al's (2008) collaborative model of knowledge translation

Baumbusch et al's (2008) collaborative model of knowledge translation (KT) acknowledges the aesthetic, philosophical, theoretical, personal and practice forms of knowledge which simultaneously informs and effect practitioners' behaviour. The model is founded on the concept of knowledge translation, a process affected by the 'push', 'pull' and 'exchange' of knowledge according to patient, practitioner and researcher needs. The model highlights individual and organisational collaboration within the knowledge translation cycle, encouraging patient participation to ensure research reflects patient needs. Central to the model is the pursuit of collaboration at a systems level with the aim of ensuring that the mechanisms for knowledge translation are in place at all organisational levels.

Whilst Baumbusch et al's (2008) model offers a comprehensive view of implementation it requires adequate organisational resources to enact. Failure to provide adequate resources for collaboration is an oversight often made when attempting to implement partnership working at an organisational level (Williams and Sullivan, 2010).

Whilst the literature around implementation is diverse, and is noted to suffer from a persistent sense of conceptual ambiguity, a number of key issues are evident, namely arguments around the nature of evidence/knowledge, the existence of boundaries of different types, and the need to span these effectively as part of the implementation process. The nature of these issues prompts a review of the literature relating to boundary spanning, an overview of which is given in the next section.

Reviewing the boundary spanning literature: people, things and knowledge involved in collaboration and knowledge exchange

CLAHRC's mandate to span the boundaries between research and practice through the process of collaboration has prompted a renewed interest in boundary-spanning practices: reviewing the literature on knowledge translation in healthcare, Barrett, Oborn and Racko (2010) draw attention to the understudied area of boundary objects – objects involved in boundary spanning,

knowledge exchange and collaboration. The concept of boundary objects has evolved to become a central focus of interest for scholars seeking to explore how boundary-spanning practices are established and enacted (Levina and Vaast 2005a; Pawlowski and Robey 2004). The concept has thrived in the fields of ICT, education and learning where the role of shared objects in the exchange and transformation of knowledge has sparked considerable interest (Engeström, 1995; Wenger, 1998).

The following section focuses on a review of the literature relating to boundary objects, situated within the wider body of boundary spanning literature. Particular attention is paid to the way in which boundaries, knowledge, and boundary spanning people and objects are conceptualised, before discussing the way in which the concept of boundary objects has emerged from its origins rooted in the Chicago School of sociology, before exploring how the concept has been applied across a number of different contexts characterised by collaborative work practices.

The origins of boundary objects – the influence of Strauss and the Chicago School on the development of a concept

In order to understand the concept of boundary objects it is first important to understand the research tradition from which it emerged. The next section introduces the Chicago school of sociology, exploring the way in which this influenced Anselm Strauss and subsequently the thinking of his student Susan Leigh Star. It traces the origins of the Chicago school and its influences on 20th century approaches to the study of science, technology, innovation and implementation, exploring the theories underpinning Star's concept.

What is symbolic interactionism and where did it come from?

Symbolic interactionism is most widely associated with the 'Chicago School' and the founding work of George Herbert Mead and his successor Herbert Blumer. Named after its continuing association with both the city and the university, the Chicago School provided a counterpoint to the predominately deterministic and structuralist approaches of Marxism and functionalism. Instead, Mead argued that human behaviour is distinguished from the purely

instinctual or conditioned behaviour of animals by the way in which humans interpret and assign meaning to their own and each other's behaviour. This enables humans to use the view from another's perspective to inform their meaning-making – for example the way in which we try to understand behaviour from another's point of view in order to develop an explanation of why an action has come about and how to then respond.

Symbolic interactionism uses the language of drama to emphasise the way in which humans (actors) generate meaning through 'role taking', conveying different versions of ourselves depending on the particular context or 'stage' in which we find ourselves. Mead used these analogies to develop and define the concept of self, arguing that the 'self' consisted on two elements, 'Me' and 'I'. In Mead's view the 'I' is the impulsive, spontaneous and uncensored portion of personality. The impulses of the 'I' is moderated by the 'Me', the internalised perspectives of others. These impact on the drive of the 'I' by generating a process of internalised role taking through which the actor tries to make sense by assigning meaning to a social encounter. Mead argued that others' perspectives must be learned and this learning represents two fundamental stages in the development of the social self: the play stage followed by the game stage. The play stage begins at the onset of speech and is evidenced by the way in which children begin to role play as they move beyond their own point of view to include alternative external perspectives. The second game stage extends this to encompass collective points of view. To Mead, these stages are crucial to the development of the social self – learning to see ourselves from another point of view, a process driven and defined by social interaction.

Following Mead's death, Herbert Blumer continued to develop these ideas, coining the term 'symbolic interactionism' to describe the way in which meaning was defined through social encounters.

Blumer evolved Mead's work to argue that whilst social structures may influence a person's behaviour, the same situation will be interpreted differently from person to person. This, he argued would then influence their behaviour (conduct), depending on their outlook on the situation. Blumer showed that meanings are not rigid but continually change in response to the fluxing

interpretation of the individual, so that conduct could vary from one person to another, despite being exposed to the same conditions. Thus individual conduct can only be understood from the perspective of that individual.

Influenced by his predecessors at the University of Chicago, Anselm Strauss along with his peers Goffman, Gusfield, Becker and others established what has become to be known anecdotally as the second Chicago School, consisting of a post-war collective of sociologists who responding to the generalist discourse promoted by Parsons (1937) and peers at Colombia. Instead, the second Chicago school endorsed post-positivist viewpoint combined with ethnographic field methods (Colomy and Brown, 1996), developing what became known as an ecological approach to sociology. Gusfield (1996) describes the collective as being defined by:

“An intensive focus on the empirical world; on seeing and understanding behavior in its particular and situated forms. Data that do not stay close to the events, actions or texts that are being studied are treated as suspect. There is a hostility to generalizations at any level that are not connected to description, to immersion in substantive matter” (p xii)

What are its implications in terms of this study?

In terms of this study symbolic interactionism is significant because it represents the research tradition from which the concept of boundary objects has emerged (see Star and Bowker, 1989). Strauss, most famous for his pioneering work in developing the methods of grounded theory, becomes significant due to his influence on his student Susan Leigh Star. Star, following the traditions of the Chicago School, became interested in the way in which scientists were able to work together without necessarily understanding or agreeing on each other's points of view. Taking the symbolic interactionist idea of social worlds, Star set out to explore to way in which different groups of actors worked together to establish the Berkeley Zoological Museum.

Understanding the background against which Star developed the concept is important to because it draws to attention to the various epistemological assumptions that underpin the concept. Without examining the preceding sociological theory, the reader is at risk of not fully understanding the concept or

jeopardises its appropriate application. For instance, Star muses how the concept of boundary objects has so frequently been taken out of context, with researchers too often focusing on a rough and ready identification of boundary objects (see also Trompette and Vinck's 2010 critique of the overzealous application of the notion), rather than, as her interactionist origins encourage, the exploration of how and why such objects become meaningful to their users, and what these mean in terms of the establishment of communities of practice and the coordination of work around such objects (Star, 2010). This study aims not to duplicate other investigations by focusing solely on the identification of boundary objects, looking at both the instrumental and symbolic dimension of such objects and asking what these may mean in terms the collaborative context of implementation through CLAHRCs?

What can be learned from symbolic interactionism?

Whilst symbolic interactionism has driven a rich vein of theory in terms of providing a counterpoint to the structuralism that dominated sociological thinking during the first half the of the last century, it has limitations and shortfalls in terms of its scope and assumptions. A critique of symbolic interactionism is that it focuses on the individual or micro-level, at the expense of widening its scope to encompass the wider organisational structures and processes that can influence behaviour at a collective level.

The research legacy of interactionist ways of thinking continues to influence implementation scholars. However rather than taking a solely interactionist approach, some contemporary researchers such as Greenhalgh and Stones (2005) recognise both the usefulness and the limitation of interactionism, using it to inform and guide rather than adhering to strict interactionist principles. This can broadly be explained by the evolution of sociological theory at the end of the twentieth century during which an attempt to unify structuralist approaches (those such as functionalism and Marxism which emphasised the role of social structures in determining behaviour) with those that emphasised social action (such as symbolic interactionism) occurred. In 1984 Anthony Giddens proposed a third way of approaching sociology – structuration theory. According to Giddens, structuralism and action are not incommensurable; rather they provide two alternate lenses focused on the same topic of inquiry. Giddens'

described this as the duality of structure, explaining that the social structures such as class are generated through social action which in turn acts to sustain these structures. Consequently there exists a simultaneous influence of structure on action and vice versa, mediating the impact of each. Contemporary implementation and boundary research reflects these developments in theory and is conducted in a broadly post-structuralism manner within which issues of structure and agency are recognised as important in influencing processes and methods of knowledge exchange.

The influence of other post-structuralist theories such as Actor Network Theory and structuration theory is evident in terms of both the boundary objects and implementation research literature. Star provides an example of this in the way that she fuses elements of symbolic interactionism with newer theories on human-object interaction such as Callon and Latour's Actor Network Theory (ANT). Despite ANT's widespread application to studies of technological innovation, in terms of implementation it has been critiqued as objectifying human actors and overlooking the complexities of multi-level practice. More contemporary theories including SST (Stones, 2005), combine with a more practice-based approach have been drawn on to explore the way in which implementation occurs at multiple levels (for example).

I acknowledge Star's interactionist background, recognising the influence of ANT on the development of the concept of boundary objects, whilst also taking heed of the limitations provoked by such a stance. The study aims to build on Star's concept of boundary objects, to explore how the concept could provide new insights into boundary crossing during implementation processes and practice. The study draws on Star's work on collaborative work practices, as well theories from across the multi-disciplinary domain of implementation research, to inform a new way of looking at implementation through collaborative entities (CLAHRCs) in which boundary crossing is key.

Before describing fully the concept of boundary objects it is important to understand the context relevant to boundary objects including boundaries, boundary spanning and communities of practice.

Boundaries – exchanging knowledge across borders

The question of what constitutes a boundary is important in terms of what sorts of ideas, objects and people may be involved in boundary spanning. Surprisingly a review of the boundary spanning literature reveals a failure to explicitly define the nature of boundaries. Instead, boundaries are described as numerous and unclear: vague, assumed and fuzzy delineations between one 'social world' and another (Strauss, 1978). Hsiao, Tsai and Lee (2011) acknowledge this ambiguity to give the broadest description of boundaries as demarcations which can be knowledge based, hierarchical, physical, geographical, social, cognitive, relational, cultural, temporal/spatial, divisional, and disciplinary in nature. Boundaries and boundary crossing has particular relevance within theories of learning. Theories of learning highlight the way in which knowledge is shared and transformed across different boundaries and between different actors, both enabling learning as well as sometimes hindering the flow of knowledge. Of specific interest is the concept of communities of practice, which highlights the way in which learning and knowledge exchange may be informal and unplanned between groups of people working together towards a common goal. The role of boundaries in learning is highlighted McKnight and Zietsma (2007) who argue that they represent both a necessary precursor, and a potential barrier to knowledge sharing. A boundary may impede the flow of knowledge (Szlanski describes how knowledge can exhibit 'stickiness' at practice boundaries); it can also generate an opportunity for learning (for example Engestrom, 1995).

Communities of practice

Wenger (1991) summarizes Communities of Practice (CoP) as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly." The learning that occurs within communities of practice is often unanticipated and unplanned, and tends to come about in an informal manner as members work together to find a solution to a practice based problem. Using a case study of Xerox engineers Wenger was able to show how learning occurs within the context of complex social systems. Wenger argued that organisations rely on these social systems because it is through these communities that knowledge is shared, learning

takes place, and a sense of identity is created which helps to promote a sense of belonging between members of communities of practice, as well as sets them apart from the members of other CoPs. Wenger conceptualised CoPs as possessing three dimensions: of engagement, imagination and alignment, which are mediated by aspects of enterprise, mutuality and repertoire. These combine in various formations to provide a community in which members seek to identify and address knowledge gaps through the negotiation of joint enquiry; establish a shared vision and goal of the problem or task at hand, and how shared routines and activities are transmitted to new members or further generations of CoP members.

Within the communities of practice literature boundaries are seen as fluid, tacit and unspoken, defined in terms of shared language, knowledge and behaviour (Lave and Wenger, 1991). Brown and Duguid (2001) describe *context* as a boundary hindering learning and the transfer of knowledge from one setting to another, whilst Bechky (2003) explains how different, multiple meanings arise as a consequence of boundaries distinguishing one group from another.

Carlile (2002) classifies boundaries as syntactic, semantic and pragmatic, where syntactic boundaries are least complex and can be spanned using a shared language. Semantic boundaries require more complex intervention to span during which shared meanings are established. Carlile's final category proposes that increasingly complex or pragmatic boundaries require knowledge to be transformed across boundaries. Carlile contends that each type of boundary requires a correspondingly complex boundary object with which to establish either a shared language, a shared meaning, or to facilitate knowledge transformation.

Broadly speaking boundaries can be summarised as explicit or implied socially constructed delineations between different groups which act to define membership, shape practice and distinguish identity. In other words, what is communicated, understood, and enacted by a group of people with shared beliefs and practices generates formal and informal divisions between those who are members, and those who are not. Boundaries are fluid, can be complex, structural, conceptual, temporal, and ideological.

Boundary crossing

Boundary crossing has emerged as a term describing the activity of moving into 'unknown territory', where a different or unfamiliar set of knowledge, practice and language is required. The experience is akin to travelling across the border into a foreign country, where different customs and language prevail, and where one is likely to encounter challenges arising from negotiating novel contexts and situations (Suchman, 1994; Engestrom et al, 1995). Suchman demonstrates how professionals may enter into a new realm in which they are "unqualified" (p. 25), experiencing a loss of expertise as knowledge is challenged or becomes irrelevant. Engestrom (1995) argues that boundary crossing is primarily a cognitive process, expanding the concept to include the mental transitions required to traverse unfamiliar realms of practice.

Boundary spanners

Boundary spanners are the people who navigate and traverse boundaries between different contexts and communities of practice. Williams (2012) defines boundary spanners as "the individual actors who engage in boundary spanning activities, processes and tasks" (p. 22). In their systematic review of brokerage roles, Long, Cunningham and Braithwaite (2013) trace early interest in boundary spanners as originating in Burt's (1992) work on the social structure of competition, within which boundary spanners operate to bridge the 'structural gaps' between clusters in a social network. Williams (2012) however cites real interest in the role emerging much earlier in the work of Leifer and Delbecq (1976), who identified a number of descriptive terms for the role including the less familiar 'boundroid', 'cupid' and 'marginal men' amongst other now more familiar description including 'networker', 'unifier' and 'collaborator'. Long, Cunningham and Braithwaite's (2013) review further emphasis the multitude of monikers which are assigned to people variably identified as boundary spanners, bridges, knowledge brokers, coordinators, and gatekeepers. Within the body of implementation research literature boundary spanners are often referred to in terms of their role as change agents, described as 'clinical champions' (Soo, Berta and Baker, 2009), and 'intermediaries' (Williams, 2013). Williams (2012) summarise the key descriptors of the boundary spanning role

by condensing it to 'reticulist, interpreter/communicator, coordinator and entrepreneur' (p.37).

Long, Cunningham and Braithwaite (2013) draw attention to the way in which the role has gained prominence within the context of commercial organisations with multiple distributed partners, as well as in healthcare where diverse professional groups typically work within multi-disciplinary teams. Boundary spanners play a role in collaboration by establishing themselves as a 'bridge' between different groups working together towards a shared goal, operating as a 'liaison', a 'go between', sharing, managing and translating knowledge across boundaries generated by structure, agency, and ideology (Gould and Frenandez, 1989; Cummings and Cross, 2003; Williams, 2012). However the literature warns that the role can be challenging and requires a level of resilience to withstand the tensions imposed by marginal status, a member of multiple social worlds but an in-betweener nonetheless. Star and Griesemer (1989) discuss boundary spanners in terms of "marginal people" (updating Park's 'marginal man'), highlighting the strategies used by marginal people to manage their identities as they move from one social world to the next. Williams (2012) echoes this concern by raising the issue of ambiguities, tensions and paradoxes that are likely to be encountered and experienced by boundary spanners as they move across boundaries. Williams identifies effective boundary spanners as those who possess competencies associated with diplomacy, negotiation, flexibility and interpersonal skills such as empathy, trust, and conflict management. Other negative costs can be incurred by boundary spanners: role overload, burn out and stress are all cited as risks of working within a boundary spanning role as competing priorities can take a personal toll (Long, Cunningham and Braithwaite, 2013). At a network level there is a risk that individuals in boundary spanning roles will inadvertently operate as a bottleneck, withholding or distorting information which can contribute to a decrease in efficiency (Stasser and Titus, 1985 cited in Long, Cunningham and Braithwaite, 2013).

In implementation in healthcare, boundary spanners as knowledge brokers have been described as the missing link in the knowledge translation process (Ward et al., 2009).

The nature of knowledge: epistemological considerations and contingencies between knowledge, people, and objects

Of fundamental concern to both the study of boundary objects and the study of implementation is the nature of knowledge: what constitutes knowledge, how is it conceptualised, and what does this mean in terms of the objects, people and processes involved in translating it across boundaries? In terms of implementation it is important to clarify what we mean by the terms 'knowledge' and 'evidence'. Some such as Bell (1999) have argued that data, information and knowledge reside on a continuum which is determined by increasing levels of human interpretation where data is least involved and knowledge is most representative of a specific interpretation of reality. This leads to notions of meaning, and how this is constructed around what is known and understood, giving knowledge a greater social resonance and epistemological depth than data or information imply. Knowledge in this context has implications in terms of objective truthfulness, with some such as Blackler (1995) arguing against any 'objective truth'. Rather knowledge according to Blackler is fragile, politicised and rhetorical in nature. Lyotard (1984) argues from a postmodern stance that valued knowledge is that which is can be bought and sold, controlled and fought over. I would argue this one step further to suggest that the dynamic and changing nature of knowledge as something that is constructed and valid only in the now, to approach knowledge as 'now-ledge', this is what is known now, and is liable to change in view of cultural, collective and individual interpretation, experience and learning.

Whilst epistemological stances may differ, one thing is clear from the literatures: knowledge does not occur in a social vacuum – it is a currency that flows through markets and people and is embedded in objects, meanings and reflected in thinking and behaviour. Knowledge then is bound by what Hanseth (2004) describes as the "heterogeneity of reality" (p. 110); it is complex, contextual, and contingent. Implementation researchers and practitioners are operating in a wider 'knowledge society' in which knowledge is organised, traded, translated, managed and safeguarded. In summary knowledge has many different dimensions, and different disciplines interested knowledge

issues around organisational learning, innovation, or knowledge management approach knowledge from different angles and perspectives.

Knowledge within networks

In terms of innovation and implementation studies, knowledge is frequently described as existing within and operating as a network. Hanseth (2004) highlights how this view of knowledge is underpinned by two critical assumptions: firstly that individual items or pieces of knowledge are related and interdependent; and secondly that different individuals adopt the same piece of knowledge. It follows then that pieces of knowledge can be embedded into routines and practices, and that these practices are subsequently linked and contingent. This perspective is woven in the communities of practice approach in which knowledge and behaviours are inextricably linked to the point that Lave and Wenger (1991) argue that knowledge *is* practice.

Communities of practice and boundary objects

Whilst it is not the intent of this review to critique the vast body of literature around communities of practice (see Lave and Wenger, 1991 for a starting point), it is important to give a brief overview of communities of practice in relation to boundary objects.

A community of practice (CoP) is a group of people who come together through the sustained pursuit of a collective enterprise, for example a group of Xerox engineers who are united through their shared trouble-shooting activities (Anderson and Crocca, 1993); or a group which forms informally over a shared interest in the use of a particular tool or resource (for example CAD systems amongst workers on a large civil engineering project in Henderson's 1991 study). It is within communities of practice that people learn how to behave in an 'everyday' way, learning how to use the tools and objects associated with the communities of practice to which they belong. Communities of practice are social worlds which operate across formal organisational or institutional boundaries, represented in the informal, the ordinary, the day-to-day relationships and interactions operating between people who do things together (Becker, 1986). However whilst interest lies in the way in which communities of

practice can be exploited to mobilise knowledge such as a new technology or innovation between members, Ferlie and Dopson (2005) warn how these groups can respond defensively to attempts to alter their behaviour, safeguarding their identity by becoming 'sealed off' from neighbouring communities of practice. This can result in a loss of connectivity between different 'tribes' as members of particular communities of practice become increasingly silo'd (Williams, 2012; Long, Cunningham and Braithwaite, 2013). Williams (2012) argues that these highly defined boundaries are amongst the most challenging to overcome when instigating multi-professional collaboration.

The role of boundary objects in communities of practice is fundamental: not only do communities form around the generation and maintenance of such shared objects, but they are also largely defined and unified by shared understandings around the use of such objects. Boundary objects then reflect the identity of the community of practice in which they emerge, practice between members is mediated by such objects, and communities of practice flourish around the production and use of such shared objects.

Bowker and Star (1999) highlight that it takes time for an object to become 'naturalized' to a specific community of practice. This highlights two challenges for those who have sought to exploit the unifying power of communities of practice and the boundary spanning potential of boundary objects across commercial contexts: namely that the informal and organic nature of communities of practice is very difficult to replicate intentionally, and that designating an object as a boundary object does not necessarily improve its boundary spanning potential (for example Atwell, 2011).

Knowledge as practice: information, objects and communities of practice

Bowker and Star (1999) explore the relationship between knowledge, people, and things, by focusing on the way in which large scale information systems enable individuals and communities of practice to communicate across disparate contexts. Bowker and Star propose every individual is a member of multiple communities of practice, possessing citizenship across multiple social worlds. They argue that everything that is involved in "doing being ordinary" (Sacks, 1975) is embedded in an individual's complex knowledge of situations,

and that this knowledge is mediated via the individual's multiple memberships and their use of objects across different communities of practice in varying ways. However this heterogeneity can understandingly drive tensions when social worlds collide and interact. When this happens, a need to generate a middle ground or shared language arises, smoothing the interfaces between communities of practice and facilitating communication. If, as Star (1991) argues, people are active interpreters of information and knowledge and possess multiple citizenship across multiple contexts, then those things that are shared across contexts also possess multiple meanings. Star (1989) named these boundary objects: the things that are shared between communities, across the boundaries, which enable members and groups to navigate the interfaces between communities of practice.

Objects in knowledge work

The concept of boundary objects has made a particular impact on practice based disciplines such as education, engineering and ICT, where people and objects interact across boundaries in order to collaborate towards reaching a shared goal, for example the completion of a large civil engineering project or working together to design and develop a new product (Levina and Vaast, 2005; Holford et al., 2008; Kimble et al., 2010). Particular emphasis is given to the role of objects as technologies used in knowledge work, for example computer supported collaborative work (CSCW) and information studies where the link between objects (for example technology) and knowledge (as constructed, shared, encountered, experienced, managed, transformed and translated) is a key concern.

Theories such as Actor Network Theory (ANT) have highlighted the way in which people and objects interact, resulting in a network of relationships in which knowledge and meanings are created, shared and transformed through encounters between human and non-human nodes. The role of objects in ANT is pronounced: Latour (1987) has argued that knowledge networks involve human and non-human 'actors'. Others such as Avgerou, Ciborra and Land (2004) consider objects and knowledge as deeply entrenched, arguing that objects such as technologies are now inseparable from human lived experience. This has prompted scholars such as Boland Jr (2004), to take an

ecological view of human experience within a wider context of objects and interaction including knowledge workers, knowledge objects, documents, and data repositories. This ecological stance is very much evident across Star's work around boundary objects (for example 1989, 1991). In *Sorting Things Out*, Bowker and Star (1999) state: "People never act in a vacuum of some sort of hypothetical pure universe of doing but always with respect to arrangements, tools and material objects" (p.298).

The concept of boundary objects

Star and Griesemer's (1989) widely cited definition describes boundary objects as objects "which both inhabit several intersecting social worlds *and* satisfy the informational requirement of each" (p.393). Boundary objects are described as vague concepts with strong cohesive properties, flexible to local needs but remaining recognisable across contexts to enable the translation of knowledge from one group to another. Star's definition remains the most widely cited, with little amendment or modification (Winget, 2008; Reddy and Phelps, 2009).

The concept gained recognition following the publication of Star and Griesemer's (1989) seminal study of boundary objects within the context of Berkeley's Museum of Vertebrate Zoology. The study explored the roles of different actors involved in collecting and classifying specimens, exploring how different individuals and groups were able to work together whilst retaining different perspectives of the shared task. It also highlighted how collaboration does not necessarily require consensus. Instead Star and Griesemer proposed that an adequate mutual understanding ('good enough') based on things and ideas that are shared between different actors was important. Star and Griesemer (1989) showed how these shared objects provided a shared reference point around which communication and cooperation across boundaries could be coordinated.

From this work a four category typology was developed to distinguish between the various objects identified as providing a shared means of communication between multiple actors involved in the museum:

1. Repositories
2. Ideal types

3. Coincident boundaries
4. Standardised forms

Within this classification, *repositories* are described as “ordered ‘piles’ of objects which are indexed in a standardised fashion” (p. 410), including libraries, museums and, more contemporaneously, databases. The second category describes abstract representations, a simplification of frequently occurring features. Objects such as atlases, diagrams and blueprints are examples of ideal types, providing a “good enough” (Star and Griesemer, 1989, p. 410) representation of another object or idea which is used to facilitate shared understanding between individuals and groups.

Coincident boundaries are described as objects sharing boundaries but possessing different internal contents. These provide a common reference point shared between parties whilst preserving different perspectives. Despite working within the same boundaries, geographically or temporally separated parties can work autonomously towards the resolution of party-specific goals rather than a mutual goal. For example, both the trappers and the natural historians in Star and Griesemer’s study both used the outline of the state of California, but emphasised data differently for different purposes: the trappers highlighted well located camping sites whilst the scientists included ecological information within the same geographic parameters.

The final category of *standardised forms* refers to methods enabling common communication resulting in the generation of standardised information. In its simplest guise, a standardised form is precisely that: a means for collecting the same information from every user to enable the production of a standardised index. Star and Griesemer (1989) proposed that the advantage of such a method is the generation of certainty through the reduction of local uncertainties.

Carlile (2002) condenses the original classification into three categories. Repositories remain, followed by ‘standardised methods and forms’, and ‘objects, models and maps’. Carlile (2002) argues that the overlap between ideal types and coincident boundaries justifies this merger, highlighting the blurriness existent between categories. Carlile’s adaption takes heed of Star

and Griesemer's (1989) proposal that the categories are interchangeable and a boundary object may be described as one or more type simultaneously. Carlile (2002) expands the conceptualisation through a discussion of the nature of boundaries, described as syntactic, semantic, or pragmatic depending on the complexity of the knowledge translated, framing boundary objects in terms of their problem-solving properties across these boundaries. In this context, repositories are described as providing a shared resource when engaged in cross-boundary problem-solving, standardised forms and methods provide a shared format, and finally objects, models and maps are representations used across different settings and can be employed to reveal the relationships and dependencies between different groups.

Pennington (2010) cites Lee (2007) to argue that the original typology fails to recognise the full range of objects used to provide a 'middle ground' enabling one group to 'speak' (Carlile, 2002) to another, because almost any object or idea could operate as shared language if it has adequate relevance to two or more actors. Pennington (2010) makes an interesting note that due to the evolution of the concept to mean different things to different groups the term 'boundary object' is "itself a boundary object that unites many different but related conceptualisations" (p. 192). Instead of adding new categories to the classic typology, Pennington (2010) extends the definition to include any object employed in a boundary crossing process.

Interpretative flexibility

A shared consensus regarding the interpretive flexibility of boundary objects is well documented: boundary objects are sufficiently flexible and recognisable across multiple contexts to provide a reference point around which cooperation can be facilitated without compromising different perspectives (Star and Griesemer, 1989; Fujimura, 1991; Briers and Chua, 2001; Carlile, 2002; Levina and Vaast, 2005; Winget, 2007; Phelps and Reddy, 2009; Pennington, 2010; Fox, 2011). Agreement exists amongst authors that a boundary object must possess adequate plasticity to be tinkered with to reflect the needs of its users, for example Henderson's (1991) study shows how the loss of flexibility in the adoption of a CAD system over the traditional sketches used by architects and construction workers leads to a reduction in shared understanding, whilst

Koskinen and Makinen (2009) contend that drawings, instructions and other inscriptions combined with intuition and elements of trust and openness are important in the process of negotiating project contracts and establishing mutual knowledge.

The vague and the visionary

Historically examples of material objects identified as boundary objects dominate the literature (for example Osterlund's exploration of the role of documents in online communities, Ackerman and Halverson's 2004 exploration of the multiples uses and understanding of employee payroll records, as well as Koskinen and Makinen's 2009 investigation of engineering project contracts). This focus on the concrete and material could reflect the fact be that those objects that are visualised, handled, and physically altered to be shared are more tangible and thus more readily identifiable. Nonetheless the notion of boundary objects can also be applied to immaterial objects such as shared concepts and ideas. In comparison, the task of identifying and describing the conceptual, the inexplicit and intangible boundary object is more challenging. However some authors have succeeded in doing so: for example Briers and Chua (2001) demonstrate how the notion of 'efficiency' amongst managers provides an example of a conceptual boundary object that is widely shared and recognised but possesses multiple interpretations.

Briers and Chua (2001), Carlile (2002), and Levina and Vaast (2005) highlight this growing concern with the tacit and symbolic to offer alternate interpretations of varying divergence from Star's (1989) original boundary object typology. Hence Briers and Chua (2001) retain the four categories but add another: 'visionary objects'. They suggest these conceptual objects possess a 'sacred' legitimacy within a group tapping into an emotional and affective response making it "difficult for a 'rational' person to be against them" (p.242). The symbolic nature of the visionary object creates an inspirational, but ambiguous concept becoming substantive only as a result of tinkering to fit a specific context. Briers and Chua (2010) describe how the concept of 'efficiency' may mean different things to different managers, the notion remaining powerful despite its intrinsic ambiguity. Barrett and Oborn (2010), and Fox (2011) encourage expanding research further to explore the complex, dynamic and

tacit elements of boundary objects, boundary interactions, knowledge negotiation, and shared meanings.

Designing objects for boundary spanning

The literature suggests that boundary spanning activities can sometimes lead to conflict and confrontation rather than collaboration, for example if inadequate shared meanings are attached to an object, or if it represents the focus of competing or opposing agendas (Carlile, 2002; Levina and Vaast, 2005; Barrett and Oborn, 2010). There is compelling evidence to suggest that the utility of a boundary object may be enhanced symbolically rather than by design, highlighting users' preference for the familiar, trusted, and meaningful, and evidenced by the growing interest in the conceptual, the tacit and intangible aspects of boundary objects (Briers and Chua, 2001; Stenfors, Tanner and Haapalinna, 2004; Levina and Vaast, 2005; Phelps and Reddy, 2009; Fox, 2011). Issues emerging from the field of technology and design highlight difficulty in designing effective boundary objects, and those tasked with designing technology enhanced boundary objects (TEBOs) have struggled to recreate the emotive symbolism exhibited by well-utilised boundary objects (Atwell, 2011).

Other issues relate to the loss of interpretive flexibility of boundary objects (for example Henderson, 1991 demonstrates how computer assisted design (CAD) is insufficiently flexible to accommodate multiple perspectives in comparison to traditional technical drawings which can be readily modified to integrate additional information contributed by a new team member), or when a designated boundary object has been rejected by users in preference for a boundary-object-in-practice (Levina and Vaast, 2005).

Authors such as Fox (2011) and Allen (2014) argue that the utility of a boundary objects is defined by embedded values and meanings which may hinder or enhance uptake, contingent upon whether or not these coincide with those held by the intended users. Boundary objects which reflect an embedded ideology which is aligned or appeals to a potential user are more likely to be taken up than those which represent divergent values and meanings. Allen (2014) notes that in the case of clinical pathway development the fact that medics have been

absent from much of the design and decision-making process has resulted in boundary objects which reflect a nursing and quality improvement agenda rather than embedded medical meanings and values.

However whilst attention has been given to the way in which boundary objects can provide a shared reference point around which collaboration can be formed, there persists a gap in the literature relating to the formation and emergence of boundary objects. The review also highlights the focus on the identification and exploration of concrete objects rather than a deeper investigation into the identification and role of the immaterial and conceptual, where a trend of 'listing' concrete objects as boundary objects seemed prevalent amongst much of the earlier literature. This could be a by-product of the physical presence and subsequent visibility of these objects and the relative ease with which they can be located in comparison to those objects which are intangible, transient and conceptual. There is also, as Star (2010) notes in her final paper on the concept an over-attention to the interpretive flexibility of boundary objects whilst standardisation, a key dimension which enables a shared format to counteract and smooth local differences, is relatively over looked. Again, standardisation may not draw the attention as flexibility does but this may be because as a term it resounds with concepts of stasis, formality and codification, concepts which may initially lack the appeal and dynamism that notions of flexibility imply.

Boundary objects in healthcare

In terms of healthcare research there is a gap in the literature; despite Fujimura (1992) exploring the concept within the context of oncology, the application of the concept within healthcare research is limited. Reddy, Dourish and Pratt (2001) apply the concept to explore the role of a computer software package in facilitating multidisciplinary collaboration in an intensive care unit, whilst Allen (2009) discusses the notion in terms of care pathway development. Allen (2014) builds on her earlier work by arguing that whilst care pathways may provide boundary objects at senior levels by aligning the properties of nursing and management, they can represent negative boundary objects amongst members of other professions. The result is that care pathways as designated boundary objects may struggle to become boundary objects in practice due to poor uptake and engagement by medics. Allen's argument hinges on the

observation that care pathways as boundary objects can challenge the entrenched state of play in which medics are perceived as the dominant profession in healthcare by representing an object driven and developed by nurses. As nurses come to the fore as leaders in clinical governance and evidence-based healthcare delivery the historical rifts between medicine and nursing are brought to light. Whilst Allen's (2014) recent works highlighting the role of pathways as boundary objects in evidence-based practice, the concept remains under articulated in terms of implementation. In contrast, the concept has evolved to become an explicit element of other practice-based disciplines such as education and learning (Engstrom, 1987; and Wenger, 1998).

Whilst earlier work such as that by Aydin and Rice (1991) tends to take a more uniformly interactionist stance on implementation, others have used it as a theoretical starting point and augmented it with more current ways of thinking. Aydin and Rice (1991) apply an interactionist point of view to understanding the importance of context within specific social worlds. Using the concept to frame the qualitative element of their exploration of the uptake of a medical information system, Aydin and Rice (1991) find that membership of specific social worlds (for example, medical staff, nursing staff or administration) influences the attitude taken towards the introduction of the new system. In other words, the way in which one behaves towards an innovation is defined by what it means according to the particular social group we align ourselves with, reflecting not only Mead's supposition of the social self but also the influence of the collective perspective on whether an innovation is embraced, resisted or rejected.

In their in-depth exploration of the role of boundary objects during implementation of a large scale genome project, Swan et al (2007) apply lessons from both symbolic interactionist and practice-based perspectives to underpin their approach, marrying an understanding of knowledge as embedded in social interaction and situated in local practice. Swan et al (2007) cite Prasad's (1993) interactionist understandings of objects as both a vehicle and outcome of social interaction, complementing with a practice perspective in which objects are involved in the mediation of knowledge across practice boundaries (Henderson, 1991; Bechy, 2003). In this way, the shortcomings of a singularly symbolic interactionist approach – its focus on the individual or micro-

level, is alleviated by the collective focus of practice-based ways of thinking, enabling a wider organisational scope to be taken.

Applying the concept of boundary objects

Since its proposal in 1989, Star and Griesemer's concept of boundary objects has been applied to a number of contexts characterised by collaborative work practices including engineering (Henderson, 1991), construction (Phelps and Reddy, 2009), and development teams (Carlile, 2002; Barrett and Oborn, 2010). The literature reveals a historical tendency to apply the concept of boundary objects to concrete shared objects, with less attention given to the conceptual. For example there is particular interest in identifying how visual and inscribed shared objects can operate as boundary objects (for example Henderson's (1991) early work on the role of sketches in creating a shared object between engineers and constructions workers, followed by Phelps and Reddy's exploration of architectural blue prints, Winget's (2007) investigation of sheet music, and continuing with Koskinen and Makinen's (2009) study of business contracts).

Is everything a boundary object?

The rapid spread of the boundary object concept has been criticised as over-zealous, leading some to suggest that it is at times applied 'anecdotally' to describe "any artefact which is involved in coordination between actors or which is at the boundary of two worlds" (Trompette and Vinck, 2009, p.12). Trompette and Vinck argue that this over simplification fails to highlight the intrinsic complexity of boundary crossing as many authors resort to a conveniently simple 'modelisation' rather than investigating the hidden depths of interactional processes. Pennington (2010) redirects this argument, encouraging an expansion of the concept to encompass any object involved in boundary crossing, whereas Lee (2007), proposes further differentiation suggesting that the term 'boundary negotiating artefacts' is a more apt description of objects that push and challenge boundaries rather than "merely sailing across" (p.308).

Framing the research gap: can the concept of boundary objects be applied to the context of implementation through CLAHRCs?

A synthesis of the findings of the boundary object literature suggests there are a number of important overlapping themes. It is clear that the processes of collaboration are of paramount concern across all fields yielding a rich evidence base on the role of boundary objects. Another shared concern is the way in which knowledge is transformed, conveyed and translated across boundaries between different groups of people. There is a growing awareness of the need to engage a diversity of stakeholders and a newfound recognition that what counts as evidence in evidence-based practice (EBP) is broader than first acknowledged by early proponents, the similarities again collide. Both domains are pragmatic, solution focused, centred on the engagement of multiple members of multiple social worlds (communities) across different settings. Again the concern with understanding what is important and meaningful to these different groups and forging a shared language which sufficiently enables cooperation and ultimately collaboration across social, epistemological, organisational and geographic boundaries is shared.

The following section outlines the rationale for applying the concept of boundary objects to the context of implementation through CLAHRCs, and highlights specific shared areas of interest in terms of the implementation challenge.

Theoretical overlap and influence across boundary object and implementation literature

It is clear from the literatures reviewed that symbolic interactionism, structuration theory and a branch of similar but distinct post-structuralist thinking in the form of Actor Network Theory (ANT) have influenced the way in which boundary object, innovation and implementation studies have been designed and delivered. The influence of theories such as ANT advanced the way in which Star approached the concept of boundary objects, focusing on the interactions between people and things. Star (1989) draws on Callon's notion of *interessement* to describe the way in which boundary objects operate during translational tasks, that is, how their interpretative flexibility enables them to convey meanings that are significant in one social world and translate them into the language reflecting the values of another.

Implementation as a collaborative process

Implementation is a complex social process requiring facilitation during which knowledge is translated and exchanged across multiple boundaries at an individual, organisational and contextual level (Beyer and Trice, 1982; Estabrooks, 1999; Profetto-McGrath et al, 2003; Rycroft-Malone et al, 2004; Baumbusch et al, 2008; Straus et al, 2009). Implementation involves communication, cooperation and collaboration between these different individuals and groups.

Recommendations for a collaborative approach defined by cooperation and partnership abound throughout the implementation literature, based on an assumption that collaboration can provide solutions to complex problems whilst maximising resources to achieve objectives rapidly (Greenhalgh, 2004; Baumbusch et al., 2008; Halladay and Bero, 2000; Nutley, Walter and Davies, 2003; Rycroft-Malone et al., 2004; Estabrooks et al., 2006). The concept of boundary objects has been successfully applied across a number of different collaborative contexts. However despite a call to investigate boundary objects further in terms of knowledge translation in healthcare, the concept has received limited attention in implementation (Barrett and Oborn, 2010).

Boundaries in implementation

Implementation scholars argue that multiple factors determine the uptake of evidence at different levels by a range of stakeholders. Straus et al (2009) suggest that professional boundaries operating at an individual and organisational level hindering implementation can be overcome through collaboration and cooperation, widening decision-making to become more inclusive and holistic. Allen (2009) and Baumbusch et al (2008) suggest that the traditional division between healthcare practitioners, the boundaries defined by practice and power such as those which have historically distinguished nurses from doctors, can also present a barrier to implementation. Privileging one form of evidence over another can generate boundaries between those whose experiential and tacit knowledge drives their practice (for example Fisher and Happell, 2009). Expanding the breadth of evidence which needs to be taken into account during the process of implementation, and joining up

knowledge producers and users at the very start of the research process have been promoted as ways to prevent the research-practice gap from developing and of growing the implementation process as an inclusive process in which multiple stakeholders at different levels are engaged.

Table 1: Cross cutting themes identified in the implementation and boundary objects literature

<i>Adequacy</i>	In practice a boundary object requires “good enough” adequacy to enable communication and cooperation (Star, 1989). In terms of implementation the idealism of early approaches is largely replaced by a pragmatic quest to seek ‘what work for whom and under what circumstances’ (Rycroft-Malone et al, 2015).
<i>Collaboration</i>	Boundary objects provide a framework for collaboration. Collaboration enables parties to form an alliance and work towards shared goals (Star & Griesemer, 1989; Winget, 2007; Phelps & Reddy, 2009). A collaborative approach to knowledge production and implementation underpins many current approaches implementation (Kitson et al, 1998; Rycroft-Malone at al, 2004; Graham et al, 2006; Baumbusch et al, 2008; Damschroder et al, 2009), providing the cornerstone philosophy for implementation through CLAHRCs.
<i>Boundaries</i>	Boundary objects are involved in boundary spanning between communities of practice to enable knowledge-sharing and collaboration (Lave & Wenger, 1991; Bowker & Star, 1999). Implementation based on collaborative knowledge exchange requires various boundaries to be crossed, at in individual, collective, and organisational level.
<i>Communication</i>	An effective boundary object creates an opportunity for shared language, allowing one group to ‘speak’ to another (Carlile, 2002). Opening up dialogue between users and producers of knowledge is a crucial stage of implementation.
<i>Shared meaning</i>	Communication leads to shared meaning through negotiation and sufficient consensus (Star & Griesemer, 1989).
<i>Conflict</i>	The same properties that instil a sense of shared meaning and alliance between one party or parties may have an incendiary effect on another if for example the symbolism is deeply meaningful to one party but contentious to another (Barrett & Oborn, 2010).

Context	Effective boundary object are context-sensitive and highly adaptable to local needs. Context is also a property that can be conveyed via the boundary object (Star & Griesemer, 1989; Fox, 2011). Context plays a key role in getting evidence into practice (Kitson et al, 1998; Rycroft-Malone at al, 2004)
Complexity	Collaboration and implementation are complex processes with inconsistent outcomes. Neither process can be forced or coerced, rather complex interventions are required to encourage and support both.
Mediation	Boundary objects are meditation agents functioning at the interfaces between parties (Stenfor, Tanner & Haapalina, 2004).
Symbolism	An effective boundary object is embedded with a symbolic meaning transcending beyond a functional level A designated boundary object or TEBO may flounder if it is not imbued with symbolism and emotive properties to make it desirable to the user group, despite being purposively 'fitter' for practice (Levina & Vaast, 2005)
Change	Boundary objects are involved in the transformation, translation and transferral of knowledge between parties. (Carlile, 2002). Implementation requires change at an individual and organisational level as knowledge is translated form one context to another.
Communities	Both literatures highlight the role that individual operate within communities of practice (for example as nurses, medics, scientists or software designers), and that by bringing these different groups together links can be strengthened, cooperation can be encouraged and knowledge can be exchanged through collaborative practices. In academia these have sometimes been referred to as collaboratories (for example CERN), in Canada the term knowledge translation partnership has been applied, whilst in the UK these partnerships are represented in the NIHR's CLAHRCs.

Applying the concept of boundary objects to the context of implementation

The investment in collaboration as a context for implementing evidence creates an opportunity to investigate the potential role of boundary objects in implementation. The review of the literature indicates that the concept of boundary object could be applied to provide a fresh insight into collaboration in the context of implementation, providing a compelling case for exploring the role of boundary objects in CLAHRCs.

Box 2: Reframing implementation in boundary object terms

'Boundary objects play a role when boundaries are spanned to enable different groups to work together during implementation. Boundary objects involved in implementation are ideas or things that can be shared between the different communities within CLAHRCs but may possess alternate meanings according to the context of their use. Boundary objects involved in implementation are adequately flexible to meet the needs of users yet retain sufficient identity to be recognised across multiple implementation contexts. The combination of flexibility and recognisability mean boundary objects can enable communication across boundaries to provide by providing a shared reference point around which collaboration can be coordinated. The creation and management of boundary objects is important in developing and maintaining boundary crossing interactions and relationships, enabling different individuals and communities to work together towards a shared implementation goal'.

(adapted from Star and Griesemer, 1989)

The applicability of boundary object concept to the exploration of implementation through CLAHRCs is evidenced by an epistemological overlap which highlights how collaboration between groups and individuals can influence whether or not knowledge is successfully mobilised across boundaries. The concept of boundary objects has emerged from studies examining the way different groups possessing multiple perspectives, agendas and understandings are able to work together towards a shared goal (Star and Griesemer, 1989).

A similar situation is generated by NIHR CLAHRCs: for the first time there has been national investment in integrating the historically distinct domains of research and practice, with the aim of encouraging collaboration between traditionally disparate social worlds in order to produce and deliver knowledge which is relevant, appealing and drives the development of more effective and efficient health care services. CLAHRCs can be described as a 'living experiment', intended to foster collaboration to accelerate the rate at which research based knowledge is translated into evidence based care. The complexity of the implementation process, hinged on a partnership approach to co-produce knowledge, means that unpacking the 'black box' of collaboration is necessary.

Whilst boundary objects have gained popularity across the parallel fields of science, technology, and innovation studies, there has been little work conducted to explore the relevance of the concept in terms of implementation in healthcare. Both the collaborative context of NIHR CLAHRCs, and the focus on translating knowledge across different contexts and stakeholders, implies that there is potential role for shared objects during implementation through CLAHRCs.

CHAPTER 3: METHODOLOGY & METHODS

Introduction

The chapter begins by outlining the various methodologies considered, looking at the principles of each in turn, before moving on to consider methodological fit in relation to the following research questions:

Box 3: Research questions

What do boundary objects mean within CLAHRCs (if anything), how are they represented (if at all), and do they play a role in implementing knowledge into practice?

These questions are based on the following propositions developed from the boundary object and implementation literatures:

1. Implementation is a social process, in which collaboration might be key (Weiss, 1979; Nutley, Walter and Davies, 2003; Greenhalgh, 2004, Rycroft-Malone et al 2004; Graham et al, 2006).
2. Boundary objects might play a role when boundaries are overcome to enable different groups to work together during implementation. (Carlile, 2002; Kislov et al, 2011)

The nature of these questions provides the criteria relating to how they will be best approached, and guides the type of data collection methods and approach to analysis selected.

The second part of the chapter will discuss the research methods adopted during the study, discussing how these have been selected in relation to the chosen research design and underpinning methodology. Finally, an account of the analytic process is presented, illustrating the way in which methodology, methods and analysis are brought together to provide a rigorous and robustly designed two phase multiple case study.

Ontological and epistemological position

The study is fundamentally qualitative in nature, conducted by a researcher (myself) whose ontological stance is most accurately described as realist. This means that I accept that there are some things, objects, events and phenomena which exist independently of human experience, and those which are generated, modified, and mediated through the lens of human interaction and interpretation.

My stance as a qualitative researcher is influenced by a realist perspective, that is, I am able to appreciate the constructed nature of knowledge and meaning, whilst understanding that some elements of reality remain intact regardless of any individual's interpretation. This allows me to mediate between a wholly constructivist approach (in which every aspect of the world as we experience is constructed through an individual's interpretation, and as such is open to limitless interpretations as inferences are created iteratively and anew by each and every new actor during every new encounter), and a fully objectivist perspective which asserts that that reality is an *absolute*—that facts are facts, regardless of an individual's interpretation, experience, views or values. Realism finds a place somewhere around the midway along the continuum between the relativism of a constructivist point of view, and the fully externalised and independent reality as proscribed by an objectivist perspective.

This study focuses on the way in which objects and ideas are shared between different stakeholders during implementation activities, and as such, it is founded on an assumption that meanings and values are generated through social interaction. However, whilst this may imply a strongly constructivist perspective, it is set against an ontological background of immutable laws. Whilst these have little impact on the way in which this study is conducted, I believe it is important to highlight the particular worldview that I ascribe to, and how this frames the approach and methods chosen.

Again, whilst I do not ascribe to a fully interactionist approach, I do recognise this research tradition in the way in which the concepts that I am applying within this study have come about. Consequently, I have taken some time to explore the influence of this tradition on the development of the concept of boundary objects, because I believe it gives context to understanding the underlying

principle which guided Star's (1989) reasoning. However, whilst I recognise the influence of interactionism upon the development of the concept, this study is not an interactionist study. Instead, my realist leanings mean that I am able to appreciate this influence in the light of other theories and ideas of social interaction, and hope to make it clear that I understand its relevance as a single viewpoint amongst many different research traditions, and that these are all valid in that they enable different features of an individual interpretation of reality to be highlighted and explored.

Considering alternative methodologies

The following section outlines three major methodologies: ethnography, grounded theory and case study. Many other methodologies exist within the vast, evolving and contested domain of qualitative research (Punch, 1998).

I will outline the main assumptions, benefits and issues associated with each, before concluding with a rationale for selecting the specific methodology chosen in relation to its usefulness and appropriateness to this study.

Ethnography

Ethnography is, as its name suggests ('ethno' meaning people, and 'graphy' meaning to describe) is defined as the art and science of describing a group or culture from the point of view of its members (Fetterman, 1989; Neumann, 1996). Ethnography emerged as response to what was perceived as the threat of positivism to dehumanise social research (Bryman, 2004). Instead, ethnography places the utmost importance on the naturalistic mode of enquiry in which the researcher is immersed in the daily lives of her participants (overtly or covertly), for an extended duration in order to investigate the social world (fieldwork). Naturalism assumes that behaviour is influenced by an individual's interpretation of a situation. This interpretation is based on meanings, which are continually being re-wrought and constructed in response to changing circumstances. Ethnography seeks to understand the social world by uncovering the shared set of meanings that define a particular group and/or culture (Spradley, 1980).

Ethnography's roots in anthropology are evident in its focus on observing and understanding cultural behaviour within context, focusing on the shared meanings of a particular group of people. Historically ethnography has lent itself to studies of groups or communities for example Goffman's work with prisoners and psychiatric patients (1961, 1974).

Hammersley and Atkinson (1995) identify six main characteristics defining an ethnographic approach. The first is the assumption that uncovering the shared cultural meanings of the group will lead to an understanding of its behaviour. The second is the aptitude to develop and interpret an insider's understanding of the meanings, behaviours and contexts within which the group lives and interacts. Related to this is the commitment of the ethnographer to study the group within its natural environment, traditionally facilitated by the practice of participant observation during which the ethnographer enters the field and becomes part of the natural setting. A fourth characteristic is the acknowledgement that ethnography will develop and emerge over time, requiring a longitudinal approach and an absence of *a priori* assumptions. A fifth feature of ethnography is that it can employ a variety of data collection methods, it is eclectic and unrestricted within the remit of naturalism (the ethnographer would not use surveys or questionnaires or impose such structured tools to the study, but may use a combination of fieldwork, observation, field notes, and or audio-visual data). Finally ethnographic data collection is traditionally conducted over the course of months and years, focusing on gathering data related to repeated actions, events and behaviours.

Ethnography in healthcare

Ethnography has been widely used in studying not only the behaviour of different disciplines, but also in focusing on specific clinical topics clinical such as cancer, HIV, heart disease, or diabetes, as well as their associated populations of clinicians, patients and carers. This is well demonstrated by a study by Perry et al. (2006) who use ethnography explore the how families of disabled relatives respond to early discharge before a full recovery has been made. Using an ethnographic approach enabled Perry et al (2006) to reveal the conflict that family caregivers can experience as their caring role is superseded by nurses, and the impact this can have on the primary caregivers. The

ethnography highlighted individuals and family's experiences of the process of admission and early discharge. Their ethnography found that some families were able to develop a level of resilience to becoming vulnerable as they enter the different world of inpatient services.

Ethnography has been used to explore the way in which cultural factors can influence patient and practitioner decisions in healthcare. Examples include Scrimshaw and Souza's (1982) study of how expectant mothers struggle to recognise the onset of labour. Using ethnography, the study showed that whilst clinicians tend to assume a shared level of understanding during discussions around care and treatment with patient, patients themselves possessed a wide degree of interpretative variance which is influenced by cultural background.

Savage (2000) suggests that ethnography has a broad relevance to research into healthcare. Savage lists a number of ways in which ethnography provides a tool for exploring belief and practices in healthcare, for investigating the experiences of healthcare delivery in a modernised NHS, as well as the experience of illness from the perspective of patients and carers. In addition Savage (2000) highlights the potential usefulness of ethnography as a way of understanding the delivery of healthcare services from an organisational standpoint, by looking into the cultures that define the different disciplines and hierarchies that operate to provide healthcare services.

Grounded theory

Grounded theory is described as both "specific and different" (Punch, 2000). It is not a theory per se and is more aptly described as a cross-cutting methodology within which specific procedures and techniques are followed, the purpose of which is to develop theory inductively from data. Despite representing one of the most widely cited methodologies in modern social research (Denzin and Lincoln, 1994), there remains ambiguity about whether the methodology is truly observed in many studies described as grounded theory, or, as many authors note, that it is applied haphazardly to denote any theory that is arrived at inductively (Bryman, 1988; Charmaz, 2000). Whilst there is no doubt that grounded theory has succeeded in making an impact across qualitative research, there remains ambiguity about whether those who

lay claim to using grounded theory possess the procedural fidelity that the methodology demands, as Glaser (1999) observes:

“Now, all research is grounded in data in some way. It is implicit in the definition of research. Thus, research is grounded by definition, but research grounded in data is not grounded theory, although many would have their work designated that way. It is grounded theory only when it follows the grounded theory methodological package. (p.1)”

The first description of grounded theory emerged following the publication of two studies exploring the experience of dying in hospital (Glaser and Strauss, 1965; 1967). In *The Discovery of Grounded Theory* (1967), Glaser and Strauss set out the rationale for grounded theory, showing how the methods and techniques were developed and refined during their investigations. The book became a landmark publication in terms of setting out the specifics of following a grounded theory approach, outlining and legitimizing the underpinning logic of inductively developing theory from data.

However, despite initially developing grounded theory as a method with which to challenge the influence of functionalism (for example such as that portrayed in the work of Parsons, (1937) and encourage their students to consider the social world from an inductive stance, the partnership between Glaser and Strauss eventually broke down. Whilst grounded theory continued to be developed and refined, significant methodological difference resulted in a highly visible schism (as evidenced through the publication of a number of opposing texts, for example Strauss and Corbin’s 1990 book *Basics of Qualitative Research* which prompted Glaser’s 1992 publication *Basics of Grounded Theory Analysis*). Strauss achieved great success pursuing a more global approach in which grounded theory provided a set of procedures which can be applied across qualitative research in general. Glaser however critiqued Strauss’s version as no longer truly representing grounded theory, describing it as *“forced, full, conceptual description”*, an entirely different method to the original (Glaser, 1992 p.5). Instead Glaser (1999) defends the original conceptualisation of grounded theory as a methodology characterised by openness and conceptual freedom.

Whilst Glaser's grounded theory is considered closer to the original methodology (Walker and Myrick, 2006; Glaser, 1992), and despite criticisms that Strauss's version is "...*programmatic and over formulaic*" (Melia, 1996; p.370), it is Strauss's version that is most widely cited and described in qualitative research textbooks; due to this visibility it is Strauss's version that will be briefly outlined. Strauss and Corbin (1998) define grounded theory as:

"theory that was derived from data, systematically gathered and analysed through the research process. In this method, data collection, analysis, and eventual theory stand on close relationship to one another". (p12)

Grounded theory is described as a process of constant comparison as it involves continual iteration between data and analysis. It is based on the concept of theoretical sampling, during which the analyst simultaneously collects, codes and analyses data to reveal an emergent theory. The type and direction of any further data collection is prompted and driven by this emergent theory, and as such represents an on-going process as opposed to a single event (for example probability sampling). The purpose is to continue the cycle of collection and analysis until theoretical saturation is achieved, that is, no new theoretical elements are revealed in new data collected. Coding is open and inductive, shaped by the researcher's emergent interpretation of the data rather than through the use of a framework which may have been developed deductively from the literature. The focus on inductive theory generation means that the use of literature occupies a somewhat different position in grounded theory in comparison to other methodologies as rationale would dictate that if there is already much known about a particular phenomenon it detracts from the focus of theory generation. True grounded theory places an emphasis on delaying the traditional first step of conducting a preliminary literature review in order to preserve the interpretive integrity of the researcher. The idea is that literature is treated as data, and can be fed into the analytic process at a later stage when some conceptual clarity has emerged.

Bryman (2000) summarises the process of grounded theory in twelve interrelated steps, starting with the identification of the research problem, moving through theoretical sampling, initial coding, concept generation and

constant comparison through to the category generation and saturation, exploration of relationships between categories, hypothesis emergence, further theoretical sampling, theoretical saturation and finally specification and testing of a substantive theory using grounded theory processes. However, he notes the inherent difficulty in attempting to capture the essentially iterative and cyclical nature of grounded theory in text. Despite the inconsistency in articulation, the ambiguity and methodological division between the main progenitors of grounded theory, it remains one of the most influential methodologies within social science today.

Grounded theory has a long history in healthcare research, stemming from Strauss and Glaser's (1965) original study of the expectations of dying held by terminally ill patients and their relatives. More recently grounded theory has been used to explore the mechanisms of getting evidence into practice, (Masso, McCarthy and Kitson, 2014), the experiences of healthcare professionals enrolled in mindfulness-based medical practice (Irving et al, 2014), the experience of receiving a diagnosis (Konradsen et al, 2014), as a way of understanding clinician's views and values of practice (Thomson, Petty and Moore, 2014).

Case study

Despite its popularity across a wide range of disciplines, for example law, education and psychology, case study can be difficult to define clearly (Thomas, 2011). Whilst some such as Yin (1988) and Stake (1995) have developed a robust set of procedures for conducting case study research, it should not, as Goode and Hatt (1952) advise, be mistaken for a research technique in itself. Instead it is useful to think of case study as providing a focus rather than as research method per se (Thomas, 2011). Case study is defined by Simons (2009) as:

“An in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, programme or system in a ‘real life’ context. It is research based, inclusive of different methods and is evidence-led. The primary purpose is to generate an in-depth understanding of a specific topic (as in a

thesis), programme, policy, institution or system to generate knowledge and/or inform policy development, professional practice and civil community action.” (p.21)

Case study as methodology is characterised by a number of key features: it is detailed, comprehensive and pays attention to the study of a phenomena within its natural setting, using multiple methods to gather data across a range of viewpoints.

Hammersley and Gomm (2000) contrast case study with experimental and survey based inquiry, explaining that case study differs in a number of ways. For example whilst experiments and surveys are useful for investigating a high volume of cases, case study focuses investigation on a single or small numbers of cases. In terms of data collection and analysis, case study enables a researcher to gather a great deal of in-depth information, whilst surveys and experiments tend to focus on a smaller number of features of each case. Again whilst experiments and surveys are concerned with quantifying data, this is a not a priority in case study. However case study can provide useful contextual detail when used as part of a mixed methods or qualitative investigation.

Finally cases studies involve the investigation of naturally occurring phenomenon with no manipulation of variables, whereas experiments imply a control of certain variables to be measured and observed, and surveys focus on naturally occurring phenomenon but demand that these are sampled in which a way to maximise representativeness of a wider population. Yin (1994) adds a further distinction by arguing that unlike experiments or surveys case study embraces rather than excludes context as important. Each of these has its advantages and limitations as determined by the research topic, the nature of the research question, the control a researcher may have over events and the focus on outcome generation.

Yin (1988) describes three strategies of case study: explanatory, exploratory and descriptive. Explanatory case studies are useful when the research question may concern exploring multiple explanations of a phenomenon, such as an event, in order to find out which theory holds most relevance (In his illustration of this type of case study Yin cites Allison’s (1971) explanatory case

study of the Cuban missile crisis). Descriptive case studies are those that follow the course of particular events over time, providing a detailed account within which key phenomena may become apparent (again Yin draws on another classic work, Whyte's 1943 portrayal of life growing up in a disadvantaged neighbourhood). Yin highlights how the third type of case study, exploratory, has traditionally been seen as having a role to play during the exploratory phase of an investigation when little is known of a phenomenon and the purpose is to develop propositions and hypotheses.

Stake (1994) offers an alternative approach, categorising cases studies as intrinsic, instrumental or collective in nature. Intrinsic case studies are conducted with the purpose of enhancing the understanding of a particular case; an instrumental case study is useful when refining a theory regarding a specific case; whereas a collective case study extends the focus of an instrumental case study across multiple cases in order to generate knowledge relating to the wider population or general condition.

However despite its ability to generate rich, detailed and contextualised accounts across a wide range of disciplines, case study has been critiqued on a number of counts. Of primary importance is the ambiguity regarding what case study is: whether, as Crotty (1998) describes, it as a research method which is governed by specific procedures, or whether it in fact represents a research methodology in which methods are less important than context (Yin, 1988). The dual status of case study originates in the different way in which it has traditionally been perceived and applied as a method in quantitative research whereas its inherently holistic and eclectic data collection methods meant that it has been espoused as a methodology amongst qualitative researchers (). Another frequent criticism of case study is its limited use in delivering generalizable findings due to its focus on the myriad details of a single case (Punch, 2000; Bryman, 2000). Reliability and rigour have also been cited as issues with case study (Punch, 2000; Bryman, 2000). However, if the purpose of an investigation is qualitative in nature, and the outcome is to develop a deep understanding of a particular case with the view that it could provide valuable insight into other similar cases (transferability), then criticisms relating to generalizability can be countered (for example if the purpose is the production of generalizable outcome then another research strategy such as experiment or

survey may be more relevant). Other issues related to rigour and validity can be addressed through the development of a robust research design, and by using multiple methods of data to triangulate data and improve credibility.

Case study has been used extensively by researcher investigating a diversity of phenomena. Recent examples include the experience and classification of back pain (Finger et al, 2014); the way in which clinical topics such as attentional deficit hyperactive disorder (ADHD) are discussed during clinician-patient dialogues (Lynch et al, 2013); whilst staffing levels and patient mortality rates provide the topic for Needleman et al (2014).

Choosing a case study approach

Case study has been selected as the most appropriate methodology with which to approach this study as it represents an ideal methodology when a holistic, in-depth investigation is needed (Feagin, Orum, and Sjoberg, 1991) in which the purpose is to develop as full an understanding of a single or small number of cases, taking context into account. The breadth of research studies that call for a case study approach are summarised by Yin (1988):

“In brief, the case study allows an investigation to retain the holistic and meaningful characteristics of real-life events – such as individual life cycles, organizational and managerial processes, neighbourhood change, international relations, and the maturation of industries.”
(p.14)

A case study approach is also helpful as it enables the use of multiple methods to gather data from a range of sources and perspectives. This means that multiple sources of data can be used to add depth and robustness to the findings of the study. In this case, documents relating to implementation published as an output of CLAHRCs were sampled before a second wave of data collection commenced. This consisted of semi-structured interviews conducted with participants recruited from across the three cases. The decision process underpinning the selection of these specific data collection methods will be described later in the research methods section of this chapter.

Whilst ethnography is also very useful when the aim is to provide an in-depth exploration, its focus on culture, rather than things and ideas, generates fundamental philosophical questions and conflicting assumptions, as this is not one of the objectives of this study. Furthermore it is beyond the capacity, resources or remit to undertake a prolonged period of fieldwork and provokes further challenges. Again, whilst micro-ethnography may remedy some of these issues the fundamental conflict between ethnography's focus and stance and the topic of this study remains. Similarly grounded theory has been rejected as it provokes a range of issues around methodological fidelity, for example the first stage of this investigation involved a review of the literatures relating to implementation in order to clarify a gap in the research and establish a set of propositions which underpinned the development of the research questions. This process would be prohibited if applying a truly grounded theory approach (bracketing).

Designing the case study

When the decision to take a case study approach has been made, the researcher must decide on the topic – what is it a case of that is to be studied? This will influence the study design: the type of case study to be conducted, to choose a single or multiple case study? Will it be exploratory, descriptive or explanatory in scope and aim? Once the decision to take a case study approach was made then these questions were tackled in turn. In terms of this study there will be two phases: an initial phase, conducted across the three cases in which documents will be analysed. The purpose of phase one was exploratory in nature, conducted to establish whether there were objects that could potentially represent boundary objects represented in the published output of the three CLAHRCs. The outcome of phase one then informed a second more explanatory phase during which the findings of phase one influenced the topics to be discussed with participants sampled from across the three cases.

Defining the case

Defining the case can be one of the biggest challenges in getting started in case study (Simons, 2009; Thomas, 2011). This apparently simple task can generate

many hours of debate as a researcher seeks to clarify what exactly constitutes the case in question. Thomas (2011) draws attention to the multiple interpretations of what is meant by the word 'case' to draw the conclusion that the case can be defined in three ways: as a container, a situation or as an argument. The case must be a case of something, it must be bounded, that is it exists within a set of parameters that make it unique and, as Stake (2005) describes, singular. In this investigation the case is defined as each participating CLAHRC, where each CLAHRC is bounded and defined by a unique set of geographical and organisational parameters.

The presence of three cases prompted the choice of a multiple case study, particularly as multiple case studies provide the opportunity to compare within and across cases to provide findings that are more robust than those yielded by single case study. Within each case there must exist a unit of comparison which can be contrasted between cases. In this case the embedded unit of analysis is people in boundary spanning roles (boundary spanners). It is these individuals whose accounts of implementation and the things and ideas that they use when attempting to engage stakeholders which provided the individual points of reference within each case.

Research methodology and research methods

It is useful at this point in the chapter to define what is meant by both the phrases 'research methodology' and 'research methods'. Despite the similarity and shared root, 'methodology' and 'methods' are different concepts. It is important to make clear that the distinction is one of approach versus apparatus, that is, methodology defines the underpinning philosophy of the researcher, their epistemological and ontological stance; whereas methods applies to the tools used by the researcher to generate, uncover and collect data.

The link between the two is one of methodological fit – the way in which the underpinning methodological assumptions are reflected in the choice of data collection methods. Issues can arise if there is a mismatch between the methodology which informs and influences the approach to the study, from the

types of questions to be asked, to the kinds of tools that are selected i.e. one's approach drives the choice of methods. For example, if a researcher states they are to undertake a phenomenological study of final year nursing students it would then be a strange and inappropriate choice to use a questionnaire to generate such data. This is because the underpinning assumption of phenomenology is that the lived experience of an individual yields the richest data relating to a particular aspect of a phenomenon (for example the researcher may wish to explore what the nursing students feel as they head towards registration in their own words and experiences), rather than data via a series of set questions presented in a survey format. The latter method of data collection immediately circumscribes the participants' own voice in favour of readily collated answers defined by specific questions. Clearly such an approach is incompatible with a phenomenologist's methodological stance. In summary it is important to be very clear from the outset as to one's methodological stance and how this informs and influences the design and delivery of a research study. This does not imply that there is standard set of tools by which every study is conducted as defined by its underpinning methodology rather it makes clear that there are some methods and methodologies which are mutually exclusive.

Research methods

Qualitative research is characterised by a wealth of research methodologies, designs and corresponding data collection techniques (Miles and Huberman, 1994). This study was a two phase study within which phase one comprised a document analysis conducted prior to phase two, a multiple case study. Both phases are framed by the wider methodology outlined above; however each has a different focus in relation to answering specific elements of the research questions. Accordingly, phase one was focused on establishing whether any potential boundary objects could be identified in written accounts relating implementation through CLAHRCs, whilst phase two built on the findings of phase one by exploring personal accounts of implementation through CLAHRCs. The purpose was to provide an initial exploratory phase establishing whether there are things or ideas which may represent boundary objects, before an explanatory phase was conducted, building, and expanding on these findings.

Phase one: a documentary analysis of published outputs relating to implementation through CLAHRCs

Phase one sought to answer the research question: *How are boundary objects represented (if at all) in implementation within CLAHRCs?* Qualitative content analysis of CLAHRC documents was chosen to investigate whether any boundary objects could be identified.

The aims and objectives of phase one were as follows:

- To identify items matching the description of boundary objects in CLAHRC documents relating to implementation
- To refine the initial conceptualisation of boundary objects involved in implementation

The overall aim of phase one was to establish a foundation for phase two, a case study exploring the meaning and role of boundary objects during CLAHRCs implementation activities as described by those in boundary spanning roles.

The decision to use documents as a data source and the way in which this material is then analysed is described in the following section.

Choosing documentary analysis

Documentary analysis is a broad term referring to a variety of analytical methods in which documents (literature, text, and inscriptions) are sampled to provide a data source for qualitative research (Punch, 2000; Bryman, 2000; May, 2001). Documents are frequently used alongside other forms of data such as interview data, particularly during case study to provide a method of triangulation (May, 2001).

The purpose of choosing documents as a source of data is both practical and illuminating. In terms of this study it was important to ground the analysis by building on what is already understood in terms of both the concept of boundary objects and the process of implementation. This knowledge has been used to inform the development of a literature driven coding framework, providing a deductively driven starting point for the first phase of the study.

Documents as data

Documentary analysis can provide “a rich vein for analysis” (Hammersley and Atkinson, 1995: p.173). In terms of this study, using documentary analysis as a data collection method had two distinct advantages: it was both unobtrusive, and, capitalised on the presence of naturally occurring data (Bryman, 2001; May 2001).

Organisations of all types produce a diversity of documentation, much of which is released into the public domain (Bryman, 2001). This is true of CLAHRCs as organisational entities swathed in documentation

Despite their integral role in the construction of organisational identity, power and knowledge, documents can be overlooked as a source of data in their own right. Prior (2007) suggests that this has two causes: firstly, in industrialised societies in which the bureaucratic infrastructure has become widespread the document has become ‘invisible’, due to its commonplace position. Secondly, she highlights the way in which the interactional, the vocalised, and the verbal have become the preferred forms of data sources, particularly amongst disciplines influenced by anthropology such as the social sciences. This is evidenced by the reams of texts, papers and books dedicated to the practice of conversation analysis, or the way in which the interview has become the quintessential qualitative data collection method (Bryman, 2001; Kvale, 2007).

Whilst documents such as diaries, journals and blogs can also shed light into the personal, the importance of documents in exploring organisational life is also apparent. An example can be found in Weber’s seminal organisational studies and his consequent development of bureaucracy theory was based primarily on insights gleaned from documentary analysis (Weber, 1905). Weber approached written (inscribed) documents as the cornerstone of modern industrial society, the study of which gave an understanding of the interactions between people and organisations. Weber’s use of documentary analysis helped him illustrate how bureaucracy-based systems played a lead role in the rationalisation of industrialised societies.

More recently Prior (2007) has applied documentary analysis to the study of organisational life in government bureaucracies and the UK health service.

Prior (2007) argues that documents should not be approached as a peripheral data source: in her exploration of psychiatric nursing assessments, Prior (2007) highlights how documentation drives the construction of individual and organisational identity.

There are a number of different approaches to documentary analysis including discourse analysis, content analysis, and semiotics. Each approach is matched by a corresponding set of methodological assumptions and terminology guiding the process of interpretation. The next section describes each approach to documentary analysis in further detail, exploring the appropriateness of each in turn in terms of this study.

Discourse analysis

Discourse analysis has emerged from a diverse disciplinary background encompassing critical linguistics, social semiotics and critical language studies. As such it cannot be described as a cohesive set of techniques for the analysis of text and language (Fairclough, 1989; Mills, 1997; Gill, 2000; Punch, 2000; Gee, 2005). Instead it is described as a way of looking above semantic structure to focus on the way language is used, for what purpose, in which context (Punch, 2000). Gill (2000) defines discourse analysis as, “careful, close reading that moves between text and context to examine the content, organization and functions of discourse” (p. 172).

The term ‘discourse’ has been employed to move beyond the scope of text to encompass the wider documentary perspective in which ideas and meanings are formulated, transmitted, and negotiated through multidimensional modes of communication and shared understandings. Gee (2005) suggests that there is a distinction between the term ‘discourse’ and, “Discourse with a capital D” (p. 21). This distinguishes the text (discourse), from the wider sociocultural context of ‘Discourse’. This ‘Discourse’ embodies the discourses (as texts), interactions, language, ideas, beliefs, understandings, values, symbols, tools, objects and so on which merge together creating and defining individual and collective social identity.

Semiotics

Semiotics, the 'science of signs' is most associated with the ideas of Saussure (1916). Saussure proposed that hermeneutics (the study of literature) can be expanded to encompass a whole range of 'sign systems', moving from language and text to encompass all media functioning as signs in social life. A fundamental feature of semiotics is the idea that language can be understood as a symbolic sign system, in which a sign is substituted or 'stands in' for something else – it becomes a representation or shorthand for another phenomenon, feeling or situation. Saussure suggested that in language these signs are the words we use to describe and replace things. For instance, the written word as text is a system of markings upon paper, but their meaning – what they represent and replace – goes far beyond the printed symbols.

Barthes (1957) developed Saussure's ideas focusing on the diversity of signs and symbols that play a role in the construction of contemporary social life: fashion (1967), music (1977), and photography (1981), asking how meaning is embedded in such things. Barthes' interests extended to the everyday signs European society is surrounded by, unravelling images and forms of rhetoric to reveal their many and mixed meanings. In this way Barthes describes text, image and other media output as 'polysemic' – possessing multiple meanings. Barthes focused not only on how meaning is embedded within images, but equally, how do consumers retrieve meaning from images? These questions have been extended further to include patterns of behaviour such as etiquette which can be analysed according to the rules of semiotics (Eco, 1976; Noth, 1995; Kreydlin, 2011).

The linguistic traditions of semiotics are evident in the way in which all cultural artefacts are treated as text. Saussure's linguistic background deeply influenced the founding assumptions shaping the development of a set of procedures to uncover meanings residing within texts. However, his American contemporary Charles Sanders Peirce (1908) proposed that everything can be seen as sign, arguing that even thoughts can be described as signs: "I define a Sign as anything which is so determined by something else, called its Object, and so determines an effect upon a person, which effect I call its Interpretant, that the latter is thereby immediately determined by the former." (pp. 80-81)

A criticism of semiotics is that despite its broad applicability its usefulness as research method is limited by the analyst's ability to articulate and defend their interpretation. That is, a semiotic analysis may be criticised as being overly arbitrary in its interpretation, relying heavily on the persuasive account of the analyst, rather than any substantive or transferable interpretation. Despite this, Bryman (2001) argues that semiotics as an analytic tool delivers no more an arbitrary analysis than other forms of qualitative documentary analysis. Criticisms of the interpretive arbitrariness of qualitative approaches can be countered by robust research design and transparency of method to produce high quality analyses that are rigorous and transferable.

Content analysis

Content analysis is described as "one of the classical procedures for analysing textual material" (Kapborg and Bertero, 2003, p.185). Krippendorff (2004) describes content analysis as both a methodology and a process to move from text to context in order to investigate represented and embedded social reality. It involves three stages: stating the research question, retrieving the text, and interpretation and analysis (May, 2001). In this phase of the study the text is the conventional inscribed kind, but text can also refer to any artefact which can be 'read' including audio-visual material and the built environment (Bryman, 2001; Prior, 2007).

Content analysis benefits from a systematic and structured approach to analysis, employing a series of procedures to make inferences from text to context (Weber, 1985; Krippendorff, 2004). Content analysis offers a flexible method which can be applied across both quantitative and qualitative research paradigms (Weber, 1985; Krippendorff, 2004). This flexibility has led to the criticism that content analysis is a-theoretical, that is that it does not adhere to a particular research tradition or possess an associated methodology (Bryman, 2001). However, this charge can be alleviated by situating content analysis within a specific theoretical context, for example this study takes a qualitative approach to understanding implementation as a complex social process in which collaboration is key (Kitson et al, 1998; Rycroft-Malone et al, 2004; Graham et al, 2006; Baumbusch et al, 2008; Damschroder et al, 2009).

Qualitative content analysis moves away from observing the measurable towards uncovering the meaningful within texts. There exists some variety in the way in which qualitative content analysis is defined. Some such as Mayring (2000) emphasise the way in which it follows the procedures of classical content analysis but avoids “rash quantification” (p.2).

Patton (2002) defines it broadly as “any qualitative data reduction method and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings” (p. 453). Ericson et al (1991) define qualitative content analysis as a process during which the relevant material for analysis is teased out and pieced together to disclose patterns and sequences. This approach enables theory to be generated and refined through a process of deconstruction, interpretation and reconstruction (Ericson et al, 1991). More recently the approach has been defined as a method for “the subjective interpretation of the content of textual data through the systematic classification process of coding and identifying themes or patterns” (Hsieh and Shannon, 2005, p.1278). Krippendorff (2004) defines content analysis from an ethnographic stance as a “technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use” (p. 18).

Krippendorff (2004) proposes six characteristics of texts that are relevant to the definition:

1. Texts possess no objective – no reader-independent – qualities. Seeing something as text implies an invitation to read it. Krippendorff (2004) argues that, “texts...arise in the process of *someone* engaging with them conceptually. A text does not exist without a reader” (p.22).
2. Texts possess multiple meanings and can be viewed from multiple perspectives. They can be analysed in a multitude of ways to give multiple interpretations. The content of a text may be manifold according to the perspective of the reader.
3. The meanings invoked by texts may not be shared. In fact they could be contentious. Content analysis does not seek to reduce text to a single shared meaning it embraces the notion of multiple, different and

conflicting meanings. The interpretation of an author may differ from that of a reader, a speaker from a listener or an artist from an observer.

4. Meanings (contents) speak to something other than the given texts, even where convention suggests that messages 'contain' them or texts 'have' them. Krippendorff (2004) highlights the capacity of texts not only to inform their recipients, but to invoke feelings and induce behavioural changes.
5. Texts have meanings relevant to particular contexts, discourses or purposes. Despite the diversity of readings of a text, a text is generated in a distinct circumstance and is thus contextually bound. Krippendorff (2004) suggests that agreement on the context of a text can be reached despite interpretative variation.
6. The nature of the text demands that content analysts draw specific inferences from a body of texts to their chosen context, "from print to what that printed matter means to particular users, from how analysts regard a body of texts to how selected audiences are affected by those texts, from available data to unobserved phenomena. Texts, messages, and symbols never speak for themselves. They inform someone." (Krippendorff, 2004: p.25)

Table 2: Three approaches to documentary analysis

	Discourse analysis	Semiotics	Content analysis
Definition	Multiple approaches to the study of ideology embedded in text and talk	The study and science of signs	Classic or quantitative content analysis seeks to quantify content in terms of predetermined categories Qualitative content analysis focuses on meanings rather word counting and involves generation of data-driven categories
Key authors	Foucault	Saussure Barthes Eco	Lasswell Mayring Bereleson Altheide Krippendorff
Classic studies	Study of the language conventions that define power and knowledge in society i.e. Foucault (1961) explored the social construction of insanity in <i>Madness and Civilization: A History of Insanity in the Age of Reason</i>	Barthes' (1967) structural analysis of the language of fashion magazines <i>Systeme de la mode</i>	Berelson and Salter's (1948) <i>classic content analysis study</i> highlighted the media under-representation of minority groups; Altheide's (2009) qualitative content analysis of the Columbine shootings and the discourse of fear.

Approach to this study

In this study, qualitative content analysis has been selected as the most appropriate approach as it provides a systematic method for looking directly at documents in a flexible, unobtrusive manner, enabling a wide range of documentary material to be gathered as data (Hammersley and Atkinson, 1995; May, 2001; Bryman, 2001). A qualitative approach to content analysis has been chosen because it focuses on the interpretation of content rather than the frequency of words or phrases (May, 2001). However, this study recognises there are few substantive differences in the way in which both approaches are applied, but that it is the perspective from which the analyst approaches and interprets the data that are determined by methodological stance. In this study the choice of qualitative content analysis reflects my perspective as a qualitative researcher who views implementation as a complex, social process. This means that any documentary data produced as an outcome of this process represents contextualised data within which meanings, values and understanding regarding implementation are embedded, which may be quite different contingent on the perspective and interpretation of reader or writer. An updated taxonomy of boundary objects developed as an outcome of a review of the literature (Chapter 2, p. 30) has informed this search, sensitising me to things and ideas represented within the sampled document which could potentially have a boundary spanning function.

Documentary analysis offers a number of benefits over other forms of data collection and interpretation. The rationale to focus phase one on an analysis of documents is underpinned both by pragmatism in terms of data collection and is consistent with Star and Griesemer's (1989) approach to exploring the concept.

Firstly the types of documents to be sampled are publically available and readily accessible. Secondly, in terms of approach there exists a methodological consistency, for example Star and Griesemer's (1989) discovery of the concept was based on a study of the documents, the diaries, reports, accounts and other artefacts relating to the establishment of the Berkeley Museum of Vertebrate Zoology (1907-1939). Much of Star and Griesemer's (1989) observation and propositions of boundary objects were drawn from their in-depth exploration of the personal letters, diary entries, and other documents

generated by the museum's manager and chief patron, giving a retrospective insight into the way in which boundaries were negotiated between amateurs and professionals in Berkeley's Museum of Vertebrate Zoology during the early 20th century.

Selecting documents

In this study documents were gathered from publically accessible sources, namely the websites of the three CLAHRCs included in the study. This study is nested within a wider evaluation of these three CLAHRCs, which have been named Ashgrove, Hazeldean and Oakdown for anonymization purposes. The rationale for selecting documents as data is that it provided an unobtrusive and conveniently accessible route to data collection. Sampling of documents was guided by Miles and Huberman's (1994) advice that "you cannot study everyone everywhere doing everything" (p. 27). A purposive approach was taken, focusing on selecting documents according to the following criteria:

1. Understanding the broad strategic intention of CLAHRCs regarding their implementation 'function'
2. Finding documents relevant to CLAHRCs function in implementation
3. Provision of a cross section of documents across different clinical themes
4. Sampling from the various different components of CLAHRCs at different levels (e.g. macro, meso, and micro):
 - Macro – broad strategic level documents
 - Meso – organisation-wide documents
 - Micro – project specific documents and published output

Examining different types of documents produced for different purposes relating to implementation enabled different dimensions of implementation through CLAHRCs to be investigated, from different perspectives. This widened the possibility of identifying a range of different boundary objects across different settings.

At a broad strategic (macro) level these documents demonstrated why CLAHRCs were established (for example the original commissioning briefs and implementation agenda drivers such as Cooksey's (2006) Review of Healthcare Research in the UK) and situating implementation within a national policy

context. Drilling down to the meso and micro levels provides a closer view of how CLAHRCs are putting this implementation agenda into action, and revealed any differences between the way in which the three Collaborations may differ in their approach at different levels.

A sample of eleven documents relating to implementation through CLAHRCs was identified through an online search of publically available documents. These were then coded by applying preliminary coding headings of the framework (see table).

The following documents have been managed in Atlas-ti version 5:

Table 3: Documents sampled during phase one

NIHR	Oakdown	Hazeldean	Ashgrove
4.5 Collaborations for Leadership in Applied Health (D4)	Oakdown CLAHRC- Annual Report 2009-2010 (D1)	Hazeldean CLAHRC Annual Report (D2)	NIHR CLAHRC for Ashgrove Annual Report 2010 (D3)
NIHR CLAHRC call for proposals for pilots (D5)	Oakdown 2009 CLAHRC academic publication (D10)	Hazeldean CLAHRC NIHR Feedback Report (D8)	Ashgrove 2009 CLAHRC study protocol (D9)
Overarching CLAHRC feedback year 1 (D7)		Hazeldean Stroke assessment tool (D11)	
		CLAHRC CKD Collaborative Phase 1 Report (D6)	

Developing and applying the coding framework

Coding is one of the fundamental steps in the analysis of all types of qualitative data. According to Miles and Huberman (1994), “coding is analysis” (p.56). At its most basic coding is the process of tagging or labelling chunks of data to assign meaning. In this study the first stage of the coding process is consistent with Attride-Stirling’s (2001). Stage one was deductive (theory-driven) and consisted of devising a coding framework based on the shared themes reported

across the implementation and boundary objects literature (see table in chapter 2 lit review). These shared themes have been identified as having relevance across both bodies of research, were used to guide a search for words, concepts, and tracts within the document which may relate to getting evidence into practice, boundaries, collaboration, and the people, things and ideas which may play a role when boundaries are spanned during implementation This enabled the data to be meaningfully dissected and organised without loss of context (Miles and Huberman, 1994).

Table 4: Phase One Initial coding framework

Phase One Initial coding framework		
Concept	Definition	Code
<i>Boundary object</i>		BO
1. Repositories	<i>Ordered stores of standardised information related to implementation accessible to different users at multiple sites</i>	BO-REP
1. Standardised methods and forms	<i>Shared information objects in standardised EBK is embedded or collated with the intention of enhancing implementability across different contexts</i>	BO-SMF
1. Objects, models and maps	<i>Shared representations around which implementation can be focused and coordinated</i>	BO-OMM
1. Symbolic objects	<i>Multiply interpreted entities possessing persuasive and emotive properties</i>	BO-SO
1. Catalysts	<i>Shared entities intended to reduce the effort required for boundary crossing</i>	BO-CAT
2. Adequacy	<i>Being 'good enough' to enable</i>	ADEQ

	<i>boundary crossing</i>	
3. Collaboration	<i>working together to collectively problem solve</i>	COLL
4. Communities of practice	<i>Group of individual sharing common language and practice values</i>	COP
5. Communication	<i>Imparting or exchanging of information by speaking, writing, or using some other medium.</i>	COMM
6. Conflict	<i>Incompatibility, disagreement and/or dispute</i>	CONF
7. Context	<i>Conditions forming the setting for an event, statement, or idea</i>	CTX
8. Mediation	<i>Intervention focussed on arbitration or intercession</i>	MED
9. Power	<i>the capacity or ability to direct or influence the behaviour of others or the course of events</i>	PWR
10. Shared meaning	<i>Consensus in understanding and alignment of values</i>	SMEAN
11. Symbolism	<i>possessing persuasive or culturally significant meaning</i>	SYM
12. Transition	<i>Moving from one state to another</i>	TRANS

These broad headings acted as sensitizing concepts to enable an initial search for correspondent content to be retrieved and organised, applying the coding framework to dissect the text, breaking the data down into meaningful chunks illustrating a particular concept. A second more inductive step (open coding) was simultaneously conducted during which things or concepts relating to boundary spanning were coded as they emerged through subsequent reads of the data. A benefit of developing a coding framework in this manner was the

way in which it grounded analysis in theory whilst facilitating second inductive step to be taken during which the framework was enriched by data-driven codes. The final coding framework is likely to differ from the initial framework as codes are reviewed, refined, collapsed and condensed in response to the data coded.

The coding process can be summarised:

- Development of the initial coding framework – this drew on an updated conceptualisation of boundary objects in implementation based on themes reported across the implementation and boundary object literature to provide a set of broad coding headings.
- Pilot application and refinement: framework piloted. The coding headings were reviewed and refined to focus on implementation-only boundary objects and boundaries. Additional headings created to accommodate emergent data-driven codes, clustering codes according to relatedness. This facilitated the retrieval and organisation of items to be used in the review and refinement of the overall coding headings.
- 2nd application and refinement - framework applied to documents and new codes are generated through thorough reading and rereading (open coding). These codes were used to populate the headings of the framework. New headings were added
- To the new codes emerged. These are reviewed during each iteration in light of new codes generated.
- Additional headings reflecting any miscellaneous codes expanded. Continued to collapse and condense codes, clustering same and similar codes.
- Coding continued in an iterative and recursive manner, reviewing and amending framework headings to accommodate new codes.
- Coding suspended as saturation reached. Saturation defined as the point at which no new codes are generated and repetition of codes occurs.

Example of coded data

Below is a tabulated excerpt of documentary data coded for repository type boundary object (BO-REP):

Table 5: Example of coded data

Doc	Data	Code	Object	Why this might be BO?
2	We are now almost halfway through the Collaborative initiative. Our practices have conducted over 150 test cycles of improvement in staff education, leadership, information and patient involvement. In this time, the number of people whose CKD was previously undetected has been increased (792 patients have been added to CKD disease registers, increasing the average practice prevalence from 4.1% to 4.9%) (p16)	BO-REP	Disease registers	<p>It allows standardised information to be shared across different groups involved in implementation.</p> <p>Bridges what is known and what is not known enabling a valid baseline to evaluate implementation and identify future implementation needs.</p>
6	<p>Validating the register</p> <p>Having an accurate register at the start of the project was important to make sure that the baseline was a true measure of the number of patients with CKD in the practice. The practices checked all the patients on their existing CKD registers to be sure that everyone was diagnosed correctly, following appropriate tests. Patients with</p>	BO-REP		<p>Acting to ensure the quality of baseline data and identify knowledge gap. This work is part of implementation work by highlighting knowledge gaps and defining areas of implementation need.</p>

	<p>incorrect diagnoses were removed from the records and a note was made to follow them up with further tests as necessary. A valuable spin-off from this exercise was that it helped to identify areas where staff knowledge was weak or lacking, for example by highlighting where test results had been misinterpreted or patients were not receiving the best available care. (p11)</p>			
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This illustrates the way in which data was labelled, managed and explored in terms of each concept, coding to the level of chunks of text rather than single words or phrases. The intention was to retain the context of each coded section so that patterns and relationships between codes, categories and themes are considered in relation to their surroundings. The framework is applied systematically until all the data is coded enabling the next stage of interpretation to take place as categories are developed and themes emerge.

Phase two: a case study conducted across three CLAHRCs

The following section considers group interviews and semi-structured interviews in turn, exploring and explaining the reasons why each method is or is not suitable in the context of phase two of this study.

Interviews and interviewing

May (2001) defines research interviews as “methods of maintaining and generating conversations on a specific topic or range of topics and the interpretations which social researchers make of the resultant data” (p.120). Research interviews may be highly focused, they may be structured, unstructured, conducted in groups or on a one to one basis, face-to-face, over the telephone, via skype, email or other communication methods. Whilst interviews are the single most popular method of data generation in the social scientist’s data collection toolkit (Green and Thorogood, 2009), the quality of data yielded and the meaningful interpretation of that data is contingent on the researcher’s interviewing and analysis skills (May, 2001).

The next section provides an overview of group, focus and semi-structured interviews. Structured interviews play less of a role in qualitative research as these types of interviews are normally associated with survey driven research where distinct, quantifiable answers are sought (May, 2001; Bryman, 2003; Green and Thorogood, 2009).

Semi-structured interviews

Semi-structured interviewing suggests a level of flexibility during which an interview is guided using a series of prepared questions around a specific topic or topics (the interview schedule or spine, see Appendix 3) but the relative time, content and depth given to answering each question is governed by the participant (May, 2001; Bryman, 2003; Green and Thorogood, 2009). Accordingly questions may not follow each other precisely or new areas of discussion may arise which could influence the development of future interview schedules. Semi-structured interviews enable a researcher to probe and explore a topic at depth whilst also enabling a participant to respond in their own words at their own pace (Kvale, 2007). The emphasis is on generating data that reflects the participants' thoughts, feelings, experiences and point of view rather than a strict adherence to a set of survey or other highly structured set of questions (Bryman, 2003). However whilst questions do not need to be asked in precisely the same way to each participant, the interviewer should be mindful of delivering each set of interview questions in a consistent manner to increase the comparability across interview data. Bryman (2003) advises that this is particularly important when conducting multiple-case study research as it imparts a level of structure required to enable cross-case comparison.

Choosing semi-structured interviews

Semi structured interviews have been chosen as a suitable method to generate data during phase two of the study. Whilst group interviews can provide rich and detailed data in some cases these have been rejected on the following grounds. A group approach to interviewing has been rejected on the basis that the study aims to drill down into the individual experience of boundary object use, using individuals' accounts to generate data across and between boundary spanners and cases. This was particularly important because at the time of designing the study there was little that is known about the role of boundary objects within implementation, let alone implementation through CLAHRCs. Unlike media or market research, there is no 'product' around which discussion can be focused. Instead, there exists a gap in the current knowledge around the potential role of boundary objects in implementation, so semi-structured interviews were required to explore the role of any shared objects in greater

depth. The aim of this study was to clarify the role of boundary objects in implementation through CLAHRCs by unpacking the uses and meanings associated with these shared objects and ideas.

The decision to use semi-structured interviews was thus based on the requirement to generate rich data around a subject that was very much defined by a gap in the current knowledge. The interview schedule (appendix 3) reflects this: questions were quite specific around the way in which implementation is defined in regards to activities associated with improving patient safety, service improvement, evidence-based practice and applied research. In comparison questions focused on finding out more about whether or not boundary objects could be identified or what role these objects may have played were less prescriptive with the intention of encouraging participants to think broadly around what sort of shared objects they may have used to open up boundaries. The purpose was to facilitate an exploration and discussion by participants during which they were encouraged to explore and explain the sorts of things and concepts they may find useful (or not) during their boundary spanning role in implementation through CLAHRCs.

Data collection process

In this study, data was collected by conducting semi-structured interviews with participants who were purposively sampled from three CLAHRCs and included individuals employed by CLAHRCs in boundary spanning roles related to implementation work. Boundary spanners were identified in partnership with CLAHRC teams, and invited to contribute to the study via email (see participant information pack, appendix 2). Once confirmation was received and consent gained, semi structured interviews lasting between 60-90 minutes were conducted, either face-to-face or via telephone depending on the preference of the participant and ease of access to the site. These were digitally recorded, transcribed and anonymised to remove any identifying details.

Each interview opened with a broad question regarding the participants role, moving through a series of broad questions to explore the types of boundaries crossed in during implementation work, and the sorts of things and strategies associated with boundary crossing, the factors that influence cross-boundary

communication and collaboration, and issues regarding whether shared understanding and knowledge exchange during implementation work (see appendix number). Participants were encouraged to share their experiences of implementation work, describing examples of challenges and successes in implementation work in their own words and style (Grewal et al, 2006). Prompts and probes were employed to clarify responses with the aim of encouraging clear examples relating to each question domain. For example, if a participant described an example of cross-boundary knowledge sharing between themselves and others involved in implementation work as successful, I would encourage a more detailed exploration of the factors that influenced a positive outcome, why should that be, what it meant in terms of their implementation work, its impact on a project or at a broader CLAHRC-wide level, and how it may have been different from another example where knowledge had not been shared, examining the example from different levels and dimensions. This generated a multidimensional picture the things and ideas that are shared during implementation.

Following each interview I completed a self-evaluation protocol (appendix 2), reflecting on aspects of the interview experience including pace, flow, tone as well as unexpected or significant responses. This enabled a reflexive approach to subsequent interviews to be taken, evolving questions and probing areas of interest as they emerged.

Safeguarding rigour and preserving validity

In qualitative research, as in quantitative research, it is of paramount importance to safeguard against loss of rigour to ensure the validity and veracity of findings (Seale and Silverman, 1997). Whilst the robustness of research design gives a level of rigour, veracity can be enhanced in a number of other ways as the study unfolds. Seale and Silverman (1997) present a number of strategies that can be used to improve the truthfulness of findings generated through qualitative research, including ensuring the representativeness of cases, using computer programmes to assist the analysis of data, testing hypotheses during data analysis, and the accurate and objective recording and documentation of all data.

Whilst conducting this study I kept these principles in mind. Firstly, I designed the investigation as a multiple case study, thereby increasing the reliability and transferability of the findings. Doing this also enabled me to pursue and contrast any deviant cases identified across the data; allowing me to test out different hypotheses as I proceeded through the analysis. Examples included testing the hypothesis that effective boundary objects were those that were coproduced was borne out by seeking examples of 'failed' or ineffective boundary objects which were also co-produced. However, despite scrutinising the data for such deviant cases none were found, and the hypothesis was supported by examples showing how some objects provoked conflict rather than opened up communication were evident across all three cases.

The next section outlines the process of analysis, describing how a framework analysis approach was applied across the dataset. Each stage of the analysis process is discussed using examples drawn from the data to illustrate the way in which framework analysis was applied.

Analysing the data – using a framework analysis approach

Qualitative research typically produces large volumes of textual data, for example interview transcripts or field notes (Pope, Ziebland and Mays, 2000). Framework Analysis, or FA (Ritchie and Spencer, 1994) has been specifically developed by researchers at the National centre for Social research to manage large volumes of textual data with the specific aim of generating policy and practice-orientated outcomes (Richie and Spencer, 1994; Richie, Spencer and O'Connor, 2003; Green and Thorogood, 2009). Framework analysis has been designed with applied research in mind, for example when the topics for investigation are predetermined, as in this study. This enabled an initial deductive approach to be taken: in this case, the study built upon the outcome of an earlier phase in which theoretical boundary objects were identified through an analysis of documents relating to implementation through CLAHRCs. The strength of this approach is that it allows qualitative researchers to respond to a drive to produce more applied findings with specific relation to health and social care policy agendas. FA enabling enables vast quantities of data to be analysed sometimes quite quickly whilst retaining transparent data management in which the account of the respondents is preserved throughout. This enables the

researcher to move between the different levels of the analytic hierarchy without becoming distanced from the raw data (Richie, Spencer and O'Connor, 2003; Green and Thorogood, 2009). In this case, using framework analysis allowed the stages of analysis to be informed by the specific goals of the research questions and the findings of phase one, drawing on participants' responses and recurrent themes to generate an index which could be used to code the remaining interview data.

Data analysis process

Transcripts were then thematically analysed within, and then across, cases using a framework approach (Ritchie & Spencer, 1994; Ritchie, Spencer & O'Connor, 2007; Green & Thorogood, 2009). Framework analysis includes the following five stages:

- *Familiarisation*—immersion in the raw data. In this study listening to digital audio recordings and reading the corresponding transcripts.
- *Identifying a thematic framework*—identifying key issues, concepts, and themes within the data by drawing on the research questions as well as interview data to highlight recurring items. The end product is an index of the data, which labels the data into manageable chunks for subsequent retrieval and exploration
- *Indexing*—applying the index systematically to all the data by annotating the transcripts with codes from the index.
- *Charting*—generating distilled summaries of the data that can be arranged according to the category or code of the framework to which they relate to create set of charts.
- *Mapping and interpretation*—an explanatory stage in which the charts are used to define concepts, create typologies and find associations between themes with the intention of generating an understanding into the findings (adapted from Pope and Ziebland, 2000).

Familiarisation

The first step of framework analysis is familiarisation: the immersion of the researcher in the raw data. In this study, data was generated through semi-structured interviews and began with transcription during which digital recordings were listened to and transcribed verbatim (Green and Thorogood, 2009). Each digital recording was approximately one hour in length, producing between 9,000 and 10,000 transcribed words. Transcripts, digital recordings, and associated notes and evaluation sheets were re-read and re-listened to generate as full and deep familiarity as possible.

The first stage began with listening to the digital recordings and reading the interview transcripts, making notes in the margin as I read through each transcript and highlighting words, phrases or sections of text that related to things and ideas which could be identified as representing boundary objects, for example an objects that I had already identified as a *boundary object-in-theory*, something that may be a boundary object that was not represented in the documents, as well as participants' responses relating to issues of communication, boundaries, and boundary crossing and the things and ideas they identified as useful during this process.

I underlined and commented on excerpts relating to relationships and their any influence/impact these may have exerted on boundary crossing; as well, any challenges, and successes encountered by participants during boundary spanning. I also explored and the factors related to these in terms of boundary spanners' the respondents experiences of implementation work in a collaborative context. Additionally, I was sensitised to identify any other recurrent or striking concepts or issues relating to the research questions that emerged during this familiarisation stage, for example anything relating to shared things or ideas used to open an opportunity for cross-boundary communication and interaction across boundaries, and what role they may have in terms of collaborative implementation through CLAHRCs. For additional rigour as this stage provided the foundation for all further analytic work, this initial stage was conducted using the first three or four transcripts as a collective exercise with my supervisory team. Each member's observations was then shared and compared to provide a systematic and structured approach to

familiarisation. These broad observations then provided a starting point for the next stage of analysis, during which the key issues, concepts, and themes within the data are identified.

Identifying the thematic framework

During the second stage of framework analysis (FA) a 'thematic framework' (Spencer and Ritchie, 1994) is developed by drawing on the research questions as well as interview data to highlight recurring items. It is this thematic framework which gives FA its name. In this case study the interview questions were used to provide the basis of an index, enabling individual participant's responses to be mapped and organised according to the key topics introduced using the interview schedule including *communication, shared understanding, knowledge exchange, boundaries and crossing, relationships, and shared things and ideas*. This highlighted the sorts of things and ideas that are used by participants during boundary spanning undertaken as part of their role, and also drew attention to additional emergent concepts as the process continued. Following familiarisation, a list of these recurring themes, important concepts related to each question domain were drawn up. Using FA helped me to organise this growing list, enabling me to construct a more manageable catalogue of themes and concepts. A further category of 'other' was added to each domain to capture anything that was not held within the main theme headings. It was important at this stage that any thematic descriptions remained true to the language of the data, retaining the participants' voice throughout rather than using the vocabulary of theory, research tradition or literature.

Initial reading of the transcripts highlighted a number of recurrent themes focussed around establishing a shared language between CLAHRC collaborators, access and entry into another collaborator's domain of practice or knowledge (gatekeeping), boundaries encountered during collaborative implementation work, reciprocal cross-boundary relationships, and the various things, ideas and opportunities that were described by participants as enabling or hindering these interactions.

The end product of this stage was an index of the data which illustrated several dimensions of the types of shared things and ideas that were involved in

establishing collaboration necessary for implementation, in addition to a number of emergent themes. The index was organised according to themes, with textual codes assigned to each to capture the “essence” of the theme or subtheme (Richie, Spencer and O’Connor, 2003). This index was then used to label the data into manageable chunks for subsequent retrieval and exploration. This enabled comparison between cases, themes, and respondents. In this study this stage was ongoing, as further data was added to the framework as each interview was completed.

Table 6: Example of Thematic Framework

Interview data	Description	Preliminary thoughts	Initial categories
Respondent 2	<i>Capturing what it is the respondent is saying in their own words</i>	<i>What is this about? What is going on?</i>	<i>Articulate essence of prelim thoughts</i>
In terms of communication in the first place it's setting up meetings, face-to-face dialogue with people... and ensuring that we speak a common language. So in terms of CLAHRC it's ensuring we show that we understand the pressures and priorities of the NHS.	Face-to-face meetings and ensuring common language spoken help open up communication. Common language is established by showing understanding of pressures and priorities of NHS	Face-to-face dialogue powerful mode of communication. Placing value on NHS priorities and aligning CLAHRC agenda to this helps validate partnership and opens up communication.	Face-to-face communication has most impact. A needs-led common language helps initiate communication.

Indexing

The next stage consisted of applying codes from the index to the full set of data by highlighting and annotating the transcripts. This indexing stage was similar to other stages referred to as 'coding', a process common across qualitative research methods. FA opts for indexing as this approach highlights the incidence and location of a particular concept within the data, providing a data management system rather than an interpretive tool. In this study, the process of indexing can be summarised as reading the interview data and making a judgement regarding which category and code to apply. Indexing enabled me

to organise the data according to specific themes. Each theme was then examined more intensely enabling a focussed comparison of the fine details and differences. During this stage, I was wary of de-contextualising the data. It was important to retain a close sense of the language and content of the data throughout rather than assigning themes and cutting the link between theme and context. This and the previous stage were conducted simultaneously as participants were recruited and additional interviews completed.

The aim of this stage was to systematically index (label to assign meaning) each transcript in order to highlight the presence of patterns, concepts and association between participant's responses, at different levels, and across the three cases as the dataset was progressively indexed. It was anticipated that the index would undergo a number of revisions as it was refined iteratively to accommodate any additional emergent concepts (codes). This stage was completed using Atlas-Ti v. 5 to organise and index the data by applying the index codes to the interview transcripts, highlighting specific sections of text that related to a specific code. Multiple codes were sometimes applied to a single excerpt of data. The idea was to label the data so that all instances relating to a particular index code could be easily retrieved and reviewed.

Box 4: Example in the style of FA of how an index has been drawn up in this study

1. Speaking the same language

- 1.1 Seeking face-to-face communication
- 1.2 Seeking other forms of communication
- 1.3 Initiating dialogue based on needs/interests/priorities
 - 1.3.1 Reflecting collaborator agenda
 - 1.3.2 Reflecting CLAHRC agenda
 - 1.3.3 Reflecting other agenda
- 1.4 Endeavouring to establish a shared language based around needs/interests/priorities
- 1.5 Endeavouring to establish a shared language based on other topics

Charting

Generating distilled summaries of the data that can be arranged according to the category or code of the framework to which they relate to create set of charts.

Charting involved plotting the themes and subthemes developed during the indexing into a chart, creating a separate thematic chart for each theme identified. The heading of the thematic chart will reiterate those of the index, though additional or different items may also be represented as a result of the refinement during the indexing process. The key aim of charting is the production of summaries of each theme, which retained the language and content of the data whilst the key elements of what it is that characterised a specific theme was distilled.

Following the principles of FA enabled the data to be reorganised through the construction of tables (charts, see appendix 6 for example) which related to each theme and associated subthemes. These charts contained summarised accounts plus passages of text or linked references. For example, the chart that depicted the above theme *speaking the same language* contained domains which related to each index code, complete with a summary relating to each respondent, plus a passage which illustrated and demonstrated context. Sometimes a single passage was indexed according to a number of themes and therefore appeared more than once across the chart. A chart was drawn up for each theme within the index and for each case which enabled clear cross case comparison.

For example, in terms of boundaries, the index reflected both the types of boundaries encountered by participants during implementation work, as well as the participant's explanations to why and how these were perceived as boundaries. It also contained a column representing the impact of these boundaries on the participant's performance of boundary spanning necessary for successful implementation, and a column relation to boundary objects i.e. the things and ideas the participant found helpful when engaged in boundary crossing, examples and explanations. The purpose was to crystallise the content of the data whilst both context and the voice of the participant was preserved.

The purpose of tabulating the data in charts is that it enabled summarised accounts of the indexed data, along with supporting passages, to be made as part of the data entry process for each new transcript as it was analysed. The process of FA enabled me to move relatively quickly through the analytical hierarchy, from assigning meaning via indexing to summarising (synthesising), comparing, contrasting and finally interpreting and reporting any patterns or associations once the initial thematic framework and subsequent index was complete.

Table 7: Example of data chart

1. Speaking the same language				
Respondent	1.1 face-to-face communication	1.2 other forms of communication	1.3 Initiating dialogue based on needs/interests/priorities	1.4 Establishing shared language based on needs/interests/priorities
<p>S1/P1</p> <p>KT project lead</p>	<p>Prefers to speak to somebody.</p> <p>Found face-to-face encounter revealed level of organisational inertia. (p10)</p>	<p>Always tries to start with phone call not email</p>	<p>By 'selling' project to engage interest and making it relevant to collaborator's context</p>	<p>Asked what language is used by each collaborating profession/discipline</p>

The purpose of organising the data into tables or charts is that it allowed me to explore each theme in more depth, between participants and across cases. To facilitate this, the charts contained rows for each participant, identified by an anonymised participant and site code. Details of each participant's role was entered on to the chart so that a comparison between level, role and experience of boundary spanning activity undertaken as part of implementation work could be easily seen. Summarised accounts of each theme and subtheme made up the body of data entered onto the charts, with shorter passages or linked references referring to the location of a specific passage entered in to the corresponding cells. Summarising was conducted by first drawing all the coded data relating to a particular theme or subtheme together, clustering and condensing the data to capture the essence in of what was going on in regard to a specific theme or subtheme. This was repeated for each participant across each case (transcript by transcript), entering the summarised data and any accompanying passages into the appropriate cells of the chart, which generated a separate set of charts for each case. The idea is that although the data is condensed, it still remains true to the voice of the participants, using but not quoting the participants own words as much as possible. It was important to keep the cells the same size as a row or column that has different dimensions could skew the way in which I looked through the charted data, increasing the risk of undue or incomplete emphasis being mis-assigned. It is also good practice to retain an extra column labelled 'other' in which thoughts, ideas or emergent patterns can be logged.

Mapping and interpretation

The final stage involved exploring each column of the charted data to detect any similarities, disparities, patterns and concepts. These were then drawn together and distilled to give a higher level category. In this case 'category' refers to a higher level in the analytic hierarchy, where interpretation has taken place to produce a more abstract concept as a result of unpacking the content, features and character of a particular theme. The aim was to move from a purely descriptive account (describing what the data says) to develop more explanatory accounts (figuring out why). Whilst bringing similar or same data together I was wary of simply 'cutting and pasting' data content as this can de-

contextualise the data and disrupt its meaning in terms of the participants' response as a whole, leading to inaccurate analysis and interpretation. At this point I moved away from using the specific words of each participant, and instead employed language that captured and articulated the full range of attributes related to a particular category. The aim was to identify elements and dimensions of the data, to refine categories and to present the data from each case in a way that clearly and meaningfully showed the distinctions between each category.

In this study mapping and interpretation took place through the production of case summaries. Each case summary was structured according to the categories revealed through interpretation, lending headings under which distilled interpretation of the data were organised. The case summaries captured the essence of what was going on, why and in what context across the three cases. Structuring the case summaries according to FA helped to clarify any differences and similarities between and across cases. The case summaries are written to reflect this to focus on the following categories:

- Borders and frontiers
- Working together
- Give and take
- Boundary objects
- Boundary spanners
- Building bridges

The categories relate to the various conditions and processes which take place when objects are shared between stakeholders during collaborative implementation activities. *Borders and frontiers* relates to the way in which the many anticipated and unanticipated boundaries which were encountered during the course of getting evidence into practice. *Working together* surmises the way in which collaboration was achieved or hindered between different stakeholders involved in implementation. *Give and take* describes the way in which there appeared to be a level of reciprocity required for stakeholders to work either, and that this involved the resources, tools and knowledge that was exchanged and traded between stakeholders. *Boundary objects* are those

objects which are shared (or not), and how by be shared (or not) they facilitated an opening up or a reinforcing of boundaries. *Boundary spanners* was a broad category but generally speaking identified all those who were influential in both access and gate keeping roles. This theme revealed that implementation required the contribution of more individuals in addition to those people employed in official boundary spanning roles, and sometimes involved those whose work across boundaries was pivotal, but informal or unrecognised. Finally, *building bridges* represented the way in which relationships were developed across boundaries, and the influence of these personal networks and new contacts on a boundary spanners ability to move freely across boundaries, or the way in which a failure to establish such bonds was shown to hinder collaboration required for implementation to succeed.

The final stage of analysis is difficult to describe as it is contingent on my own interpretation and sense-making. I initially revisited the data relating to a particular theme as displayed under heading of the case summary, looking between the three cases and re-reading until a connection or pattern became clear. As I read through the columns I asked questions of the data such as ‘How does this relate to participants’ responses from case two and three?’, ‘Is there any connection or anything unusual in regard to this case?’, ‘What are the key features and content of this category?’ The intention was to sensitise myself to pick up on patterns, focusing on what it was that made it different to this category as represented across cases, and why? It is at this point that an internal process of interpretation and analysis took place, as prior to this the process consisted of describing rather than explaining the data. The way in which the data is charted and condensed ensures that there is a trail showing the links between the stages of interpretation and the data itself. During this final stage I endeavoured to bring together elements drawn from across the data set as whole which may not otherwise have been apparent in single participants’ response alone in order to shed new light on how and why some things and ideas are being shared between the different people and groups who are collaborating to get evidence into practice, and how this may create an opportunity for boundary spanning knowledge exchange and its influence on implementation. Two overarching themes were identified as an outcome of this stage. The first was a focus on the nature of boundaries to be spanned during

implementation; whilst the second focused identifying features of effective boundary spanning.

In essence this final stage revolved around theory building, during which the core properties of boundary objects used during implementation were crystallised. The outcome of this stage was that a new understanding of boundary objects was proposed, one which moved away from focusing on a taxonomy of type towards understanding boundary objects in terms of their catalytic and inhibitory action based properties. This interpretative stage allowed a richer picture to be developed regarding the way in which boundary objects are used (or not), and how this influenced the outcome of implementation through CLAHRCs.

CHAPTER 4: FINDINGS OF PHASE ONE, A DOCUMENT ANALYSIS

Structure of the findings section

The findings are divided into two parts reflecting the two phases of the study. A full account of the qualitative content analysis process used to do the document analysis is given in Chapter 3, Methodology and methods.

The following documents have been managed in Atlas-ti (version 5):

Table 3: Documents sampled during Phase One

NIHR	Oakdown	Hazeldean	Ashgrove
4.5 Collaborations for Leadership in Applied Health Research and Care (D4)	Oakdown CLAHRC- Annual Report 2009-2010 (D1)	Hazeldean CLAHRC Annual Report (D2)	NIHR CLAHRC for Ashgrove Annual Report 2010 (D3)
NIHR CLAHRC call for proposals for pilots (D5)	Oakdown 2009 CLAHRC academic publication (D10)	Hazeldean CLAHRC NIHR Feedback Report (D8)	Ashgrove 2009 CLAHRC study protocol (D9)
Overarching CLAHRC feedback year 1 (D7)		Hazeldean Stroke assessment tool (D11)	
		CLAHRC CKD Collaborative Phase 1 Report (D6)	

Five themes emerged from the analysis:

1. Approaches to implementation
2. Developing shared objects for implementation: *boundary objects-in-theory*
3. Boundaries
4. Generating context
5. Tailoring

These themes illustrate the various elements, people and processes involved in implementation through CLAHRCs and the way in which boundary objects may be represented in the implementation process.

Approaches to implementation

This theme relates to the way in which CLAHRCs seek to activate and apply evidence-based knowledge using a variety of theories, models and methods. The data provides the context of implementation, demonstrating the way in which each CLAHRC has interpreted and operationalised the implementation mandate within their proposals and the theoretical assumptions underpinning each CLAHRC's approach.

Implementation as collaboration

Implementation as a collaborative process is represented through a diversity of concepts related to working together, partnership, joined up working, cooperation and teamwork.

The documents from across all three cases describe implementation as a collaborative activity to varying degrees. Collaboration is encouraged within and across the CLAHRCs, framed in terms of 'joint' and 'joined up working', for example at Hazeldean

We have promoted and supported networking across the CLAHRC, and have encouraged the concept of cross-theme working in the development of joint projects and posts, and promoted learning with one another as we progress. (Oakdown, D1, p11)

The focus on applied research as a collaborative exercise is also evident at Oakdown:

With this obvious need for health innovations, our vision for the collaboration is for [Oakdown] to become internationally recognised in the field of self-management of long-term conditions through applied research, health technology innovations and translation of knowledge into quality patient care. (Oakdown, D10, p. 171)

Implementation, improvement, and evaluation

There is a diversity of terms used to describe the process of getting evidence into practice, with mixed focus on the stages of the process at which stakeholder engagement and collaboration is required. At Ashgrove there appeared to be some ambiguity between what is described as formal and linear methods, and contemporary collaborative approaches to implementation:

The applied themes serve to establish a substantial team of researchers, practitioners, and managers who are acquiring experience of using research together. (Ashgrove, D9, p4)

Translation is regarded as a new, broader, collaborative approach that brings clinicians, researchers, patients, and managers together to improve care. (Ashgrove, D9. P4)

Across the three cases there appears to be a fusing of quality improvement and evaluation models with approaches to implementation. This gives a homespun feel where cycles such as Plan Do Study Act (PDSA, Langley et al, 2009) are used in conjunction with principles of the Knowledge to Action Cycle (K2A, Graham et al, 2006) and Promoting Action on Research Implementation in Health Services (PARIHS), (Kitson et al, 1998; Rycroft-Malone et al, 2004) (for example during Hazeldean's CKD work).

Learning events and knowledge exchange opportunities

All three CLAHRCs focus on generating learning opportunities by scheduling events aimed at encouraging communication and collaboration between stakeholders:

To help us in our work, we have developed a Tele-Specialist Interest Group (Tele-SIG). The group includes local authority members as well as representatives from the region's PCTs and Trusts. It provides a forum for the continued sharing of knowledge and enables members to highlight activities that are taking place in their own areas. As well as knowledge sharing, members identify and undertake new projects that fulfil service needs and have already

drawn up their strategic priorities. These are now being developed into local projects. (Oakdown, D1, p37)

Collaboration is encouraged within and across the CLAHRC, framed in terms of 'joint' and 'joined up working':

We have promoted and supported networking across the CLAHRC, and have encouraged the concept of cross-theme working in the development of joint projects and posts, and promoted learning with one another as we progress. (Oakdown, D1, p.11)

However it is difficult to ascertain from a document analysis what other types of informal boundary crossing events may happen as a part of implementation work, or whether or not shared objects play a role in this. It was anticipated that phase two would facilitate a more in depth exploration of what was taking place from a boundary-spanner's perspective.

Communication, collaboration and relationships

Collaboration cannot occur in an absence of communication. Opening up a dialogue between potential stakeholders represents the first step in establishing a collaborative relationship. Building relationships between would-be partners is seen as the first step in establishing collaboration at Oakdown:

We have devoted year one to building good working relationships with the health care practitioners and commissioners whose engagement is essential to the CLAHRC's implementation programme (Hazeldean, D2, p.12)

Oakdown describes how it is focusing on generating platforms for dialogue across boundaries, capitalising on existent links and developing inter-CLAHRC relationships:

We have invested considerable time in creating platforms to enable on-going dialogue between stakeholders and CLAHRC OAKDOWN. Equally, we are developing other external links, both nationally and internationally. Having initiated regular meetings between the Directors of all nine CLAHRCs, we have become involved in joint

activity with other CLAHRCs. At least two of our themes, Diabetes and Stroke, already had active collaborations with CLAHRCs outside[Oakdown]. (Oakdown, D1. p. 12)

Ashgrove CLAHRC has extended the partnership to engage external health research organisations through its Patient and Public Involvement (PPI) initiative. This is appraised positively as evidence of establishing meaningful partnership across multiple stakeholder groups.

The CLAHRCs have also been successful in developing a joined up approach to PPI in other ways, including holding Learning Events with a clear PPI focus and by actively seeking to collaborate locally on PPI with their nearest Research Design Services, NHS Trusts, and Biomedical Research Centres and Units.

In summary whilst implementation is described as a collaborative endeavour across much of the documents, it also retains a focus on more traditional approaches to service evaluation and continuing improvement work. However, despite the assumption given by the CLAHRC's name and the widely used rhetoric of collaboration, it is unclear as to where the practice of working together sits in terms of the continuum between consultation and collective sense making and problem solving. The multiple interpretations of getting evidence into practice suggest that the concept itself may possess boundary object properties.

The various theories, models and frameworks of getting evidence into practice have been identified as *object, model and maps* type boundary objects, and are discussed later in this chapter.

Developing shared objects for implementation

A range of objects were identified through the documentary analysis as a potential boundary object; that is, on paper, but it has not been possible to show if they operate as boundary objects in practice. These are objects and ideas which may be shared between stakeholders involved in implementation to smooth boundaries, encourage communication, and enable cooperation between stakeholders, organisations, localities, academia and practice.

This theme directly relates to the research question “How are boundary objects represented (if at all)?” and as such reflects much of the focus of phase one. This category captures the types of objects and ideas which have been identified in the sampled documents as those which possess a boundary spanning potential.

A total identified of 48 items were identified as potential boundary objects in CLAHRC documents. These ranged from highly visible and concrete objects such as the abundant references to best practice guidelines (for example Ashgrove’s obesity guideline implementation project), to the development of assessment tools (such as Hazeldean’s stroke assessment tool), as well as the focus on validating disease registers at Hazeldean and Ashgrove, and through the use of an Excel based data extraction and audit tool with which to do this.

The next section discusses these theoretical boundary objects in the context of the revised taxonomy of boundary objects proposed as an outcome of the literature review (See table below).

Table 8: Updated Typology of Boundary Objects

<i>Boundary object</i>	Definition
	<i>shared things or ideas around which communication and collaboration can be focused and coordinated</i>
<i>Repositories</i>	<i>Ordered stores of standardised information accessible to different users at multiple sites</i>
<i>Standardised methods and forms</i>	<i>Standardised format allows easy sharing and promotes consistency of embedded and shared information despite contextual and other differences between settings and users</i>
<i>Objects, models and maps</i>	<i>Shared representations standing in for place, person, process or idea, often simpler or abstracted in a way that transmit a key point or interpretation free of the complexity of the thing or idea as its exists naturally,</i>
<i>Symbolic objects</i>	<i>Multiply interpreted conceptual an/or material things or ideas which possess persuasive and emotive properties.</i>

Repositories

Ordered stores of standardised information accessible to different users at multiple sites.

Chronic disease registers and databases

Chronic disease registers (relating to long term vascular conditions including chronic kidney disease (CKD), diabetes, and heart failure (HF) provide a good examples of *repository* type boundary objects involved in implementation identified in documents sampled. Disease registers represent collections of standardised patient information that can be accessed by multiple users across multiple clinical settings. Updating and validating these registers to ensure that they provide accurate patient data represents a shared concern across Ashgrove and Hazeldean (see documents D2 and D6).

In terms of implementation, these registers contain information that potentially informs, directs and coordinates implementation work, as well as providing a focus around which collaborative groups could potentially form (akin to Wenger's(1998) theory of communities of practice). Validating, maintaining, and training Primary Care practices in using these registers represents the focus of much implementation work at Hazeldean and Ashgrove, who are engaged in a formal collaboration around implementing an improvement package together with a data extraction and audit tool which can be used to interrogate the registers. Their role in improving evidence-based practice is clearly demonstrated at Hazeldean:

Next steps. We will continue to work with practices, testing further improvements to achieve our aim of adding approximately 2,500 patients to CKD disease registers, with 75% of those patients having their blood pressure managed in accordance with NICE guidelines, by July 2010. (Hazeldean, D2, p.16)

Validated registers also provided a potential benchmark against which implementation outcomes can be measured, for example as described in the CKD Collaborative report:

An impressive 1,324 additional patients have been added to the CKD registers by the 19 Collaborative practices (Hazeldean and Ashgrove, D6, p. 7)

In this way the registers provide a focus for collaboration, around which multiple stakeholders representing the domains of research (CLAHRC boundary spanners) and practice (GPs and Primary Care employees) are able to work together across multiple settings.

Disease registers as repository type boundary objects can be used in a variety of ways and for different purposes. At Hazeldean diabetes registers are again found to play a role in bridging an all too often overlooked boundary between physical health (i.e. diabetes) and mental (i.e. depression):

All 1,000 people on the type 1 diabetes register were sent a copy of the Diabetes UK booklet on diabetes and depression, a depression assessment form, together with an invitation from a hospital specialist to return the forms if they would like to discuss the contents of the booklet – an offer accepted by 20% of patients (Hazeldean, D2, p9)

However, despite theoretically, that is, on paper, providing a focus of much implementation work across Hazeldean and Ashgrove, it is difficult to gauge whether these repositories operate to align and unify stakeholders in practice. An objective of phase two is to unpack this.

Websites as repositories

Like their disease registers, CLAHRC-built websites are aimed at encouraging engagement in implementation activities. These websites again provide ordered stores of information, which can be accessed and used in a numbers of ways by different users from across different sites. At Hazeldean, boundary crossing is facilitated by a website which provides a mechanism to enable communication across boundaries distinguishing patients, carers and practitioners during the implementation of an evidence-based Standard of Care for heart failure:

A website for patients, carers and health care professionals will support the programme, holding up-to-date clinical guidelines, patient stories and advice, service information and, in the case of professionals, facilitating information exchange. (Hazeldean, D2, p17)

However, scant data relating to the uptake and use of such websites prompts a query as to whether or not such websites are used consistently, effectively or by the intended users, and if so, how does this actively facilitate boundary spanning?

Table 9: Examples of Potential Boundary Objects

Repositories	Standardised methods & forms	Objects, models & maps	symbolic objects	Boundary spanners
Disease registers	Care pathways Formal implementation methods Assessment & audit tools Guidelines Standards of care CATALYSTS <i>Functional property of ALL BOs and actors?</i>	Knowledge-to- Action cycle PARIHS CFIR PDSA Concrete models Diagrams & visual representations Published output Annual reports Newsletters Multimedia Websites ITC	CLAHRC concept & vision EBP Implementation?	Knowledge brokers Knowledge transfer associates Nutrition champions Health trainers & educators CLAHRC co-ordinators Other formal/informal roles?

Standardised methods and forms

Standardised format allows easy sharing and promotes consistency of embedded and shared information despite contextual and other differences between settings and users

Standardised methods and form type boundary objects are identified in the many kinds of tools required for, or around which, implementation activity is focused across the sampled documents.

Care pathways, protocols and other standardised approaches to care

The shared format of many of these tools identifies them as *standardised methods and forms* (SMF) type boundary objects (Star and Griesemer, 1989). These shared objects are intended to enable the collection and collation of standardised information across different contexts, reducing local uncertainties to provide a means of common communication across groups.

Clinical care pathways are identified as *standardised methods and forms* which featured predominately throughout the documents to provide “one way of providing more standardised care to all patients” (p13, document six). Care pathways have been developed as a decision-making and care delivery tool against which the roles and responsibilities of each member of the MDT can be benchmarked, documented and evaluated, to provide a roadmap of the decision making and care delivery process. These pathways clarify the roles and responsibilities of each member in line with best practice evidence in order to provide a document that guides and records the decision made by the MDT regarding treatment and outcomes.

CLAHRCs’ mandate to improve self-management of chronic conditions encourages a reappraisal of care pathways. This has prompted a range of work across each CLAHRC focused on engaging patients and carers in the development of care pathways in order to generate tools in which patient knowledge and perspective is embedded. This approach is demonstrated at Ashgrove:

Self-management of Longer-term Depression (IQuESTS), aims to increase both user engagement with services and self-management by employing user knowledge and experience in the development of those services. We are trying to find out and test the best ways to improve the care pathway for people with this distressing and disabling condition (Ashgrove, D3 p34)

The data suggest that each CLAHRC has focused on developing pathways which meet the needs of patients more effectively by embedding stakeholder knowledge in them.

A comprehensive care pathway map of HF transitions of care between hospital and community services across NHS Hazeldean has been developed, utilising discovery interviews with clinicians, audit of patient records and data to document the perceptions and realities of the patient's journey along the pathway. (Hazeldean, D2, p13)

The Health Care Practitioners research theme has engaged patients and carers in developing a care pathway for people with vascular conditions who also have depression. (Hazeldean, D2, p.23)

Other *standardised methods and forms* include tools such as Ashgrove's CKD register data extraction and audit tool, and the various care pathways being developed to better reflect users' needs. There are also the many guidelines and standards of care whose content provides much of the research-based knowledge to be implemented across all three CLAHRCs. These objects possess the potential to provide a shared object which may be helpful in encouraging collaboration by drawing different individuals and groups to work together towards a specific implementation goal.

Other evidence-based clinical tools

Potential boundary objects are widely represented in the various tools which are being developed and implemented across all three CLAHRCs. Each CLAHRC has focused both on the development and delivery of a number of tools, both to enable implementation (for example Ashgrove's implementation toolkit), or as

an outcome of implementation work (such as the stroke assessment tool developed by Hazeldean CLAHRC)

An example of a tool developed as an outcome of implementation through CLAHRCs is provided by the development of a stroke assessment tool at Hazeldean. The tool has been developed in partnership with stroke patients and practitioners to capture unmet needs of stroke survivors across a number of patient-specific domains. In terms of implementation it provides an example of an object that is the focus of implementation the work, developed to support dialogue and bridge the boundaries between patient and practitioner:

Selecting and refining the tools developed or implemented by CLAHRC is a crucial aspect of implementation work across all three cases. Training stakeholders to use these tools effectively is another important aspect and relates to activities aimed at embedding these objects in daily practice so that their use becomes familiar, routine and accepted.

Implementation methods

NIHR funding of CLAHRCs: throughout the data there is the acknowledgement that the methods of getting research into practice must themselves be evidenced – choosing the most appropriate implementation intervention is crucial. This is a stated objective of CLAHRC's as set out in the original NIHR call for pilots:

The Group was particularly keen that new interventions would include analysis of mechanisms for implementation themselves, i.e. the trialling of initiatives to encourage adoption of evidence based practice or clinical effectiveness. (NIHR, D5, p.1):

Evaluating these “formal methods of implementation” (Baker et al, 2009) to some extent reflects funding requirement as stated by NIHR: “Our providers need efficient and practical methods that can be used routinely” (Ashgrove, D9, p4).

The data from across all three CLAHRCs suggest that a variety of models and frameworks have been applied across each CLAHRC, with a fusing of

improvement and evaluation approaches in order to provide a barometer of quantifiable outcomes. This gives a sense that there is a level of inconsistency between and within each CLAHRC when it comes to approaching implementation, with various elements of both the Knowledge-to-action cycle (Graham et al, 2006) and the PARIHS framework (Kitson et al, 1998; Rycroft-Malone et al, 2004) partnered with a range of evaluation and improvement approaches such as implementing the Plan Do Study Act (Deming, 1986) improvement cycle at Hazeldean.

Objects, models, and maps

Shared representations standing in for place, person, process or idea, often simpler or abstracted in a way that transmit a key point or interpretation free of the complexity of the thing or idea as its exists in nature.

Alongside standardised methods and forms (Star and Griesemer, 1989), things that can be described as objects models and maps (Carlile, 2002) type boundary objects dominate the data. Object, models, and maps are representations consisting of incomplete information to convey a whole, which can serve as a 'good enough' framework for cooperation (Star and Griesemer, 1989). Guidelines and standards of care are the most noticeable examples in the CLAHRC documents of objects models and maps; in terms of implementation these receive the greatest attention across all CLAHRCs. Also represented within this group are the various approaches to getting evidence into practice such as the Knowledge to Action Cycle (Graham et al, 2006) and the PARIHS (Kitson et al, 1998; Rycroft-Malone et al, 2004) framework, which are referred to underpinning implementation activities across all three cases.

Clinical guidelines and standards of care

Guidelines literally provide a standardised format for conveying evidence-based knowledge across multiple sites and users in a standardised form. Guidelines and protocols are the major focus of implementation activity across all three CLAHRCs.

Guidelines and protocols provide some of the most noticeable examples of shared objects, typically directing organisations and individuals in the delivery of

evidence-based care in the documents; for example guideline implementation is clearly stated as providing the basis of much implementation work at Ashgrove-CLAHRC:

On-going and completed Implementation Theme projects are:

- *Implementation of NICE guidelines on Teenage pregnancy*
- *Implementation of NICE guidelines on Obesity (HERO) (Ashgrove, D3, p3)*

The findings suggest that a process of tailoring is used to contextualise these generic objects to meet local needs, as illustrated at Ashgrove:

Protocols are one way of providing more standardised care for all patients. Practices created protocols that staff could follow to identify and treat patients with CKD, using existing guidelines such as those from NICE or the Map of Medicine, and localising them to suit their individual needs (Ashgrove D6, p11)

At Ashgrove the implementation theme has focused on understanding and responding to the context of getting evidence in practice, tailoring guidelines to reflect these:

The focus of the Implementation Theme was initially on approaches to tailoring implementation interventions to identified barriers and enablers to appropriate care as summarised, for example, in clinical guidelines or policies. (Ashgrove, D3, p.3)

Table 10: Theoretical boundary objects identified through analysis of CLAHRCs documents

Object	Repository	Standardised methods & forms	Objects models & maps	Symbolic object	Catalysts
<i>web-based cardiac rehabilitation programme</i>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
<i>Annual & other report</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
<i>Assessment tools</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
<i>Audit tools</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
<i>Blog</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
<i>Breathing Space</i>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Care pathway		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Chronic Respiratory Disease Questionnaire		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
CKD audit tool		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Diabetes UK booklet on diabetes and depression		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Disease register	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>
Email		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

Guideline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
K2A		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KT casebook		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Self-Assessment risk score	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
MUST+	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
PARIHS		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Protocols	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COPD Self-management manual		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Website		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
worksheets	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

Both tables illustrate the inherent blurriness of types of boundary object in terms of simultaneously occupying one or more classes in line with Star and Griesemer's original 1989 taxonomy of type.

Theories, models and frameworks of implementation as objects, models, and maps type boundary objects

The various theories, models, and frameworks used to guide and explain implementation have been identified as object, models, and maps type boundary objects because they possess the potential to align stakeholders to work together to get evidence into practice. These may function as a shared language between stakeholders who use them to explain and engage stakeholders in the implementation process. A variety of models and framework are used to underpin implementation activities, for example, PARIHS is cited as a tool to guide thinking regarding how to structure and approach implementation activity at Hazeldean:

Each health care improvement initiative follows five steps ...based on the Model for Improvement and the Promoting Action on Research Implementation in Health Services (PARIHS) framework. (Hazeldean, D2, p.13)

Whilst Ashgrove refer to the Knowledge to Action cycle (KTA) as informing their CLAHRC's approach to implementation:

The primary aim of this initial work was to develop readily applicable methods for identifying barriers and enablers to evidence use, and for selecting implementation interventions to address them (tailored implementation). This approach is a key component of knowledge translation models, including the Canadian Health Research Institute's (CIHRs) knowledge-to-action (KTA) cycle that is a key component of our approach to knowledge translation . (Ashgrove, D3, p. 3)

However despite reference to these models and frameworks there remains a strong focus on more traditional approaches such as improvement and evaluation work. This is evidenced by the way in which various quality improvement models are merged with more contemporary approaches to getting evidence into practice.

These are applied to assess, evaluate and focus implementation work, for example at Hazeldean CLAHRC:

We used routinely collected performance data from general practices (Quality and Outcomes Framework) to highlight the shortfall in the number of people identified with CKD. (Hazeldean, D2, p16)

At Oakdown a similar deployment of a model of organisational excellence is utilised as a method to align practitioners, managers and researchers to work together to improve service delivery.

While it is too early to judge the success of the organisational excellence model in healthcare, the concept of bringing practitioners, managers and researchers together to address a shared goal--improvement of health of local patients--is engaging and has some initial evidence to indicate its potential (Oakdown D9, p4)

Making implementation more visible: Oakdown's Knowledge Translation Casebook

Knowledge capture and exchange is central to the approach adopted by Oakdown-CLAHRC, during which best practice stories of implementation success are captured, collated, translated and packaged for sharing across CLAHRC and the wider implementation community:

Our second project, the knowledge translation casebook, is based on the Canadian Institute for Health Research model. It aims to capture existing and new knowledge translation activity across CLAHRC Oakdown. We envisage that it will become a vehicle for shared learning about knowledge translation. It will provide concrete examples for training and outreach and demonstrate the impact of implementing research evidence. We are currently in the process of identifying projects for inclusion. (Oakdown, D1, p.21)

The knowledge translation casebook represents an object developed with the purpose of sharing and spreading implementation knowledge and experience amongst different groups within and beyond the CLAHRC partnership. The casebook is described as a set of “templates developed to identify sources of

knowledge to inform both past and future public health strategies” (Oakdown, D1, p21).

The casebook is intended to play a role in bridging the gap between research and practice by providing a set of stories in which implementation theory and implementation practice are explicitly linked, adding relevance to theory by placing in the context of use. It is important in implementation as it is a designated shared object that has been designed to generate alliance and support with the CLAHRC’s implementation directive.

Symbolic objects

Multiply interpreted concepts and ideas which possess persuasive and emotive properties.

In this study *symbolic object* type boundary objects combine the attributes of Briers and Chua’s (2001) visionary object with the symbolic qualities described by Levina and Vaast (2005) to define a boundary object that is endorsed with a strongly emotive value. Symbolic object is used to describe an object that is highly persuasive but remains ambiguous and open to multiple interpretations. The presence of symbolic objects is suggested in the documents sampled but not explicitly articulated. There is evidence suggesting that concepts and ideas including ‘*implementation*’, ‘*CLAHRC*’ and ‘*evidence-based practice*’ could possess symbolic properties.

CLAHRC as shared object

An analysis of CLAHRC documents suggested that the CLAHRC itself could potentially represent a type of boundary object or entity. CLAHRCs are a network intended to bring those who think alike across different social domains to work together towards implementation. It embodies an idealised notion of implementation, drawing on positive notions of partnership, joint working, collaboration and knowledge sharing to reinforce a profile that encourages support and promotes alliance with its values and aims. At Hazeldean, the Collaborative is

described as motivational, 'fantastic' and 'very beneficial' (Hazeldean, D2, page number)

Whilst each CLAHRC has been established to operationalise the NIHR's implementation mandate (as specified within NIHR document four, it is clear that each CLAHRC has developed its own organisational identity. However a shared feature is the way in which the CLAHRC partnership is promoted across all three cases as a pioneering endeavour to bridge the research-practice gap by bringing HEIs and NHS providers to work together to accelerate the translation of knowledge into improved patient care. In this way the CLAHRC concept becomes a totem, a symbol of collaboration between different stakeholders towards a shared goal. The intention of CLAHRC as a symbolic object to align a diversity of stakeholders by generating innovative communities of practice is demonstrated in the following excerpt:

The NIHR collaborations have been designed to be innovative communities of health professionals, academic researchers, technologists, voluntary agencies, industry and the public, with the aim of improving patient outcomes by conducting applied research and knowledge translation. (Oakdown, D10, p170)

In terms of boundary spanning CLAHRCs have been developed and designed specifically to bring researchers, practitioners, managers and service-users together to work collaboratively to translate knowledge into practice. It is intended to facilitate joined up working between stakeholders i.e. 'by helping clinicians with the understanding and clarification of CKD and removal of fear for patient' (Hazeldean). It could be described as an endeavour to generate a community of practice within which boundaries between research, practice, management, patients and public are joined up.

The idea of sustaining and preserving knowledge acquired through shared learning is described as central to encouraging the evolution of improved evidence-based health services and care at Hazeldean CLAHRC:

Improvements to care, services and ultimately to lives. The twin pillars of interaction and engagement, central to the CLAHRC ethos ensure that

whatever the nature of these developments, whether in practice, equipment or service design, they can be shared across the region, the knowledge and learning never lost or wasted (Oakdown, D1, p.17)

Ashgrove CLAHRC is very clear in its intention to share CLAHRC-generated knowledge across the wider healthcare community:

Potentially important findings are emerging and the CLAHRC is beginning to share these with partner organisations and the wider health and research communities across Ashgrove. (Ashgrove D3, p.2)

And:

Activity in the theme has spearheaded various initiatives around dissemination of research knowledge, skills and shared learning from specific projects both within and without [Ashgrove] CLAHRC. (D3, p.8)

The findings suggest that CLAHRC itself could potentially be described as a symbolic object as it is projected as a universally positive concept, but is variably interpreted and resists concrete capture. Evidence of symbolic rhetoric used to convey the legitimacy of CLAHRC is found in the widespread use of 'visionary' motifs to encourage alliance with CLAHRCs implementation aims. This is initially established by the NIHR's 'vision' of CLAHRC:

The vision of the National Institute for Health Research (NIHR) is to improve the health and wealth of the nation through research. This document sets out how the NIHR Collaborations for Leadership in Applied Health Research and Care is contributing to this vision (NIHR, D4, p.1),

Drawing on the twin incentives of cost efficiency and improved patient care, the NIHR presents a powerful case for CLAHRCs as pioneering, ambassadorial entities striving towards creating a wealthier, healthier nation (D1). The concept of CLAHRC embodies these visionary elements, conveying the sense that CLAHRC itself is a symbolic entity marrying two historically opposing aims into one whole, defined by partnership in innovation. Each CLAHRC is founded on these symbolic

principles, emphasising the ambitions of CLAHRC to unify and engage researchers and practitioners as stakeholders in a mission to close the research-practice gap, as noted at Hazeldean:

The CLAHRC initiates a signal change by providing the leadership, strategic vision and resources needed for all NHS Trusts in [Hazeldean] to make greater use of research in service design and commissioning, and for researchers to engage in the development of the local NHS. (Hazeldean, D2, p.5)

Phase two of this study will uncover more nuanced features of the way in which this and other concepts may or may not operate in practice to align and unify diverse groups of stakeholders.

Catalysts?

The idea of boundary objects as catalysts is based on the proposition that things and ideas shared between stakeholders during boundary spanning activities could help to reduce the 'effort' required to initiate and manage boundary crossing activities. It is suggested that this may be a core function of all things which support boundary crossing.

The findings suggest that individuals occupying boundary spanning roles within CLAHRCs may also have a potentially catalytic influence on implementation by acting as bridges to span the various boundaries distinguishing the various stakeholder groups and organisations involved in getting evidence into practice through the CLAHRC.

Boundaries

This theme encompasses codes relating to stakeholder, organisational, geographic, temporal, professional, disciplinary and knowledge boundaries which must be spanned to enable different individuals and groups to work together towards an implementation goal. The findings suggest that boundary objects-in-theory involved may target specific boundaries by providing a shared language or shared reference point which can be used to open up communication between the different stakeholders involved in implementation work.

Complex boundaries

Phase one data identified a wide range of boundaries which may require crossing for implementation to succeed. The range of boundaries highlighted in the data demonstrates that successful implementation work requires spanning multiple boundaries using multiple tactics. Boundaries are described as explicit, for example the professional boundaries that define stakeholders' practice and identity (for example nurses, doctors, academics), as well as more implicit knowledge boundaries which many require a cognitive change to overcome, for example such as a change in personal practice approach as result of taking part in a training or education programme.

Boundaries can operate at an individual level, and may be tackled on a one-to-one basis through the negotiation of shared meaning (for example those between health trainer and patient during which a shared understanding of impaired glucose tolerance (IGT) results is established at Hazeldean or at an organisational level requiring a consensus amongst high level decision-makers around how to align CLAHRCs implementation aims with the clinical priorities of its NHS partners.

Organisational boundaries

Central to the notion of implementation through CLAHRCs is the joining up of the boundaries between healthcare and higher education organisations as defined by NIHR:

To address these issues, the pilot NIHR Collaborations for Leadership in Applied Health Research and Care will not simply focus on one academic organisation and its historic local NHS partner, but will comprise a partnership between Academia and the NHS across the widest possible local geographic area. (NIHR, D5, p.2)

Individuals in boundary spanning roles are described as a crucial part of this process, actively seeking to bridge the gap between research and practice:

The way in which the implementation process is facilitated (each initiative is facilitated by a Knowledge Transfer Associate (KTA) who

supports the exchange of knowledge between the University and the NHS (Hazeldean, D2, p. 13)

Stakeholder groups

The intention of CLAHRCs is bring together different people and groups involved knowledge production and use. Various stakeholder groups were identified across each of the documents, including patients, public, carers, practitioners, and academics involved in getting research into practice. These boundaries are further defined through a number of other subdivisions including gender, age, ethnicity, and other social delineations which may provoke or perpetuate hard to reach or at risk groups.

Bridging an age gap between young patients, and engaging them in managing their own long term conditions is described as the focus of one of Oakdown's diabetes projects:

Adolescence is challenging for people with type 1 diabetes, as well as their families and diabetes professionals. (Oakdown, D1, p.30)

At Ashgrove the boundaries between patients, practitioners and researchers are recognised as the primary focus of CLAHRC:

The collaboration in [Ashgrove] has potential to provide evidence on how partnerships between practitioners, patients, and researchers can improve the transfer of evidence into practice. (Ashgrove, D9, p.1)

At Hazeldean, the established multi-disciplinary teams typical of GP practices in the UK is utilised during an implementation initiative focused on improving managing vascular health within Primary Care. Here the professional boundaries between medicine, nursing and management are targeted to facilitate joint working towards a shared improvement goal by designating a representative from each professional domain:

Establishing a multi-professional improvement team. Each practice designated a team to lead the improvement work, consisting of a GP, a nurse and a practice manager. (Hazeldean, D6. p.11)

However, the fullest description of the different professional, disciplinary and public boundaries which define the anticipated stakeholders to be engaged by the partnerships is summarised at Oakdown:

The NIHR collaborations have been designed to be innovative communities of health professionals, academic researchers, technologists, voluntary agencies, industry and the public, with the aim of improving patient outcomes by conducting applied research and knowledge translation. (Oakdown, D10, p.170)

Generating context

Setting the scene for implementation

The findings reveal that there are a number of factors possessing an enabling effect in terms of boundary-crossing to facilitate implementation through CLAHRCs. These enablers are frequently contextual, may play a role in encouraging uptake amongst stakeholders, or positively influence the role of boundary objects during implementation. Enablers may also include both the features of boundary objects and the qualities of people who operate in a boundary-spanning role during implementation.

The importance of context

Throughout the data there is recognition that context can impede or enable implementation. Cultivating a culture of change receptive to the changes required for implementation to succeed is a key objective of CLAHRCs and a first step in setting the scene for implementation. Boundary objects and those people occupying boundary spanning roles appear to possess role in implementation that is related to altering context:

Investing time in assessing the practice context. The organisational context – or ‘the way things are done around here’ – has been shown to be a major factor that influences the successful implementation of

improvement initiatives in healthcare. Context can be affected by a variety of factors, such as the leadership style of key individuals within the organisation, the way in which work is organised and managed, the level of trust and responsibility that exists amongst the team and the commitment to reflecting on practice and learning about how to do things better. (Ashgrove and Hazeldean, D6, p11)

Identifying knowledge gaps

The documents suggest that the division between what is known and what is done is represented by knowledge gaps which show where there is need to improve evidenced-based practice. The findings indicate that it is also necessary to address knowledge boundaries, whether this is in terms of addressing an identified knowledge deficit, or where knowledge can be freed up and shared across domains. Knowledge gaps are represented by identifying skills gaps in the NHS workforce. Bridging these gaps provides a focus for implementation work:

A valuable spin-off from this exercise was that it helped to identify areas where staff knowledge was weak or lacking, for example by highlighting where test results had been misinterpreted or patients were not receiving the best available care (Ashgrove and Hazeldean, D6, p. 11)

Establishing a baseline level against which implementation needs and outcomes can be assessed is achieved through accurate diagnosis of knowledge gaps. This type of implementation groundwork is demonstrated at Hazeldean where much of the initial work in the CKD project revolves around assessing the current level of CKD diagnosis against the predicted level in order to generate a baseline against which improvement can be measured:

In this time, the number of people whose CKD was previously undetected has been increased (792 patients have been added to CKD disease registers, increasing the average practice prevalence from 4.1% to 4.9%). (Hazeldean, D2, p. 16)

Generating a culture of collaboration:

At an organisational level

Each CLAHRC is structured as a partnership made up of NHS and HEI organisations. This partnership extends beyond the organisational level to reach out towards a variety of stakeholders, some of whom may be represented in traditionally hard to reach populations or groups. Seeking partnership is enshrined at the heart of CLAHRCs philosophy, as illustrated by NIHR's call for pilots:

Nine NIHR Collaborations for Leadership in Applied Health Research and Care (CLAHRCs) have been funded as collaborative partnerships between a university and the surrounding NHS organisations. (NIHR, D4, p1)

And is embodied within each CLAHRC:

Building collaborations and co-production (Oakdown, D1, p12)

The second most important development is in the level of collaboration between partner organisations, bringing together ideas and innovations, which will also benefit our communities. (Oakdown, D1, p5)

At a stakeholder level

Generating a partnership with a variety of stakeholder groups is central to CLAHRCs implementation ethos, in which service-users, are described as 'equal partners' possessing valued knowledge which can be utilised to improve the design and development of health care products and services (intended shared objects) at Oakdown CLAHRC's user-centred healthcare design (UCHD) theme:

Patients and service users are seen as equal partners in that collaboration. They are the experts in the systems they are navigating (Oakdown, D1, p.18)

Seeking to engage patients and carers as stakeholders in the development of new products, tools and services (as potential shared objects) is also widely represented, for example in Oakdown and Hazeldean's stroke work:

Service users and carers are closely involved in all our work packages. For example, Dr XXX and colleagues have formed a project advisory group consisting of people with aphasia (a language disorder which can affect speech, writing and understanding as a result of stroke) of all severities, representatives from the Stroke Association and carers of people with long-standing aphasia post stroke. (Oakdown, D1, p33)

This type of involvement in which patient and service-user knowledge is embedded into the objects and tools is also again evident in the form of the Hazeldean's stroke tool which has been developed in partnership with service-users to meet service-user identified needs:

Patients, carers and professionals have played a vital role in providing expert input to the development of the assessment tool. (Hazeldean, D2, p. 14)

A key occupation of CLAHRCs according to the sampled documents, is to achieve behaviour change at an individual and organisational level through generating a context which engenders knowledge exchange and shared learning. Creating a culture of change is a primary directive of NIHR, and shared objects are presented as playing a part in triggering change. CLAHRCs themselves are described as an enabler of change by "effecting a culture change and creating a magnet for staff". (NIHR, D5, p.5) CLAHRC is described as providing a nurturing environment in which change (as innovation) can be fostered at Oakdown:

We feel that CLAHRC Oakdown can provide an excellent environment for developing and supporting these health innovations. (Oakdown, D1, p,7)

Engagement

Stakeholder engagement is described in some documents, but the promotional nature of the documents analysed makes it difficult to determine how effectively this is conducted, and how it may influence the creation, role and uptake of boundary objects. For this study, engagement was broadly seen as 'getting

involved', a participatory process defined by different levels of stakeholder commitment. Successful implementation work necessitates meaningful engagement across boundaries:

...Improvements to care, services and ultimately to lives. The twin pillars of interaction and engagement, central to the CLAHRC ethos ensure that whatever the nature of these developments, whether in practice, equipment or service design, they can be shared across the region, the knowledge and learning never lost or wasted (Oakdown, D1, p.17)

There is a clear emphasis on the need to get stakeholders involved in the design and development of various shared objects in order to improve relevance and uptake of things like tools, documents and other inscribed objects in which knowledge is embedded and conveyed. Engagement is required at an individual service-user level, for example in the case of engaging and collaborating with adolescents with type 2 diabetes at Oakdown CLAHRC:

In addition to this project, we are developing a diabetes proposal in collaboration with Diabetes theme. This project will engage young people who have type 2 diabetes, helping to increase their access to information about how to self-manage their condition. (Oakdown, D1, p.19)

Getting service-users involved is enshrined in the CLAHRCs specific focus on addressing long-term conditions (LTC) and is represented as a key driver of implementation through CLAHRCs as demonstrated at NIHR level:

One of the Group's five recommendations was to harness better the capacity of higher education to assist with this agenda through promoting the development of new models of community wide "academic health centres" to encourage relevant research, engagement and population focus and embed a critical culture that is more receptive to change. (NIHR, D5, p.1)

Engaging patients in the active self-management of their condition, which may be key to helping them adjust to changes and adhere to treatments, is the focus of the Diabetes theme. (Oakdown, D1, p.30)

At an organisational level researchers are encouraged to get involved with the development of the NHS service design and delivery:

The CLAHRC initiates a signal change by providing the leadership, strategic vision and resources needed for all NHS Trusts in Hazeldean to make greater use of research in service design and commissioning, and for researchers to engage in the development of the local NHS (Hazeldean, D2, p.5)

When seeking to engage an individual or stakeholder group it is important to express an awareness of the context. This is particularly apparent when seeking to engage patient and public where individual contextual differences may significantly influence levels of engagement, for example as recognised at Hazeldean:

Develop new strategies of engagement and support for self-care which are sensitive to the differing contexts in which people live with vascular conditions (Hazeldean, D2, p.8)

Expressing an awareness of context is a fundamental element of building boundary-spanning relationships between stakeholders, the strength of which can influence ongoing stakeholder engagement:

We have devoted year one to building good working relationships with the health care practitioners and commissioners whose engagement is essential to the CLAHRC's implementation programme (Hazeldean, D2, p.12)

A range of theoretical boundary objects are described as engagement mechanisms employed during implementation work:

The public were involved via the university website, posters around the university, through Hope Against Cancer and through the Sharma

Centre (Asian women's centre). The evening event included talks and hands-on activities using exercise equipment, activity cards and laboratory equipment university website, posters around the university, through Hope Against Cancer and through the Sharma Centre (Asian women's centre). The evening event included talks and hands-on activities using exercise equipment, activity cards and laboratory equipment (Ashgrove, D3, p.16)

In summary engagement is an explicit requirement for successful implementation and cannot succeed in an absence of engagement:

A lesson that has shaped our approach is the increased recognition of the importance of meaningful engagement of Trust staff in our efforts to accelerate knowledge generation, dissemination and use. (Ashgrove, D3, p.2)

Placing people in boundary spanning roles

Across each case there are people who have been employed or recruited to fulfil boundary spanning roles. Whilst it is inappropriate to describe people as boundary objects due to their individual agency, they do occupy specific knowledge brokering roles during implementation through CLAHRCs. These range from those who are directly employed by CLAHRC, such as the various knowledge broker roles which go by various names across each case, for example at Hazeldean:

The way in which the implementation process is facilitated (each initiative is facilitated by a Knowledge Transfer Associate (KTA) who supports the exchange of knowledge between the University and the NHS). (Hazeldean, D2, p.13),

They helped practices assess changes and consider what could be tried next. They also acted as a conduit to share knowledge and lessons learnt from successful changes between practices, so that improvements could be quickly spread across the whole Collaborative. (Ashgrove and Hazeldean, D6, p.6)

And at Ashgrove:

The appointment of 'boundary spanning' CLAHRC Co-ordinators in Trusts has supported this principle. Their networking role has proved invaluable in topic prioritisation, project scoping and partnership development. (Ashgrove, D3, p.2)

Or simply as knowledge brokers at Oakdown:

We are expanding our investment in 'knowledge brokers' – NHS staff with a specific role to promote the dissemination and use of evidence. (Ashgrove, D3, p.2)

Boundary spanners also include a variety of service users who have been recruited to link up with hard to reach communities who present with specific but often overlooked health issues, as demonstrated by the appointment of 'health trainers' and educators at Hazeldean. These are designated individuals whose role involves facilitating knowledge exchange across multiple boundaries:

We have worked with NHS XXXX to design a lifestyle intervention for people with Impaired Glucose Tolerance (IGT), delivered by health trainers and incorporating face-to-face and telephone-based support services. (Hazeldean D2, p.15)

With the support of the CLAHRC, the study team have trained a total of 36 educators to deliver the intervention to patients at high risk of diabetes (Ashgrove, D3, p.5)

Other boundary spanning roles intended to encourage and facilitate implementation include 'nutrition champions' at Oakdown (healthcare workers with a specific remit to ensure that patients receive optimum nutrition); as well as taxi drivers trained in healthy living skills with the purpose of addressing the high rate of congestive heart disease (CHD) amongst the local black and minority ethnic (BME) population. In a similar way Ashgrove has appointed 'graduates' of its diabetes programme as patient champions to encourage and engage participation amongst those at risk of developing type two diabetes.

Education and training opportunities are embedded within each CLAHRC's implementation programmes, and are intended to improve the research capacity of the NHS through the cultivation of a number of cross cutting roles. Analysis of the sampled documents suggests that alongside developing new objects for boundary spanning, CLAHRCs are also focused on developing boundary spanning capacity amongst clinical and academic stakeholders. Oakdown in particular has developed new training programmes such as a Clinical Academic Training Pathway MSc in Clinical Research which are targeted at nurses, midwives and allied health professionals and delivered in collaboration with the regional HEI (Oakdown, D1, p. 13):

The second year of CLAHRC sees a programme-wide seminar series, skill development and knowledge exchange events, development of a mentorship scheme, development of a professional doctorate cohort in the Intelligent Commissioning theme, and capacity building secondments from the Department of Nursing and Midwifery at XXXX University into three CLAHRC themes (Oakdown, D1, p.15)

Training up a new generation of boundary spanning researchers is seen as crucial to developing research capacity at Hazeldean, a primary objective of CLAHRCs:

The CLAHRC has been active in training the next generation of new researchers. Over the past year, theme leaders collectively supervised 27 PhD and one MPhil student of whom eight successfully completed their degrees. (Hazeldean, D2, p.7)

However it is not possible to detect from the sampled documents what the influence and impact of these boundary spanners has been, or how successful they have been at developing new shared objects.

Tailoring

Evident across all cases is a strong emphasis on tailoring – adapting the approach and tools of implementation to reflect the context of local practice. Both knowledge and objects are amended to generate knowledge objects that are tailored to the

needs of users. It is difficult to ascertain exactly how this is done and to what effect on the process and outcome of implementation.

Tailoring is particularly evident as a method to localise generic objects such as clinical guidelines, standards of care and other national evidence. Tailoring can refer to the adaptation of implementation tools and techniques to respond to multiple contextual factors including local barriers and enablers. Tailoring should be needs-led to ensure the final product or approach is relevant to stakeholders and service-users, as illustrated at Hazeldean:

We are currently working with PCT commissioners and providers to develop and test local models for delivering the assessment tool, tailoring it to the needs of local populations and making best use of available resources, before it is then implemented in practice (Hazeldean, D2, p. 14)

Objects used to support boundary spanning during implementation work must also be adequately flexible to be adapted to local contextual requirements. Tailoring involves adapting shared objects to reflect local needs and context at Hazeldean:

Protocols are one way of providing more standardised care for all patients. Practices created protocols that staff could follow to identify and treat patients with CKD, using existing guidelines such as those from NICE or the Map of Medicine, and localising them to suit their individual needs. (Ashgrove and Hazeldean, D6, p.11)

Therefore, prior to its application, [stroke assessment tool] needs to be 'localised' to reflect local service provision and organisation (including the capacity of each service). From a commissioning perspective this can be an interesting process, enabling commissioners to identify where the services they commission are unable to address post-stroke needs in a manner in line with best practice. (Hazeldean, D11, p.10)

Tailoring is particularly associated with the contextualisation of standardised and generic forms of knowledge, such as that embedded in national evidence such as

clinical guidelines. Tailoring these generic forms of knowledge is intended to render it relevant and accessible and making such knowledge more 'palatable' to users:

Local adaptation of research findings will be undertaken, associated with learning within teams and the organisation, and partnerships with universities and other bodies may be used to facilitate the creation and use of knowledge. Our model is also influenced by the knowledge to action process [5] in which identification of the need for knowledge and the adaptation or tailoring of knowledge have important roles (Ashgrove, D9, p.3)

Such as:

Within the implementation theme, as projects are instituted in accordance with local priorities, we will undertake associated research to develop an approach to tailoring that could be used by healthcare staff after only limited training. (Ashgrove, D9, p.4)

Tailoring and standardisation are two sides of the same process: an initial standardisation creates a template which can be adapted to specific implementation contexts. Standardised evidence-based knowledge such as that captured in guidelines, protocols, clinical care pathways, and assessment tools can then be tinkered with by users to develop a flexible representation of evidence-based knowledge reflecting the needs and context of use.

A discussion of the findings of this first phase of the study begins on page 240

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CHAPTER 5: FINDINGS OF PHASE TWO, A MULTIPLE CASE STUDY

CASE SUMMARIES

Case 1 summary: Oakdown

Oakdown CLAHRC consists of a partnership between two regional universities, 12 NHS Trusts, a children's charity and an online innovation hub organisation. It is made up of four metropolitan boroughs with a population of 1.34 million, who are mainly white with Asian or British Asian people being the larger, other ethnic group. There exist pockets of severe deprivation and related poor health, disability, and high unemployment. Life expectancy is 10.7 years lower for men and 7.7 years lower for women in the most deprived areas. Health priorities identified by Public Health England were addressing health inequalities, smoking, and mental health. Early deaths from cancer and stroke are higher than the England average, and 19.3% of children in year 6 (age 10 years) were classified as obese. Oakdown has created joint roles i.e. appointing individuals with clinical experience into strategic, managerial and frontline implementation roles. Oakdown is characterised by individuals in leadership roles who possess both theoretical and practical knowledge of implementation. This knowledge drives a clear vision of what implementation is and how CLAHRC can meet the needs of the NHS and the population it serves. Boundary spanners at Oakdown are typically seconded clinical staff employed within the local NHS, with mixed levels of experience of research or service improvement.

Each case summary is organised using the headings developed for a framework that emerged from analysis of the interview data. This framework generated a number of headings, with data from each case populating each heading to various degrees. It developed iteratively as the data from each interview and each case was analysed, resulting in a final framework which encompassed the following

headings: borders and frontiers, working together, give and take, speaking the same language, boundary objects, and users, and developers.

Borders and frontiers

This heading refers to the various different types of boundaries identified and discussed by participants. A diversity of boundaries was identified across each case.

Research-practice gap

Closing the research-practice gap to accelerate the translation of research evidence into improved patient care is a primary directive of all CLAHRCs. The gap is defined as a disparity between what is known to be good practice, compared to what is actually happening in practice. The benchmark of evidence-based practice is typically defined by guidelines, standards of care and other forms of national evidence. Like other CLAHRCs, Oakdown had focused on getting this type of evidence into practice through tailoring tools and evidence to meet the needs of local contexts. Participants from Oakdown reported that the level of tailoring required in order to achieve this contextualisation and improve the appeal and uptake of evidence had superseded their initial expectations, resulting in a more focused approach to understanding and developing boundary objects which were very localised rather than conducting large scale Trust-wide training and implementation initiatives.

The boundary between research and practice at Oakdown was articulated as a misunderstanding or a failure to appreciate the context of practice. One participant felt that an appreciation of the realities of implementation in an NHS context could only be achieved through exposure and experience:

I mean one of the ... I would love to do before I die is like get the researchers to just spend a week on the wards, on the front line, to appreciate ... what pressure everybody's under. Because I think if they appreciated what they're under they would ... negotiate a little bit more than what ... they appear to do, if you know what I mean. (Maureen, frontline boundary spanner Oakdown)

Boundary spanners at Oakdown reported that they avoided the use of 'research-ey' language when attempting to engage NHS staff as this can emphasise the division between research and practice:

*...and don't call the **** project the **** project either...because to me that's another...that's quite a research-y thing...so it's the Nutrition Project, that's...frontline staff know it as the Nutrition Project. (Jean, senior boundary spanner Oakdown)*

Professional and disciplinary boundaries

The depth of the divide between different professional and disciplines in healthcare has generated a barrier to collaboration and hinders implementation at Oakdown:

And it's also interesting how different the cultures are even within ...the hospital, because their culture there is very different to what they have in medicine...Really different, and something that I was unfamiliar with and not necessarily expecting... So my lack of knowledge of that particular area I think, and how they worked and what makes them tick and what ... they're quite competitive ... quite ... hierarchical ...quite ... not necessarily in a bad way ... but yeah, very ... very different, and I think a lot of it ... maybe we didn't achieve as much as we could have done because we actually needed more time to get to know them and learn about them, and ... build a better relationship. (Bernie, senior boundary spanner Oakdown)

Border defence: gatekeeping and gaining access

Boundary spanners at Oakdown identified individual wards as representing specific domains or communities which were closed to outsiders. These boundaries were defended by those in gatekeeping roles, making it difficult to gain access to a potential implementation site or group of intended users:

I mean the other thing that was a hindrance was one of the wards that we chose ... we found it difficult to ... I won't say get on there because we used to go on to this ward, but ... the ward manager wasn't

helpful...So the gatekeeper wasn't very helpful. (Bernie, senior boundary spanner Oakdown)

Working together

Commitment to working together was reported by participants across Oakdown, ensuring that a partnership approach is embedded at a strategic and frontline level by matching CLAHRC implementation work to NHS priorities. Participants worked together to identify boundaries and develop complementary boundary objects. This was demonstrated in the attention and resources given to working with stakeholders to tailor national evidence in order to develop contextualised tools and products, for example the tailoring and trialling of a venous thromboembolism (VTE) assessment tool:

We worked with the Trust or the Trust worked with us in identifying other areas to focus on like root cause analysis. So that again was identified in terms of partnership. So the point as we took forward the aspects of the study, for example training, revising the VTE assessment tool, all along it was much CLAHRC people working in partnership with people within the NHS organisation in this case [place] at different levels be it ward staff people like pharmacy or senior medical consultants, be it matrons be it the head of quality. Very much a partnership approach to working (Rose, high level boundary spanner Oakdown)

Stakeholders worked together to tailor 'rigid' generic objects (such as clinical tools and guidelines) to create bespoke objects which were designed to meet the needs of local users. This was illustrated during the development of nutrition action plans, during which a guideline provided the starting point for the development of a user-designed, contextually resonant product. Creating such a contextualised object collectively helped to reduce or compensate for any sense of imposition amongst intended users. The rationale was that imposed objects were less appealing, typically had poor uptake and symbolised a top-down agenda rather an awareness of local needs:

So I think one of ... one of the things that we tried to do with Nutrition Champions when they wanted to implement anything on their wards, to

some ... I mean to an extent MUST and the nursing care guidelines were very prescriptive ...but anything else that we wanted them to do ... we developed some action points, where they chose their own goals really; ...they chose three goals related to their own ward area, that they wanted to achieve within their area. ...And in the end they sort of like ... I call it 'Pick and Mix', they ... they'd picked and mixed what they wanted to do in their area, and ... and I think that was a good way really, rather than us telling them what to do. They were more aware of what was happening in their area than we were, and I think that gave them some empowerment. (Maureen, frontline boundary spanner Oakdown)

Give-and-take: reciprocity, compromise and mutual exchange in implementation

Give-and-take was apparent in the way in which Oakdown endeavoured to give something back to stakeholders, through formal recognition of the contribution made by users in the development, design and implementation of a new tool or product, or through the sharing of skills and knowledge in exchange for participation. This reversal of the traditional view of research as a one-way process in which subjects are recruited, and provided a symbol that recognised the contribution of stakeholders and formalised the collaboration:

I think it's as I said before it's about being respectful that you're not going to burden them but they're going to get something back and I also think it's getting back in different ways. One of the things I thought worked really well on the dysphagia project was that the ward manager we did the learning she counter-signed all the certificates and really that was really to gain her engagement but also to show the expectation was that all the wards that they were getting designated time off the ward and then they would then put it back they would then apply the learning. ... It was their project as well as it was our project ... you're going to do something together relevant together that is going to bring benefits for both of you and it's not it's reciprocal it's not the researcher going in and using people. (Jean, senior boundary spanner Oakdown)

Give-and-take was represented in the various things that were exchanged during implementation: knowledge and skills, kudos (validation and recognition), and resources including staff time:

... engaging people's interest is something that was relevant to them so working in a way ... that wasn't burdensome, didn't take a lot of time or energy or effort and also hopefully was a benefit to them that they got something back in terms of we trained all 32 ward staff or they also had their project showcased in the implementation casebook and they were acknowledged in presentations and publications so there was something that they got back as well as being very relevant. (Jean, senior boundary spanner Oakdown)

Participants reported that give and take was a crucial element of working together effectively. Collaboration can break down rapidly if reciprocity is deemed to be absent:

We had a partnership with the board who were project managing but we didn't really have a partnership with the site who volunteered to participate and they participated they volunteered at the last minute after a long procurement process of the technology and then the one site where we did eventually go and visit and observe a training meeting and we were due to go back the next week it I just felt we weren't relevant we were not we hadn't a close relationship, they didn't think they were going to get anything back. (Christy, senior boundary spanner Oakdown)

Boundary objects-in-use

A diversity of *boundary objects-in-theory* and *in-use* were identified by participants at Oakdown. However, it was those objects which were developed in collaboration with users which appeared to be more readily used in practice., for example the nutrition action plans developed as part of the nutrition tool and nursing standards implementation project.

CLAHRC as concept and entity

Staff at Oakdown saw CLAHRC as an external organisational entity, which could generate a boundary between CLAHRC and its NHS partners. This was characterised by wariness and suspicion:

I got through to someone in an audit department and I tried to explain what it was about and he was obviously highly suspicious...as an outsider...and had obviously not heard of CLAHRC. (Jean, senior boundary spanner Oakdown)

CLAHRC as a concept was variably interpreted and understood. However it is clear that recognition of the concept was growing:

So although people are starting...people at the higher levels are starting to...understand what CLAHRC is, or they've heard of it but they're not sure what it is (Bernie, senior boundary spanner Oakdown)

However at ward level there remained uncertainty regarding what it was and what it meant:

I realised when I first started to try and explain about CLAHRC...I had to really try and simplify it because it all...staff would just go 'What?', 'What?', CLAHRC, NIHR, all these they just didn't understand...you just need to make it more meaningful to them. (Bernie, senior boundary spanner Oakdown)

Theories and frameworks

Boundary spanners at Oakdown used theories and frameworks of implementation to provide an underpinning strategy to guide and support their implementation efforts. These theoretical tools were also deployed as boundary objects to explain implementation activities and recruit collaborators:

I mean that's the KT tools that we've used. I mean the other artefacts ...what we'd call the research tools that come out of the funnel of the K2A framework which are things like I think I mentioned before the

MUST screening tool, the VTE assessment tool. (Rose, high level boundary spanner Oakdown)

However, whilst theories and frameworks might have provided useful shared objects at senior levels, at a frontline level they could have an inhibitory impact due to being perceived as belonging to the research rather than clinical domain. Being seen as 'research-y' could reinforce the boundary between research and practice.

National evidence, tools and guidelines

Oakdown used extensive tailoring to implement national guidelines, protocols and evidence-based tools through extensive tailoring. These objects were perceived to be 'generic' and therefore required significant adaptation to increase their relevance to users at different levels.

So there's a variety of different tools and several of those tools have been made available to our NHS partner organisations so that they can use them on an ongoing basis so it's not just educational materials it's actually the evaluation tools and the feedback tools that they can adapt and use in future...And those are specific to each generally to each project although they're adapted there's an observational schedule we were doing observations on meal times can be adapted for observations of dysphagia or observation in pressure ulcer prevention in our new project (Rose, high level boundary spanner Oakdown)

This was demonstrated during Oakdown's nutrition project where generic national evidence was embedded within tailored action plans:

The action plan was a way ... of giving them back some ... it was their action plan, they decided on it...So although it had some top down elements in that, you know, they had to get better at using MUST, they decided that ... and they decided how that would be done. And they decided what other little objectives they would have around supporting people with oral nutrition. So the action plan I suppose was a ... was a boundary object... in ... you know, to cross that ... top down issue...

problem...Yeah so ... so yeah, yeah so you could unify those things ...together. (Christy, senior boundary spanner Oakdown)

The process of working together with users to create tailored objects helped to instil these objects with locally resonant knowledge, improving relevance, encouraging uptake by generating a sense of shared ownership.

Targets and incentives

At a senior organisational level it was reported that engaging with CLAHRC represented an attractive opportunity to fulfil a number of mandatory targets. For example it provided an incentive to participate in the nutrition project:

I think from a senior level within the Trust ... they were quite... very... supportive. Because obviously we were implementing... guidance that linked to CQUINS targets... so of course they were very supportive. (Bernie, senior boundary spanner Oakdown)

However, whilst such targets were perceived to be meaningful at a senior level they appeared to lack resonance at clinical level:

If you stand and say 'Well if you don't fill this form in this Trust isn't going to meet its ... targets and it'll lose some money', that means nothing to the frontline staff (Bernie, senior boundary spanner Oakdown)

Shared concepts and ideas

Clinical topics and emotionally resonant concepts

The use of shared concepts as *boundary objects-in-use* was identified across Oakdown, particularly in the use of clinical topics such as 'dysphagia' and 'nutrition', in addition to symbolic or emotive concepts such as 'improving patient care'.

And maybe the point is that the other projects that we've worked on things like nutrition...They're all really quite critical aspects of care, how

to best deliver it or who's delivering it. They are pertinent in different ways so maybe one of the things is in terms it's almost like the relevance of the object y'know if you see the project or the topic as the object that crosses boundaries as it naturally does. (Rose, strategic level boundary spanner Oakdown)

Clinical topics and catch phrases were used to summarise and share a unifying concept or idea, for example during the dysphagia project the project lead (S1P1) described how “everybody’s business” represented a powerful slogan which she used to generate engagement by highlighting the relevance of swallowing problems to both patients and clinicians:

I'm tending to use a slogan that I suppose is about patient safety... "Everybody's business". So those are sort of catch phrases that capture people's interest (Jean, senior boundary spanner Oakdown)

Topics such as “nutrition” were also used in a similar way by participants to generate alliance amongst healthcare professionals. As a symbolic object “nutrition” represented a shared concern which was persuasive and difficult to oppose:

I think the thing with nutrition is it's not a hard sell... I really don't think anybody thinks it's not important ...everybody thinks it is important, I'll get all the negatives out of that sentence. And most people and I can't think ... as I say, most people believe nutrition is important... So it's not a hard sell. What's the hard sell is how to do it. (Charlotte, frontline boundary spanner Oakdown)

Despite their wide recognisability these concepts could be understood in a variety of ways which could be contingent on stakeholder identity. There is evidence to suggest that a concept such as ‘nutrition’, despite its persuasive power, may fail to adequately meet the priorities of some members of the multidisciplinary team (MDT); for example one participant described struggling to engage a consultant in the nutrition project and discovering that this was not a shared concern.

Speaking the same language – using shared concepts as common ground

Participants at Oakdown reported how one of the first decisions that took place when CLAHRC first established was to listen to the priorities of NHS stakeholders and align CLAHRC's implementation aims with these. The significance of this approach was that it showed how CLAHRC stakeholders recognised and appreciated the conditions of clinical practice, and sought to engage NHS stakeholders as allies, rather than as subjects upon whom implementation work was imposed. This set the tone of the partnership at the outset of CLAHRC, ensuring that NHS priorities provided a shared language throughout the lifespan of the partnership:

And the initial communication for all of our work has been at that level. Our projects are addressing the priorities of our NHS providers rather than identifying what we want to work on (Rose, Strategic level boundary spanner Oakdown)

Boundary spanners identified semantic boundaries between languages spoken by different professions and disciplines involved in implementation. For example, one senior boundary spanner described how a failure to establish a common language resulted in an inability to engage the Trust's audit department in a piece of implementation work:

Multiple interpretations of implementation

It was reported that a variety of shared concepts around implementation were used by different professional and disciplinary groups. For example, GPs spoke of 'service improvement'; whilst 'evidence based practice' or 'EBP' were the terms most widely used by nursing staff:

Yes but what I've really talked about is evidence-based practice... that was a much more familiar and acceptable term although one of things that I also did when I was trying to get general practitioners to...For example from practice I spoke with a couple of general practitioners in training or who were responsible for training and asked them what their what language and they talked about service improvement...So I did try

to use the language that each different discipline was familiar with and was comfortable with and understood although that was also a learning process. (Jean, Senior boundary spanner Oakdown)

Users and developers of boundary objects – who they are and what they do

Oakdown had focused on appointing boundary spanners with clinical backgrounds at every level, for example an implementation lead with a joint clinical/academic role, as well as the many nurse and other applied healthcare professionals who were seconded as facilitators. It was reported that contextual awareness and credibility were associated with the boundary-spanning effectiveness of these individuals:

I think ... I mean [name], who was a ... practising nurse, I think she brought a lot to the project because she could stand up to other nurses and say 'Well on my ward we do this' or 'We don't do this' or 'I understand this problem' because, you know, she faces that every day. (Christy senior boundary spanner Oakdown)

However this credibility could be compromised and had to be re-established when the role was unfamiliar:

And, like I say, as soon as I saw ... as soon as I saw their faces when I and I was working on the front line with them, they'd completely changed, they completely warmed to my character, whereas I'd gone in ... I did a little bit of an exercise, I did it on purpose, where I went in and I said 'Oh, I'm a Knowledge Translation Facilitator', it was like 'What?', you know, and I was there obviously wearing plain clothes, I wasn't wearing my uniform ...I could have been absolutely anybody, and as soon as I said 'Look, I'm actually a staff nurse and I work with you' (Maureen, frontline boundary spanner Oakdown)

Building bridges through relationships

Relationships set the scene for collaboration in implementation, enabling boundary spanners to establish and sustain their activities. A boundary spanner who works in the clinical domain is more able to move across borders and recruit collaborators by being seen as “one of us”, for example:

But I ... introduced myself on my very first visit as the Knowledge Translation Facilitator to these Champions that I was educating, and they just looked at me with blank faces. And so then I said actually I'm ... I've come here to educate you on nutrition, I'm a staff nurse and I work, you know, on the wards with you, you know, a couple of days a week ...and with CLAHRC three days a week, and as soon as I said that I... I saw a complete change in their faces, and it seemed to break down the barriers immediately. (Maureen, frontline boundary spanner Oakdown)

At a strategic level the dual membership of Oakdown's implementation lead, who held both academic and clinical posts, was important to opening up communication between the NHS and the universities within the CLAHRC. This enabled her to engage stakeholders at a strategic level, adding impact to her personal influence:

One... relationship was already established which was with[place] hospital because I have a joint appointment...And my line manager is the chief nurse she's operating out of [place]...And in my joint appointment role I sit on the nurse executive group within [place] and various other committees where CLAHRC comes up from time to time and that's in my capacity as a joint appointment between the university and the trust with a lead responsibility around research so I already had those relationships set up. (Rose, high level boundary spanner Oakdown)

Summary

At Oakdown, implementation through CLAHRC was approached from the outset as a way to address local clinical priorities and to build on previous improvement work. The vision of Oakdown CLAHRC is influenced by the experience and understanding of its implementation theme lead, who has extensive knowledge of implementation theory and practice. In addition, her leadership is strengthened by her dual citizenship; as both an academic and a clinician, she operates across both domains of research and practice. Aligning the implementation agenda with local NHS priorities enabled Oakdown to build rapport with clinical leaders at a strategic level. However, despite its growing familiarity at a strategic level, the concept of CLAHRC remained variably understood, and there were continuing challenges in terms of engaging Trusts and engagement at ward level.

Oakdown CLAHRC modified the way in which it implemented the various boundary objects-in-theory identified, for example guidelines and evidence-based tools. Instead of opting for large-scale training sessions, Oakdown moved its focus to concentrate on implementing boundary objects-in-theory on a smaller, typically ward –based scale. This was more successful, as each boundary object-in-theory was tailored to each ward context to generate a boundary object-in-use which was directly meaningful to users. Participants at Oakdown reported that extensive tailoring is sometimes required to make an object appealing to users, and that engaging users in this process is key to instilling an object with relevance. Participants at Oakdown were the only participants to report how the location and visibility of boundary objects in theory was important to their uptake, but determining such a location requires insider knowledge. Boundary spanners report how their clinical background was helpful when attempting to engage frontline staff, as it enabled them to both convey credibility and understand why issues of visibility and ownership could impact on an object’s uptake and appeal.

Case 2 Summary - Hazeldean

Hazeldean CLAHRC was made up of a partnership between a large city university and four regional Clinical Commissioning Groups (CCGs) serving a mixed population of 2.5 million which is comparable in terms of diversity to the population of England as a whole. Deprivation indices (2010) showed a mixed picture of poverty across the area, with pockets of severe deprivation around the main city and in some outlying boroughs. Vascular conditions were seen by the CLAHRC as a priority and included diabetes, coronary heart disease, chronic kidney disease and stroke.

These CCGs have replaced the original ten Primary Care Trusts (PCTs) and NHS Trusts which represented the NHS partners during the first four years of CLAHRC. There is evidence that this organisational change in the NHS has impacted across CLAHRC, with role uncertainty damaging relationships within the partnership. Organisational division is also evident across the partnership itself as demonstrated by the segregation of Hazeldean's 'implementation' theme from its 'research' theme, automatically assuming boundaries between the two work streams. Boundary spanners at Hazeldean were typically graduates or people with experience in industry, academia and project management. However as Hazeldean CLAHRC matured, more NHS employed secondees were recruited into boundary spanning roles, as it was found that their skills and experience of the NHS provided important 'insider' knowledge.

Borders and frontiers

Research-practice gap

In contrast to Oakdown, boundary spanners at Hazeldean found it challenging to explain implementation through CLAHRC. Data from across Hazeldean showed that implementation was approached primarily as improvement work, rather than focusing on the research-practice gap *per se*. It was reported by participants that NHS stakeholders assumed that CLAHRC was primarily a research entity, and

because of this, the research-practice divide was sometimes reinforced rather than spanned:

It's quite a difficult concept really to first ... I suppose portray, because I think immediately people assume that you ... you're doing a research study and ... and they don't quite understand. And I suppose if you just talk about it in the context of sort of service reorganisation or ... or delivery, you know, or service improvement, then they get ... a bit more of a ... you know, a helpful steer on what you ... what you're actually meaning, but just to kind of keep away from the fact that you're really talking ... we're not talking about, you know, going in and doing a ... a research study. (Jon, frontline boundary spanner Hazeldean)

CLAHRC CLAHRC-generated boundaries

At Hazeldean participants reported how some boundaries were generated and sustained by CLAHRC itself. This stemmed from the way in which Hazeldean CLAHRC had been structured, resulting in the segregation of the 'research' theme from the 'implementation' theme:

You know we've definitely crossed them but we've formed some as well and we think that that is largely down to the way that the whole thing was set up (Jaime, senior boundary spanner Hazeldean)

Divisions deepened over the lifetime of CLAHRC, hindering intra-CLAHRC communication and collaboration:

I think we should, within the whole of CLAHRC, within Hazeldean, we should make far more effort to be open in our debates and dialogue with the, with the research teams. (Jaime, senior boundary spanner Hazeldean)

The data showed that the segregation of researchers from implementers appeared to have come about through a lack of clarity about what implementation was and how to approach it. This contrasts with Oakdown where there appeared to be a greater clarity over matching implementation to clinical needs, whereas at

Ashgrove participants reported how it took time to clarify what CLAHRC and implementation both meant.

Divergent theoretical perspectives – epistemic boundaries

At Hazeldean, there was uncertainty about what implementation was and how it should be approached:

For the first nine months to a year as a team of academics I think we probably struggled to actually think about it conceptually. (Shirley, senior boundary spanner Hazeldean)

The academics involved in each of Hazeldean's four vascular implementation projects held different views about implementation, resulting in boundaries between academics:

What I found in the CLAHRC as a whole is that the other academic leads have all taken a different approach. (Jaime, senior boundary spanner)

I think there are different ideas about whether you co-produce research, you know, right from the very, right from the very beginning and that's not the approach that's taken within Hazeldean, as I say, and that's where there, where you'd definitely say there wasn't cross boundary discussions to the extent that there should have been. (Jaime, senior boundary spanner Hazeldean).

These divisions were played out at a CLAHRC-wide level, hindering inter-CLAHRC collaboration (see following section, *Speaking the same language*, for illustration).

Organisational boundaries

Spanning NHS organisational boundaries was central to implementation work (for example the organisational divisions between primary and secondary care in the heart failure project, and primary care and mental health services in the mental health project):

Secondary Care doesn't really know what exists in Primary Care...So that's one big and that is a massive boundary I think. And again I think there's boundaries internally in Primary Care as well within different organisations. (Sion, frontline boundary spanner Hazeldean)

Participants at Hazeldean reported how these stakeholder discussions were important in clarifying the boundaries to be addressed by CLAHRC. The depth or influence of boundaries was not always immediately visible and might only become apparent through stakeholder discussion. This meant that if discussions with stakeholders did not take place as part of the project development phase then important boundaries could be missed or overlooked

Rivalry and territorialism

Commercial rivalry appeared to be a boundary which was seen as both a driver and barrier to implementation. For example, evidence from the CKD project suggested that a certain level of competition could encourage GP practices to engage with CLAHRC:

They're separate businesses first of all, but to some extent that works as a positive force because it does sort of create this slight climate of competition where they want to do better than their neighbouring practices... (Jaime, senior boundary spanner Hazeldean).

However such rivalry could lead to territorialism. This could impede collaboration and knowledge sharing required for implementation, especially if this was associated with a risk of highlighting failings or gaps in practice. Territorialism was also represented in defensive gatekeeping tactics where access was denied:

Yeah I think that's where...where we've struggled, where we've not got the participation that we were after is with those types of practices, where they're ... probably traditionally hard to reach practices...Which are very ...kind of not engaged in the wider community of ... of healthcare and the NHS in general. (Jaime, senior boundary spanner Hazeldean)

This highlighted the fact that engagement must be voluntary, as attempts at coercion trigger territorial defences.

Speaking the same language

Failure to identify a shared language around implementation has hindered boundary spanning and collaboration within Hazeldean itself. This also hindered inter-CLAHRC collaboration, undermining efforts to work together. The CLAHRCs continued to work in an insular way:

I think we actually do have different ideas about things so whereas that two or three years ago I worked on a, on a presentation with about, people from about two other CLAHRC's, three other CLAHRC's we, we actually weren't speaking the same language. They were, some of them were talking about change management or change agents and the others talking in very different ways and so, yeah I didn't give time to actually start learning their language and they obviously didn't give me any time to think about it the way I thought about it... But yes we never went any further. There wasn't this, oh great this is fantastic, we all think alike. It was oh God this will be too painful I might as well just stick to my own way of looking at things...it wasn't written up, it remains as a conference paper...because we understood it from...different perspectives and we were all doing different things. (Shirley, senior boundary spanner)

Working together

Hazeldean created opportunities for face-to-face communication. This close physical proximity was reported to be beneficial encouraging communication and collaboration:

And the fact that everyone was in the same room together because we had these sort of collaborative meeting and all the practices came together (Jon, frontline boundary spanner Hazeldean)

These collaborative sessions could sometimes lead to an 'implementation moment', the moment at which a shared understanding of implementation through CLAHRC is achieved:

I think there has, but I don't think it's as clear cut, it's been as clear cut. But yes I think there has been eureka moments where it's happened in [sl. meetings], which I think as academics, or as people working within this environment we would class as implementation moments. (Jaime, senior boundary spanner Hazeldean)

Working together well – Hazeldean's Heart failure card

Hazeldean's heart failure card was developed collectively with stakeholders. There is a consensus amongst boundary spanners that communicating, listening and responding to stakeholder needs rather than CLAHRC implementation aims led to the development of an object which was meaningful to all stakeholders.

As I said, we didn't have a project, we had ideas ...but it ended up that the ideas that we had weren't really ... weren't the things that people wanted... (Susan, senior boundary spanner Hazeldean)

But ...that was something that came from ... from the ... like from the nurses really...The problem came from them and then we just tried to find a solution for it. (Susan, senior boundary spanner Hazeldean)

The problems identified were poor communication between primary and secondary care, the inaccuracy of the heart failure registers and GPs lack of confidence in treating heart failure.

I'd ... I'd been to see the Heart Failure Nurses in Hazeldean, we'd been to see them a few times, and then I had this idea of ... you know, like I said, one of their ... the problems that they had was communication between primary and secondary care ...they're based in the community

and when their heart failure patients were admitted to hospital nobody ... they didn't know...So they felt that that was an issue for them. So we came up with a Heart Failure Alert Card ... (Susan, senior boundary spanner Hazeldean)

The final sentence below emphasises the importance of stakeholder engagement from the outset.

The impact of the Heart Failure Alert Card was clearly demonstrated by stakeholder feedback:

I interviewed the Heart Failure Nurses involved and some patients...and the feedback I got was that the patients actually ... they loved them...And the nurses ... thought they were really good as well. And they did actually work; I mean I wouldn't say ... that they'd work, you know, in other situations, but in this situation it did actually work. And the nurses started to be contacted by the ward, you know, and told that ...the patient had been admitted, and it had never happened before. And they were also contacted when the patients were due to be discharged (Susan, senior boundary spanner Hazeldean)

then the Heart Failure Nurses started to get copied into the letters that were sent out to the GP. So it did ... did kind of ... it did start to improve communication. And what came out from the patient interviews was the patients felt more empowered, you know, having this card. (Susan, senior boundary spanner Hazeldean)

The card was not only meaningful to nurses, it was also valued by patients:

And one of the things that was interesting that came out was they felt it legitimised the fact that they'd got heart failure because they had a card, a plastic card (Susan, senior boundary spanner Hazeldean)

The acceptability and appeal of the Heart Failure Alert Card continued to be demonstrated by its ready uptake and ease of spread:

They were quite successful. And they've been spread now, you know, to quite a lot of ... quite a few other heart failure services...In fact I went out yesterday because a Practice Nurse ...asked me if she could have some ...and we were talking about how they could be adapted, you know, to be used in primary care. (Susan, senior boundary spanner)

Shared objects and ideas

A number of shared concepts, objects and ideas were identified which exerted either a catalytic or inhibitory influence on implementation. As with Oakdown, it was found that some clinical topics and tools could unite stakeholders and help them to work together. However, participants at Hazeldean reported how clinical topics could also represent divisive concepts, accepted by some of the intended users and rejected by others. Being able to match an object with a specific boundary to be spanned, or a user-identified need or priority, appeared to be crucial to whether or not an object was successfully used for boundary spanning.

Effective boundary spanners needed to be able to recognise objects that had a persuasive currency across different domains, and could thus be readily shared between stakeholders. The following quote highlights the diversity of things and ideas that were perceived to help open up a dialogue around implementation:

It could be anything, yes it could be a physical resource and it could be a protocol, which they can use in their practice. It could be like a little process idea you've taken from somewhere else you've recognised, like a common issue. It could be something they can utilise for a long term like an audit tool or like a change package as a whole; again it's about establishing what they really need at that time. (Dafydd, frontline boundary spanner Hazeldean)

Clinical topics

At Hazeldean there was evidence that particular concepts, for example clinical topics, were used to generate alliance and engagement with CLAHRC's implementation aims. However, there was also evidence to suggest that clinical

topics could hinder engagement if there was a mismatch between those topics which represented CLAHRC's focus, and those which were local priorities in clinical practice. This was demonstrated during Hazeldean's CKD (Chronic Kidney Disease) project, where engagement was found to be compromised in Clinical Commissioning Groups (CCGs) where another clinical topic occupied top priority:

Yes, I'm thinking about initially, when we were going round and we were talking about ... pushing the programme, or delivering the ... the programme of CKD improvement ...because CKD, Chronic Kidney Disease, at the time wasn't kind of one of these real hot topic areas to address ...it was always like Stroke was the favourite, or in most places Heart Failure was also a favourite, you know (Sion, frontline boundary spanner Hazeldean)

Well it was quite difficult to get people to focus on ... or to want to focus on Chronic Kidney Disease. (Sion, frontline boundary spanner Hazeldean)

It was apparent that the focus on CKD was assigned to particular geographic regions with little acknowledgement of the clinical priorities identified by primary care teams in those areas.

CLAHRC as concept and entity

Hazeldean CLAHRC was frequently perceived as an external non-NHS entity, despite efforts to embed it within the NHS:

And we try to put on training for them but I think because it's seen as, 'oh the CLAHRC's doing that, it's not the Trust'. There's quite an issue to that as well because we always, I mean we try to be as much endorsed by the Trust or embedded but at the same time we're seen as a different organisation. (Sion, frontline boundary spanner Hazeldean)

CLAHRC was emerging as a shared concept at a senior level, but at a frontline level there was still ambiguity about what it was and how it might fit into the wider context of the NHS:

[re. CLAHRC] No they wouldn't understand; they don't what ... they don't know what it stands for. And people can't even spell it (laughs). (Blythe, frontline boundary spanner Hazeldean)

Targets and incentives

Boundary spanners at Hazeldean frequently utilised evidence from the Quality Outcome Framework (QOF) data to persuade GP practices to take part in implementation projects. This had mixed results:

And I think ... I think sort of that ... that sort of more ... more senior level, you know ...coming in and really setting the scene by ... by really looking at ... at evidence, and showing them the evidence to what's out there and why you're proposing what you're proposing in terms of a change to ... to service delivery, or a change to the way their practices are managing a specific disease, was ... was really that I suppose ... the research evidence that was available around that and the ... whether it was NICE guidance or whatever ... whatever other evidence; well it could be local sort of opinion leader evidence, was really ... there's sort of the ... sort of those headline messages that you had to go in with ...to really open that dialogue. (Dafydd, frontline boundary spanner Hazeldean).

Whilst QOF data initially appeared to represent a clear and compelling case for participating in implementation, in practice, its usefulness as a persuasive mechanism was variable:

I'd say in terms of the work that we did, our kidney disease work, probably one of the things that opened up the dialogue initially and on an on-going basis was data that we had. We had QOF data and we had national data which showed very clearly that the local delivery of care was not as good as one would have expected it to be. (Jaime, senior boundary spanner Hazeldean)

National evidence, tools and guidelines

One of Hazeldean's implementation projects had been designed to bridge the gap between physical and mental health. The project involved implementing a physical health assessment tool designed for use with mental health service users. These service-users are at a greater risk of developing physical health co-morbidities, both as a consequence of lower engagement with primary care services, and also as a consequence of some type of medication which can have severe side effects including metabolic and other disorders. However whilst the tool represented a boundary object at a commissioner level, there had been poor uptake at user level:

...it being high on their [commissioners] agenda and ... them, you know, wanting the help of a ... of a CLAHRC and being ...you know, I suppose ... yes, and there's been something much more receptive about the Mental Health Trust in ... in that offer of health ...and seeing us as kind of a ... I'm not saying people see us as a threat coming in, but, you know, they were ... they were just ... I just feel it's much more of a partnership and a level ... and a level footing almost, where before, when I've worked with some PCTs, I've always felt a little bit on the back foot, like ... we weren't seen as ... as a real true partner. (Chantelle, senior boundary spanner Hazeldean)

A failure to involve frontline practitioners in decision-making around implementing a physical health tool to be used by care coordinators had resulted in resistance and poor uptake. The outcome was that the physical health assessment tool as a *boundary object-in-theory* was struggling to make the transition to become a *boundary object-in-use*. This was in contrast with the heart failure alert card described earlier in this section.

Boundary spanners

Participants at Hazeldean reported how the boundary spanners employed at the beginning of CLAHRC were primarily recruited on the basis of interpersonal skills. They were typically recent graduates without a clinical background:

I think the KTAs had fantastic communication skills, so that was probably one of the things we recruited them on initially was their interpersonal skills... (Jaime, senior boundary spanner Hazeldean)

However there was a growing recognition that an effective boundary spanner was one who possessed experience and tacit knowledge of the implementation context:

I think the issue about being an insider versus an outsider is important...So across the CLAHRC as a whole now we've got at least as many seconded people in knowledge transfer type roles as we have people we originally recruited because that does bring that much more informal knowledge of people, networks and the clinical knowledge you know, and although there's a few of those who we recruited who are good facilitators, in view of credibility and particularly the confidence that goes with those abilities are very important I think... You know I'm still thinking is there a perfect combination of internal/external but I would definitely go towards adding more internal myself. (Jaime, senior boundary spanner Hazeldean)

An issue amongst many of the boundary spanners was that they struggled with credibility within clinical practice because they lacked experience working within a clinical context. In the case of a project focused on CKD this generated additional resistance when attempting to conduct an auditing exercise; some clinicians did not respond well to the prospect of discovering the true level of their practice's poor performance, and sometimes saw this as a criticism from a non-credible party.

But there are certainly plenty more examples I'd say of people that don't really, may not get it even after it's been explained to them and there is certainly examples that I've come across before where there's a certain degree of professional and clinical pride where they don't necessarily like to admit that they're not so good at something and they don't really understand it. Especially with me coming from a non-clinical background, I think we've all been through that in the CLAHRC because most of us don't come from a clinical background and that it's not, I suppose it's not a very easy thing to be told by someone outside your

profession that you know they think you could be doing something better. (Dafydd, frontline Boundary spanner Hazeldean)

And I think that's something with some of our KTA's, there's certain limitations because apart from a few we don't have that clinical background or not specific to that area we're working to (Jaime, senior boundary spanner Hazeldean)

Boundary spanning skills were primarily interpersonal, enabling connections to be made at multiple levels using communication, being flexible and having good empathy to read signals translated by different stakeholders. Those who had mastered these skills and were most likely to succeed:

I think that is absolutely fundamental to being a good boundary spanner, that you can be flexible, that you've got really good sort of empathy to pick up messages that people are giving out to you (Sion, frontline boundary spanner Hazeldean)

A boundary spanner's identity was important as those who were deemed to be 'insiders' were perceived as being more authentically empathetic.

Summary

Hazeldean differed from Oakdown in the way in which it approached implementation through CLAHRC. Rather than aligning with local NHS priorities at the outset, Hazeldean CLAHRC assigned specific vascular conditions on which to focus implementation activities to each geographical area. For example, one area might be assigned CKD, diabetes, stroke or heart failure. Participants reported that these clinical topics were dealt out in a way that overlooked the clinical priorities in those regions. This led to challenges in terms of engaging primary care practitioners, who felt that CLAHRC's priorities were at odds with theirs.

Unlike Oakdown, there was uncertainty about what implementation was and how it should be conducted, with arguments reported amongst theme leads and academic leads as to the right way to approach implementation, both theoretically

and practically. Instead, there was evidence to suggest that Hazeldean conformed to a more service improvement type of approach. Collaboration across themes and amongst stakeholders was affected by this, leading to challenges in engaging and collaborating within and across CLAHRC.

Collaboration between Hazeldean and Ashgrove focused on the sharing of tools and knowledge around the identification and management of CKD, with Hazeldean sharing an improvement package to be used during training sessions with primary health care practitioners, and Ashgrove contributing an Excel based data extraction and CKD disease register audit tool.

Broadly speaking, boundary spanners at Hazeldean were initially recruited on the basis of interpersonal skills rather implementation experience. Lack of clinical experience reduced their credibility when attempting to engage clinicians in implementation work. In the later stages of CLAHRC, there was a growing recognition of the importance of having 'insider knowledge' of the clinical domain, and a number of nurses were recruited into facilitation roles.

Boundary objects in theory were produced and implemented at Hazeldean, with mixed levels of success. Those that struggled to make the transition from *boundary object-in-theory* to *boundary object-in-use* have been those which were imposed, rather than generated collectively with users, with some objects operating as boundary objects at commissioner level but not amongst frontline practitioners. However, where boundary objects were developed in partnership with stakeholders, these objects proved to be appealing to users and successful uptake was seen (for example the heart failure card).

Case 3 Summary – Ashgrove

Ashgrove's patch covered a substantial mixed urban and rural geographical area with a population of 1.34 million in three counties.¹ At the time of data collection, the background of the population was 50% white and 50% other ethnicities. Deprivation indices showed a mixed picture, with pockets of severe deprivation and related poor health and disability. Life expectancy was 9.4 years lower for men and 5 years lower for women in the most deprived areas compared to the least, and was lower than the England average across the CLAHRC area. Ashgrove segregated research from implementation, with implementation remaining a separate activity focused on spread and dissemination. The CLAHRC was split up into four applied research themes and an implementation theme, concentrating on topics around prevention, early detection, self-management, and rehabilitation. Projects were embedded within each strand and were typically led by clinical academics, with research studies being conducted by university-based teams, and implementation activities delegated to boundary spanners. The professional background of boundary spanners at Ashgrove was mixed, but none possessed specific clinical experience of the conditions around which implementation work was focused. During the course of CLAHRC, Ashgrove underwent a review, conducted by a number of implementation experts. Subsequently, Ashgrove was restructured with the intention of strengthening linkages between research and practice. Ashgrove had an established collaboration with Hazeldean CLAHRC, sharing evidence and tools concerned with the management of kidney disease.

Borders and frontiers

Research-practice gap

Stakeholders at Ashgrove recognised the depth and impact of the research-practice gap, describing academia and the NHS as “two distinct cultures”, requiring time and resources beyond the scope of CLAHRC to bridge:

And I think I'm going to say exactly what everybody else ... I suspect everybody else has said, its cultures, two very, very different cultures in academia and healthcare. (Gerald, senior boundary spanner Ashgrove)

The cultural division between research and practice was defined by what was meaningful and valued within each domain:

I mean academia and the NHS are two quite distinct sort of cultures ... just by the very definition you're gonna get academics that are driven largely by, I don't know, this might be slightly stereotypical but knowledge generation and sort of publications and the whole, that's what you're sort of judged on as an academic, which doesn't really have much, much weight or meaning for NHS staff who are sort of more interested in, more driven by patient care and stuff like that. (Gerald, senior boundary spanner Ashgrove)

There was recognition the gap was complex and involved bridging multiple boundaries:

I think coming from an academic perspective when you think about implementation I think you don't really understand all the problems and all the issues and all the boundaries that are there until you've been amongst the NHS ...I would say it's surprising just how difficult it is and kind of all the, like the boundaries that there to actually putting your evidence into practice, things that you might not have considered. (Tanya, senior boundary spanner Ashgrove)

The depth of the division was felt to be beyond the scope of CLAHRC to bridge effectively during its allotted lifespan:

... Again it boils down to sort of just culture of the organisation ... doesn't it? And ... and good luck if anybody's ever going to change that in the NHS. (Gerald, senior boundary spanner Ashgrove)

CLAHRC as something separate

Some of the challenges that Ashgrove CLAHRC encountered when attempting to bridge the research-practice gap was due to the way in which the partnership was perceived: as an ambiguous external entity, allied with neither academia nor the NHS. This was similar to the way in which participants at Hazeldean reported how CLAHRC was frequently perceived as something separate from the NHS, rather than a partnership between NHS and university stakeholders:

So yeah technically it is all of them together but I think the perception from staff within the NHS Trust would be that it's more something that's based within the University. But I think rather than them seeing themselves as a part of it which we try and kind of explain but it's not that easy to explain CLAHRC (Stefan, frontline boundary spanner)

I think it is, it's one of the challenges that I don't think we, well I'm pretty confident in fact that we haven't totally and utterly overcome it although I think we've made great steps from where we started and that is that for our partners seeing us as a separate entity, whereas we should not be seen as a separate entity.... But there is still this working with CLAHRC as an entirely separate organisation rather than just saying, 'oh well we are part of CLAHRC, you know, working with them is working with us,' we're working with ourselves when we're working with CLAHRC. But on the other hand there's the element of fact that if you're going to set up an organisation that has got its own identity you are always going to come across, even if it's collaborative, even if it's a partnership you're always going to come across those challenges of it being seen as a separate organisation. (Judy, senior boundary spanner Ashgrove)

The language of implementation was reported to exacerbate this sense of otherness, by representing an additional boundary which hindered engagement:

[Re implementation] No, it's not the friendliest term is it? (Tanya, senior boundary spanner Ashgrove)

Left unbridged, communication boundaries could represent a barrier to collaboration, limiting knowledge sharing across and within Ashgrove:

I mean within CLAHRC there's always some, there's always quite a lot of non-communication, do you know what I mean, like the actual organisation of CLAHRC (Tanya, senior boundary spanner Ashgrove)

Organisational structure and bureaucratic boundaries

The division between CLAHRC and the NHS was further exacerbated by the structure of both domains, which hindered communication across levels and between organisations:

I think what we've got to look at is organisations, both the NHS and academia that to use the word hierarchical...there was a very firmly established pecking order in both of them I think... More so than in other organisations I've worked with (Gerald, senior boundary spanner Ashgrove)

Recognition was also given to the departmental boundaries within the university, which were not effectively bridged:

There's not been as much engagement with other departments that may have an interest or be relevant. I know they're trying to do a little bit more work with sort of pharmacy partners and those kinds of things as well. But certainly initially, you know, most of the staff are based within the Health Sciences. (Ffion, frontline boundary spanner Ashgrove)

Issues of status also generated boundaries at an organisational level within academia, and hindered Ashgrove's ability to collaborate effectively across its academic partner organisations:

*There did seem to be that sort of, as I say this thing that they were the poor relation... There is a university in **** and I won't apologise, it's a bumped up poly. (Gerald, senior boundary spanner Ashgrove)*

The sense of rivalry was acknowledged by those boundary spanners who had endeavoured to widen the CLAHRC partnership, for example one boundary spanner reports the challenges she encountered as she tried to link up neighbouring universities. Here, she describes the difficulties she experienced as she attempted to bridge the historical divide which was based on the sense that one university was viewed as more prestigious than another, which generated a barrier to collaboration:

And I think because they're quite a red brick ... sort of university aren't they but ... yeah, that attitude probably exists a bit more than ... you know, than ... possibly sort of our local university, which although it is ... it's now top 50 ...they've done alright. (Tanya, senior boundary spanner Ashgrove)

CLAHRC-to-CLAHRC boundaries

Similar issues regarding status and prestige appeared to impact on the formal Ashgrove-Hazeldean collaboration set up around improving CKD detection and treatment work:

I mean because ... some of the work we do is collaborations between different CLAHRCs and sometimes some of the CLAHRCs are less willing to recognise the collaborative element of it than they really should be because I'm always happy to recognise the collaborative element of what we do. You know, some people say, 'oh well this CLAHRC is doing this,' whereas really I know that in fact it's that CLAHRC is doing it in collaboration with us or with another one. So that can be a bit of a problem but we work all through that, you know, we're all big grown-up boys and girls. (Gerald, senior boundary spanner Ashgrove)

The outcome was that Ashgrove appeared to struggle with CLAHRC-to-CLAHRC collaboration:

I mean the CKD work is a perfect example, I know that the Hazeldean CLAHRC always talk about it as being their work, whereas whenever we talk about it we always talk it about being us and Hazeldean CLAHRC (Gerald, senior boundary spanner Ashgrove)

Silos

Both academics and clinicians were described as being 'silo'd', with limited awareness of what drives or conditions each other's practice. Breaking down these silos was seen as an important step to release knowledge potential and build capacity:

And one of the problems that I think that is similar in both academia and the NHS is that people tend to operate in, no matter how much they try, people operate in very, well the term people normally use in silos...they operate in niches, in very specialist areas. And their interests lie in that specialist area in the main and you need to understand what their knowledge of that specialist area is or what their specialist area is in order to identify information that might be of value to them. (Gerald, senior boundary spanner Ashgrove)

And everyone's working very silo'd ...and actually, even within our region, you've probably got three teams working on the same sort of projects, but if you work together, you know, you can pool resources and work [unclear - 0:38:59] on there. (Stefan, frontline boundary spanner Ashgrove)

Shared objects and ideas

Much implementation work was focused on the development, refinement, tailoring and production of boundary objects. These ranged in scale from CLAHRC itself to the tools and innovations to be implemented.

Concept of CLAHRC

Despite their integral role, boundary spanners at Ashgrove initially struggled with clarifying the concept of CLAHRC and their role within it:

I mean initially, yeah it was just working out what CLAHRC was and what my role might be, and trying to get my head round that. And it was after that that we then ... were encouraged to set up research projects. So yeah, initially that's what it was like. (Ffion, frontline boundary spanner Ashgrove)

We all met up ... sort of because of our background and ... and, you know, the organisations that we were working for, sort of how we fit in the structures and ... we really sort of got our heads together about what CLAHRC was, and actually what we should be doing. And in fact I ... I kind of ... you know, when the new co-ordinator started, because I sort of gave them a briefing of what I'd found out about CLAHRC and how I interpreted it, and ... yeah, we kind of just worked something out ourselves and just created a job and created work for ourselves, based on our interpretations of ... of what it is. (Ffion, frontline boundary spanner Ashgrove)

A definition was determined and a meaning agreed upon through a process of collective sense-making:

Yeah it is ... it's a programme of work to promote collaborative ...collaborative work between academia and healthcare to ...ensure research evidence is used quickly, and it is ... is ... worthwhile, it's wanted, and it's used. And its high quality obviously. And it's setting up the ... the systems and structures to enable that. (Ffion, frontline boundary spanner Ashgrove)

Working together

Working together was contingent on recognising and reconciling two disparate domains of practice, the NHS and the host university:

I think it's a lot about listening to other people so I suppose, because the University and the NHS are really quite different so it's being able to listen to how you might be able to work with the Trust in a way that's useful so what they actually need and want rather than what we want to do (Tanya, senior boundary spanner Ashgrove)

CLAHRC-to-CLAHRC collaboration

Hazeldean and Ashgrove CLAHRCs collaborated around the development and implementation of an Excel-based data extraction and audit tool, continuing the work of an earlier pre-CLAHRC research project dealing with the detection and management of chronic kidney disease (CKD):

*Yeah it started out as, it was, it was called the PSP Primary Secondary Care Partnership CKD Management, it was a research project that the CLAHRC was doing down in **** And out of that there was this, there was an Excel-based tool that they were using as the data extraction and realised, sort of in a nutshell that that was, that could be turned into something of a standalone use, usage. (Stefan, frontline boundary spanner Ashgrove)*

Stakeholders from different domains came together around the audit tool which embodied a shared goal:

which is ultimately to help to identify patients who've got chronic kidney disease and get people to start being treated early, So that's gonna, we've all been able to sort of see that as not only a benefit to the, benefit to the general, the general practice or the GPs surgery, they'll benefit because their registers will be up to date so QOF points and stuff like that. The patients will be able to sort of benefit because they'll hopefully they're obviously gonna reap the benefits of better sort of care being targeted earlier. And then the financial implications for the NHS is being

able to save money on sort of. (Stefan, frontline boundary spanner Ashgrove)

Targets and incentives

A variety of incentivising tactics were deployed by boundary spanners to encourage uptake of the CKD tool:

You know and it helps them with their QOF points, it can help them with their revalidation, there's so many, again carrots that you can dangle in front of them that you don't really have to try that hard. (Stefan, frontline boundary spanner Ashgrove)

One of the most prominent features of the audit tool was the way it made visible the shortfall in identifying of patients at risk of CKD and other vascular conditions. It did this by generating localised data relevant to each separate practice. This could have an incentivising impact:

they'd say 'yeah that's great, come on in' so one of us or, yeah normally it's been one or two of us have sort of gone out and visited the Practice, explained the situation and then they'd sort of log us onto the system and we'd sort of run it all there and then... And get the results immediately... If they've been sort of stand-offish and they've seen the results and been swayed. (Stefan, frontline boundary spanner Ashgrove)

However, engagement in implementing the audit tool and improvement package could be hindered if associated with a boundary spanner who lacked clinical credibility:

... I have had one or two GP's who are slightly sceptical ...and I guess unsure about me and have questioned my qualifications and knowledge and purpose which is sometimes, you know, a challenge. But I'm not from a clinical background, I don't have a medical degree so I'm always kind of honest about that but I tell them I'm here to implement the tool in their practice and, you know, look through their data and it's up to them

what they want to do with it and I'm not going to give them any clinical advice.... So that's probably the most challenging side of that. (Stefan, frontline boundary spanner Ashgrove)

Building bridges

Relationships between stakeholders were built with mixed levels of success at Ashgrove. Whilst partner organisations remained largely disparate (see earlier border and frontier section), there is evidence that boundary spanners developed a network amongst themselves which emerged as a type of community of practice. This network enabled frontline boundary spanners to share knowledge and support each other through their various experiences of implementation through CLAHRC:

See initially we, initially I was under the, of the understanding that the coordinators were all quite separate and they sort of got together as, got together more as a unit so they were more of a collective group of coordinators. (Tanya, senior boundary spanner Ashgrove)

Give and take

Ashgrove provided evidence that if an object was shared in a non-reciprocal way, this could trigger disharmony amongst stakeholders, as when a tool was shared without consulting its creator. Instead of representing a shared object, ownership issues provoked a reinstatement of boundaries:

I have been burned a couple of time when people, you know, they'll take stuff ... and I find that very difficult. But, you know, its [unclear - 0:53:44] stops me being quite so open with my if I design something ... like the Opportunities Tool ... anyone who wants to use it, use it that's fine, and I make it freely available, but then when other people then front it up as their own work ...you're like, well ... no that's not on (Judy, senior boundary spanner Ashgrove)

It's happening more and more, and you just think ... do I need to get advice on what I need to ... what's it as my intellectual property ... whereas I'm ... perhaps too much, I just want to make things better for the patient, and ... if that's what is going help raise the profile with researchers, help them understand the opportunities, then I want that information out there ...but if ... if somebody else is then going to come and... I suppose I do want the acknowledgement that it's mine (Judy, senior boundary spanner Ashgrove)

This demonstrated how issues of ownership and use are interlinked. An object must be shared consensually, rather than taken or imposed, if it has to be beneficial in practice.

Boundary spanners

Boundary spanners at Ashgrove were recruited from a variety of backgrounds:

... All of us, as co-ordinators, have come from ... well, you know, real different sort of walks of life. And ... you know, you need that ... that mix of skill sets that we had. As I said, we had somebody that had expertise in statistics. Yeah, and we ... another example of that, you know ... that's ... one person that was very, very good at doing literature reviews (Ffion, frontline boundary spanner, Ashgrove)

The boundary spanning role was described as an ambassador role. Boundary spanners spent time raising awareness of what CLAHRC was:

A lot of my role has been simply talking to people, explaining CLAHRC and spreading the word ...being like an ambassador for CLAHRC (Ffion, frontline boundary spanner Ashgrove)

Some frontline boundary spanners at Ashgrove struggled with role clarity, credibility and recognition:

Yeah, when the CLAHRC was set, I don't know whether our roles were worked into the original bid, I think they were kind of added on

afterwards, but I'm not one hundred percent sure and ... you know, [unclear - 0:44:45]. (Julie, frontline boundary spanner Ashgrove)

Without role clarity or a clear sense of what CLAHRC was, boundary spanners at Ashgrove came together to collectively make sense of the Collaborative and their role within it:

But it's been very much ... sort of individually, as a collective, as a group, we worked out what ... what we want to do and what we want to get out of the role, and giving it some sort of definition. (Ffion, frontline boundary spanner Ashgrove)

Boundary spanners at Ashgrove have experienced marginal status amongst both researchers and practitioners. Some have found that the support of senior individuals had been helpful in adding the credibility and prestige their role has lacked:

one of the consultants in public health was also associated with CLAHRC, he was the Deputy lead into our implementation theme...I mean if it was just me on my own, I wouldn't ... all these [unclear - 0:23:02] ... senior people, you know, these ... like we have a Cardiology Consultant for the General Hospital, he wouldn't have seen me (laughs), he wouldn't have given me the time of day because, you know, I'm just ... because I know people sort of saw me as his PA ... and, you know, it speaks volumes I think. I think ...because the job wasn't particularly ... you know, high end (Ffion, frontline boundary spanner Ashgrove)

Speaking the same language

The use of specialist or technical languages amongst academics and clinicians was seen to provide a barrier to engagement amongst other stakeholders:

I have seen meetings where people just glaze over, you know, and unfortunately that the result and people can be lost really quickly, you

know, if somebody starts a presentation or a meeting (Gerald, senior boundary spanner Ashgrove)

This type of language was used to define professional and disciplinary boundaries between stakeholders:

that this is quite a sociological comment isn't it that people in particular disciplines, whatever, like to speak the same language because it gives them the impression perhaps of comradeship, partnership if the other people speak in that language... You know, you're part of the same tribe aren't you? If you're a clinician and can throw in the technical terms about the particular clinical condition then you're part of the same tribe. (Gerald, senior boundary spanner Ashgrove)

Some senior boundary spanners possessed joint membership of academia and clinical practice and were therefore able to speak, interpret and translate across multiple stakeholder groups involved in implementation:

So I was brought into the link to provide the bridge between research and patients and public. Because of my Doctorate I can talk to the academics and they're a bit more ... able to listen to me, but equally I'm out day to day with community groups and ... hearing what the real health and social care issues are on the ground. (Judy, senior boundary spanner Ashgrove)

Empathy

Boundary spanners at Ashgrove frequently reflected on how being able to express empathy and understanding was key to engaging stakeholders in implementation work:

Yeah I mean negotiation ... you've got to come across as likeable. So, sort of sympathetic, empathetic, something like that to sort of the person needs and stuff like that. (Stefan, frontline boundary spanner Ashgrove)

Empathy enabled a boundary spanner to interpret stakeholder feelings towards implementation:

Yeah trying to be, trying to be as receptive as possible to the needs of, certainly the sort of person you're dealing with without, without going native. I suppose in sociology terms. Yeah I've always tried to be sort of empathetic like what, whoever I'm sort of working with, what they sort of want and what their, I don't know being able to sort of get a sense of what that, what that person's feelings are towards whatever you're talking to them about...Trying to get, and then trying not to push their buttons too early. (Stefan, frontline boundary spanner Ashgrove)

Summary

In comparison to Oakdown and Hazeldean, participants from Ashgrove CLAHRC reported how it had taken time for the ambiguity about CLAHRC to clear. Implementation at Ashgrove is frequently synonymous with evaluation work, and some participants have reported how they have struggled to make sense of implementation through CLAHRC and their role within it. Ashgrove CLAHRC appears more strongly aligned and defined by the university around which it has centred its hub, to the extent that it has sometimes been difficult to collaborate with other regional universities. Here there is explicit reference to way in which CLAHRC has been viewed as a rival research organisation, deemed to be competing for resources with local Clinical Research Network (CLRN).

Boundary spanners have sometimes felt as though they are neither a part of academia or clinical practice, and have reported feeling 'in between' rather than bridging both domains. It was reported how much of the boundary spanning role was ambassadorial in nature, spreading the word and raising awareness of CLAHRC. The formal collaboration with Hazeldean had yielded some successes, but has also provoked a sense of competition, as each CLAHRC vied for ownership of knowledge, resources, and successes.

It is at Ashgrove that the importance of collectively generating objects in partnership with users was most apparent, with failed attempts at creating tools and resources adding further evidence. Ashgrove provided the richest data showing how *boundary objects-in-theory* developed without the input of users could be perceived as unappealing and irrelevant. Example include tools developed in isolation of users, and a cardiac rehabilitation programme which on first launch failed because it did not represent users views and values sufficiently.

CHAPTER 6: CROSS CASE STUDY FINDINGS

Phase one of this study reported a number of potential boundary objects or *boundary objects in theory*. Findings from the case study described three contexts in which boundary objects might operate. This section draws together the findings from across the three cases to unpack the context and processes which influence this transition and better understand how boundary objects may be mobilised during boundary spanning implementation activities.

The three cases studied revealed that a range of *boundary objects-in-theory* and *in-use* operate to facilitate (or sometimes hinder) the types of boundary crossing necessary for implementation to succeed. Whilst the context of the three cases differed in terms of the way in which each CLAHRC interpreted and operationalised the NIHR's implementation mandate (for example Oakdown and Hazeldean took a service improvement approach whilst Ashgrove focussed on evaluation), there were common features in the ways in which boundary objects were generated and mobilised, and in the factors which influenced their effectiveness in practice.

Two overarching themes, each of which incorporated a range of specific issues, emerged from the cross-cutting analysis. The first was to do with the nature of the boundaries to be spanned, and the second elucidated the features of effective boundary spanning.

1. The organisational context and its boundaries:
 - a. Issues related to the nature of the organisations and their boundaries, associated with tensions *between organisations*.
 - b. Differing agendas and divisions which create boundaries *within organisations*, for example interdisciplinary tensions.
2. Finding solutions to problems: the features of successful boundary spanning
 - a. Working together from the beginning
 - b. Developing a shared language
 - c. Making the boundary spanner's role work
 - d. Enhancing the effectiveness of boundary objects.

Table 11, below, lists the boundary objects identified in Phase two of this study. There is a marked difference between the number in Phase one (boundary objects-in-theory) and those which emerged during Phase two. Only a few of the 48 *boundary objects-in-theory* described in Phase one actually made the transition to *boundary objects-in-use* in Phase two; many, such as Ashgrove's teenage pregnancy guideline implementation project, disappeared entirely. The data in this table are drawn from tables found in Appendix 4 and 6.

The findings from the interviews with boundary spanners illustrated the complexity of collective processes required to transform a *boundary object-in-theory* (i.e. those on paper, in documents) into a *boundary object-in-use*. For this to occur, the boundary object must be imbued with shared meaning. This symbolic element may be a crucial influence on whether or not such objects made the transition to *boundary objects-in-use*.

Table 11 Boundary Objects Identified in Phase Two of the Study

CLAHRC	Boundary Object	Origin of Boundary Object	Effectiveness in use
Oakdown	Implementation project proposal	Developed collectively using the Knowledge to Action cycle & framework	Allowed negotiation of organisational boundaries
	VTE assessment form	Adapted from Department of Health tool by boundary spanners and frontline staff	In use after appropriate location identified.
	MUST+	Validated tool to which dieticians added questions	In use after appropriate location identified.
	“Evidence-based practice” and “service improvement”	Concepts in use among healthcare practitioners	Transition from theory to use required recognition of language issues.
	“Patient Safety”	Catchphrase spanning stakeholder boundaries	Highly resonant symbolic boundary object.
	Nutrition	Widely shared clinical topic	A powerful and symbolic boundary object, understood by all stakeholders.
	Nutrition action plan	Developed by ward staff and CLAHRC facilitators.	Made generic tool (MUST+) context specific and meaningful.

Table 11 Boundary Objects Identified in Phase Two of the Study (continued)

CLAHRC	Boundary Object	Origin of Boundary Object	Effectiveness in use
	Nutrition education package	Developed by CLAHRC facilitators with NHS staff.	A tailored pack of Boundary objects-in-theory with enhanced potential to succeed as a BO-in-use.
Hazeldean	Statistics such as national data and local QOF data	Department of Health	Possibly not a true boundary object although has potential to improve service delivery.
	Disease registers	Registers in GP practices	Inaccuracy and lack of standardisation hampered improvement work in practice.
	CLAHRC	Department of Health, NIHR	Concept not widely understood, it reflects priorities at a senior organisational level but generally unhelpful at frontline.
	Heart Failure (HF) Alert Card	Developed by stakeholders and driven by user need rather than CLAHRC policy.	Highly effective boundary object.
	Implementation models and frameworks	Theoretical models of knowledge mobilization informing the CLAHRC approach.	Helpful for coordination of projects at an organisational level, so may act as boundary objects-in-use; but can also inhibit communication.
Hazeldean	Physical health assessment tool	Linked with target set by Trust	Met with resistance at frontline. Not understood or accepted by intended users.
	Chronic Kidney Disease (CKD) Improvement Guide	Created by Hazeldean boundary spanners using Phase 1 resources.	Effective as part of a complex intervention but required a dedicated facilitator.
	CKD audit tool	Collaboration between CLAHRCs	Allows formal collaboration but could provoke rivalry.
	Stroke Assessment Tool	Developed by facilitator in discussion with stakeholders	No information on effectiveness – this is a boundary object-in-theory.
	Change package/audit tool/shared protocol	Facilitators working with practice teams	Facilitates formation of community of practice.

Table 11 Boundary Objects Identified in Phase Two of the Study (continued)

CLAHRC	Boundary Object	Origin of Boundary Object	Effectiveness in use
Ashgrove	Chronic Kidney Disease (CKD) audit tool	Developed by CLAHRC team working with a GP.	Establishes baseline data which could assist implementation. A boundary object-in-theory, it provoked territorialism and rivalry.
	CKD audit data	System developed by CLAHRC team for use in GP practices.	This reveals missed treatment opportunities, thus potentially provoking resistance; it can both hinder and enable implementation.
	Evaluation and implementation toolkits	Developed by CLAHRC team to enable users to share information.	Boundary objects-in-theory which may facilitate negotiation of implementation goals.
	Research opportunity tool	Developed by CLAHRC team to bridge gap between researchers and service users	Unclear. Problems around ownership and sharing.
	Lesser diabetes risk score	Initially developed by CLAHRC team, later revised with input from stakeholders.	Initially ineffective: content inappropriate, confusing and offensive to target community. After revision, this made the transition to boundary object-in-use.
	Bowel screening card	Developed by CLAHRC team	Unknown.
	Cardiac e-rehab programme	Initially developed by CLAHRC team, later revised with input from patients.	Initially ineffective, seen as reflecting clinical agenda rather than patient experience. After revision, this made the transition to boundary object-in-use.
	CLAHRC	Department of Health, NIHR	Required a process of collective sense-making to achieve clarity.

Organisational Boundaries

Organisational boundaries refer to boundaries between the CLAHRC's partner organisations and within CLAHRC, including boundaries between disciplines, professions, departments and staff groups at different levels within the partnership. The architecture of each CLAHRC appeared to have generated a range of boundaries, which had varying impact on how successful collaboration was between themes, teams, and projects. This is noted by participants at Hazeldean who expressed how the collaborative potential within CLAHRC was not fully realised, and that different perspectives on how implementation whole proceeded through CLAHRC created barriers between different themes and projects leads, hindering prospects to work together effectively across and within CLAHRC. Boundaries that influenced implementation include inter- and intra-NHS boundaries, those operating between general practices (as business competitors), multi-disciplinary boundaries between practice members (e.g. between nursing and medical staff), and hierarchies (signified by mixed priorities influencing participation in implementation). All of these influenced the transition of a *boundary object-in-theory* to *boundary object-in-use*.

What is CLAHRC?

Participants in all three cases revealed confusion about the nature of CLAHRC as an organisational entity. There were multiple interpretations as to what it was and what it did. This identity crisis was systemic. Not only was there evidence of uncertainty about the conceptual basis of CLAHRC (as revealed by the disciplinary divisions which contributed to an inconsistent approach to implementation at Hazeldean), but there was also a sense of ambiguity across partner organisations (as demonstrated by the way all three CLAHRCs struggled to shake off the perception that they were external or separate organisational entities). This resulted in difficulties integrating across either domain of research or practice, limiting bridging potential, generating unanticipated boundaries and marginalising 'the CLAHRC'. This was revealed by the way CLAHRC as a concept and entity

was received with wariness amongst those in clinical practice, whilst amongst academics it struggled with a perceived lack of status.

CLAHRC as external entity

CLAHRC was frequently cited by participants in the study as being seen as an external or separate organisation, despite efforts to embed it within the NHS. At Hazeldean the partnership was perceived as an unfamiliar organisational entity which was pursuing an implementation agenda sometimes at odds with local clinical priorities, whilst at Oakdown its unfamiliarity amongst NHS staff generated wariness and suspicion:

I got through to someone in an audit department and I tried to explain what it was about and he was obviously highly suspicious...as an outsider...and had obviously not heard of CLAHRC. (Jean Senior boundary spanner Oakdown)

At Hazeldean this unfamiliarity hindered implementation work. Stakeholder engagement was sometimes improved when the brand identity of CLAHRC was minimised or obscured:

And we try to put on training for them but I think because it's seen as, 'oh the CLAHRC's doing that, it's not the Trust'. There's quite an issue to that as well because we always, I mean we try to be as much endorsed by the Trust or embedded but at the same time we're seen as a different organisation. (Sion, frontline boundary spanner Hazeldean)

The concept of CLAHRC was variously understood across all three cases, where different interpretations led to different responses from stakeholders at different levels. There is some recognition of the concept among more senior staff but it remained largely unfamiliar at the frontline:

Well ... number one, you don't really mention CLAHRC, because nobody understands it ... and it's the most ridiculous acronym in the whole world anyway. So ... although people are starting ... people at the higher levels are starting to ...understand what CLAHRC is, or

they've ... they've heard of it but they're not sure what it is. (Christy senior boundary spanner Oakdown)

Stakeholder identity appeared to be an important factor influencing the way in which individuals interpreted and responded to CLAHRC. For those at a commissioner and management level it is clear that the partnership offered an opportunity, be it to reach targets (as illustrated at Oakdown and Hazeldean), to continue or initiate service improvement or evaluation work (demonstrated by the ongoing chronic disease detection and management work at Hazeldean), or to generate new interest in public and patient involvement (most apparent at Ashgrove). To others, particularly at the frontline, it appeared unfamiliar and external, resulting in challenges with engaging people in it. However, at the end of each CLAHRC's lifespan there was evidence that the concept of CLAHRC was more readily recognised by all stakeholder sectors and organisational levels.

CLAHRC as boundary object

The findings from phase two corroborate a proposition developed as an outcome of phase one, that CLAHRC itself may operate as a boundary object. Phase two reveals some interesting issues around the efficacy of CLAHRC as a boundary spanning entity and concept, highlighting the way in which multiple interpretations regarding what CLAHRC is have hindered boundary spanning activities and in some cases generated additional boundaries.

At an organisational level CLAHRC as a concept served as a *boundary object-in-theory* and *in-use* around which collaboration could be cultivated and coordinated. However the concept was variably interpreted, generating a number of responses across different settings, for example it was reported that CLAHRC was viewed with trepidation by frontline clinical staff, whilst at commissioner level it was seen as a mechanism to reach targets.

CLAHRC's efforts to cultivate collaboration across research and practice partners had mixed results. Despite some high profile successes, for example the formal CKD collaborative between Hazeldean and Ashgrove, there persisted a sense that the collaborative potential of CLAHRCs on a systemic scale had not been fully

realised, as various themes remained separate and knowledge was not effectively shared across and between individual CLAHRCs. Across all cases studied it was found that when CLAHRCs do function as effective boundary objects, it was frequently at a strategic level. However, achieving collaboration through CLAHRC has not been without challenges: for example Hazeldean and Ashgrove struggled with inter-CLAHRC rivalry, whilst members of both partnerships acknowledged that the potential for collaboration within, across, and beyond CLAHRC was yet to be fully exploited.

Rivalry between CLAHRCs

A sense of competition that was akin to rivalry was evident across the CLAHRC partnerships, for example between Hazeldean and Ashgrove:

And then in terms of the wider scenario I guess, I just got the impression it does seem a bit competitive in the CLAHRCs over the years as we get closer to having to prove that we've actually done something. I just sort of wonder if it's becoming a little bit more competitive. (Blythe; senior boundary spanner Hazeldean)

The formal collaboration between Ashgrove and Hazeldean demonstrated how a partnership could be built upon the sharing of *boundary objects-in-theory* represented by the tools and resources (a disease register audit tool developed by Ashgrove combined with a CKD change package produced by Hazeldean) shared between the two CLAHRCs. However, as the partnerships drew to a close, there was a sense that the same objects could trigger conflict as each CLAHRC attempted to reinstate ownership and, as a consequence, reassert its own boundaries. The withdrawal of once-shared objects around which the collaboration formed fuelled a renewed sense of competition as the pressure to prove individual CLAHRC outcomes intensified.

Despite the fact that these CLAHRCs were partnered within an official collaboration around the sharing of tools, evidence and experience around the detection and management of vascular conditions within primary care, there appeared to be fundamental divisions, which were reinforced rather bridged:

But I think you know some people perhaps are a bit more competitive like in... well that they want to actually... I mean because some... some of the work we do is collaborations between different CLAHRCs and sometimes some of the CLAHRCs are less willing to recognise the collaborative element of it than they really should (Gerald, senior boundary spanner Ashgrove)

An outcome of the collaboration did not appear to be a strengthening of bonds between the members of the two CLAHRCs, but rather a reinforcement of divisions driven by competition and leading to a renewed sense of rivalry between the two partnerships. This demonstrates how challenging it is to achieve collaboration within a competitive climate: despite CLAHRC's collaborative mandate, the requirement to prove impact can hinder collaborative relationships if one partner feels less equal.

CLAHRC as organisational competitor for resources

At Ashgrove, there is evidence to suggest that CLAHRC was perceived as an organisational threat, draining funding and participants away from neighbouring academic and research organisations such as the local Clinical Research Network (CLRN):

So CLAHRC has all the partners, but equally it was quite apparent from the outset that the CLRN...the CLRN found CLAHRC as a threat...I sat on the CLRN Board as well through my link role and there was a real... 'Oh now we don't...no, that's a CLAHRC project, they're taking away our recruitments, they're doing this, they're doing that' (Judy, senior boundary spanner Ashgrove)

Making sense of CLAHRC

Evidence from Ashgrove in particular illustrated a lack of clarity regarding what CLAHRC is and its role within either the NHS or academia. Despite a clear drive to embed CLAHRC within the NHS, for example by employing boundary spanners within each participating Trust, there was a persistent lack of clarity about the

nature of CLAHRC. This is illustrated by the experiences of a boundary spanner who described how she struggled to conceptualise CLAHRC and her role within it:

And we kind of ... we all met up ... sort of because of our background and ... and, you know, the organisations that we were working for, sort of how we fit in the structures and ... you know, and ... we really sort of got our heads together about what CLAHRC was, and actually what we should be doing. And in fact, when the new co-ordinator started, because I sort of gave them a briefing of what I'd found out about CLAHRC and how I interpreted it, and ... yeah, we kind of just worked something out ourselves and just created a job and created work for ourselves, based on our interpretations of ... of what it is. (Ffion, frontline boundary spanner Ashgrove)

Through a process of collective sense-making, a definition was eventually determined and a meaning agreed upon:

Yeah it is ... its ... it's a programme of work to promote collaborative ...collaborative work between academia and healthcare to ...ensure research evidence is used quickly, and it is ... is ... worthwhile, it's wanted, and it's used. And its high quality obviously. And it's setting up the ... the systems and structures to enable that. (Ffion, frontline boundary spanner Ashgrove)

It is clear that whilst CLAHRC enabled some successful boundary crossing and collaboration between stakeholders, there was also evidence of boundary generation which inhibited and hindered implementation work. The perception of CLAHRC as a separate, non-NHS entity hindered the partnerships' catalytic potential to bridge the various boundaries to enable successful implementation. Instead, new boundaries were established, such as those between CLAHRC and its partners. This is illustrated by the way in which the CLAHRC brand was labelled "research-ey" at Oakdown, and by the effort put into overcoming the boundaries between Hazeldean and its NHS partners. At Hazeldean the CLAHRC appeared to reinforce historical boundaries between those who 'do' research and those who 'do' implementation.

The two cultures of research and practice

The research–practice boundary was represented by the gap between what is known (what research evidence or other knowledge tells us) and what is done (practice behaviour). It is this boundary with which CLAHRCs were tasked to bridge, by bringing knowledge producers and knowledge users to work closer together. The findings indicate that whilst CLAHRCs have succeeded in bridging this gap in some respects, in other ways the boundary had been reinforced and perpetuated, highlighting the cultural differences between members of academia and clinical practice.

Stakeholders at Ashgrove recognised the depth and impact of the research-practice gap, describing academia and healthcare as “distinct cultures”:

I mean academia and the NHS are two quite distinct sort of cultures ... just by the very definition (Pat, frontline boundary spanner Ashgrove)

Sort of, you get sort of a sense of that there are these different cultures and they've got their own sort of characteristics and sort of nuances and things that they sort of, their priority, what they see as a priority say. (Pat, frontline boundary spanner Ashgrove)

The experience of taking part in implementation enabled stakeholders to develop an appreciation for the contextual differences between the ‘two cultures’ of research and practice, and demonstrated how the concept of implementation could itself operate as a unifying (or divisive) idea across different contexts:

I think coming from an academic perspective, when you think about implementation I think you don't really understand all the problems and all the issues and all the boundaries that are there until you've been amongst the NHS and you sort of understand more about, I suppose the difficulties really, not just the boundaries but kind of the real difficulties and how you take that evidence and get it into practice or you take... the intervention from your research and see actually how it's gonna work in an NHS situation. (Tanya, senior boundary spanner Ashgrove)

This perspective was echoed at Oakdown, where one participant felt that understanding the realities of implementation in an NHS context could only be achieved through immersion and exposure:

I mean one of the ... of the things I would love to do before I die is like get the researchers to just spend a week on the wards, on the front line, to appreciate what ... what pressure everybody's under. (Maureen, frontline boundary spanner Oakdown)

This suggests that both *CLAHRC* and *implementation* can operate as boundary spanning concepts. In summary it was found that whilst each CLAHRC set out to bridge the research-practice gap, an under estimation of the depth of the cultural divide between these two cultures meant that the gap remained, and in some cases was reinforced.

Different agendas

In the CLAHRCs

One of the differences between Oakdown and the other cases studied was that Oakdown had clear vision at a senior organisational level about implementation through CLAHRC i.e. it was about aligning the implementation agenda with NHS priorities in order to target topics which were important locally. The documents that provided the cornerstone of proposed implementation work at a strategic level were collectively generated so that CLAHRC's implementation agenda was aligned with local NHS priorities. By contrast, at Hazeldean, local NHS priorities were not always considered at the outset, so that the CLAHRC's agenda was not consistent with frontline concerns.

and I think the problem was when ... when the CLAHRCs were originally ... when this CLAHRC was set up it was kind of like there's our ten ... ten areas, we divided ourselves into these four ... therapy areas, Heart Disease, Stroke, Diabetes and Chronic Kidney Disease, and ... and it was just a case of sort of a finger in the air, right we'll give [place name] Diabetes, and we'll give [place name]...you know, Chronic Kidney Disease and Diabetes, and without actually looking at ... at what their

sort of priority areas of work were. (Chantelle, frontline Boundary spanner Hazeldean)

Between decision-makers and front-line staff

The priorities of agenda-setters at senior levels often failed to recognise those of frontline staff. This mis-match was also reflected in problems that resulted from attempts to use CLAHRCs to help Trusts meet Department of Health targets.

Annual performance ratings have been published for NHS trusts in England since 2001 (Bevan and Hood, 2006). The rationale behind target setting and incentives is that it is intended to encourage benchmarking systems which make the performance of every trust visible in order to cultivate a climate of competition where Trusts with consistently high levels of achievement are rewarded financially. Targets and incentives have become a mainstay of service improvement culture and a focus of managerial and commissioner level decision-making. However, since the economic downturn of 2008, targets and incentives have gained greater significance as cash-strapped Trusts seek to hit targets as a way of offsetting public sector spending cuts. Targets and incentives also have a wider role to play as drivers for improved performance and accountability of the NHS. In terms of implementation, there was a clear drive to use targets and incentives as financial and political drivers to progress the CLAHRC implementation agenda, with boundary spanners at Hazeldean making frequent referral to the persuasive potential of framing the benefits of engaging with CLAHRC in terms of reaching targets and gaining incentives. However, whilst targets and incentives may be mobilised to good effect at senior levels as *boundary-objects-in-use*, at the frontline they could remain *boundary objects-in-theory* only.

At an organisational level, evidence such as NICE guidelines and QOF data was deployed as a persuasive conceptual device to convince decision makers to take part in Hazeldean CLAHRC:

I'd say in terms of the work that we did, our kidney disease work, probably one of the things that opened up the dialogue initially and on an on-going basis was data that we had. We had QOF data and we had national data which showed very clearly that the local delivery of care

was not as good as one would have expected it to be. (Jaime, senior boundary spanner Hazeldean)

Similarly at Oakdown, engaging with CLAHRC represented an attractive opportunity to fulfil a number of mandatory targets such as the Commissioning for Quality and Innovation payments framework (CQUINS):

I think from a senior level within the Trust we didn't have a problem...because as time went on, for example, we met with other senior individuals...and they were quite...very...supportive. Because obviously we were implementing...guidance that linked to CQUINS targets... so of course they were very supportive. (Bernie; senior boundary spanner Oakdown)

And obviously at senior level you have to do it because it's linked to payment, and if you don't reach your targets...the Trust will lose money, so that was a real... sort of a carrot and stick incentive (Bernie; Senior boundary spanner Oakdown)

However whilst such targets are meaningful at a senior level, they can lack resonance at ward level:

If you stand and say 'Well if you don't fill this form in this Trust isn't going to meet its CQUINS targets and it'll lose some money', that means nothing to the frontline staff (Bernie, senior boundary spanner Oakdown)

One challenge is that linking implementation to targets could imply the imposition of a top-down agenda, overriding local and frontline clinical priorities:

And it did feel a little bit top down, that people go, 'We're only doing it because of CQUINS', or 'We're only doing it because of this', to keep the hospital happy. (Bernie, senior boundary spanner Oakdown)

The data suggested that the persuasive power of targets and incentives is mediated by its meaning at different levels: what does it mean to stakeholders and how does it resonate with their own values? Whilst QOF targets may possess leverage at a commissioner or senior management level, they may lack resonance

at a practitioner level where individual behaviour is more strongly driven by a desire to improve patient care (which in itself provides an example of a *symbolic boundary object-in-use*).

Imposition of boundary object-in-theory hinders transition to boundary object-in-use

Hazeldean's mental health project demonstrated the difficulties associated with trying to impose a potential boundary object which lacks an embedded meaning or value to users:

I think the Trust themselves initially brought in the Rethink assessment because it was a target they had to do set by the commissioners. With no actual explanation of why it needed to be done, how it could be utilised (Dafydd, frontline boundary spanner Hazeldean).

The boundaries that must be negotiated by each CLAHRC were varied and were to be found both between and within all the organisations involved. Sometimes the people involved referred to organisational boundaries indirectly, by associating boundary objects with issues that could cause friction between organisations or different parts of an organisation. For example, some *boundary objects-in-theory* become tainted with a sense of an embedded top-down agenda (priorities adopted by a different part of the organisation) and thus caused contention when 'imposed' on potential users at a frontline level:

it was set as a target, the team managers probably knew about it but again in three out of four groups there was no understanding on the ground what it actually was, how to access it, what I need to do and there's a massive skill set problem because they, most people weren't trained, especially like social workers. (Dafydd, frontline boundary spanner Hazeldean)

Intra-organisational boundaries

Within any large organisation, it is inevitable that staff at different levels and with different areas of expertise will have specific sets of attitudes and agendas. The research/practice divide was outlined above; equally strong in both academia and

the NHS are the divisions between disciplines and different levels in the hierarchy. The influence of perceived top-down imposition – whether it originates within an organisation such as a Trust or from outside – has also been demonstrated above.

Among the plethora of intra-NHS boundaries, the findings of this study reveal specific problems associated with boundaries between practice members from different disciplines (e.g. nursing and medical staff), and hierarchies (signified by mixed priorities influencing participation in implementation). Boundaries between general practices (operating as business competitors) emerged as a specific issue affecting implementation facilitated by CLAHRCs.

Hierarchies

Across academia and the NHS, hierarchical boundaries could hamper communication and collaboration across and between partner organisations:

I think what we've got to look at is organisations, both the NHS and academia that to use the word hierarchical...there was a very firmly established pecking order in both of them I think... More so than in other organisations I've worked with (Gerald; senior boundary spanner Ashgrove)

These hierarchies potentially made it challenging to facilitate collaboration amongst stakeholders, particularly as some senior stakeholders may be unused to putting aside their professional status in order to collaborate with stakeholders from a range of backgrounds as equal partners:

It was very interesting at the project management group, you could see that some of the other disciplines who hadn't worked with patients at a strategic level were quite taken aback when their views were not only equal but sometimes had precedence. (Jean, senior boundary spanner Oakdown)

Disciplinary divisions

Inter-professional division was perceived to hinder collaboration in implementation work. At Oakdown, the meaning of implementation was different for auditors, medical staff and nurses. At Hazeldean, differing disciplinary perspectives led to disparities in the way that implementation work was approached across different themes and projects, reinforcing rather than bridging internal, academic boundaries:

You know other people will bring other, you know, other, there's four or five academic leads that work in the CLAHRC, all have come from slightly different disciplines, slightly different perspectives on this so I guess each of us has brought something and they would be equally critical probably of things that I wouldn't naturally think of as important... (Jaime, senior boundary spanner Hazeldean)

That at the very beginning of CLAHRC in the implementation team I think we did actually struggle understanding each other when we were actually trying to work out the conceptual basis of CLAHRC. (Blithe, senior boundary spanner Hazeldean)

This failure to reach a consensus regarding the conceptual basis of implementation through CLAHRCs was further demonstrated in an example of a failed collaboration between CLAHRC members to produce an academic paper at Hazeldean:

I guess it comes back to the, academically I think we actually do have different ideas about things so whereas that two or three years ago I worked on a, on a presentation with about, people from about two other CLAHRCs, three other CLAHRCs we, we actually weren't speaking the same language ... The three of us put a conference together but we also decided there was no way we were going to write a paper together, you know, in terms of, so that's quite an interesting outcome really. (Shirley, senior boundary spanner Hazeldean)

Silos

A silo is a term that is most often used to describe the bounded nature of disciplinary specialisms within the NHS and academia. It denotes a sense of being 'cut off' from other groups and communities, where members may operate in isolation from others who may unknowingly share a wealth of similarities and/or concerns:

Yeah I was talking about the Primary and Secondary Care divide really being such a massive boundary. Taking my experience and what I've seen is that Secondary Care works in completely, they work in silos, completely in silos. Secondary Care doesn't really know what exists in Primary Care ... So that's one big and that is a massive boundary I think. (Sion, frontline boundary spanner Hazeldean)

At Ashgrove, academics and clinicians were also described as operating within established silos, which could be challenging to penetrate:

And one of the problems that I think that is similar in both academia and the NHS is that people tend to operate in, no matter how much they try, people operate in very, well the term people normally use in silos... they operate in niches, in very specialist areas. And their interests lie in that specialist area in the main and you need to understand what their knowledge of that specialist area is or what their specialist area is in order to identify information that might be of value to them. (Gerald, senior boundary spanner Ashgrove)

Although knowledge may be shared between members within silos, it can be a challenge to release such 'silo'd' knowledge to be shared with the wider CLAHRC partnership. Whilst some boundaries may be visible to all stakeholders from the outset of implementation work, others may prove elusive. Internal boundaries such as those between primary and secondary heart failure services at Hazeldean, or between catering and nursing staff at Oakdown, became visible through stakeholder discussion. This collective sense-making revealed that stakeholder-identified boundaries superseded the original assumptions regarding boundaries to be spanned during the project.

Competition and rivalry between implementation sites

Organisational boundaries were again evident at Hazeldean, where the focus was on engaging primary healthcare organisations, groups and practitioners in implementation work.

I think probably the main, not so much boundary, but challenge for her is perhaps, which hasn't happened very often but practices being a little bit wary because she is from another practice and she's coming into their practice. (Dafydd, frontline boundary spanner Hazeldean)

Effort is required to cross each of these boundaries. It required boundary spanners to establish rapport, develop relationships, and demonstrate the potential benefits of participation:

Yeah and likewise trying to break down the kind of, the boundaries that do exist practice to practice, because although they're willing to collaborate on most things they're effectively businesses and they are effectively in competition. You do have to kind of work to make sure that people do want to work together on it. (Dafydd, frontline boundary spanner Hazeldean)

The desire to safeguard each GP practice's 'turf' resulted in a sense of territorialism between each individual practice. However this was exploited by boundary spanners who recognised the desire to achieve better standards in comparison to rival GP practices as a powerful driver for engagement in implementation work:

They're separate businesses first of all, but to some extent that works as a positive force because it does sort of create this slight climate of competition where they want to do better than their neighbouring practices. (Jaime, senior boundary spanner Hazeldean)

Facilitating solutions and enabling transition from boundary object-in-theory to boundary object-in-use

Collective endeavour and the development of boundary objects-in-use

Table 11, above (p.211) showed that a consistent finding in this phase of the study was that when boundary objects were created collectively by a group of stakeholders with a shared interest in implementation, they were likely to be repeatedly used. Boundary objects such as toolkits created outside the group that would be using them (*boundary objects-in-theory*) would usually be less acceptable, and would only make the transition to *boundary objects-in-use* after extensive adaptation by frontline stakeholders.

Working together - collective discussion and collaborative activity - was crucial to success. This feature, more than any other, appeared to discriminate between those *boundary objects-in-theory* that did not make the transition to *boundary objects-in-use* (including many of those identified in Phase one) to become potentially useful implementation tools.

The three CLAHRCs in the study differed from the outset in their approach to implementation. At Oakdown, the importance of collaboration was understood and featured early in the development of all the boundary objects described. At Ashgrove and Hazeldean, by contrast, most of the boundary objects were developed by CLAHRC staff only and therefore tended to meet with resistance at the frontline and/or required dedicated facilitators if they were to be used. Ashgrove responded to this problem by adapting two of its implementation tools with input from stakeholders, after which they became acceptable. Ashgrove's diabetes tool was initially unacceptable to stakeholders as its translation from English to Mandarin was inappropriate and flawed, whilst its online cardiac rehabilitation programme only succeeded once patient knowledge rather than simply clinical assumptions regarding health and wellbeing were represented. Hazeldean produced one tool that could be described as a boundary object, the Heart Failure Alert Card. This object emerged as an outcome of discussions with stakeholders, rather than as planned project – and became the only tool developed by Hazeldean which was fully acceptable in use.

Hazeldean's Heart Failure Alert Card: emergence of a Boundary Object in focus

During a period of funding uncertainty in 2009, when no firm project was yet decided, a mapping exercise of heart failure (HF) professionals and services was undertaken by members of Hazeldean CLAHRC's heart failure implementation team. This identified poor communication between primary and secondary care as a problem:

The problem came from them and then we just tried to find a solution for it. (Susan, senior boundary spanner, Hazeldean)

In particular community heart failure specialist nurses were not being notified when patients on their caseload were admitted to hospital and discharged home. This issue was the subject of discussion with HF professionals and service users during stakeholder meeting facilitated by Hazeldean CLAHRC. The boundary spanner took the idea of an emergency card used in Cumbria to the meeting with the suggestion that something similar could have potential uses to convey information regarding a patient's heart failure status across primary and secondary care settings:

'This would be a good idea ...to adapt this and maybe use it for patients ... to improve communication' (Susan, senior boundary spanner, Hazeldean).

Discussion with stakeholders led to the development of a credit card sized Heart Failure Alert Card to be shown by patients at secondary care appointments:

So we came up with a Heart Failure Alert Card ...you know, the patient has this card ... and it's got the contact details ... it's got kind of ... patient ... a few details about the patient, but it's also got the contact details of the Heart Failure Nurses, and also states ... please contact my Heart Failure Nurse, you know, on admission or whatever. (Susan, senior boundary spanner, Hazeldean)

Feedback gathered a year later confirmed that the implementation of the card had been evaluated as a success by primary care professionals.

... It was quite successful. And from that there's ... quite a few heart failure services, you know, across Hazeldean, are using it now...And one Practice Nurse is going to trial it for me... and actually, you know, making sure that patients are receiving the treatment that they ... that's best suited to them. (Susan, senior boundary spanner, Hazeldean)

According to the Heart Failure Alert Card Report, there are now recommendations to spread the card to different services, for example, community matrons, active case managers, secondary care heart failure specialist nurses and GPs. The format of the alert card would remain the same but the information on the card would be revised to reflect the service (context of use).

Plans and proposals

Implementation project proposals and action plans were collectively generated in partnership with stakeholders at different levels at Oakdown. These functioned variably as *boundary objects-in-use* in implementation by encompassing stakeholder perspectives, reflecting the context of use (r) in order to guide and coordinate implementation work. They were contextually relevant and meaningful across multiple stakeholders at senior and frontline levels:

I think a key thing in the early stages is actually the development of a proposal...Which is developed it's usually led by us in the theme but developed in dialogue with key people in the organisation that we're working with and that spells out what the areas of the project we're working on is, what we're seeking to achieve, how we're going to achieve it, what are our anticipated outcomes are and that the written document is developed and worked up in partnership with key people in our partner organisations. (Rose, high level boundary spanner Oakdown)

Guidelines and evidence-based standards

Clinical guidelines such as those published by NICE, and standards of care such as those developed by the various national agencies such as Diabetes UK, were described by participants as providing the driver for much implementation work.

Difficulties were reported by those who attempted to implement a nursing guideline and associated tools to tackle malnutrition amongst hospital patients at Oakdown. These were often associated with apathy towards guidelines, and it is found that guidelines *per se* did not operate well as boundary objects. Instead, these 'generic' objects were found to be more useful when they were embedded within more flexible and contextualised formats. Examples from the nutrition project at Oakdown described how large scale training intended to skill up the hospital workforce failed to improve uptake. However uptake was improved when smaller scale ward-based training sessions were undertaken, during which the tool and guideline were embedded within contextualized 'nutrition action plans'. Participants described how these ward-based sessions allowed stakeholders to make sense of the tools and guidelines collectively, as they chose how the tool and guideline should be represented within ward-specific action plans. This collective endeavour – taking the generic guideline and tool and embedding them into contextualised and meaningful action plans - appeared to offset the perception that guidelines and other tools are rigid and imposed via a top-down agenda, to give meaning and context to users at the frontline.

Tailoring and improvising together

At Oakdown, much implementation work focused on standardised generic objects originating from external sources and organisations, such as the malnutrition assessment tool and the venous thromboembolism assessment tool. These standardised, generic objects were perceived as rigid and a-contextual, lacking resonance at a frontline level. However, through a process of amendment involving discussion with stakeholders, such generic objects were tailored and contextualised, a process that enabled shared meaning to be established between stakeholders and created tools with cohesive properties and shared ownership. One example from Oakdown was the addition of local dietician knowledge to the malnutrition tool, resulting in the malnutrition assessment tool 'plus' (MUST+):

for example things like the MUST screening tool or the department of health VTE assessment form and the idea that those are then adapted to the local context so MUST was developed to what we called MUST

*plus because it had an extra question that we felt was appropriate.
(Rose, high level boundary spanner Oakdown)*

So we've got the validated tool, we haven't touched the tool ...it's still the tool as is, but alongside that, on admission there are four or five other questions in addition to MUST, because they didn't feel ... the dieticians didn't feel MUST was enough on its own. So they added ... they added that in. And they used their ... professional expertise and knowledge that ... that kind of evidence, to create those questions.”(Christy, senior boundary spanner Oakdown)

Despite this, the malnutrition assessment tool continued to lack resonance at a frontline level, so it went through a further process of contextualisation to make it into a flexible, collectively generated object:

The action plan was a way ... of giving them back some ... it was their action plan, they decided on it...So although it had some top down elements in that, you know, they had to get better at using MUS plus, they decided that ... and they decided how that would be done. And they decided what other little objectives they would have around supporting people with oral nutrition. (Christy, senior boundary spanner Oakdown)

I mean to an extent MUST plus and the nursing care guidelines were very prescriptive ...but anything else that we wanted them to do ... we developed some action points, where they chose their own goals really; ...they chose three goals related to their own ward area, that they wanted to achieve within their area. ...And in the end they sort of like ... I call it 'Pick and Mix', they ... they'd picked and mixed what they wanted to do in their area, and ... and I think that was a good way really, rather than us telling them what to do. (Maureen, frontline boundary spanner Oakdown)

This object became meaningful through a collective process of discussion which included users and subsequent amendment. However it required a higher than expected level of tailoring, as described by this Oakdown participant:

So the sort of general thing, without us ... without doing enough tailoring ... I think what we learnt was you have to do a lot more tailoring than you think...And obviously that's part of ... we used the Knowledge to Action Cycle, and one of the bits of that talks about tailoring. And I think it just highlighted actually how important that bit of the cycle is. (Christy, Senior boundary Oakdown)

Therefore, *boundary objects-in-theory* can make the transition to *boundary-objects-in-use* through collective processes which pay an attention to the needs of the users. Ashgrove CLAHRC provided some of the richest data demonstrating how failure to engage stakeholders in the design of boundary objects led to poor uptake and unsuccessful implementation (for example the issues encountered when attempting to implement the diabetes risk assessment tool, and the online cardiac rehabilitation programme). The problems associated with the implementation of these objects were sufficiently severe to necessitate withdrawal of both items. It was found that neither reflected the views or values of the intended users; the cardiac programme failed to reflect the day-to-day concerns of patients and instead focused on clinical queries, whilst Ashgrove's diabetes score was discovered to be offensive due to a literal translation into an Asian dialect.

So the tool had been out there and just wasn't doing anything...so they sort of took it back to grass roots and with them as patients, with their own lived experience to say 'Well I wouldn't do that, why would I bother sitting and plugging in to a computer to...', you know, they were able to give very frank and very honest reasons why it probably wasn't being used, why it wasn't working. (Judy, senior boundary spanner Ashgrove)

Evidence of this type of tailoring and adaptation of generic objects to meet local user needs is found across the research literature, for example the way in which nurses are found to use standardised approaches flexibly, tailoring protocols to meet the needs of specific contexts (Rycroft-Malone et al, 2009, 2010).

Creating inhibitory objects by failing to engage stakeholders

Findings from across the three cases demonstrated how in order for an object to be elevated from a *boundary object-in-theory* (on paper) to a *boundary object in use* (i.e. in practice) it must undergo a process of collective endeavour. However, some objects which appeared to represent *boundary objects in theory* seemed to take another route, becoming inhibitory objects which were perceived to hinder collaboration by reinforcing boundaries. Some things identified as *boundary objects-in-use* at one level simultaneously also operated as boundary reinforcing objects at another level, for example the way in which Rethink's' physical health checker tool for mental health service users operated as a boundary object in use at a commissioner level, but at the frontline appeared to reinforce the boundaries between commissioners, managers and care coordinators. The emergence of inhibitory objects is explored in the next section.

Translating Ashgrove's diabetes tool – emergence of an inhibitory boundary object

Despite its apparent simplicity in terms of content and questions, developing the diabetes tool without involving the intended users led to the production of a tool which was inappropriate and unfit for purpose:

I can give you an example from our CLAHRC, when they developed the ...diabetes risk score. It's an online tool, seven questions, very simple; age, your BMI, family history of high blood pressure, whether you're on any medication for high blood pressure, all these sorts of things, seemingly very simple. (Judy, senior boundary spanner Ashgrove)

South Asian communities have a higher incidence of diabetes at a lower BMI ...and obviously Ashgrove has a very high South Asian population; it was really important that this tool worked for that group. (Judy, Senior boundary spanner Ashgrove)

So ...they'd done a literal translation, which was in places quite offensive ...it would not have worked for that group if they hadn't had that conversation. (Judy, senior boundary spanner Ashgrove)

This demonstrated how developing a tool without users' input can have disastrous results. After the diabetes tool had been redesigned with the input of users, it was re-launched, this time successfully.

So it ... yeah, if they hadn't had that conversation it wouldn't it wouldn't have worked, it wouldn't have helped. But likewise, it can now be adapted further for different communities, the Chinese community have a rising diabetes incidence, they want to know (Judy, senior boundary spanner Ashgrove)

The response to Hazeldean's physical health assessment tool reveals a similar pattern of problems created by a failure to involve crucial stakeholders in its development. This tool operated as a *boundary object-in-use* at a senior level, but there were problems with uptake at user level:

We're quite struggling with the physical health assessment ... despite the fact that it's an organisational requirement ... We seem to have lost that improvement because we had, because we had really good engagement with the senior, the exec team from the beginning and they really bought into the project but the next step was kind of spreading it, the commitment is not there at the moment, or we feel it's not there...I don't think it has failed yet but I think the next few months will be quite critical... I think it is not that that they don't see the added value of doing it, it's about something else they need to do and I think they, they feel they are quite stretched capacity-wise anyway, care coordinators in that team. And they feel that it is, something the Trust was putting on without giving any support, without giving any adequate training...So I think that's the main blockage or barrier, they feel they don't have the capacity to do it. (Dafydd, frontline boundary spanner Hazeldean)

Whilst the rationale for the use of *boundary objects-in-theory* like the physical health assessment tool may be apparent, a lack of stakeholder engagement in their development can result in unshared objects that are challenging to implement and may operate as divisive rather than unifying objects (i.e. not boundary objects)

These examples demonstrate how objects developed without the input of stakeholders can inhibit implementation by reinforcing boundaries, provoking conflict and hindering communication. Engaging stakeholders in the design and development of an object increases the likelihood of uptake.

The presence of boundary spanners

Boundary spanners have important roles to play in fragmented and compartmentalised organisational environments such as the NHS and academia. They provide links, sharing and translating knowledge between and across stakeholder groups. All three CLAHRCs employed specific individuals in boundary spanning roles, but the responsibilities and recruitment of these boundary spanners differed. Oakdown focused on appointing secondees from clinical practice to frontline facilitation roles, cultivating dual citizenship by skilling up nurses and others with implementation knowledge and skills. The value of dual citizenship is embedded at a strategic level at Oakdown, with high level boundary spanners also operating within a joint academic and NHS capacity. This is not true of all three cases, although at Hazeldean there was a growing recognition of the value of appointing individuals with clinical experience as boundary spanners due to their increased credibility. At Ashgrove, where boundary spanners were recruited from non-clinical backgrounds, many felt marginalised.

Speaking the same language

It was reported across all three cases that effective boundary spanners were individuals who could identify and establish an appropriate shared language (often found to be represented as symbolic boundary objects) between stakeholders. This was represented by a fluency in the language of other domains:

So I did try to use the language that each different discipline was familiar with and was comfortable with and understood although that was also a learning process... and that and that is where the dysphagia project was really everybody understood each other...because it was an existing idea (Jean, senior boundary spanner Oakdown)

At Ashgrove, one boundary spanner reported how her previous career in academia helped her to use the right language to engage academics, whilst her current experience of working within the NHS helped her to communicate with patients and practitioners. Others reported that identifying a shared language facilitated dialogue across boundaries; for example, a participant at Oakdown was able to identify the concept of 'dysphagia' as one that had relevance to both patients and practitioners:

One of the things I always say about the dysphagia project is that I don't have any problem selling it as someone who's had anything to do with, worked with anyone who has swallowing problems, they're immediately on board. (Jean, Senior boundary spanner Oakdown)

Participants stated that establishing a shared language is crucial, as it facilitated the negotiation of shared understanding and mutual goal setting between stakeholders. Importantly, speaking a shared language imbued a boundary spanner with credibility and empathy, leading to acceptance as 'as one of us' rather than being seen as a "research-y" outsider. This was particularly important when engaging stakeholders at ward level, for example when discussing the venous thromboembolism (VTE) project:

But I ... introduced myself on my very first visit as the ... Facilitator to these Champions that I was educating, and they just looked at me with blank faces. And so then I said actually I'm ... I've come here to educate you on nutrition, I'm a staff nurse and I work, you know, on the wards with you, you know, a couple of days a week ...and with CLAHRC three days a week, and as soon as I said that I... I saw a complete change in their faces, and it seemed to break down the barriers immediately. And I think they saw me as one of them. (Maureen, frontline boundary spanner Oakdown)

Conceptual and symbolic boundary objects were identified in the way in which key phrases and ideas were used by boundary spanners across all three cases to generate a shared language, encouraging alliance and engagement with implementation through CLAHRC. At Oakdown these included the notion of

'improving patient care', catch phrases such as "everybody's business" in the dysphagia project, and boundary spanning clinical topics such as 'nutrition':

And maybe the point is that the other projects that we've worked on things like nutrition...They're all really quite critical aspects of care, how to best deliver it or who's delivering it. They are pertinent in different ways so maybe one of the things is in terms it's almost like the relevance of the object y'know if you see the project or the topic as the object that crosses boundaries as it naturally does. (Jean, senior boundary spanner Oakdown)

Implementation as shared concept?

At Oakdown it was clear that whilst there were some shared concepts around implementation, different groups expressed these concepts in different ways. The ability to identify and utilise a language that was familiar to different stakeholders was important during the production of Oakdown's Implementation Casebook because it enabled a shared understanding of implementation. During the production of the casebook, it was found that medics used the term 'service improvement' to refer to implementation activities, whilst 'evidence based practice' or 'EBP' were the terms most widely understood amongst nursing staff:

yes but what I've really talked about is evidence-based practice... that was a much more familiar and acceptable term although one of things that I also did when I was trying to get general practitioners ... and asked them what their what language and they talked about service improvement...So I did try to use the language that each different discipline was familiar with and was comfortable with and understood although that was also a learning process. (Jean, senior boundary spanner Oakdown)

Despite their wide recognisability, it was reported that these concepts can provoke a range of responses which could be subjective and context dependent, contingent on stakeholder identity. This meant it could take time and skill to identify the correct terminology, which then might or might not operate as a symbolic *boundary object*-

in-use. Indeed, as data from Oakdown illustrates, such concepts cannot be assumed to provide a shared language, and may require preliminary 'ground work' i.e. collective action in the form of involvement and discussions to establish a shared understanding based on an appreciation of context and use:

I think also using a language translating concepts into ways that people at different levels of an NHS organisation as it stands whether its frontline staff whether its middle managers whether its lead clinicians or whether its senior managers the moving away from issues of research language...and putting into a more a language that they understand...And so it's partly about developing that shared language that takes the project forward (Rose, high level boundary spanner Oakdown)

Models and frameworks

Models and frameworks of implementation provided a shared language between some stakeholders involved in implementation work, operating as a catalyst for successful implementation by providing a coordinating device around which implementation can be organised and conducted. Whilst there was considerably less data around the role of implementation models and frameworks identified in phase two in comparison to phase one findings, this does not detract from the finding that they can play a boundary spanning role. Whilst the findings from Phase One indicated that one would expect implementation models and frameworks to play a highly visible role in implementation work, their actual role was sometimes more implicit.

Whilst an absence of reference to models and frameworks of implementation was found at Ashgrove, findings from Oakdown and Hazeldean revealed a pattern of underpinning implementation practice with implementation theory, for example the use of the Knowledge-to-Action cycle at Oakdown and the PARIHS framework at Hazeldean.

We did analyse practice by practice what was happening so we used some of the PARIHS framework (Jaime, senior boundary spanner Hazeldean)

However, despite providing some level of consistency in terms of shared vision and a language around implementation, models and frameworks were not always explicit in their use, and remained as an internalised or cognitive heuristic helping to shape an individual's approach to implementation work:

No I never use [PARIHS]...I never, no because I think it's, I think it's something which initially switches people off if I'm honest. I do, I do mention it in, I mention it in a blurb which we've perhaps put together...As part of a project plan. But when I'm actually speaking to people I would very rarely mention it... And I think having that, I think having that as, in the back of your mind whilst you approach people it is quite, it is really useful to be honest... I think I indirectly work in the Paris Framework all the time to be honest, but not directly if that makes sense. (Dafydd, frontline boundary spanner Hazeldean)

Clinical topics

At Oakdown there was evidence of using particular clinical topics and other concepts as symbolic objects. This was illustrated in the way in which the topics of 'dysphagia' and 'nutrition' were used as boundary spanning concepts by boundary spanners, possessing resonance amongst a range of stakeholders at different levels, and compelling in terms of representing a strong and positive message:

And maybe the point is that the other projects that we've worked on things like nutrition...They're all really quite critical aspects of care...They are pertinent in different ways so maybe one of the things is in terms it's almost like the relevance of the...the project or the topic as the object that crosses boundaries as it naturally does ... And most people and I can't think ... as I say, most people believe nutrition is important...So it's not a hard sell. (Charlotte, frontline boundary spanner Oakdown)

However there is also evidence that these clinical topics could also operate as divisive rather than unifying ideas. This was demonstrated at Hazeldean. When the four vascular work streams were divided out across the Hazeldean area, it became clear that little consultation with primary care stakeholders had taken place. Instead CKD and other clinical conditions were assigned to primary care trusts with little awareness of local clinical priorities:

I think the problem was ...when this CLAHRC was set up it was kind of like there's our ten areas, we divided ourselves up into these four...therapy areas, Heart Disease, Stroke, Diabetes and Chronic Kidney disease, and... and it was just a case of sort of a finger in the air, right we'll give XXXX Diabetes, and we'll give XXXX...you know, Chronic Kidney Disease and Diabetes, and without actually looking at ... at what their sort of priority areas of work were, you know. (Tanya, Senior boundary spanner Hazeldean)

Whilst some clinical topics represented unifying ideas amongst stakeholders in some contexts (for example dysphagia and nutrition at Oakdown), at Hazeldean some clinical topics, such as CKD, had the opposite effect. The key difference was the way in which a specific topic emerged as the focus for implementation work, namely whether it had been identified through collaboration with stakeholders or whether it embodied the imposition of a top down agenda, provoking resistance rather than enabling engagement. This highlighted the way in which some ideas provoked conflict amongst stakeholders due to contention around their meaning and relevance, whilst others provided a shared point of reference around which stakeholders could converge:

Yes, I'm thinking about initially, when we were going round and we were talking about ... pushing the programme, or delivering the ... the programme of CKD improvement ...because CKD, Chronic Kidney Disease, at the time wasn't kind of one of these real hot topic areas to address ...it was always like Stroke was the favourite, or in most places Heart Failure was also a favourite, you know (Chantelle, senior boundary spanner Hazeldean)

The case for clinical topics as boundary objects is seen most clearly in the findings from Oakdown and Hazeldean, demonstrating the way in which such concepts can be used skilfully by boundary spanners to generate allegiance; or, conversely through their haphazard deployment can instead provoke resistance. At Oakdown, clinical topics such as Dysphagia and nutrition are used to bring patients and practitioners together to address implementation of evidence based tools around these conditions, whereas at Hazeldean the way in which clinical topics are assigned to different geographical areas without consultation with stakeholders resulted in a mismatch between the implementation agenda of CLAHRC, and the local clinical priorities, around various vascular conditions, and the level of engagement seen across the assigned implementation sites.

The influence of boundary spanners

Being one of us

The data shows that contextual awareness and credibility were strongly associated with boundary-spanning effectiveness at Oakdown. Unlike Hazeldean and Ashgrove, Oakdown focused on appointing boundary spanners possessing a clinical background at a frontline, project management and senior organisational level. Here, those with nursing and allied health professional background dominated. Indeed participants at Oakdown all spoke of the way in which their clinical background enabled them to move more freely across the research-practice boundary in order to share CLAHRC's implementation message and recruit potential stakeholders and this was demonstrated in the way in which every boundary spanner reported how they used their knowledge of the clinical domain to establish rapport with clinical stakeholders:

I think, when I mentioned the facilitators ...the fact that you've got someone that's clinical and credible ...but also has an understanding of what CLAHRC is trying to achieve. (Jean, senior boundary spanner Oakdown)

The findings at Oakdown were corroborated at Hazeldean, where those who were originally recruited into boundary spanner roles were typically young professionals and recent graduates, selected primarily for their strong interpersonal skills. As the project continued, the importance of having people such as nurses in boundary spanning roles, particularly at the frontline, became increasingly apparent. It was recognised that boundary spanners required both interpersonal and project management skills, and experiential and tacit knowledge of the NHS context:

I think the issue about being an insider versus an outsider is important...So across the CLAHRC as a whole now we've got at least as many seconded people in knowledge transfer type roles as we have people we originally recruited because that does bring that much more informal knowledge of people, networks and the clinical knowledge (Jaime, senior boundary spanner Hazeldean)

Boundary spanners at Ashgrove reported experiencing a sense of marginalisation. Operating in a borderland between research and practice, they found themselves members of neither domain, for example one participant reported how neither those in research nor academia recognised her role or the role of CLAHRC. Boundary spanners required a type of 'sponsorship' by those who were respected within the clinical world, lending a form of vicarious credibility:

one of the consultants in public health was also associated with CLAHRC... and that's ... that's how it happened, it's because you've got ... you've got somebody senior...I mean if it was just me on my own... like we have a Cardiology Consultant for the General Hospital, he wouldn't have seen me (laughs), he wouldn't have given me the time of day because, you know, I'm just ... because I know people sort of saw me as his PA ... and, you know, it speaks volumes I think. I think ...yeah, because the job wasn't particularly ... you know, high end. (Ffion, frontline boundary spanner Ashgrove)

This lack of membership of either domain brought Ashgrove's boundary spanners together to form a sort of community of practice, carving a new identity for themselves based on their role as 'go-between' and driven by a sense of collective

marginalisation from the domains they were tasked to bridge. It was within this community that support was given, experiences around implementation were discussed and knowledge shared. Coming together in their own community of practice enabled them to ventilate their feelings and experiences in a supportive environment, working together to make sense of CLAHRC and their role within it.

Building bridges

Effective boundary spanners in this study were individuals who accessed and developed networks as a way to recruit stakeholders and promote implementation across different domains. Boundary spanners used their knowledge of the context of clinical practice to develop relationships, deploying a range of skills including negotiation, empathy, credibility, and mediation:

I've put negotiate obviously, that was very much ... apparent really, that was a typical example, between catering and ward staff, obviously I was trying to break down the barriers so I did a lot of negotiating...Flexibility as well, it's things like, you know, we'd try and accommodate the ward staff, when we went to do the educational sessions ... we were well aware that we couldn't go in the morning because obviously, you know, the ward was very busy. So we tried to be as flexible and as adaptable as possible. We were open, we were friendly, and I think that sort of helped them ... try to be, you know, more engaged really. We encouraged their motivation (Maureen frontline boundary spanner Oakdown)

Boundary skills

A specific set of skills were seen as important by participants engaged in building bridges across different domains of research and practice. Boundary skills were defined as the skill set required to successfully navigate the various gaps, divisions, differences and barriers between stakeholder groups and organisations which required bridging during implementation work. They included specific traits of boundary spanners, such as being perceived as credible, as well as the ability to identify and understand what is meaningful to members of different domains.

Effective boundary spanners were reported to be those who were able to identify and mobilise things, ideas, concepts and symbols originating in one context (for example research evidence or patient knowledge), which could be meaningful to members of another stakeholder groups. These boundary spanners used their ability to translate and interpret across boundaries to highlight shared goals. However, whilst some boundary skills could be learned, others were less tangible and were influenced by personal style, or gained only through exposure and experience.

Boundary object competency

The findings from across the three cases suggest that there existed a shared feature amongst boundary spanners which I describe as boundary object competency. i.e. the ability to identify, improvise and mobilise boundary objects effectively. Effective boundary spanners were individuals who were skilled in identifying a shared idea or thing which had potential relevance and meaning across multiple domains.

Effective boundary spanners

These individuals were able to identify and key into what was seen as important within each implementation setting, and to use this as a type of shared object to drive collaboration. For example, rather than attempting to 'sell' implementation through CLAHRC on the basis of potential financial benefits, those who were clinically savvy were more likely to highlight the potential for improving patient care, understanding this this is the primary motivator amongst practitioner, the thing that in general has driven their career choice and is embedded within their clinical identity (i.e. as part of the Hippocratic oath for medics, and as embedded within the NMC Code of Conduct for nurses). Improving patient care is thus one of the most widely recognised, accepted and symbolic concepts amongst practitioners across all healthcare discipline. Boundary spanners with a clinical background tended to immediately recognise this, and used the concept to generate cohesion and allegiance amongst patients and practitioners, for example as reported by participants at Oakdown. This revealed how the idea of 'improved patient care' was skilfully deployed as a *boundary object-in-use* by those boundary spanners

who appreciated its symbolic potency amongst frontline practitioners, recognising that financial incentives were irrelevant to this stakeholder group.

The findings across the three cases suggest that boundary object competency can influence the role and efficacy of *boundary objects-in-use*. This was demonstrated at Oakdown, where a boundary spanner operating at a senior strategic level demonstrated how a co-produced implementation project proposal could establish cohesion and cooperation between stakeholders at a senior organisational level. She utilised her dual citizenship to initiate collective endeavour around the production of the proposal, thus instilling each document with an embedded meaningfulness which could be altered to accommodate changing needs and priorities. By identifying and mobilising the proposal in this way, she was able to engage stakeholders at different organisational levels and to sustain and reinforce the collaborative relationships at a strategic level.

At Hazeldean, a similar process of collective endeavour occurred at a frontline level. Whilst this came about serendipitously rather than through planning, the outcome – a co-produced shared object that represented the needs of all stakeholders adequately and facilitated communication and cooperation across boundaries - was similar. Accurate identification of a potentially useful *boundary object-in-theory* which could then be modified in partnership with stakeholders led to the production of an effective *boundary object-in-use* in the form of Hazeldean's heart failure alert card, which was discussed earlier in this chapter. The template card was introduced to stakeholders, who tailored it to their needs through collective discussions to produce a *boundary-object-in use* which was symbolically powerful and pragmatically situated to be visible during all encounters between patient, primary care, and secondary care practitioners. The emergence and mobilisation of this card elucidated the collective processes by which an effective boundary object can be developed.

Developing objects to meet the needs of users, with users: implementing clinical assessment tools

Implementing a nutrition guideline and assessment at Oakdown

Understanding the needs of the intended users and context of use appeared to be a crucial factor influencing the success of implementation of tools and guidelines. Identification of the intended users and their location within the wider context of use (visibility) enabled more effective, targeted boundary object deployment. For example, if an object was placed in a location where it was not readily visible to the intended users, it would not be used. Getting these conditions right could enhance the potency of a boundary object and increase the likelihood that a *boundary object-in-theory* would make the transition to *boundary object-in-use*.

Both the VTE and MUST tools were revised and refined with the input of a number of relevant stakeholders. The results were tools which were tailored to the specific boundaries, made visible and accessible to the intended users, and which had arrived at their final incarnation through a characteristically collective process of adaptation and amendment.

so the point as we took forward the aspects of the study for example training, revising the assessment tool all a long it was much CLAHRC people working in partnership with people within the NHS organisation in this case [place] at different levels be it ward staff people like pharmacy or senior medical consultants, be it matrons be it the head of quality. Very much a partnership approach to working. (Rose, high level boundary spanner Oakdown)

However, this was not enough to ensure that the malnutrition assessment tool was used consistently. It was also necessary to increase visibility by placing the nursing guidelines, BMI calculation graphs and weighing scales closer together. Without insider knowledge and stakeholder engagement, these boundaries might have remained unrecognised.

And it was just little things like ... when we introduced MUST, at first the graphs for MUST were actually put on a notice board well away from the

scales and all of the wards...and I came along, because of my practical knowledge, and because I still work on the frontline, I said 'Hang on a minute, we need to probably hang these graphs on the weighing scales' ...you know, so as you weigh the patient you can relate to the graphs, work out the MUST score...right at the beginning of the project when we realised it was a problem, because the ... the nursing staff were like to-ing and fro-ing from the weighing scales to the graph and then back again, and ... they were wasting a lot of time doing it. Again, you know, my frontline clinical experience came in handy. (Maureen, frontline boundary spanner Oakdown)

Those at Oakdown learned through failed implementation initiatives that listening to and working with stakeholders could influence whether an object would be shared effectively. Attempting a large scale implementation of an object without the necessary adaptation or attention to the context of use could generate a disparity between top-down and bottom-up priorities.

Implementing a venous thromboembolism (VTE) risk assessment tool at Oakdown

Another example from Oakdown illustrated how changing the visibility of a venous thromboembolism (VTE) assessment tool influenced its uptake and use. The incidence of VTE in hospitalised patients was described by the chief nurse at Oakdown as an issue which “keeps her up at night”. Identifying this as an area of concern which matched both CLAHRC's implementation mandate and local clinical priorities led to the introduction of a VTE assessment tool. However, it was found that the tool was not being used.

It became apparent that there were issues regarding ownership of the VTE assessment tool: was it a medical or nursing task? Stakeholder discussions led to a consensus that assessing VTE risk was a medical task, and a decision was made to relocate the VTE assessment to the drug sheet (kardex), where it would be highly visible to medical staff, and therefore prompt its use

Matching an object to the conditions of its use (e.g. by matching it to the needs of users, and to the specific boundaries it is intended to bridge) can influence the

appeal and uptake of an object, encouraging the transition from *boundary object-in-theory* to *boundary object-in-use*. This example demonstrated how collective stakeholder discussion helped to clarify who the intended users were (doctors), and where the objects should be placed to be most visible and accessible to these people (integrated into the drugs sheet):

The VTE assessment tool went through about eight iterations both in terms of the questions being asked and where it was located which ended up on the drug kardex. (Christy, senior boundary spanner Oakdown)

In both the cases of the VTE and the nutrition tool, stakeholder engagement was instrumental in clarifying the user, making visible the boundaries to be bridged and amending the tools to reflect these.

As Hazeldean CLAHRC matured, there was a shift towards focusing implementation work around the development of collectively generated objects which reconciled a range of stakeholders' priorities. For example Hazeldean's stroke assessment tool illustrates an attempt to develop an evidence-based tool within which stakeholders' views and values were embedded.

So I worked with a lot of stroke professionals, out in the community, in the hospitals, and patients and carers, to look at exactly what post stroke reviews, and six months reviews particularly, should consist of. (Susan, senior boundary spanner Hazeldean)

These findings suggest that collective endeavour provides the process by which an object gains its resonance, making it more meaningful to stakeholders and potential users. Examples include the way in which Oakdown's nutrition tool is embedded with local dieticians' knowledge to extend its usefulness and prompt action rather simply assessment of the risk of a patient's risk of malnutrition; and the way in which Hazeldean's heart failure alert card is matched to the needs of a range of stakeholders and fulfils various roles contingent on the identity of the user i.e. it prompts communication across primary and secondary care practitioners, which it helped patients without clinical knowledge to be able to communicate their condition clearly to a range of professionals. Counter examples drawn from

Ashgrove reveal how a failure to collaborate with users when designing boundary objects such as the diabetes tool led to the production of an object which lacked relevance or meaning to its target users.

Summary: the importance of collective action, shared ownership, and visibility of boundary objects used during implementation

Ultimately, boundary objects are defined by their use, their users, and the context in which they are used. *Boundary objects-in-theory* and *in-use* become associated with the people who use them and as such, reflect their users' identities, which can have a positive or negative impact on uptake.

Ownership of *boundary objects-in-theory* must be associated with *all* members of the implementation workforce, not just an individual (such as a boundary spanner) or particular group (such as senior management).

The deployment of a boundary object designed for implementation must match its intended level of use, and it must be readily accessible and visible in an appropriate physical location.

CHAPTER 7: DISCUSSION

Introduction

This chapter begins with a discussion of phase one, a document analysis, before summarising the findings of phase two, a multiple case study. Key findings from both phases are used to critique the classical taxonomy of boundary objects proposed by Star and Griesemer (1989), later developed by Briers and Chua (2001) and Carlile (2002). I discuss the usefulness of applying the taxonomy as a tool with which to identify potential boundary objects, and argue that a classification based on type fails to reflect the inherent blurriness of boundary objects in practice. Instead I propose a conceptualisation of boundary objects based on properties identified through action.

Next I consider the way in which boundary objects were found to emerge during implementation. I suggest that boundary objects, boundaries and users are identified through collective processes; that *bricolage* (Levi-Strauss, 1962) plays an important role in the way in which objects are co-produced and contextualised. Using examples from the study and the wider literature, I discuss how collaboration and co-production are twin processes which shape and define *boundary objects-in-theory* and *in-use*.

Finally the chapter explores the role of boundary objects in implementation through CLAHRCs. The impact and influence of boundary objects as both positive and negative objects which can reduce or reinforce boundaries is discussed. The chapter concludes that boundary objects can simultaneously exert a catalytic or inhibitory influence on implementation, contingent on the conditions in which they emerge and evolve. The study emphasises the need to engage stakeholders to ensure that multiple perspectives and knowledge are reconciled and accommodated in the development of the final object.

Taxonomy: structure vs action

The original and most widely cited definition of boundary objects describes them as shared things and ideas “which both inhabit several intersecting social worlds and

satisfy the informational requirement of each” (p.393, Star and Griesemer, 1989). Star and Griesemer proposed a corresponding taxonomy reflecting the different forms of boundary object identified during their study of the Berkeley Zoological Museum. Although local contextual uncertainties were reduced by standardisation in order to create a shared format for communication between different groups, the authors also suggested that boundary objects were intrinsically vague, fuzzy and fluid, indicating this was also true of the taxonomy (Star and Griesemer, 1989).

Star and Griesemer highlight the blurriness of boundary objects, suggesting that an object can inhabit one or more categories of the taxonomy simultaneously. This study confirms this blurriness, showing how many objects identified as *objects, models and maps* also operate as *standardised methods and forms*. Examples include the many guidelines, assessments tools, protocols, templates, models, frameworks, and other outputs of research around which implementation is focused across the three case studies.

Star and Griesemer’s definition is frequently cited wholesale across the literature, with critique of the concept arising most frequently in variations on the query, “Can anything be a boundary object?” (Trompette and Vinck, 2010). The taxonomy has however undergone some development, for example Carlile (2002) condenses ‘coincident boundaries’ and ‘ideal types’ to the more easily understood class of ‘objects, models and maps’, retaining ‘repositories’ and ‘standardised methods and forms’. Briers and Chua (2005) propose a category of ‘visionary objects’ in order to reinforce the conceptual and persuasive properties of boundary objects. Both Carlile’s and Briers and Chua’s work have contributed to an updated taxonomy which was produced as an outcome of reviewing the literature at the start of this study. This revised taxonomy was then used to guide the identification of boundary objects during a document analysis of literature relating to implementation through CLAHRCs (phase one of this study).

Phase One, a document analysis

A coding framework incorporating the revised taxonomy of boundary objects developed from a review of the literature was applied to documents relating to implementation through CLAHRCs (see chapter 3/page 94 for a full description).

Documents were obtained from three CLAHRCs to give a view of implementation from various different levels: project, Collaborative, and the national funder's perspective. A list of things/objects that could potentially be boundary objects was produced and organised according to a revised taxonomy. Phase one showed the challenges of attempting to assign each identified object to a specific type, confirming Star's (1989) observation that boundary objects are blurry and may represent more than one type simultaneously (Star and Griesemer, 1989).

The document analysis revealed a high number of potential boundary objects (*boundary objects-in-theory*), most of which were found to be documents and other inscribed artefacts. Examples included tools, clinical care pathways, and national guidelines which represented the key focus of implementation work across all three CLAHRCs. As in earlier studies, the properties of the objects identified were discussed in relation to the original taxonomy and definition (i.e. Henderson, 1991). Whilst phase one achieved its aim of identifying potential boundary objects, developing an understanding of where such objects may be found and providing a springboard for phase two, it was not clear if or how such objects were used in practice, or what conditions might influence this process. Assuming that an object is capable of spanning boundaries has led to problems with uptake (e.g. Atwell, 2011).

Conclusions of Phase One

It is apparent that the uptake and use of boundary objects as recognised in documents sampled during phase one cannot be predicted, despite a focus on developing them in order to mobilise knowledge across various boundaries including stakeholder, organisational, cultural, geographical, temporal, professional and disciplinary (these are discussed in more detail in the evaluation of implementation through CLAHRCs conducted by Rycroft-Malone et al, 2015) This requires a level of specificity, matching boundary objects to particular boundaries, leading to questions about the reality of implementation of *boundary objects-in-theory*.

Phase one raises questions regarding the presence and role of conceptual *symbolic objects*, boundary objects which are deployed to encourage alliance

between users. Whilst it is beyond the scope of a document analysis to ascertain whether or not an idea or concept carries resonance across users, it is clear that certain tropes recurred throughout the data. These revolved around the multiple interpretations of the NIHR's original call – for example the NIHR's feedback document that the concept of patient and public involvement (PPI), a core concept embedded within the collaborative model of implementation that CLAHRC was intended to deliver, has been variously interpreted across the nine funded CLAHRCs. The notion of CLAHRC itself, as well as the concept of implementation, has different meanings for different people in different sites.

The notion that boundary objects possess a symbolic dimension was implied by Star and Griesemer in their original paper and was developed by Briers and Chua in 2001. This became the focus of what Briers and Chua (2001) defined as 'visionary objects', using vaguely defined, widely shared and powerfully persuasive concepts. In their work the shared concept of 'efficiency' demonstrates how an idea operated as a boundary object between managers.

Applying Star and Griesemer's taxonomy during phase one revealed that it could help to identify potential boundary objects (*boundary objects-in-theory*), but its emphasis on structure, rather than action, combined with the limitations of investigating documents rather than accounts, did little to elucidate boundary objects in practice (*boundary objects-in-use*).

Phase Two, a multiple case study

Phase two built on the findings of phase one by investigating whether or not any *boundary objects-in-theory* identified in the document analysis were visible within the accounts of implementation of people in boundary spanning roles ('boundary spanners').

Findings from phase two revealed the complexity of boundary object creation and use, showing how boundary objects are influenced by the interaction and engagement of stakeholders, the conditions of use, and the way in which meanings are embedded in objects and interpreted across different domains of use and user.

The way in which different objects and ideas were developed and deployed by stakeholders influenced the course and outcome of implementation activities. Importantly, phase two added depth and detail to the findings of phase one by highlighting how some objects operated as boundary objects under some conditions but not others. Some objects operated to either open up or reinforce boundaries between stakeholders, and as such were found as having either catalytic or inhibitory influences on the collaboration required for successful implementation

One of the first findings of phase two was that participants referred to relatively few of the *boundary objects-in-theory* found during phase one. Of the 48 items identified within the sampled documents, only 26 were mentioned by boundary spanners. These were the various chronic disease registers (*repositories*), an associated electronic audit tool and improvement work package discussed by participants from Hazeldean and Ashgrove, and some clinical assessment tools and guidelines at Oakdown (see table 11 for list). Not all of these were effective for boundary spanning, with findings from Ashgrove revealing how some objects identified in phase one were found to hinder boundary spanning in practice (for example an electronic cardiac rehabilitation programme and a diabetes assessment tool). Rather than promoting communication and cooperation, some objects were found to provoke conflict and reinforce boundaries at an individual, group and organisational level. This was demonstrated by the way in which some wards closed ranks to resist the implementation of nursing guidelines and assessment tools at Oakdown.

The findings of phase two showed that the objects which were used most successfully by boundary spanners were those which were most highly symbolic – a dimension of boundary objects which was poorly represented amongst the documents sampled in phase one. Phase two confirmed the importance of specificity indicated in Phase one, showing how effective *boundary objects-in-use* match the boundaries they are intended to span. However, the process of matching objects to boundaries was not straightforward; both boundaries and boundary objects were sometimes elusive, frequently emergent, and *boundary objects-in-theory* often required extensive modification before they could effectively

operate as *boundary objects-in-use*. Consequently many *boundary objects-in-theory* identified in phase one were found to have limited impact, and participants detailed how they failed to operate at all without extensive restructuring, tailoring and adaptation. A disparity between boundaries, objects and users led to limited boundary spanning, whilst understanding the nature of boundaries and the conditions of use informed the development of effective *boundary objects-in theory* and *in-use*.

The findings of phase two suggest that the way in which stakeholders respond to an object has less to do with intended use and more to do with the way the object is perceived and interpreted. Those objects which succeeded as boundary objects, or which made the transition from *in-theory* to *in-use*, were found to be those in which shared values and views were adequately represented. Uptake of objects was contingent on a sense of shared ownership, and this tended to be developed and instilled in objects through a process of collective endeavour involving all relevant stakeholders. Examples demonstrating the deleterious effect of failing to engage relevant stakeholders in the development of an object revealed the importance of this process of collective endeavour.

The significance of the way in which boundary objects emerged and developed was demonstrated by the perception by some participants that improvised boundary objects were amongst the most effective. Such objects evolved organically as stakeholders worked together to clarify the types of boundaries which needed spanning and together identified a solution. Through this sometimes unplanned process, *boundary objects-in-theory* were modified, or novel objects were created to meet the needs of users. This is similar to the process of *bricolage*, in which new solutions are created from old materials (Levi-Strauss, 1962).

Boundary objects-in-theory vs. boundary objects-in-use

It can be misleading to attempt to identify a boundary object according to structural features as defined by the classical taxonomy (Star, 1989), because in practice it appears that meaning, rather than structure, determines whether or not a thing or idea will be used as a boundary object. However, applying such a taxonomy can

be useful to direct researchers towards resources and research outputs, which may potentially function as boundary objects.

Phase one showed how this approach led to the identification of many potential boundary objects, but gave little indication as to whether or not these objects were actually used in practice. Phase two showed that possession of the structural elements indicative of a boundary object is insufficient to ensure an object is used in practice. To be useful in practice, objects required a more complex set of properties derived through action and interaction.

This highlights the way in which a true boundary object is defined through action rather than designation (Atwell, 2011). The findings show that users assign a range of meanings (both positive and negative), which ultimately influence whether or not an object makes the transition to become a perceived boundary *object-in-use*.

Action in context

The following section discusses the conditions which are found to influence the way in which *boundary objects-in-theory* and *in-use* emerged and are mobilised, emphasising the interaction between boundaries, people, things and ideas. Knowledge, and the objects in which it is shared, is interpreted in different ways and meanings are negotiated as stakeholders work together to implement evidence in practice.

Context has been widely recognised as a key element influencing successful implementation (e.g. Rycroft-Malone et al, 2004). Context plays an important role in whether or not a *boundary object-in-theory* also operated as a *boundary object-in-use*. Boundary objects are deeply contextual and possess an inherent flexibility which enables them to be adapted by different users across different sites.

Considering boundary objects as the means by which knowledge is conveyed has important implications for implementation, particularly in the way in which knowledge is produced, presented and shared. Examples include the outputs of research such as the development and dissemination of evidence-based guidelines, protocols, pathways and tools which make up the majority of *boundary objects-in-theory* identified in both phases of this study. This study finds that there

is a balance to be struck between safeguarding the integrity of the transferable aspects of knowledge (across boundaries), whilst recognising that some elements of knowledge must be context specific. This links to ideas about adoption vs adaptation, fidelity, and core and peripheral elements of evidence-based interventions in the broader implementation literature (for example Greenhalgh et al's 2004 synthesis; and Damschroder's 2009 model of implementation). However these findings also raise questions around the legitimacy of stakeholder perspectives vs. the integrity of research evidence, as well the need to be explicit about which aspects of user knowledge are relevant (Van Kammen, 2003).

The nature of boundaries

Two of the most important conditions which influence the effectiveness of boundary objects were found to be the type of boundary to be spanned, and the presence and competence of boundary spanners.

Recognising boundaries

Understanding the type of boundaries to be spanned during implementation is instrumental to the identification, development and deployment of an effective boundary. Failure to recognise boundaries can result in a disparity between boundary and object. Boundaries across the three cases were typically seen as semantic and symbolic in nature, with the effectiveness of boundary spanners influenced by their ability to recognise what is of shared concern in both domains and to using this to establish a shared language. This was exemplified by the way in which multiple languages were used to discuss the concepts of implementation, and how these languages generated collaboration or conflict amongst stakeholders. Correct assessment of boundaries helped to ensure that a complementary object was developed and mobilised. This is supported by the findings of Gkeredakis and Samiotis (2006), who suggest that boundary actors must first identify and manage boundaries, and in doing so, the requisite characteristics of an effective boundary object will also become clear. However, boundaries may be difficult to discern from an external viewpoint, which is a position that many boundary spanners found themselves in.

The nature and diversity of boundaries found across the three cases is concordant with the current thinking that boundaries are ambiguous in nature and can encompass a wide range of differences, divisions, and opportunities between two or more sites (Akkerman and Bakker, 2011). This suggests that boundaries to be spanned during implementation are multiple and diverse, ranging from those which operate at organisational levels, such as disciplinary and professional divisions, to the bureaucratic and hierarchical conventions that underpin the structures of organisations (see Rycroft-Malone et al, 2015, for further discussion).

Boundary spanners across all three cases reported that a variety of boundaries associated with CLAHRC itself required resolution, and that various tactics and strategies were used to recruit allies and generate allegiance across these boundaries. Examples include the use of incentives around reaching national targets to engage primary care practitioners in Hazeldean's vascular implementation projects; or the way in which boundary spanners at Oakdown engaged ward staff to participate in the nutrition project by downscaling training so that the nutrition action plans produced were specific to each ward, contextualised with local knowledge, and represented objects which were co-produced. Other boundary spanners with clinical experience at Oakdown and Hazeldean found that framing implementation work as a way in which practitioners could improve patient care, rather than successfully reach targets, helped them to span boundaries between different stakeholders. All of these tactics were deployed with the intention to bring stakeholders to work together towards a shared implementation goal, by cultivating a commitment to the focus of each piece of implementation work, be it a tool such as Hazeldean's stroke assessment tool, or a shared idea such as the notion of 'nutrition' at Oakdown. This corresponds with Pinch's (2003) earlier observation that building commitment to an object is something that all effective salespeople do, and having a vision that can be shared is a compelling way to do this (p. 268).

Findings from all three cases demonstrate in varying degrees how the CLAHRC's organisational identity had generated an additional boundary, exacerbating the divide between researchers and practitioners. The influence of this type of

boundary is corroborated by the work of Kislov et al (2011), who revealed that the structure and nature of the Collaborative generated new boundaries.

Box 5: Skills required by boundary spanners

Credibility, mediation, openness, resilience, and empathy are the skills required to undertake a boundary spanning role and mobilise a boundary object effectively. Empathy enables a boundary spanner to identify an object which is meaningful, whilst credibility helps to ensure that the object is associated with a boundary spanner who is respected and trusted by stakeholders. The ability to recognise and mobilise an object that is meaningful to other stakeholders appears to be an important role of effective boundary spanners. Being able to do this ensures that objects selected as boundary objects are adequately understood and valued across boundaries. This provides a shared object around which dialogue and collaboration can be focused. However, if boundary skills are lacking, empathy is insufficiently exhibited and credibility is diminished, then this is also perceived as a feature of an object deployed by that person. This reflects the way in which a boundary object is porous, absorbing and reflecting the identity and associated characteristics, values and agendas of users, with positive or negative results.

Towards a new view of boundary objects

This study has shown how attempts to classify potential boundary objects according to a structure-based taxonomy are inherently problematic when investigating an issue such as implementation that is intrinsically complex and requires flexibility and attention to context. Therefore, I propose a new approach for understanding the types of things and ideas that are likely to operate as effective boundary objects in practice, moving away from a taxonomy of type towards a focus on mechanisms of action. This approach sits alongside Star's original definition, which highlights the characteristic combination of stability plus flexibility of boundary objects. By redirecting focus on to the underlying mechanisms of action, it reduces the likelihood that objects are categorised and constrained by the definition.

Proposed action-based properties of boundary objects-in-use

The following summary introduces an alternative view of boundary objects, departing from the classic taxonomy of type to promote the symbolic and conceptual dimensions of boundary objects-in-theory and in-use. It highlights how boundary objects are determined and defined by meaning, interpretation and response during boundary spanning (or reinforcing) activities between members of different stakeholder groups.

Emergence

The findings highlight the close relationship between boundaries, actors and objects to reveal that one of the critical differences between *boundary objects-in-theory* and *boundary objects-in-use* is the manner in which they emerge and evolve. Boundary objects have been found to emerge from boundary spanning activities when different stakeholder groups seek to open up communication and cooperate towards a shared goal, in this case getting evidence into practice

One of the most significant findings is the discovery of how boundary objects emerge, develop and evolve through collective processes enacted between users and producers. Despite Star's observation that the activity of creating boundary objects, is "...a key process in developing coherence across intersecting worlds" (Star and Griesemer 1989, p. 393), little attention has been given to unpacking these specific processes.

The role of collaboration and co-production in the generation, development and mobilisation of *boundary objects-in-use* is highlighted, as are the gaps in the process which can lead to poor uptake, the creation of insufficiently meaningful objects, or of objects which provoke conflict rather than unified stakeholders to work together during implementation.

The emergence of *boundary objects-in-theory* and *in-use* is important because it influences the overall uptake and appeal of shared objects in practice. Emergence can occur in a number of ways. Firstly a boundary object may be born through serendipity - unanticipated and organic. These objects emerge through interactions across boundaries, bubbling up at the site of collaboration as a means

to support and sustain communication and cooperation between different stakeholders. Such objects are found to emerge at the site of collaboration as stakeholders find ways to communicate and cooperate across various boundaries. These improvised objects are often shared things and ideas which possess a natural ability to transcend boundaries, or the flexibility which allows them to be readily modified to meet a new purpose.

Secondly there appears to exist a range of *boundary objects-in-theory* which have been designed to bridge the boundary between research and practice but do not necessarily succeed in doing so. The utility of such objects is often limited by their formal content, rigid structure and links to a top-down implementation agenda. The result is that such objects are felt to be imposed upon, rather than shared with, stakeholders. They characteristically possess a less flexible structure than those boundary objects which are improvised *in situ*, and require a greater degree of tailoring to achieve the requisite level of interpretive flexibility, for example the outputs of research such as guidelines, protocols and clinical assessment tools.

In both cases these boundary objects then follow a path of development which is characterised by collective endeavour and episodes of trial and error during which an object is contextualised with knowledge and meanings contributed by stakeholders. If an object fails to follow this path of development, then it is likely to remain a *boundary object-in-theory* rather than *in-use*.

Whilst emergence cannot always be predicted, it can be precipitated by individuals or groups who are solution focused, willing to improvise, and ready to recognise others' needs. The role of boundary spanners is linked to their skill in being able to do this and to encourage stakeholders to participate in this process, thereby increasing the likelihood that a *boundary object-in-use* will emerge.

Meaningfulness

Boundary objects as objects in which knowledge is conveyed are inherently meaningful. They not only convey, communicate, translate and transform knowledge across boundaries; they also reflect the meanings which are attached to this knowledge. Meaningfulness primarily relates to the values, associations,

and discourses with which knowledge, objects and actors are ascribed according to identity, interpretation and the context in which they are created and mobilised. If an object is insufficiently meaningful, then it is unlikely to appeal to prospective users.

However, whilst meaningfulness is important in generating the appeal of an object, it does not guarantee it, nor does it imply that the embedded meanings are necessarily positive. More impactful boundary objects are those which are found to be high in positive meanings and thus valued by multiple stakeholders across different contexts. Conversely, an inhibitory boundary object is one which is assigned negative meanings by some stakeholders, causing it to generate and reinforce boundaries. It is predicted that negative meanings can generate negative *resonance* and leads to divergence amongst stakeholders which in turn will hinder whether an object makes the transition from *boundary object-in-theory* to *boundary-object-in-use*. Inhibitory boundary objects can represent meanings that are symbolically powerful but which generate an opportunity for competition and conflict rather than communication, cooperation and collaboration.

Convergence

An object which is more likely to succeed is one which adequately represents convergence between all relevant stakeholders. This helps to generate an object with which all stakeholders feel a sense of ownership, smoothing boundaries by making visible the common ground between them. This in turn provides a means to communicate and an incentive to cooperate. Establishing a sense of shared ownership can help improve uptake and appeal amongst intended users, as long as all relevant viewpoints are adequately represented and reconciled.

Convergence refers to the degree in which different priorities, agendas and perspectives (meanings, values and discourses) can be aligned through the use of an object. This involves establishing a shared understanding between stakeholders and is evidenced as an overlap of stakeholder concerns. Recognising and appreciating this overlap by showing empathy of another's context and concerns can encourage cooperation across boundaries.

In the boundary spanning literature, convergence is linked to a conceptualisation of boundary objects as providing a common ground or shared language between groups (Star and Griesemer, 1989; Carlile, 2002). This notion is reminiscent of Akrich, Callon and Latour's (2002) idea of *interessement*, during which the concerns of one group are translated into the concerns of another's to facilitate cooperation. Star describes the translatory role of boundary objects in this way, discussing the role of such objects in transforming one party's perspective, knowledge, views and values, into that of another's. Star does not imply that there is a perfect segueing of viewpoints, rather that boundary objects facilitate an adequate alignment of one viewpoint with another's. The impact of this property, if all relevant stakeholders are appropriately and meaningfully engaged, is the development of an object within which stakeholder views and perspectives are adequately embedded and there is a sense of shared ownership.

Boundary objects-in-use may represent divergence (a lack of convergence between stakeholders' views and values) as a consequence of their association with an 'external' or imposed agenda. This was demonstrated at Hazeldean, where a tool designed to assess the physical health of mental health service-users was perceived as imposed upon care co-ordinators and out of tune with frontline priorities. A similar struggle to introduce improvement packages using targets and incentives to encourage best practice around a range of vascular diseases also ran into difficulties when it was found that the topics assigned to each primary care locality failed to match local clinical concerns.

The importance of managing multiple perspectives in order to facilitate collaboration is highlighted by Du, Jing and Lui (2012), who demonstrate how focusing on generating a shared understanding between teams of designers and customers can lead to the production of products with the highest level of quality and customer satisfaction. Conversely, a lack of embedded shared vision results in an object that insufficiently reflects and reconciles all stakeholders' perspectives, values and needs. Van Kammen (2003) writes how failure to incorporate multiple user perspectives into an object can lead to the production of a "technological monster", a sophisticated object that is unattractive to users (p.20). This is comparable to the fate of the diabetes tool and the cardiac rehabilitation

programme at Ashgrove, which failed to attract users due to embedded assumptions about what users needed.

Box 6: Convergence in focus

Convergence is important because it influences the overall utility of an object as a boundary object. Without this, or when there is insufficient convergence, there is a lack of shared understanding or common ground between stakeholders around which collaboration can be formed. This was seen at Ashgrove where a failure to establish a shared understanding around implementing *boundary objects-in-theory* such as a cardiac rehabilitation programme and a diabetes assessment tool resulted in objects which lacked meaningfulness, resonance or authenticity amongst the intended users. Findings from Hazeldean illustrate how inconsistent convergence results in objects with mixed boundary spanning capacity (for example there was a divergence in values and viewpoints which hindered the boundary spanning capacity of the mental health assessment tool). In contrast, Oakdown is conspicuous in its commitment to embedding shared vision around implementation within *boundary objects-in-theory* and *in-use*, establishing this as the foundation around which implementation goals might be delivered.

Resonance

Resonance is defined by the OED as “Richness or significance, especially evoking an association or strong emotion”. Resonance plays an important role in the way in which boundary objects are generated, responded to and ultimately used (or not). Resonance is influenced by levels of meaningfulness and degree of convergence exhibited by an object. These in turn influence the object’s catalytic potential to generate or inhibit alliance and collaboration between stakeholders by bridging, resolving, or reinforcing boundaries. Resonance exists when the meanings embedded within an object are strong and convergence between stakeholders’ perspectives and values is high.

Boundary objects-in-use are found to be those objects which resonate positively with users. A catalytic boundary object is one that adequately resonates with all stakeholders and sufficiently reflects the values and perspectives of all users.

Box 7: Resonance in focus

Data from phase two highlights how the tools and disease registers involved in the vascular improvement work at Hazeldean and Ashgrove were initially devoid of meaning and failed to resonate with the intended users. Meaningfulness and convergence were then generated through a process of collective endeavour during which a highly resonant notion (the concept of *improved patient care*) was emphasised and embedded, generating authenticity and potency. In many ways the story of the vascular implementation work across Hazeldean and Ashgrove is a story of objects and their users, during which both the contentious and the collaborative potential of objects emerged. A counter example is again drawn from Hazeldean, where the implementation of a physical health assessment represented a *boundary object-in-theory and in-use* at a senior organisational level but its implementation was hindered by its lack of resonance with frontline practitioners. At the time of data collection, this tool was struggling to make the transition to become a *boundary object-in-use*.

Authenticity

Authenticity is crucial to uptake: it is defined as a combination of the various action-based properties of objects which lend a shared symbolic dimension to *boundary objects-in-use*. Authenticity arises when there is a high level of congruence between the combined meaningful, convergent and resonant properties of an object. Authenticity is generated, developed and bestowed upon *boundary objects-in-theory and in-use* through collective processes to create an object which is credible, contextualised and collectively meaningful. These objects are sufficiently embedded with the knowledge and values of each stakeholder group to provide a reference point around which future collaborative endeavour can be formed or fought over.

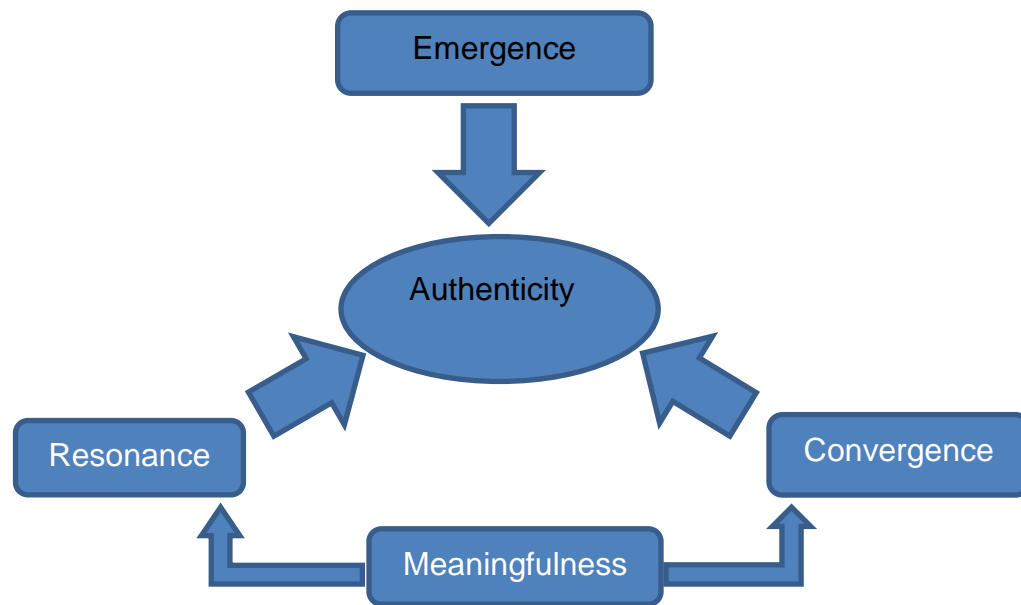


Figure 1: Action-based properties of boundary objects

Recognising the properties of catalytic boundary objects

Whilst structure may be important, the study shows that the properties of action may play a larger role in whether or not an object operates as boundary object in practice. Findings from this study showed how a mismatch between these properties can lead to the generation of an object which is inhibitory rather than catalytic in terms of boundary spanning necessary for implementation.

Rather than using a structure-based approach to identify boundary objects, this consideration of the various action-derived properties emphasises how and why some objects, despite design and intention, may operate as *boundary objects-in-use* whilst others remain as *boundary object-in-theory*. Considering boundary objects from this stance, the structure of a boundary objects becomes less relevant than the emergent, meaningful, convergent and resonant properties which contribute to the authenticity of an object. This helps to explain why there may be problems with implementation of those objects which are defined and developed with knowledge-sharing in mind (such as guidelines, protocols and pathways) unless they undergo a process of adaptation during which local knowledge is

Table 12: Action-based properties of boundary objects

Boundary objects are:	
Emergent	Typically these boundary objects emerge as a consequence of boundary spanning activities when two or more parties attempt to strike up communication. Emergence can be serendipitous (unplanned, unanticipated, and organic); or objects can emerge through deliberative action (planned, anticipated, selected). In both cases it is important that emergence is founded on collective endeavour involving all relevant stakeholders.
Meaningful	Boundary objects are embedded with knowledge which is conveyed and translated across boundaries. As such, boundary objects reflect the meanings which are attached to this embedded knowledge, which can have positive or negative connotation for different stakeholders.
Convergent	Boundary objects represent and reflect a convergence of multiple perspectives. Convergence occurs when the concerns of one stakeholder group are translated into the concerns of another's through alignment and reconciliation of views, priorities, values and agendas. This enables them to provide a shared language which can be used to facilitate communication and cooperation between different stakeholders. This means it is important to identify relevant stakeholders, including those who will maintain these objects and facilitate their function.
Resonant	Boundaries objects must resonate with stakeholders, evoking an emotional response which coincides with a stakeholder's own value and beliefs. Resonance is influenced by how meaningful an object is to the stakeholder. The more meaningful and convergent an object, the more resonance it will possess.
Authentic	Emergence, meaningfulness, convergence, and resonance contribute to the overall authenticity of a boundary object. An object which exhibits high levels of these properties is more likely to be perceived as authentic to stakeholders and more likely to be used. Authenticity is enhanced when all properties are congruent, for example an object is well matched to boundaries, is positively resonant and highly convergent with the views and needs of all relevant stakeholders.

embedded, meanings are instilled, and stakeholder views and values are accommodated. *Bricolage* is discussed later as a mechanism by which meaningfulness can be instilled, resonance can be cultivated, and authenticity instilled within an object.

Accommodating multiple perspectives and cultivating interpretive flexibility: the role of collaboration and co-production in boundary object creation and use

Achieving convergence by preserving interpretive flexibility

The findings of this study suggest that interpretive flexibility can be bestowed upon a boundary object-in-theory by adopting the principles of co-production. Co-producing boundary objects helps to ensure that such objects incorporate the views and perspectives of those who have been involved in their development (Ramirez, 1999; Dui, Jing and Lui, 2012). Co-production can occur at varying stages and to varying degrees during the lifecycle of boundary objects, when they are created or at a later stage as they are reviewed, refined and amended in collaboration with stakeholders. Boundary objects-in-theory which had been developed in isolation from users were found to be more likely to hinder collaboration by reinforcing the differences between stakeholder groups involved in implementation. This leads to lower levels of uptake as such objects are deemed to be imposed, to reflect another group's agenda, or fail to reconcile the priorities of different stakeholder groups. These findings also reflect contemporary discussions about co-production which are considered below.

Co-production, convergence, and incorporating multiple perspectives

Co-production has gained prominence across a range of policy, practice, business, and service innovation realms, where its potential to span the gap between stakeholders through the development of ideas, goods and services which possess a high intrinsic value amongst users has proved alluring (Ramirez, 1999; Du, Jing and Lui, 2012). Co-production has also proved appealing across the implementation literature, finding a place amongst contemporary approaches to

bridging the research-practice gap (for example the Canadian Institutes of Health Research's approach to engaging stakeholders throughout the implementation process)

This interest in co-production as a means and method for instilling value in an object is not new. In 1999 Ramirez highlighted the way in which the industrial production line could be transformed by adopting an approach in which value is "coproduced by two or more actors, with and for each other" (p.49). Ramirez argued that co-produced goods were less likely to suffer rapid depreciation by rendering them valuable across a wider range of stakeholders. Ramirez (1999) found that it was because of a sense of shared ownership that co-produced items were valued more highly, and for longer, a finding which is reflected in this study. (The Heart Failure card provides a good example of how shared ownership gives a sense of empowerment to the patients who use it during clinical encounters.) Rather than producers creating goods and then attempting to stimulate interest via promotion and persuasion, co-production asserts that items generated in this way will naturally experience higher consumption as they reflect the needs and perspectives of users.

In essence, a co-produced object is likely to be a valued object, reflecting and combining the needs and perspectives of users and producers in one shared object. Writing from a design perspective, Du, Jing and Liu (2012) argue that shared understanding in terms of both the content and process of new technologies is central to the production of products which are of higher quality. However they also observe that despite best efforts, the tools and methods for enabling this process are neglected and remain little used in practice.

Balancing act: preserving flexibility, safeguarding fidelity and managing multiple perspectives

Collaboration has been described as a process of managing different perspectives (Du, Jing and Lui, 2012). Products which emerge as an outcome of collaboration and which are co-produced are associated with higher levels of quality and customer satisfaction (Ramirez, 1999; Du, Jing and Lui, 2012). However, whilst maximising the opportunity for the exchange of thinking and ideas between

stakeholders may increase the likelihood of generating objects which are rated highly by recipients, there remains a challenge of balancing multiple perspectives, priorities, needs, values and understandings against knowledge fidelity. That is, how can a balance be struck between generating an object which retains interpretive flexibility whilst safeguarding against the dilution of high quality knowledge?

Within CLAHRCs much of implementation is focused on standardised objects conveying codified knowledge (for example as represented by the outputs of research such as tools, guidelines and other concrete *boundary-objects-in theory*). Whilst these objects can represent useful boundary objects at senior organisational levels, they may fail to adequately represent the concerns of frontline stakeholders. A process of modification is required during which objects are contextualised by supplementing with local user knowledge. This is a collective process within which the intended users are active participants, resulting in the creation of an object which is meaningful and resonant. This collective creation of an object represents a process of *bricolage* within which the boundary spanner as *bricoleur* is an instigator of collective deliberation, an improviser and an innovator of objects.

I suggest that the collective process of boundary object creation and development is a type of bricolage, during which boundary objects are amended and improvised to be relevant to specific contexts. The twin concepts of collaboration (a process of managing different perspectives) and co-production (the development of knowledge and objects through collaboration) find a natural partner in the notion of bricolage (Levi-Strauss, 1962). Bricolage therefore provides a useful description of a process of creating, developing and amending boundary objects which is complex, messy, often unpredictable, frequently improvised, and involves collective endeavour between stakeholders.

Make do and amend – bricolage and the creation of boundary objects.

Bricolage describes both a process and an outcome which has gained popularity across the organisation, business and entrepreneurship literatures (Levi-Strauss, 1963; Cuhna, 2010; Duymedjian and Ruling, 2010). Its appeal lies in the attention it pays to explaining why some businesses are able to thrive in poorly resourced

conditions whilst others fail (Cuhna, 2010). Bricolage assumes that the hands-on knowledge possessed by the bricoleur extends to human, material and symbolic resources (Duymedjian and Ruling, 2010). The acceptance of a practice reality which is prone to unanticipated change, and is riven with the multiple perspectives of different stakeholders, lends bricolage a unique affinity for understanding the processes by which *boundary objects-in-theory* and *in-use* emerge.

Historically, *bricolage*, as proposed by Levi-Straus (1963), has been described as an individual process focused on the *bricoleur* – the ‘jack of all trades’ who uses available resources to meet new purposes through improvisation, modification and tinkering. *Bricolage* is a way of using objects at hand to meet new needs, and as such is contingent on the creativity of the bricoleur. For Levi-Strauss, the bricoleur “is someone who works with his hands and uses devious means compared to those of a craftsman” (p16). Levi-Strauss used the term in an anthropological sense to describe the way in which the thinking and problem solving approaches of tribespeople differ from the engineer or scientist. *Bricoleurs* work differently; rather than creating a new tool for a novel purpose from newly acquired materials, they are constrained by limited resources and are adept at creating new tools from old materials. Others such as Baker and Nelson (2005) interpret the bricoleur’s skill as the ability to create something from nothing, to use what others abandon, reject, leave behind or view as worthless. Fundamentally the bricoleur is ‘hands on’ – experimenting, reframing, re-contextualising, imagining and manipulating (Cuhna, 2010). This ability to upcycle, recycle and reuse is something that gives bricoleurs the upper hand in resource-constrained environments, enabling those individuals and the ventures they run to thrive when others struggle.

Boundary spanners possessing the skills of the bricoleur typically have an aptitude for taking that which is at hand – a guideline, protocol or tool - and through improvisation, experimentation and modification, find novel ways to get evidence into practice. Levi-Strauss highlights how the bricoleur is limited to a set of resources (repertoire) “whatever the task at hand because it has nothing else at its disposal” (p17). In terms of implementation, the findings of this study showed that boundary objects created in partnership with stakeholders were often remodelled, amended with local knowledge, and contextualised in order to breathe life into

otherwise rigid objects. Conceptualising this process as one of bricolage allows an understanding of the way in which a boundary objects carries something of its creator with it:

“he ‘speaks’ not only with things...but also through the medium of things: giving an account of his personality and life by the choices he makes between the limited possibilities. The ‘bricoleur’ may not ever complete his purpose but he always puts something of himself into it.”
(p.21)

Bricolage has the potential to explain the way in which objects can become both appealing and unappealing, contingent on the identity of the creator and of the intended user. By ensuring that the process of boundary object creation is one which is collective in nature, one which is co-productive in principle, and conducted through a process of bricolage, I argue that the final object will be imbued with the identities, perspectives, knowledge and values of all stakeholders and as such is more likely to be successfully mobilised across boundaries.

Despite the potential of bricolage to provide hands-on solutions with limited resources, it also presents a number of issues. First, whilst the appeal of working with limited materials is attractive, particularly when considering the tight financial constraints currently dominating the healthcare funding landscape in the UK, it cannot be assumed that a bricolage approach will always give an effective, lasting or reliable solution. Bricolage by its very nature is tolerant of error, fallings, and mistakes – it is improvised and experimental and because of this is may not always give the desired outcome. How does one mediate this at a strategic or commissioner level? Can an acceptance of uncertainty be written into a contract or project proposal?

The rogue nature of bricoleurs is not one that sits comfortably within standard organisational structures: they are often described as non-conformist, displaying an ambivalence for rules, and frequently anti-authoritarian (Baker and Nelson, 2005). There are difficulties associated with the maverick nature of bricolage; in many respects the bricoleur is unfettered by convention and tends to avoid the over-regulated – can this ever be tolerated within healthcare where the need to ensure

safety is paramount? If bricolage is to thrive through the cultivation of bricoleur skills within an organisation, then a certain level of trust is required which can be stifled by directive management. This may be at odds with the NHS context (Ferneley and Bell, 2006).

Bricolage in an organisational context is thus both provocative and promising. Whilst Duymedjian and Ruling (2010) report the challenges encountered by those practising bricolage within organisations which veer towards the formal, within which I include those of CLAHRC and its academic and healthcare partners, this study suggests that it should neither be overlooked nor underestimated. However it is clear that for bricolage to gain legitimacy within an organisational context there must be an acceptance that it often involves trial and error and, as such may not guarantee a robust solution. Despite these issues this study proposes that the boundary spanner as bricoleur and bricolage as a collective process encouraging co-production provides novel way to approach the tricky and elusive business of boundary object creation and development.

Public and patient involvement (PPI) and the emergence of boundary objects

The publication of The New NHS (DH, 1997) heralded a new focus on the role of public and patient involvement (PPI) in healthcare services delivery in the UK. However, whilst PPI remains a priority in terms of public policy and practice, the findings of this study confirm how it also remains a challenge as Trusts struggle to implement PPI effectively.

Despite the clear mandate to involve patients and public in the improvement of healthcare products and services, there remains a gap in the evidence base relating to the outcome and impact of PPI activities (DH, 2006; Mockford et al, 2011). CLAHRCs have represented an opportunity to bridge this gap by embedding PPI at the heart of the implementation process, but as this study has shown, implementing PPI has met with mixed levels of success from site to site.

Within this study reference to PPI is noticeable due to its absence within participants' accounts of implementation at Hazeldean and Oakdown. Whilst this may be due to an artefact of the interview schedule, it may also provide a stark

reminder as to how far even collaborative partnerships have to go before patients and carers are truly integrated into research and implementation teams. Indeed, the cross case analysis revealed a striking contrast with Ashgrove, where PPI was discussed in participants accounts with greater depth and detail.

Whilst this represents an initially interesting finding it is also unsurprising: in its second year Ashgrove underwent an external review which highlighted its failure to attend to some of the primary tenets of the NIHR implementation mandate, namely building stronger bonds between universities and healthcare providers, as well as engaging a diversity of identified stakeholders as contributors to the implementation process. In response, Ashgrove established a dedicated PPI lead, whose expertise stemmed from her previous experience of engagement work with service-user groups. PPI at Ashgrove thus became a priority, as opportunities for patient and public involvement were sought and identified through, for example, the development and implementation of a research opportunities tool. The tool had two purposes: firstly, it made visible the points within the research process at which patient and public stakeholders could be recruited and engaged; and secondly it functioned as a *boundary object-in-use* to raise awareness and educate researchers and academics to the importance of attending to these opportunities.

This renewed focus on PPI did not, however, safeguard Ashgrove from providing some counter examples demonstrating the deleterious effect a failure to attend to PPI can have. This is unambiguously illustrated by the disastrous attempts to implement both a diabetes score, and an online cardiac rehabilitation eLearning programme, both of which failed to a dramatic effect. Overlooking the importance of PPI led to the development of a diabetes assessment tool that was found to be not only unappealing, but actually offensive to its target BME audience; whilst the online cardiac rehabilitation programme was rejected by users on the basis of not reflecting their needs and priorities as patients.

PPI was not entirely neglected across cases – at Oakdown it is referred to indirectly by a participant who recalls how dysphagia is a topic that is readily engaged with by “anyone who’s ever been effected by swallowing problems”, whilst at Hazeldean the feedback from patients involved in the trialling of the heart failure alert card provides valuable evidence about how the card operated in practice.

Although there was little data relating to it specifically in Phase Two, the development of Hazeldean's stroke review tool was directly influenced by the contributions of patients and carers. The purpose of this project was the redevelopment of a standard six month post stroke assessment tool by populating it with a wider set of questions relating to quality of life issues, and other areas that discussion with stroke survivors and their families had shown to be important. Rather than focusing entirely on benchmarking progress made towards clinical care and treatment objectives, the tool was updated with knowledge gained directly via PPI. However, despite the profile of this tool and its launch, it was discussed in little detail by participants from Hazeldean.

One reason for this may be that there was as yet little data to reveal how it was succeeding in practice, and that those objects and ideas which were high profile due to their high level of success (or failure), were the ones which naturally drew participants attention.

In this study investigating the role of PPI led to a number of important findings. Firstly, that despite a national funder's directive to embed PPI at the core of implementation activities it remained variably understood and implemented to various degrees. Secondly, CLAHRCs provided a rich opportunity to evaluate the outcome and impact of both attention, and a failure to attend to, PPI during implementation. The findings of this study contribute to the growing evidence around evaluating the role and influence of PPI by providing clear examples of what can happen if patients and public are overlooked as valued stakeholders within the implementation process, and how their engagement can positively influence the outcome of implementation activities, providing a mechanism for success even in the face of previous failure.

In terms of the influence of PPI on the development of *boundary objects-in-theory* and *in-use* the evidence is unequivocal: patients and their carers are essential stakeholders whose engagement in the development of shared things and ideas is crucial. In terms of the theory developed as an outcome of this study PPI is seen to be an essential element of the type of collective bricolage that is required to transform a *boundary object-in-theory*, into a *boundary object-in-use*. Objects developed in the absence of PPI are those that are repeatedly shown to

experience poor uptake due to compromised appeal: they are meaningless, lack resonance, represent divergent viewpoints and values, and ultimately suffer from a sense of inauthenticity which limits their utility in practice.

Positive and negative boundary objects

The findings support an alternative view of boundary objects, suggesting that some objects can be identified both as objects around which collaboration can be enacted (positive boundary objects), and simultaneously as objects which are contentious and volatile (negative boundary objects), for example the way in which the CKD collaboration between Ashgrove and Hazeldean was hindered by a sense of competing and retaining rather than sharing tools and resources. Whilst there is little in the literature to suggest that this dimension of boundary objects has been explored in depth, this study draws support from Star's (2010) assertion that any object can potentially operate as a boundary object under certain conditions of scale and scope but not under others. The findings of this study suggest that an object can simultaneously possess boundary spanning and boundary reinforcing properties; that is under certain conditions an object may provide a fulcrum for collaboration or conflict, contingent on the balance of contextual factors.

This dual role, as a catalyst for collaboration as well as conflict, provokes further questions around the way in which boundary objects are created. It emphasises the symbolic and the intangible, warning against complacency regarding the complexities of collaboration during implementation.

Challenges of boundary object creation and development

The boundary object literature warns that it is challenging to recreate boundary objects, emphasising the difficulties that can arise when attempting to reproduce the characteristic combination of stability and flexibility that represents the hallmark of boundary objects. Henderson (1991) revealed the loss of interpretive flexibility when drawings were substituted with CAD (computer assisted design). Henderson's work showed how drawings provided more effective boundary objects than a static technology within which multiple and changing perspectives were poorly accommodated (Henderson, 1991). Evidence from the design literature

also draws attention to the fate of many designated boundary objects, which, despite their intended use, are frequently rejected by intended users due to a loss of intrinsic flexibility and subsequent inability to accommodate multiple viewpoints simultaneously (Atwell, 2011).

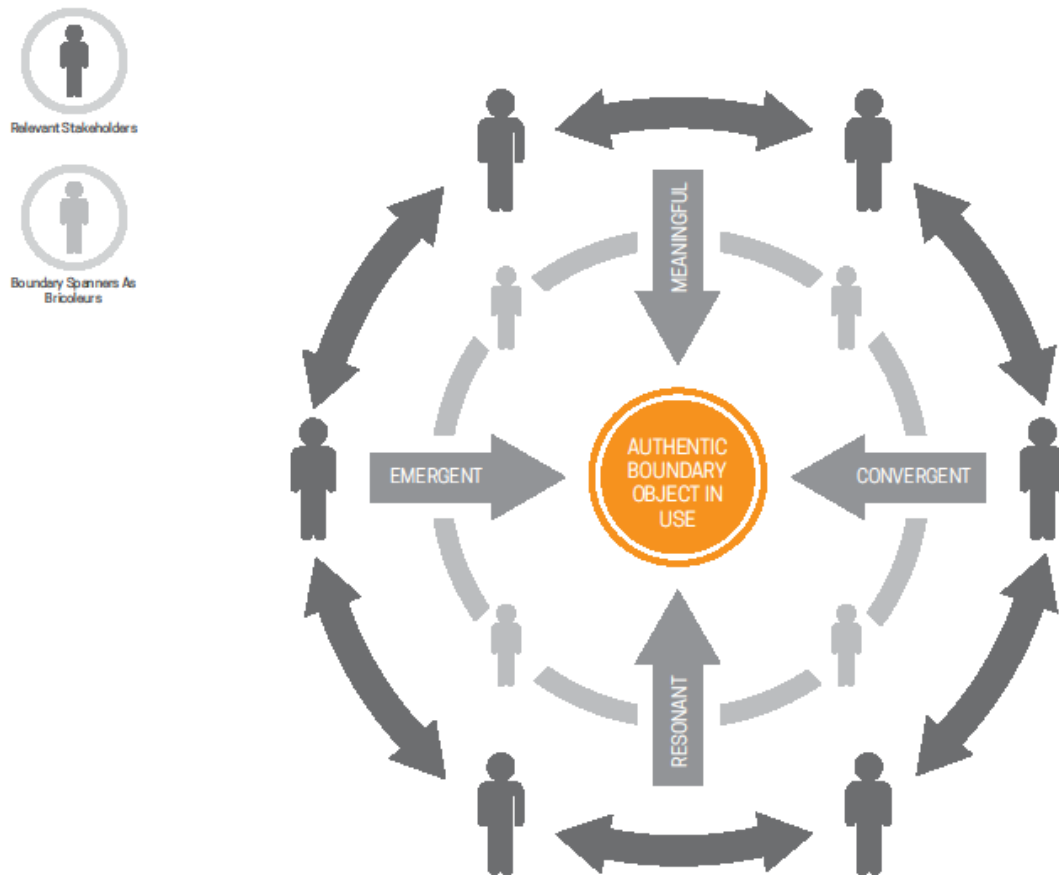
The challenge of generating boundary objects for implementation reflects these issues. It is clear from the findings across the three studies that variable levels of stakeholder involvement in the design and development of *boundary objects-in-theory* and *in-use* can lead to mixed levels of uptake. The findings demonstrated how increasing the way in which boundary objects are valued across all stakeholders by increasing their resonance and authenticity through collective endeavour, can help to encourage uptake by instilling such objects with relevant stakeholder knowledge and promoted a sense of shared ownership. This increased commitment to using objects reproduced in this way, because they possessed an intrinsically higher value to all relevant stakeholders. The challenge remains in how the developer of boundary objects for implementation are able to identify and engage all relevant stakeholders in the process, and whether or not the traditional and hierarchical systems which remains the feature of academia and the NHS are able to accommodate a new way of working in which all stakeholders are equal members of the design team.

Whilst the rhetoric of stakeholder engagement and some commitment to the principles of PPI is evident across the cases, there remained issues in putting these principles into practice. The case study indicates that both time and resources beyond the short lifespan of CLAHRC are required to do this effectively – time will now tell whether the lessons learned from this first cycle of CLAHRCs are carried into a second cohort of CLAHRCs. At the time of this study coming to a close the second call for CLAHRCs had been announced, and a new generation of Collaboratives was in development.

The findings of this study suggest that if the principles of collective bricolage are put into practice to create boundary objects that are co-produced, resonant, and authentic to all relevant stakeholders, then there is an increased likelihood that these objects will be shared across boundaries to unify and align different stakeholders involved in getting research into practice. However the level of

engagement that is achieved will influence the overall impact and effectiveness of any objects produced in this way.

Figure 2: Theory of boundary object emergence



This diagram represents the way in which *boundary objects-in-theory* are transformed into *boundary objects-in-use* through a process of collective endeavour identified as a type of *bricolage*. It illustrates the way in which boundary spanners apply their *bricoleur* skills to instigate, encourage and sustain stakeholders to work together across boundaries, a process which is facilitated through the creation of an authentic co-produced *boundary object-in-use*.

The diagram highlights the way in which the properties of a boundary object are generated via this process, and instilled in the final boundary object to bestow authenticity. Authenticity is a combination of the four properties (represented by the inner pointing arrows), and it is this which lends a *boundary object-in-use* its appeal in practice (as opposed to a *boundary object-in-theory* i.e. on paper). In the diagram relevant stakeholders (figures occupying outer orbit) are shown as linked to each other through relationships that are founded on working together towards shared goals (where working together is represented within the space between the outer orbit). Whilst these goals may vary in the way in which each is interpreted and prioritised from stakeholder to stakeholder, they provide a motivating incentive to sustain working together. Collective bricolage is then cultivated by the skills and influence of boundary spanners as *bricoleurs*. Participation in this process is further strengthened as an outcome of working together, as relevant stakeholders become more deeply engaged in communicating and sharing knowledge and skills across various diverse and complex boundaries (represented by the two orbits; arrows indicate boundary interactions between stakeholders, whilst boundary spanners are shown to occupy a steady orbit as they traverse and bridge boundaries between stakeholders).

The role of the boundary spanner as *bricoleur* is highlighted (inner orbit) as providing a bridging and brokering role, applying *bricoleur* tactics to instigate and encourage stakeholders to work together. Boundary spanners do this by using their *bricoleur* skills to engage stakeholders through the detection and promotion of shared views and needs. By making the overlap between these shared concerns visible, the boundary spanner as *bricoleur* is then able to encourage participation in the creation of a co-produced *boundary object-in-use* which is emergent through *bricolage*, is meaningful, represents a convergence of viewpoints, is symbolically resonant, and ultimately authentic to all relevant stakeholders (shown centre of diagram). This co-produced boundary object in use can then play a role in aligning, unifying and engaging relevant stakeholders in a shared task – in this case getting research evidence into clinical practice.

CHAPTER 8: THE ROLE OF BOUNDARY OBJECTS IN IMPLEMENTATION

IMPLICATIONS AND RECOMMENDATIONS

What this study adds

This study develops our understanding of how boundary objects emerge and how this determines their effectiveness in implementation. The question of how to create boundary objects that are both appealing and useful has not previously been addressed in the context of health care and there have been persistent problems with poor uptake and ineffective use. This study has clarified differences between *boundary objects-in-theory* and *boundary objects-in-use*, highlighting the challenges of this transition.

Boundary objects, by their nature, are imbued with social meaning. This study demonstrates how a process of collective endeavour (*bricolage*) must occur if objects are to become *boundary objects-in-use*. All the objects which were actually used during boundary spanning activities in this study were produced through collective endeavour, involving all relevant stakeholders in the design and development, generating an object which was co-produced. When crucial stakeholders – such as users and front-line staff - were excluded from the process of development, the objects produced were neither useful nor effective.

The properties that make such objects useful and appealing are created during the process by which they emerge; these properties embody a convergence of stakeholders' views and values. These are the properties that make the object meaningful and contribute to its level of symbolic resonance among stakeholders, so that it is perceived as authentic by users.

The greater its authenticity, the more likely it is that a *boundary object-in-theory* will evolve to become a *boundary object-in-use*. Those objects which are perceived as inauthentic or which fail to take account of the needs and priorities of those who are expected to use them will not become effective *boundary objects-in-*

use; indeed, they can have damaging, inhibitory effects, reinforcing boundaries rather than spanning them.

Recognising that objects which may appear on paper to possess the structural qualities of boundary objects (*boundary objects-in-theory*) may not act as *boundary objects-in-use*, has important implication in terms of future design and development of boundary objects, and for implementation as a whole. Boundary objects can exert either inhibitory or catalytic effects on the implementation process, depending on whether they are perceived in positive or negative ways. This builds on Star's (2010) argument that regardless of something's *potential* to be a boundary object, whether or not it *becomes* one is determined by the conditions of use.

This study broadens the understanding of the types of shared things and ideas that can operate as boundary objects during implementation. It shows that the outputs of research such as evidence-based tools, protocol, guidelines, and pathways could all potentially operate as boundary objects in theory and practice, but their efficacy is contingent on the way they are perceived by the intended users. An object such as a tool or guideline may operate effectively at a commissioner level as it embodies a convergence of priorities, but may fail or be met with resistance at a frontline where it may be perceived as lacking relevance and authenticity.

The study also highlights a less studied aspect of boundary objects: those things and ideas which are less concrete and intangible, for example the ideas and concepts that are shared between stakeholders. Ideas around implementation itself, the various clinical conditions around which implementation work is focused, notions of 'improved patient care' and shared ideas around concepts like 'nutrition' which have broad ranging appeal amongst a variety of stakeholder groups.

Taking an approach to boundary object development which is underpinned by a commitment to co-production and stakeholder engagement can make it possible to produce boundary objects that will be much more effective in implementation. By aligning and reconciling different stakeholder agendas, stakeholders can achieve a shared understanding of why implementation is important, and how it can be

achieved. This can be expected to produce enhanced levels of stakeholder engagement and improved implementation outcomes.

This chapter considers how boundary objects can be utilised during the implementation process, both in terms of their potential as the products and outputs of research which are used to convey knowledge across boundaries, and as a mechanism by which to cultivate collaboration between stakeholders. The challenge of developing boundary objects is discussed, exploring some of the barriers that can impede the transition from *boundary object-in-theory* (i.e. on paper) to *boundary object-in-use* (i.e. used in practice). The chapter concludes with a discussion of some of the limitations of the study, before making recommendations as to how the concept of boundary objects could be applied as a catalyst to assist the process of getting research into practice as well as making recommendations for policy, practice and research. The following recommendations are based on the findings of this study:

Box 8: Recommendations for research and practice

- Boundary objects must be co-produced in partnership with all relevant stakeholders.
- Boundary objects must be instilled with sufficient plasticity that they can be readily adapted to different contexts of use and user.
- It is important to engage users at the outset of boundary object development, and ensure that user knowledge is embedded in the final object. This can encourage the transition from boundary object-in-theory to boundary object-in-use.
- There must be a process of contextualisation before guidelines, pathways, tools and other rigid outputs of research make the transition from boundary objects-in-theory to boundary objects-in-use.
- Knowledge, and the objects in which it is conveyed, translated and embedded, must reflect a user-identified need, emphasising the fundamental and intrinsic link between knowledge, users, and context.

- It is important to identify the most recognisable and understood terminology in use within an implementation site, and utilise this language to explain the purpose and benefits of implementation, in order to engage stakeholders in this process.
- The implication for future implementation work is that it is important to establish a common ground and language around implementation: do stakeholders take a service improvement stance, or is another concept such as knowledge translation better understood?
- Without further longitudinal and field-based investigation, it remains challenging to determine the potential long-term influence of these objects on the process of getting evidence into practice.

These recommendations have particular relevance for the design, development and delivery of formal outputs of research, in particular those things, such as clinical guidelines, which often represent the focus of implementation work at a national and local level. The following section suggests that viewing guidelines and other formal representations of best practice knowledge as boundary objects-in-theory could have an influence on their uptake in practice. The rationale is that by taking this view enables an appreciation of the potential for adaptation by instilling a level of plasticity to guidelines, offsetting the inherent rigidity of such objects. This would encourage the development of guidelines which can be readily adapted to users' needs and the context of use.

Guidelines as boundary objects-in-theory and in-use

Guidelines, protocols and other outputs of research were the most visible potential and actual boundary objects identified across all three CLAHRCs. However, the study shows that despite their prominence as the focus of much implementation activity, and despite their intended use as objects to convey knowledge across boundaries (i.e. *boundary objects-in-theory*), they do not always operate in this way and their success as *boundary objects-in-use* is limited. Without extensive tailoring, guidelines, protocols and other forms of evidence-based tools can remain rigid and restrictive. Adapting such objects by embedding local knowledge and

contextualising them to suit users' needs makes them meaningful and more appealing in practice. The study demonstrates that this is most effectively achieved by following the principles of co-production involving all relevant stakeholders and through a process of collective endeavour which is best described as bricolage. The recommendation for guideline developers and others involved in creating evidence-based products is that if such things are to make the transition from *boundary objects-in-theory* to *boundary objects-in-use*, then they must be co-produced in partnership with all relevant stakeholders, and instilled with sufficient plasticity that they can be adapted to fit different contexts of use.

Much attention has been given to the challenges of guideline implementation, with evidence suggesting that the impact of guideline implementation is low, resulting in around 10% improvement to outcomes of care (Grimshaw et al., 2004; Grimshaw et al., 2006). This prompts questions regarding the investment in guidelines and whether guidelines are effective methods to convey evidence-based knowledge, as well as the way in which their development is resourced and conducted. The findings of this study confirm that when guidelines, protocols, tools and other outputs of research are implemented without sufficient adaptation, and in the absence of stakeholder involvement, levels of uptake will be low.

Co-produced guidelines as boundary objects

Returning to the issue of guideline development and implementation, Harrison *et al* (2010) suggest applying the ADAPTE process, which gives emphasis to the role stakeholders play in tailoring a guideline to meet a specific practice context. Whilst the ADAPTE process echoes the knowledge-to-action cycle's mandate to engage stakeholders at every stage of the implementation process, embedding stakeholder knowledge within the final guideline, Harrison *et al.* recognise the inherent tensions that can arise when attempting to reconcile best practice evidence with local need without loss of knowledge integrity. Harrison *et al*'s description of applying ADAPTE to localise guidelines supports a view of guidelines as *boundary objects in-theory* by reinforcing the need for guideline developers to adopt an adequately flexible format whilst recognising and respecting the source materials (p. 182). The principles of this process converge with the findings of this study to support an approach to guideline development in which collective processes are utilised to

produce guidelines which are sufficiently flexible to tolerate tailoring without loss of knowledge integrity. However, attempting to strike a balance between engaging multiple stakeholders whilst preserving the integrity of evidence can provoke conflict during guideline (or other *boundary object-in-theory*) development. The first arises in response to the assumption that guidelines necessarily reflect best practice evidence: Shaneyfelt *et al* (2009) have found that there is mixed adherence to the current standards of guideline development amongst developers (p.989). The issue of whether or not a guideline is rigorously developed is again brought up by Brouwers *et al* (2010), who surmise that it remains a problematic area for those who rely on guidelines as providing a gold standard of evidence. Finally, assumptions may be “inscribed” about users’ needs which may not reflect practice reality (Akrich, 1992; Oudshoorn, 1998).

Others such as Umscheid (2009) challenge the assumption that stakeholder knowledge (in terms of patient preferences) should be incorporated within all guidelines. Umscheid criticises such a focus as potentially compromising the robustness of guideline evidence, arguing that it is not always possible or appropriate to embed such knowledge. Umscheid argues that this type of knowledge can hinder the applicability of guidelines and overlooks the fact that many guideline developers already struggle to incorporate best practice evidence into guidelines, or to even follow rigorous guideline development approaches (for example Shaneyfelt *et al*, 2009; Brouwers *et al*, 2010).

Whilst Star highlighted the role of standardisation in smoothing contextual differences, she also emphasised the need to preserve plasticity, describing boundary objects as things which are weakly structured in general use, becoming more strongly structured in local use (Star, 1989). Viewing guidelines and other forms output of research as boundary objects has implications in terms of the way in which these objects are generated and the range of stakeholders engaged in the process of design, development and delivery. Guidelines as boundary objects must strike a balance between conveying knowledge which retains its integrity, whilst simultaneously exhibiting a flexibility which enables adaptation across multiple contexts. Crucially, guidelines and other knowledge products must sufficiently meet the knowledge/evidence needs of all intended users.

If guidelines are to make the transition from *boundary objects-in-theory* to *boundary objects-in-use*, it is important to engage users at the outset, and ensure that user knowledge is embedded in the final object. Authors such as Liotta *et al* (2010) in the UK, and Harrison *et al* (2010) in Canada, explicitly place patients, practitioners and other stakeholders as key members of the guideline development team and contributors of knowledge. This approach, in which participation includes all those whose views and knowledge may be relevant to the final product, naturally chimes with the findings of this study. This confirms and reinforces the importance of co-production, highlighting how it can help to ensure that objects produced in this way are relevant and meaningful across stakeholder groups.

The study revealed how a process of contextualisation must occur if guidelines, pathways, tools and other outputs of research are to make the transition from *boundary objects-in-theory* to *boundary objects-in-use*. In essence, this process, most effectively conducted collectively, operates to offset the inherent rigidity of these objects. This links to notions of co-production and corresponds with findings outlined in the design literature which suggest that co-produced products possess higher intrinsic value amongst users (Du, Jing and Liu, 2012). The findings of this study suggest that adopting a co-production approach to boundary object design and development can increase the likelihood that multiple stakeholder perspectives will be accommodated, increasing a sense of shared ownership, enhancing appeal and ultimately improving uptake of the final object.

The three case studies show that for evidence to be successfully implemented, it must be relevant to users (Rycroft-Malone *et al*, 2004). This confirms the importance of taking a wider view of knowledge that recognises the tacit (Nonaka *et al*, 2001; Garvey and Williamson, 2002), experiential, constructed (Tsoukas and Mylonopoulos, 2004) and contested nature of knowledge which influences the way in which it is perceived, mobilised, and consumed. In healthcare, knowledge which is most appealing to practitioners appears to be that which reflects their own values and beliefs, is accessible, and above all chimes with a credibility which may have little to do with empirical accuracy. This is demonstrated by Fitzgerald and Dopson (2005), who contrasted the way that the findings of randomised controlled trials (RCTs) are commonly portrayed as the 'gold standard' of robust evidence with the

views of GPs who argued that such evidence rarely applies to “the patient in front of you” (2005, p. 141).

This reflects wider arguments across implementation, where there is growing recognition of how the context of use can influence the translation of evidence into practice (Rycroft-Malone et al, 2004; Nutley, Powell and Davies, 2013). Nutley, Powell and Davies (2013) argue that what counts as good (or good enough) evidence is contingent on its intended use. This is pertinent to this study as it supports the argument that knowledge, and the objects in which it is conveyed, translated and embedded, must reflect a user-identified need, emphasising the fundamental and intrinsic link between knowledge, users, and context. If evidence/knowledge such as that conveyed within guidelines, protocols and pathways is to be meaningfully viewed and approached as both *boundary objects-in-theory* and *in-use*, then such objects must retain sufficient detail and possess adequate plasticity to ensure they can be shared across different contexts of use and user.

Shared concepts as boundary objects in theory and in use

Clinical topics have been identified as symbolic boundary objects within this study. Whilst the concept of ‘efficiency’ has been identified as a visionary boundary object by Briers and Chua (2001), little exploration of the role of shared ideas can be found in the research literature. Identifying clinical topics (e.g. medical conditions, symptoms and treatments), as conceptual and inconsistently persuasive boundary objects provokes an exploration around the way in which such concepts can operate as variably cohesive and/or contentious boundary objects in theory or in use. ‘Implementation’ as a concept itself represented another powerful symbolic object. When it was framed in terms of using the shared idea of ‘improving patient care’, there were higher levels of uptake at Oakdown, as this resonated with all relevant stakeholders across various boundaries. However, deploying other concepts associated with getting evidence into practice such as ‘EBP’ or ‘quality improvement’ as boundary objects required an awareness on the part of the boundary spanner of the different languages spoken by different stakeholders when discussing implementation. This highlights the necessity of boundary

spanners possessing a type of credibility which can only come from familiarity with the clinical context.

The implications of this in terms of implementation are quite clear: instead of making assumptions about the significance of specific shared ideas, it is necessary to do the groundwork and assess the context of the implementation site before initiating any programme of work. For example, it is essential to ask what is important to users in practice, and what types of boundaries require bridging. Taking heed of PARIHS (Rycroft-Malone et al. , 2004), the findings imply that it is necessary to assess any barriers or enablers that are already present; to take stock of the intrinsic culture, to understand what is meaningful and what is needed at a particular site. Taking a stakeholder-led approach has been shown to be the most effective way to uncover and clarify these contextual features. Failure to do so can lead to the misappropriation of concepts which may appear to represent *boundary objects-in-theory* but may struggle to succeed as *boundary objects-in-use*.

Implementation?

Both in principle and in practice, the concept of implementation means different things to different people. This study showed how the various terms and phrases associated with getting evidence into practice represented a multitude of overlapping ideas which sometimes led to confusion and disharmony rather than aligning stakeholders to work together towards a shared implementation goal. The implications for future implementation work are that it is important to establish a common ground and language around implementation: do stakeholders take a service improvement stance, or is the notion of knowledge translation better understood? In terms of disciplinary approaches, the study demonstrated how an ongoing struggle to establish conceptual clarity can impact on different stakeholders' ability to collaborate. This chimes with the work of Allen (2014), who proposes that boundary objects can be both positive and negative in terms of their boundary spanning (or reinforcing) impact. However, when a shared vision and understanding of implementation is established at the outset, and when there is a sense of conceptual fidelity which is cascaded effectively throughout all relevant stakeholder groups and organisational levels, and when this is adequately matched

to stakeholder needs and clinical priorities, then implementation, and the theories, frameworks, models and approaches associated with it, can be used to open up communication and engender a sense of shared understanding between different stakeholder groups involved in getting evidence into practice.

An outcome of this study is that it is important to identify the most recognisable and understood terminology in use within an implementation site, and utilise this as a boundary object to explain the purpose and benefits of implementation and to engage stakeholders in this process.

Collaboration?

Collaboration is central to the way in which boundary objects emerge and the role they play in implementation. However whilst this study confirmed the role of boundary objects as providing frameworks for collaboration (for example Reddy and Phelps, 2009) during implementation, it also highlights some of the issues provoked by the assumption (evident across the rhetoric of CLAHRCs and implementation as a whole) that all relevant stakeholders actually wish to collaborate in implementation. Collaboration involves a willingness to engage in shared decision making, and assumes that the necessary precursors of mutual trust and respect are in place (Lown et al, 2008). In healthcare, this is often questionable. Exploring the implementation of a tool to support shared decision making between physicians and patients, Lown et al. (2008) found that being willing and able to articulate one's preferences, desires and understanding is crucial. Implementation as a co-productive process revolves around shared control and negotiation between stakeholders as equal partners contributing different types of knowledge during a two-way dialogue. Lown *et al's* (2008) warning is reflected in the findings of this study: the willingness to collaborate cannot be assumed; adequate trust and respect is required for collaboration to succeed, despite the presence of objects and ideas intended to support this process.

Positive and negative boundary objects

The findings support an alternative view of boundary objects, suggesting that some things can be identified both as objects around which collaboration can be enacted

(positive boundary objects), and simultaneously as objects which are contentious and volatile (negative boundary objects). There is little in the literature to suggest that this dimension of boundary objects has been explored in depth, but this study draws support from Star's (2010) assertion that any object can potentially operate as a boundary object under certain conditions of scale and scope but not under others. Findings suggest that an object can simultaneously possess boundary spanning and boundary reinforcing properties; that is, under certain conditions an object may provide a fulcrum for collaboration or conflict, contingent on the balance of contextual factors.

This dual role, as a catalyst for collaboration as well as conflict, provokes further questions around the way in which boundary objects are created. It emphasises the symbolic and the intangible, warning against complacency regarding the complexities of collaboration during implementation.

Challenges of boundary object creation and development

The boundary object literature warns that it is challenging to recreate boundary objects, emphasising the difficulties that can arise when attempting to reproduce the characteristic combination of stability and flexibility that represents the hallmark of effective boundary objects. Henderson (1991) revealed the loss of interpretive flexibility when CAD (computer assisted design) was substituted for drawings. Henderson's work showed how drawings provided more effective boundary objects than a static technology within which multiple and changing perspectives were poorly accommodated (Henderson, 1991). Evidence from the design literature also draws attention to the fate of many designated boundary objects, which, despite their intended use, are frequently rejected by intended users due to a loss of intrinsic flexibility and subsequent inability to accommodate multiple viewpoints simultaneously (Atwell, 2011).

The challenge of generating boundary objects for implementation reflects these issues. It is clear from the findings across the three studies that variable levels of stakeholder involvement in the design and development of *boundary objects-in-theory* and *in-use* can lead to mixed levels of uptake. The findings demonstrated how increasing the way in which boundary objects are valued across all

stakeholders by increasing their meaningfulness, resonance and authenticity through collective endeavour, can help to encourage uptake by instilling such objects with relevant stakeholder knowledge and promoted a sense of shared ownership. This increased commitment to using objects produced in this way, because they possessed an intrinsically higher value to all relevant stakeholders. The challenge remains for developers of boundary objects for implementation to find a way to identify and engage all relevant stakeholders in the process, and to discover how the traditional and hierarchical systems which remain the feature of academia and the NHS may accommodate a new way of working in which all stakeholders are equal members of the development team.

Whilst the rhetoric of stakeholder engagement and some commitment to the principles of Patient and Public Involvement (PPI) is evident across the cases, there remained issues in putting these principles into practice. This case study indicated that both time and resources beyond the short lifespan of CLAHRC are required to do this effectively – time will now tell whether the lessons learned from this first cycle of CLAHRCs are carried into second generation CLAHRCs. At the time when data collection for this study was ending, the second call for CLAHRCs had been announced and a new generation of Collaboratives was in development.

The findings of this study suggest that if the principles of collective bricolage are put into practice to create boundary objects that are co-produced, resonant, and authentic to all relevant stakeholders, then there is an increased likelihood that these objects will be shared across boundaries to unify and align the different stakeholders involved in getting research into practice. However, the level of engagement that is achieved will influence the overall impact and effectiveness of any objects produced in this way.

The following section explores the potential implications and impacts of using boundary objects in the context of implementation, discussing the potential role of boundary objects as catalysts for getting research into practice before exploring limitations of this study and the implication this has for future research.

Impact

The impact of boundary objects in terms of their influence on implementation is difficult to assess precisely. The findings of this study show that *boundary objects-in-use* which are co-designed and co-produced through collective processes are more likely to be appealing to users, to engender collaboration, and can be predicted to possess higher levels of uptake. The case studies succeed in demonstrating how and why boundary objects generated and mobilised in this way possess greater capacity to unify different stakeholder groups. However, without further longitudinal and field based investigation, it remains challenging to determine the long term influence of these objects in getting evidence into practice.

Whilst the study succeeds in illustrating a number of perceived impacts associated with the use of boundary objects during implementation, it also suggests that further investigation is required to explore the processes associated with the bridging of various boundaries and divisions amongst stakeholder groups through negotiation, sense-making and establishment of a shared understanding through the use of an object; how an alignment and reconciliation of stakeholder priorities can be maximised to enable partnership working towards a shared goal; and how boundary objects can be selectively developed and deployed to encourage engagement in the implementation process. Clarifying these processes through further targeted research could lead to potential benefits in terms of influencing the successful outcome of implementation activity.

Unification through shared understanding

The first key area relates to the primary function of a boundary object: to enable one group to speak to another despite the presence of multiple physical, epistemological, temporal, organisational and other boundaries (see Rycroft-Malone et al, 2015 report). Stakeholders are enabled to work together more readily when a shared understanding around implementation is established. *Boundary objects-in-use* provide a platform for discussion and adequate representation of different stakeholder perspectives that when crafted and mobilised with skill and insight, can provide a shared object around which implementation work, roles, responsibilities and expectation can be coordinated.

When operating in this way, such an object can help unify and strengthen communication and cooperation between different stakeholder groups. However, despite displaying cohesive properties, such objects may also provoke contention and conflict if there is inadequate convergence between the views and values of different stakeholders.

Alignment, reconciliation and convergence

A significant impact of *boundary objects-in-use* during implementation is the way in which the use of such objects can help to align the priorities and agendas of different stakeholder groups. The use of boundary objects can help to reconcile one stakeholder's agenda with another's priorities, in effect helping to translate the concerns of one group into the concerns of another. This overlap of priorities is enshrined within a boundary object, helping to ensure that a shared goal is visible throughout the implementation process.

Enhanced levels of engagement

When adequately co-produced, the use of boundary objects can generate an opportunity for enhanced levels of engagement in implementation. By widening participation in their production and extending the development process to include members of relevant stakeholder groups, shared ownership is achieved. Co-producing an object with the input of all those who will be involved in its maintenance and use helps to ensure that a boundary object is appealing and attractive to a broader range of stakeholders who are committed to its upkeep and ongoing success.

Improved implementation outcomes

The cumulative impact of the above three points generates a situation in which boundary objects as the topic and focus of implementation can play a catalytic role in implementation. By stimulating communication and generating a fertile opportunity for cross-boundary cooperation, boundary objects have the potential to be a powerful tool in the implementation tool kit. Furthermore, their capacity to reconcile disparate agendas and promote a sense of alliance between

stakeholders means that they can exert a powerful influence in terms of the collaborative potential between different stakeholders involved in getting evidence into practice. The proposal that their emergence and uptake is both contingent and connected to coproduction and subsequent collaboration between stakeholders means that their potential to play a catalytic role within implementation should not be overlooked. Nevertheless, despite this potential to enable collaboration, there exists a risk that such objects may simultaneously operate in an inhibitory fashion by conveying knowledge that may be provocative or contentious, according to the identities and contributions of stakeholders involved.

The role of boundary objects in implementation through CLAHRCs

This case study has revealed that boundary objects can potentially play a catalytic role in implementation if they have been developed through bricolage and are perceived as meaningful, resonant and authentic across all intended users. This potential was reported by participants but not observed by myself directly. However analysis of participants' responses suggests that creating, developing and mobilising shared objects which can convey the values and perspectives of all stakeholders sufficiently whilst preserving a level of best practice knowledge fidelity can have a catalytic influence on implementation. This is evidenced by the provision of a shared object to enable communication and collaboration between multiple stakeholders who may possess differing aims and interpretations of getting evidence into practice.

The wider implications of this study – the transformative potential of boundary objects on a global scale

Whilst it is clear that there are a number of benefits which could be associated with expanding our understanding of the action-based properties of boundary objects, for example as outlined above: increased alignment, coherence, and improved outcomes, the findings of this study suggest that this knowledge could possess wider implications in terms of its applicability and potential impact across a breadth of collaborative practice domains.

As noted by Williams (2012), there is an inescapable mandate to seek collaborative, partnership working across public policy and practice in the UK and abroad. And yet effective joined up working remains challenging and elusive (Williams and Sullivan, 2010). Working together provides the cornerstone not just of multi-disciplinary care planning and delivery within healthcare, or provides the basis of contemporary approaches to bridging the research practice gap (as demonstrated by the CLAHRC initiative), it also possesses fundamental relevance across education, social care, the justice system, the environment and conservation sector, as well as numerous commercial and industrial settings within which different groups are brought together to reach a shared goal.

However due to the original nature of the action-based view of boundary objects proposed, it is difficult to make concrete recommendations. Despite this a number of implications are recognised. Extending the view of *boundary objects-in-theory* and *in-use* to encompass all those shared things and ideas which have an inherently cohesive function, driven by properties relating to how meaningful these are, the extent to which they represent and accommodate a convergence of stakeholder perspectives, how this in turn influences the level of symbolic resonance such objects hold for users, and how these properties coalesce to determine the overall authenticity of an object, have profound and far reaching implications across any domain where working together has become imperative.

Consequently, rather than focusing on the concrete objects which can both hinder and enhance collaboration, such as the architectural blueprints described by Henderson, or the contracts discussed by Koskinen and Makinen (2009); taking an action-based view in which the properties of boundary objects are instilled through a process of collective action could help to transform new product design, development and delivery. In terms of the commercial viability of such an approach the implications are clear: taking this tactic could transform the way in which products are created and redirect marketing tactics by reversing the traditional flow of product design, development and marketing. Instead of attempting to trigger interest and stimulate demand, this approach would commence with a stakeholder identified need, working with stakeholders to create and produce products and services which are inherently appealing and

commercially viable. Products and service rendered in this way will be those which fill a gap in the market as detected by consumers, rather than producers.

Some potential implications that explain the applicability of understanding boundary objects as shared things and ideas whose utility arise from their emergence as an outcome of collective bricolage include:

- Increasing the engagement of pupils in educational exercises e.g. through the development of more intuitive and meaningful teaching resources and technologies.
- Improving the breadth and contributions of multiple stakeholders in local, national and international conservation programmes: for example by generating and sustaining engagement in green initiatives such as engaging local residents in grass roots conservation efforts.
- Increasing capacity in terms of the public understanding of science e.g. through working with science education providers, centres and event organisers to develop interactive and participatory modes of engagement and education. This could link in with the wider mandate of building science, technology, engineering and mathematics (STEM) capacity and the potential advances in scientific understanding and technological progress this could herald.
- Improving the engagement in community and national decision-making, for example by generating policies and manifestos that reflect a specific populations priorities and needs.
- Encouraging investment in public and community ventures: for example the development and production of boundary objects would be used as a mechanism to engage local residents in public education, health and cultural events and initiatives.

An additional suggestion based on the findings of this study would be the active recruitment of individuals with bricoleur skills into knowledge brokering and boundary spanning roles across a wide range of disciplines. The findings indicate that a grasp of these skills, both in a formal and informal sense, is something that can prove valuable and useful which attempting to integrate collaboration and

change at a stakeholder and organisational level. However, there are some queries as to whether these are skills that can be taught, are learned through practical hands on experience, or represent an intrinsic quality of people who are naturally gifted with personal attributes that render boundary spanning a natural, rather than an acquired, talent.

In terms of viewing and valuing the skills of the bricoleur as a feature of effective boundary spanners there are also a number of implications: for example by recognising and valuing the informal bricolage that occurs on a day-to-day basis within classrooms, board rooms, and committees and at higher strategic and executive levels of organisations and projects. Rather than smothering the creativity and potentially maverick nature of these individuals, these skills – to look beyond the formal, to seek the opportunity to tinker and experiment, to encourage improvisation, could be cultivated in order to increase the influence and impact of an organisation in terms of stakeholder appeal and engagement.

From a theory development perspective the study contributes to an understanding of boundary objects that highlights the collective and symbolic as key indicators as to whether or not an object possess boundary spanning capacity. This has implications across all practice domains in which collaboration is key, as well as the numerous technological, ICT, and knowledge management domains in which attempts to generate effective boundary objects have met with failure (for example Atwell's (2011) discussion of the challenges of creating technology enhanced boundary objects, TEBOs).

The implications are far-reaching; for example, the theory of boundary object emergence developed as an outcome of this study could provide an alternative starting point for those engaged in the design, development and delivery of TEBOs and other boundary objects, refocusing designers to consider what it is that an object, for example a technology, piece of kit or equipment, is instilled with from a symbolically aware, user-centred perspective? Ashgrove gave the richest data on how and why instilling a *boundary object-in-theory* (the cardiac rehabilitation eLearning package) with user knowledge imbues it with the necessary meaningfulness that it resonated with patients and was more appealing in practice, thus successfully making the transition to become a *boundary object-in-use*.

In summary, it would be challenging to identify a domain – public or private, commercial or industrial, political, national or international – where collaborative working practice is not sought and encouraged. Not only do the findings of this study possess importance in terms of the potential of *boundary objects in-theory* and *in-use* to act as a catalysts for improving patient outcomes through the collective development of co-produced, co-owned products and services, things and ideas which can be meaningfully shared across a diversity of complex boundaries influence the translation of knowledge into evidence-based practice, but they also possess the potential to transform the way in which goods and services are produced, and the way in which teams of different stakeholders are cultivated and sustained. Thus the projected field in which these findings have relevance is extended to include commercial sectors such as business and organisational management, where shared objects and ideas generated according to the proposed the proposed theory could be utilised to enhance team cohesion, firm up organisational vision statements, and improve relationships and productivity within teams; but it also has potential relevance in the way in which industrial-scale projects and products are managed and executed.

The lessons learned from this study are thus manifold: always consider the needs of stakeholders, endeavour to engage all relevant stakeholders within the design and development process, and apply the principles of the theory developed as an outcome of this study to underpin this process. The breadth of these implications, and the relevance of these recommendations across a number of public, commercial, and industrial domains provokes the requirement for further study to investigate this theory in practice.

Limitations of the study

The findings of phase one revealed that whilst many objects could be identified as potential boundary objects (*boundary objects-in-theory*), it was unclear whether or not these objects operated as boundary objects in practice (*boundary objects-in-use*). Applying these terms highlights the disparity between theory and action, helping to clarify the action based distinction between things which possess the potential to operate as boundary objects and those shared objects which are used in practice.

Whilst phase one achieved what it set out to do (to identify any potential boundary objects, develop an understanding of where such objects may be found, and provide a springboard for phase two), it was not possible to clarify whether or not these *boundary objects-in-theory* made the transition to *boundary objects-in-use*, or the conditions which may influence this process.

A limitation of some of the documents analysed from across the three CLAHRCs is what the NIHR describes as a tendency to report “esteem factors” rather than actual impact on healthcare delivery (see document seven). This tendency to focus on the promotional is noted across all the documents sampled, skewing the data to give an ultra-positive portrayal of implementation through CLAHRC. In terms of the *boundary objects-in theory* identified during phase one, this means that there is scant mention of the challenges or complexity involved in implementing the many *standardised methods and tools*, and *models and maps* type boundary objects identified (for example the many outputs of research developed to share knowledge across the research-practice gap).

Conclusion

The concept of boundary objects has spread rapidly across a range of practice-based disciplines in which collaboration is key. However it has yet to be fully applied to the context of getting healthcare evidence into practice, a process referred to as implementation in this study. The potential for boundary objects as shared things and ideas which can enable one stakeholder group to communicate with another, despite different understandings and sometimes opposing views, raise questions about the role of boundary objects in implementation. Implementation requires different stakeholders to work together, and as such, it is necessary to bridge a range of boundaries in order to increase the likelihood that a successful implementation outcome is achieved. This study builds on previous understanding of boundary objects developed by Star and Griesemer, 1989; Briers and Chua, 2001; Carlile, 2002; Levina and Vaast, 2005) to propose an updated typology and understanding of boundary objects which highlights action-based properties rather than structural features.

Rather than defining boundary objects via their structural features i.e. whether or not they comply with Star and Griesemer's (1989) original conceptualisation, this study promotes a view of boundary objects as shared things and ideas which possess inherent embedded meanings. This develops the ideas of Fox and Briers and Chua (2001) to emphasise the symbolic potency of boundary objects. It also develops Star's (2010) final argument that simply because an object possesses cohesive properties under some conditions, it does not necessarily mean that it will operate as a boundary object in another context (scale and scope). Instead, I propose that there are things and ideas which can be identified as *boundary objects-in-theory* i.e. those which possess the features of boundary objects according to an updated typology, but which despite this may not represent boundary objects in practice i.e. *boundary objects-in-use*.

This distinction is important because for the first time it helps to clarify and anticipate the emergence of boundary objects and defines a new set of criteria which could be used to guide and encourage the creation of useful and effective *boundary objects-in-theory* and *in-use*. The study contributes to an understanding of boundary objects, and uses the concept to unpack the black box of complex interaction that takes place between different stakeholders who work together to get research into practice. It has taken an active look at the sorts of things and ideas upon which boundary spanning hinges during implementation activities. Instead of identifying boundary objects in retrospect, the findings of this study contribute to a more proactive approach to how boundary objects emerge and are used in practice. The study has shown how engaging all relevant stakeholders in the process of identifying boundaries to be spanned, and consequently within the entire development process, is crucial to the creation of useful boundary objects, and can directly influence the outcome of implementation activities. It demonstrates how a failure to engage stakeholders in this process can lead to objects which poorly represent the views and values of all stakeholders, and because of this can experience poor uptake, may trigger conflict by representing contentious objects or ideas, and ultimately may fail to make the transition from *boundary object-in-theory* to *boundary object-in-use*.

Looking forward

Organisations wishing to improve the uptake of evidence-based things and ideas, for example guidelines, tools and protocols, could do well to focus on cultivating boundary spanning relationships between relevant stakeholder groups. This study demonstrates that people in boundary spanning roles (boundary spanners) play an important part in generating a climate of collaboration between different stakeholder groups. It also highlights how it is crucial that these people possess a range of skills and attributes, including strong interpersonal skills and a credibility across the different domains of practice that they are intended to work across. These people play an integral role in both triggering collective discussion which can lead to the identification of previously unrecognised boundaries which may be impeding the translation of knowledge into action, as well as cultivating a fertile breeding ground for the development of new objects and ideas with which knowledge can be conveyed across these boundaries. The findings consistently show that paying attention to stakeholders' views and perspectives about what it is that they perceive as important, in order to tailor *boundary objects-in-theory* to their needs, and instilling them with users' local knowledge, is more likely to produce boundary objects that are appealing, meaningful, resonant and authentic. Objects co-produced in partnership with stakeholders will be more readily shared between stakeholders and thus help to overcome boundaries that may otherwise impede the implementation of evidence into practice.

If, as this study concludes, the process by which *boundary objects-in-use* emerge is via collective bricolage, then it makes sense that individuals, groups and organisations wishing to harness the potential of boundary objects are also amenable to cultivating an organisational context in which experimentalism, creativity, compromise and trial and error are not only tolerated, but embraced. These dimensions are difficult to replicate, and are instead contingent on the various relationships and supporting infrastructures that influence the character, identity and culture of an organisation. Being open to different ways of thinking and doing, even if these do not always easily correspond with a historical or traditional way of 'doing things around here' mean that innovation and new approaches to problem solving, which may sometimes be maverick or come about

as an outcome of organic collectivism, are more likely to emerge and thrive. It is under these conditions, where every relevant stakeholder voice is heard, where all relevant stakeholders are engaged and urged to contribute their knowledge and experience, that *boundary objects-in-use* are forged. Generating this climate of innovation and embracing the unpredictable nature of bricolage and the objects which emerge as an outcome of such unfettered collective endeavour presents a particular challenge for organisations such as the NHS and HEIs which have traditionally been founded on hierarchy, prestige and competition.

CHAPTER 9: REFLECTIVE ACCOUNT

Or, A short story about PhD survival

In the beginning

In 2007 I set off on a journey into nursing that was to lead me back into academia. Higher education was a strange and mysterious place I'd felt I'd already left once, after completing a Masters in Science, Culture and Communication at the University of Bath in 2002. However, life being what it is, a complex and confusing affair in which the unanticipated more often shapes events than the planned, I had found myself in an interesting position where I'd been successful in winning a tribunal for unfair dismissal, but consequently found myself jobless at 25. Overqualified in a field that meant very little to most employers, I turned my hand to temping and within three months I was back fulltime employed, this time as a project worker in a night shelter for homeless service users.

The next few years saw me grow in my role working with homeless and vulnerably housed clients who frequently presented with a range of challenging and complex issues, including a high level of poly substance misuse, the offending this generates, and consequent poor physical and mental health. As I gained experience in this sector and was exposed to the reality that homelessness is generally a symptom of other issues, I began to understand the close link between housing, health and education – Nye Bevan's three pillars of society.

Working closely with substance misuse services and community mental health teams to support service users meant that I came into contact with a number of inspirational people, namely community psychiatric nurses (CPNs). Until this point I had been aware of the existence of these mysterious individuals, nurses who didn't wear uniforms and worked with clients in and out of their homes and across many different contexts in between.

Encouraged by a colleague who had applied to do the mental health nurse training I found myself hotfooting it to the School of Nursing, taking my application with me on the day of interview. Accepted onto the course, I fortuitously passed my driving test and threw myself into my new life as a student nurse.

Three years flew by in a frenzy of placements and essays, and before I knew it I was qualified and ready to take on the wards. Unfortunately in 2010 there was a shortage of permanent jobs. I looked towards my former tutor Dave for advice. It was Dave who alerted me to the possibility of research, suggesting I consider applying for a NIHR funded studentship supervised by Professor Jo Rycroft-Malone.

And so I applied, with the sense that this could be a challenge and an adventure, and that there was nothing to be lost by giving it a go. I didn't know any other newly qualified nurses who had taken this path, but it felt like a natural progression.

The interview was the first encounter I had with my future supervisory team. Chris ushered me upstairs; I noted he wore brightly coloured socks, which somehow reassured me.

The interview was over in a flash, the questions felt challenging, but I answered them all. I left deflated as is always the way, considering points I hadn't quite made. Afterwards I met my best friend and my partner for a well-deserved drink. Whilst there Jo phoned me to confirm I'd been successful, to which I answered with an incredulous 'Awesome!', and thus lost any credibility in the first few hours of meeting.

Finding my bearings - The first few years

Gaining my place as a newly fledged PhD student was both exciting and a little daunting. Joyce took me under her wing and gave me a book about different students' experiences of their PhD journey. I thought of it as my 'PhD survival guide'.

The first year found me attempting to familiarise myself not only with the conceptual ambiguity that characterises implementation, but also with the sometimes seemingly intangible concept of boundary objects. I attempted to find my bearings amongst the new landscape of social science, and found myself struggling to understand the words and phrases qualitative researchers used with enthusiasm: 'lived experiences', and 'ethnographies' and all sorts of exotic phenomena were introduced to me through the pages of papers. Only later did I

realise it would have made my struggle infinitely less arduous if I had just decided there and then to read a couple of textbooks on sociology and qualitative research (a piece of advice I now find myself sharing with the newcomers to the swampy lowlands of qualitative research). I think this would have helped orientate me to the giddy variety of research traditions, the origins of each, and the impact and influence this had on different ways of investigating the world. I may have grasped more quickly how the underpinning philosophical assumptions and philosophies are interwoven; the way in which theories are built around ontological assumptions and epistemological stances they reflect.

These things remain mysterious and I am convinced that social science is a dark art to which I have yet to be fully initiated.

Discovering dyspraxia

The PhD journey is one that every student finds has unexpected bumps, twists and turns. I've tried to keep the words of my former tutor in mind during my personal journey: "Lucy, real life has a way of disrupting the best laid plans". Never a truer word spoken. For me, my journey forced me to confront something I'd studiously chosen to try and ignore. More than 25 years after teachers had expressed their concern at my inability to read by age 7, and my apparent lack of attention in class, my supervisory team prompted an assessment of my learning needs. Concerned that despite my apparent consumption of literature, and evidenced in the way I squirmed and cringed during direct questioning that required specific recall of details, compounded by my habit of over complicating and under structuring my oral and written responses, Jo, Joyce and Chris gently encouraged me to confront a childhood characterised by awkwardness, confusion and misunderstanding. Rather than making it an issue and provoking further defensiveness from me as I struggled to articulate the way in which my mind worked (or didn't), and how frustrating I found that instead of memory I appeared to possess a mixture of fog and cotton wool in which random facts were sometimes found submerged; they thoughtfully encouraged me to access Bangor University's world class Miles Dyslexia Centre. Here, Maureen, my personal support worker, conducted an initial screening. I felt vulnerable and exposed – I had attended screenings but declined further assessments before, consequently dodging any formal diagnosis. The

Miles staff made me feel welcome and normalised the process, and I underwent a thorough assessment of my reading, writing, executive, attentional, recall, cognition and visuo-spatial skills. When the final assessment report was received, and I was talked through what my results meant, a picture of how I struggled with sequencing and recall and how this impacted not only on my academic performance, but day-to-day activities: the inability to play group games, the failure to recall rules, the way I constantly interrupted conversations without intending to be rude, the fact that I need absolute silence to work in, and complete darkness to sleep, my clinical clumsiness.

Without prejudice or judgement, a snapshot of how my 'disobedient mind' functioned when faced with various tasks was revealed. To be confronted with this report was both distressing and relieving; on one hand I felt I could explain rather than defend; on the other, I felt sad for the awkward unsure child I had always seen myself as, for the years of being unable to 'high five', for never being able to play team sports despite being fit and fast; for struggling to participate in every outdoor activity I yearned to be able to do with my graceful friends. It explained a lot more than just why I wrote and communicated so chaotically. It explained the years of frustration I had felt I'd provoked in teachers and lecturers and others who couldn't understand why someone apparently bright could struggle with the simplest physical and procedural tasks: my numerous driving instructors, the Trusts's restrictive physical intervention (RPI) instructors, anyone who ever threw me something thinking I'd be able to catch it.

The thing I learned most sharply though was the simple fact that undertaking a PhD is a struggle for the most 'obediently minded', but attempting such a feat with an underperforming working memory and an attentional deficit that made prolonged periods of concentration feel unbearably uncomfortable, well, I was gearing myself up for a battle of epic proportions. However, one positive was taken from the assessment experience, and highlighted by the Miles staff: I had come this far, I had managed, and coped, despite these things impacting on my performance. If anything I over compensated by working extra hard, so my resilience to brutal work commitments was already proven.

This was fortuitous, as I then combined full time study with a return to clinical practise in 2012.

Balancing practice with research – the trials and tribulations of someone who's no good at balancing

Post dyspraxia diagnosis life continued. My supervisors responded by ensuring I had a quiet place to work with little distraction. I muddled through my second and third year, eventually returning to clinical practice following a two year hiatus during which I battled to be allowed to complete my preceptorship. During this time I became personally aware of the schism between research and practice, as I attempted to persuade managers that yes, it was true what they'd heard, I was indeed doing a doctorate; but no, this did not mean that I had defected from nursing. After numerous emails, letters, and meetings across the Trust, I was forced to bring to the attention of the chief of nursing staff that whilst the local headlines decried staff shortages, I was considering union action to try and get back onto the wards. The stark contrast of this situation was impossible to avoid, and my hard work paid off: by 2012 I was completing my long overdue preceptorship on a local older adult acute admission ward. I was blessed with a patient, caring and knowledgeable mentor, Wendy, who guided me with thoughtfulness and kindness, giving me the encouragement and support I needed to rediscover and develop my clinical skills.

Regaining my clinical skills renewed my interest in my own study, lending a practice-based perspective and grounding my work within the context of my own clinical experiences. How do we as nurses view guidelines and protocols? Are frontline staff involved in the development of new tools they're expected to use? What sorts of boundaries define the many different stakeholder groups who must work together if evidence is translated into improved patient outcomes?

My clinical background also helped me build a rapport with my participants, many of whom had nursing backgrounds. The instant understanding of context, the hustle and bustle of a busy ward, the difference in perspectives, views, values and status between multidisciplinary team members, the relationships with patients, public and carers. At Oakdown, the only site I was able to visit, I was instantly

made welcome by the team at CLAHRC HQ; at Hazeldean the sense of frustration at the ever shifting landscape of the NHS was understood; at Ashgrove the mutual knowledge of working across academic and NHS boundaries provided a shared reference point between myself and the boundary spanners I interviewed.

Maintaining momentum

Throughout the data collection stage I began to reflect on my own role as a boundary spanner, and what it meant to experience in-between-ness: on one hand I wore the identity of the student, diligently studying at university, arriving with books packed and lap top ready; on the other I turned up in scrubs ready to take care of people during a long day, sometimes a night. I realised my own life was one of bridging different social worlds, sometimes where there was little day-to-day overlap. It caused me to reflect on the many different identities we embody, the multiplicity of context and our response to it, the rituals, behaviours and tools we take for granted as we move from one community into another.

One thing that struck me sharply was how noticeable the division between research and practise was in the context of my own professional life, how at times the languages and behaviours of each world were so different. I became adept at explaining in a nutshell what exactly it is I was doing when I wasn't in practise: "I'm investigating partnerships between universities and NHS trusts by talking to people who work between the two about whether there are any shared things or ideas that collaboration hinges on when they're working together with patients and practitioners to get evidence into practice." I learned to avoid the mystifying concept of 'boundary objects'

2012 saw another two milestones reached, both in and out of academia. Having attended the Knowledge Utilisation conference in Belfast in 2011, my first international conference of its type, where I was a little star struck by meeting the great scholars of implementation: Cheryl Stetler, Jackie Tetroe, Ian Graham, Brendon McCormack, and Huw Davies, I was lucky enough to be invited back to KU12, this time in Melbourne.

The challenge this time, as previously, was to deliver my study innovatively and creatively. KU11 had given me the opportunity to riff upon the idea of using helium

filled balloons as boundary objects which I used to open up communication over a taped 'boundary' line on the floor, sharing my boundary objects across the line, and leading to a hall filled with balloons. I admit at this point I still struggled with the concept, but managed successfully to engage attendees, probably because curiosity about my balloons provided sufficient incentive.

By KU12 I knew I needed to up my game. Unfortunately the timing was extremely inconvenient as I'd also just managed to buy my first home and was in the process of moving whilst simultaneously creating my most innovative presentation to date. Having racked my brains for ideas I suddenly reached a eureka moment when I recalled how symbolic and resonant the AIDS quilts of the early 1990s had been. How these quilts developed through collaboration as people who had lost friends, family and loved one created panels to be added to the quilts as they travelled across the US. The idea of making something together and learning through this collective process, generating resonance that carried far beyond the contribution of individual quilters, inspired me to try my hand at presenting my work through the medium of quilt. The quilt would operate as a boundary object, would trigger conversation, and would consist of different panels where conference attendees could pin their own thoughts and interpretations about what implementation meant to them. In this way each attendee would contribute, so that the final quilt would resonate with their thoughts and feelings. However, I also needed to remain focused and on target. I created a set of 'salt sellers', with which I engaged attendees by offering the incentive of sweets. Over the course of the two hour 'expo' type event, I cajoled, persuaded, lured and eventually engaged all the attendees to 'play' with me, adding their unique touch to the quilt. By the end of the session the quilt was covered with pinned pieces of coloured paper containing each attendee's contribution.

One thing I learned from the quilting experience is how hard it is to convey a large (2m x 2m) quilt across the globe. A poster would have been much easier to transport I thought, as I travelled on my own, lugging my precious cargo with me from terminal to terminal during the course of the 36 hours flight. It took up my entire hand luggage allowance, and then some, but miraculously no one appeared to notice. Many times during the journey I felt I would rather just wrap myself up in

it and avoid the stress and strain of the struggling to lug it with me. Instead, I succeeded, sewing the final details to the quilt in my hotel room in a haze of jet lag. However my hard work paid off: the quilt's originality and the way it engaged users as contributors chimed with the conference attendees, and I was the overall winner of the presentation competition.

Needless to say, the quilt remained in my hold luggage for the rest of the trip.

By 2014, with a mortgage to pay, a partner who was out of work, and zero hours contracts to generate any income, I found myself worrying about how to see myself through to the end of my PhD. By this time I had a few years of clinical experience under my belt, and was being pursued by inpatient managers to join the ward teams fulltime. I felt conflicted when on two occasions I was successful in gaining positions as a fulltime staff nurse in the local acute unit, but had to pass both up when it became evident I would not be able to negotiate a part time through potential job share. Eventually I focused on part time jobs, and by the summer of 2014 I joined a local older person's community mental health team as a community psychiatric nurse (CPN), a role I continue in today.

Balancing practise with study had been an ongoing struggle but with a supportive supervisory team and understanding managers I felt I was able to manage, just.

Surviving catastrophe, or how real life always gets in the way of the best laid plans

The next year things in my personal life changed so dramatically that everything I had worked so hard to achieve suddenly appeared precariously unstable. Jo and Chris had warned me from the outset that a PhD not only took a toll on the student, it would also impact on personal relationships. Suddenly and without any warning my long term partner ended our seven year relationship and left the home I'd worked so hard to create. It was and has been the single most painful experience of my life to date, the sting of betrayal, the sudden shifting of all that had been solid. Suddenly the relationship I felt had grounded me was shown to be brutally fragile. It felt as though my life imploded, and I was shell shocked, dazed, confused. I felt my future was lost. I could see nothing ahead. All I felt was blinding fear and a raw grief that led to a series of anxiety attacks that left me feeling vulnerable and lost.

The timing could not have been worse: with a fortnight until the submission deadline for my first draft of the thesis, I somehow managed to get through. It felt strange and surreal and I was frightened and panicky for months afterwards.

As I write this account I reflect on the impact this has had on me, and again, how real life happens, and sometimes we have no choice but to sink or swim. I'm not sure, but initially I think I was just lucky enough to avoid sinking as my head was kept above the water by the spectacular love and support shown to me by my friends and family. I am writing this now because of their love, and because Jo and Chris and everyone who saw me through those dark days helped keep my hope alight as I struggled to get through each day and night.

The loneliness of the PhD thesis writer

My journey continued alone from spring 2015 onwards. I have continued to spin many plates, wear many hats, endeavouring to strike a difficult balance as I now race towards my deadlines. If there is one thing I have come to realise it is. You need to be absolutely truthful with yourself about why you want to undertake this huge venture, and what you expect of it as a process? Ask yourself: are you ready to become utterly self-absorbed? Are you ready to take on a project that impacts you at every given moment of your day or night? Are you and your relationships strong enough to weather the storm? Do you understand and accept that by doing this, you will become selfish and distant; you will no longer have free time, there will not be a point when you will be completely at ease knowing it needs your time, your energy, and all your psychological and intellectual resources? Are you ready to cancel special dates and events? Do you have or do you wish to have children? If you already have a family, how will you manage to fit in time to watch your kids grow up and develop? Is your partner filled with saint-like patience? Are you aware of how this may affect you financially? Are you and those around you sufficiently resilient to survive this?

But most all, be honest with yourself. Why do you want to do a PhD? If it's just for the love of letters as a prefix to your name, then, that simply may not be a good enough reason. It will be harder, and take longer, than you envisage. It will push you to your limits, and beyond. It will likely impinge upon your conversational

capacity at parties. People will always ask you what it's about, and you will likely struggle to capture the sense of your study before their eyes understandably glaze over and they're already thinking about their eBay bids or what's for dinner.

You will sacrifice the time you have not only for friends and family, but for yourself.

Is this a sacrifice you can make?

But above all people will ask why you've chosen to pursue a PhD...and when they finally get fed up of that, they'll ask when you'll be finished. Repetitively. And you will likely want to scream with frustration because you've long forgotten what life without this albatross feels like.

What this means to me in real life (IRL)

This year has been one of unexpected change, and with it has come growth and renewal through recovery. As I write this I have taken time to reflect on the journey my PhD has taken me on, and the many tangents, short cuts, and panicky points where I have all but lost my bearings. It's been an experience.

When I'm asked what does this mean to me I sometimes struggle. This PhD means survival. It's a document and a totem of my own personal battles against adversity. That may sound unseemingly self-indulgent or dramatic. But it is what it means to me – it is a record of where I've been and how I've got there.

It doesn't change me physically – I remain a daughter, a sister, an auntie, a niece, a CPN, a cat owner, a lover of Sunday lunches, craft ales, and long walks in the mountains. I continue to experience occasional anxiety, but this is calmed at times by this story I've heard told in hushed tones...they say there is a myth, the promise of life after PhD. I'm on a quest to seek it. I'm on a mission to find it. It's so close it's almost tangible. But at this point it remains a glittering jewel shimmering with hope and promise, but yet to be within my grasp.

By the time you read this I hope I'm one step closer to achieving that mystical status, to discovering what life holds as a PhD survivor.

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APPENDICES

Appendix 1: Ethics approval, insurance, and governance documents

COLEG IECHYD A GWYDDORAU YMDDYGIADOL
COLLEGE OF HEALTH AND BEHAVIOURAL SCIENCES

YSGOL GWYDDORAU GOFAL IECHYD
SCHOOL OF HEALTHCARE SCIENCES

25th January, 2012

Ms Lucy Melville-Richards
Doctoral Candidate
School of Healthcare Sciences
Bangor University
Fron Heulog
Ffriddoedd Road
Bangor
Gwynedd, LL57 2EF



Dear Lucy,

Re: Healthcare and Medical Sciences Academic Ethics Committee (HCMS AEC) Review

2011-12-03 - "Exploring the role of boundary objects in CLAHRCs"

Thank you for your submission to the AEC.

I am pleased to tell you that your application has been subject to an expedited review and your application was noted to be well presented and provided sufficient information regarding the design and the study conduct, with due attention to ethical principles. It is noted that you have also given consideration to elements of risk and that you completed a risk assessment. All of the necessary study documentation was appropriately completed.

I am therefore able to give approval for your study on behalf of the AEC.

Should you require to make any substantial amendments to your study protocol during the lifetime of the research, you are required to submit notice of these to the AEC for further approval, prior to making changes to the conduct of the study.

Your study will still require NHS Research Governance approvals and you will now be able to submit an application for these. Your study cannot commence until you have these approvals.

PRIFYSGOL BANGOR
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LL57 2EF, UK

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If you have any queries relating to this letter, please do not hesitate to contact myself, or Dr Joyce Wilkinson.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Sion Williams', with a horizontal line underneath the name.

Dr Sion Williams
Vice Chair, HCMS AEC

Cc: Dr Joyce Wilkinson
Chair, AEC
Supervisor

CERTIFICATE OF EMPLOYERS' LIABILITY INSURANCE (a)

(Where required by regulation 5 of the Employers' Liability (Compulsory Insurance) Regulations 1998 (the Regulations), one or more copies of this certificate must be displayed at each place of business at which the policy holder employs persons covered by the policy)

1. Name of policy holder Policy No **Y016458QBE0111A / 026**
Bangor University

2. Date of commencement of insurance policy **1st August 2011**

3. Date of expiry of insurance policy **31st July 2012**

We hereby certify that subject to paragraph 2:

1. the policy to which this certificate relates satisfies the requirements of the relevant law applicable in Great Britain, Northern Ireland, Isle of Man, Island of Jersey, Island of Guernsey, Island of Alderney; or any offshore installations in territorial waters around Great Britain and its Continental Shelf (b); and;
2. (a) the minimum amount of cover provided by this policy is no less than £5 million (c); or
 (b) ~~the cover provided under this policy relates to claims in excess of [£] but not exceeding [£].~~
3. the policy covers the holding company and all its subsidiaries

Signed on behalf of QBE Insurance (Europe) Limited (Authorised Insurer)



Notes

- (a) *Where the employer is a company to which regulation 3(2) of the Regulations applies, the certificate shall state in a prominent place, either that the policy covers the holding company and all its subsidiaries, or that the policy covers the holding company and all its subsidiaries except any specifically excluded by name, or that the policy covers the holding company and only the named subsidiaries.*
- (b) *Specify applicable law as provided for in regulation 4(6) of the Regulations.*
- (c) *See regulation 3(1) of the Regulations and delete whichever of paragraphs 2(a) or 2(b) does not apply. Where 2(b) is applicable, specify the amount of cover provided by the relevant policy.*

Important

The Employers' Liability (Compulsory Insurance) Regulations 1998 requires that you keep this certificate or a copy for at least 40 years. Extra copies of the certificate will be supplied upon request.

QBE Insurance (Europe) Limited, Plantation Place, 30 Fenchurch Street, London, EC3M 3BD - Registered in England No. 1761561
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Hasilwood House
60 Bishopsgate
London EC2N 4AW
Tel: 020 7847 8670
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TO WHOM IT MAY CONCERN

1st August 2011

Dear Sir/Madam

**BANGOR UNIVERSITY
AND ALL ITS SUBSIDIARY COMPANIES**

We confirm that the above Institution is a Member of U.M. Association Limited, and that the following covers are currently in place:-

1. EMPLOYERS' LIABILITY

Certificate No.	Y016458QBE0111A/026
Period of Cover	1 August 2011 to 31 July 2012
Limit of Indemnity	£25,000,000 any one event unlimited in the aggregate.
Includes	Indemnity to Principals
Cover provided by	QBE Insurance (Europe) Limited and Excess Insurers.

2. PUBLIC AND PRODUCTS LIABILITY

Certificate of Entry No.	UM026/95
Period of Cover	1 August 2011 to 31 July 2012
Includes	Indemnity to Principals
Limit Of Indemnity	£50,000,000 any one event and in the aggregate in respect of Products Liability and unlimited in the aggregate in respect of Public Liability.
Cover provided by	U.M. Association Limited and Excess Cover Providers led by QBE Insurance (Europe) Limited

If you have any queries in respect of the above details, please do not hesitate to contact us.

Yours faithfully

Susan Wilkinson
For U.M. Association Limited



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Ariennir gan
Lywodraeth Cymru
Funded by
Welsh Government

Certificate of Attendance

Lucy Melville-Richards

attended

Introduction to Good Clinical Practice (GCP):

A practical guide to ethical and scientific quality standards in clinical research

on 31st January 2012

Sessions include:

1. The Value of Clinical Research and the role of NIHR CRN & NISCHR CRC
2. GCP: the standards and why we have them
3. Study set up: responsibilities, approvals and essential documents
4. The process of informed consent
5. Case report form, source data and data entry completion
6. Safety reporting in clinical trials

This course is accredited by the Royal College of Physicians (6 CPD points) and the Royal College of Nursing Accreditation Unit (7 study hours)

Zoe Whale
Training & Development Manager
NISCHR CRC

Paul Maher
NIHR CRN GCP Training Manager

Mae NISCHR CRC yn rhan o'r isadeiledd ymchwil i Gymru sy'n cael ei ariannu gan NISCHR, Llywodraeth Cymru www.wales.gov.uk/nischr
NISCHR CRC is part of the research infrastructure for Wales funded by NISCHR, Welsh Government www.wales.gov.uk/nischr

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SCHOOL OF HEALTHCARE SCIENCES



19th December 2011-12-19

To whom it may concern

Re: Lucy Melville-Richards (13.01.78)

I would like to provide a reference for Lucy and I am happy to support her application for a research passport. She is a current PhD student with Prof Jo Rycroft- Malone, in the School of Healthcare Sciences.

Lucy has previously successfully completed her Bachelor of Nursing degree, RMN in the same school and so has a professional background and skills valuable for her research project. She will also be attending Good Clinical Practice training in January in preparation for conducting research in healthcare.

Yours Sincerely,

Dr Claire Hawkes

Research Fellow

School of Healthcare Sciences, Bangor University

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Appendix 2: participant information pack and consent forms

Exploring the role of boundary objects in CLAHRCs



Project summary

Please read this sheet before signing the consent form.

This study focuses on the collaborative element of CLAHRCs to look at how different people and groups across the partnership are able to work together during implementation. A specific aim is to investigate the things or strategies people in boundary spanning roles may use to encourage communication between different people and groups, and how these may influence collaboration during implementation. These shared objects have been named boundary objects as they are involved in overcoming the multiple boundaries that need to be crossed in implementation.

Care pathways are an example of a shared object that facilitates communication and coordinates collaboration between different partners in healthcare. Care pathways are defined as multidisciplinary care management tools which map out key activities in a healthcare process. The pathway can be shared amongst the team to facilitate communication and understanding between members. In this way the care pathway is a shared object that acts as a catalyst to overcome the multiple boundaries separating different disciplines to enable collaboration.

This study seeks to uncover if things that are shared between different CLAHRCs partners such as guidelines, clinical registers, assessment tools, models and frameworks, documents and presentations (amongst other things) may act as catalysts to help open or support a dialogue between different partners involved in implementation. The study uses interviews with people involved in boundary spanning roles to ask questions focused on finding out what sorts of things can be useful for communication and collaboration across boundaries for mutual understanding between different partners involved in implementation.

This study is supported by funding from NIHR SDO programme and is conducted as part of a PhD studentship by Lucy Melville-Richards. The study is supervised by Prof. Jo Rycroft-Malone, Dr Joyce Wilkinson and Dr Chris Burton at Implement@BU, the implementation science research cluster at Bangor University, Wales.

If you have any queries regarding the conduct of this study please contact the study supervisor:

Dr Joyce Wilkinson
Centre for Health Related Research
Bangor University
Fron Heulog
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Bangor
Gwynedd LL57 2EF

j.e.wilkinson@bangor.ac.uk

01248 38 3143

Thank you for taking the time to read this project summary sheet and for considering taking part in the study

Exploring the role of boundary objects in CLAHRCs



Participant information sheet

Please read this sheet before signing the consent form.

1. What is the purpose of the study

This study investigates a specific aspect of CLAHRCs to investigate whether 'boundary objects' – shared objects that have been shown to be helpful in facilitating understanding between individuals and groups, influence the process of getting research into practice (also known as implementation). The study aims to answer the following research questions:

What do boundary objects mean within CLAHRCs (if anything),

How are they represented (if at all), and;

Do they play a role in implementing research into practice?

2. Why have I been chosen?

You have been identified by CLAHRCs core team as someone who works within a boundary spanning role. The nature of this role means that you are more likely than others to be someone who uses specific objects or strategies to communicate and work together with different people and groups involved in implementation through CLAHRCs.

3. Do I have to take part?

No, participation is entirely voluntary and there is no expectation for you to take part. If you do take part, but change your mind at any stage, you can withdraw from the study at anytime. You do not have to give a reason if you decide to withdraw from the study and there will be no repercussions in terms of your professional or employee rights and status.

4. What will happen if I agree to take part?

If you decide to take part in this study you will need to sign a consent form and return it to me at the address provided. I will then contact you to introduce myself and arrange a suitable date and time for an interview. This will also provide an opportunity to answer any questions you may have regarding the study or any other aspects of participation. The interview will be face-to-face or by telephone and will last no more than an hour. It will involve questions about your experiences working with other individuals and groups in implementation and what sorts of things you find can be helpful in opening up and sustaining communication. The interview will focus on what sorts of things or strategies you may use to encourage different people or groups to work together, how you use these things and why.

5. Will my part in the study be kept confidential?

Yes, every measure will be taken to ensure that your participation is kept confidential by ensuring that your contribution is anonymous. Data gathered from the interview will be anonymised and kept in locked filing cabinets in a locked office. Any findings from the study used to illustrate conference presentations, reports, publications will be anonymised and confidentiality protected in line with Bangor University research ethics policy. Any information stored electronically on a password protected computer will have any identifying information removed before being stored securely and protected by Bangor University's secure server.

6. Are there any potential risks or disadvantages associated with taking part?

This study is about the things different people and groups use to work together to get research in practice and does not plan to cover any sensitive or personal topics. There are no specific risks associated with taking part in this study and but it is recognised that you will be giving up some of your working day to take part in the interview. Interviews will be arranged at a time and place convenient to you.

7. Are there any potential advantages or benefits associated with taking part?

There are no recognised personal advantages to taking part in this study but it is anticipated that participation can be beneficial by creating an opportunity for you to make an active and important contribution to the study by sharing your knowledge and experience, and contributes to understanding boundary objects for the CLAHRC.

8. What will happen to the results of this study?

The research is being undertaken as part of a PhD and results will form a doctoral thesis.

9. Who is organising and funding this study?

The study is funded by National Institute of Health Research through their Service Delivery Organisation programme and is nested within a wider evaluation study of implementation through CLAHRCs.

10. Who has reviewed this study?

This study has been submitted to Bangor University School of Healthcare Science and Medical Science Academic Ethics Committee and is subjects to NHS governance approval meeting standards set for the conduct of safe and ethical research.

if you feel there is a problem

If you have a concern about any aspect of this study, you can contact me the researcher directly by telephone or email and I will endeavour to answer any questions or queries.

If you remain unsatisfied, or if you have any issues about the way in which this study is co ducted, you may contact the study supervisor:

Dr Joyce Wilkinson
Centre for Health Related Research
Bangor University
Fron Heulog
Ffriddoedd Road
Bangor
Gwynedd LL57 2EF

j.e.wilkinson@bangor.ac.uk

01248 38 3143

If you decide to take part in this study please return your completed CONSENT FORM to the following address:

Researcher contact details

Name: Lucy Melville-Richards

Address: School of Healthcare Sciences, Bangor University, Fron Heulog,
Ffriddoedd Road, Bangor, Gwynedd, LL57 2EF.

Telephone: 01248 38 3193

Email: hspc22@bangor.ac.uk

Thank you for taking the time to read this information sheet and for considering taking part in the study.

Exploring the role of boundary objects in CLAHRCs



Participant consent form V_3 13-12-11

Please read the following and INITIAL the appropriate box.

<p>1. I confirm that I have read and understand the participant information sheet (V_3 13-12-11) for the above study. I have taken time to consider this information and have had any questions answered satisfactorily.</p>	1.
<p>2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without any detrimental effect.</p>	2.
<p>3. Interview: I agree to take part in a face-to-face or telephone interview which will be digitally recorded and transcribed for the purpose of analysis.</p>	3.
<p>4. I agree to the use of anonymous quotes in any reports, presentations, publications or other literature related to the progress and dissemination of the study findings.</p>	4.
<p>5. I understand and agree that the data will be stored on a secure computer and that anonymised data may be used again in the future.</p>	5.
<p>6. I understand that the relevant sections of the data collected during the study may be looked at by representatives from Bangor University, NIHR, and other regulatory bodies, external examiners or the from the NHS where relevant and appropriate. I give permission for these individuals to access data collected from me.</p>	6.

Participant

name.....Sign.....Date.....

Researcher

name.....Sign.....Date.....

Three copies: one each for participant, study, and governance

Site code:

Data collection point:

Appendix 3: Interview spine

Exploring the role of boundary objects in CLAHRCs



INTERVIEW SPINE

1. Introduction

1.1 Welcome and Introduction

1.2 Boundary spanning role specification and experience

2. Implementation work

Use of vignette OR specification of an implementation challenge (across boundaries) that participants have been involved in, focusing on communication and collaboration

Experiences and views on the following:

2.1 Repositories – standardised information sharing within implementation work

2.1 Standardised methods and forms – documentation and/or procedures that support and/or sustain implementation work across different groups (boundaries)

2.3 Objects, models and maps – representations that support and/or sustain implementation work across different groups (boundaries)

2.4 Symbolic objects – concepts and ways of thinking that enable consensus within implementation work

2.5 Catalysts – objects of any category enabling communication during implementation work

3.0 Interview closure and thanks.

Appendix 4: Phase 1, Example of documentary analysis

KEY: Documents sampled

- 1: CLAHRC-Oakdown-Annual-Report 2: Hazeldean CLAHRC ANNUAL REPORT 2009-2010 3: NIHR CLAHRC for Ashgrove Annual Report 2010 4: 4.5 Collaborations for Leadership in Applied Health Research and Care
- 5: CLAHRC-Call for Proposals for Pilots 6: Ashgrove and Hazeldean CLAHRC CKD Collaborative Phase 1 Report Sept 10 7: Overarching CLAHRC Feedback Year 1 8: Hazeldean CLAHRC feedback
- 9: CLAHRC-Publication-implementation science-1 10: NIHR CLAHRC Oakdown Academic publication 2009 11: -The Hazeldean-Stroke-Assessment-Tool

KEY: Types of boundary object (BO)

KEY: Types of boundary object (BO)				
Repositories	Standardised methods and forms (SMF)	Objects models and maps (OMM)	Symbolic objects	Catalysts
Doc	Data example	Object	Type of BO	Why this might be BO?
2	We are now almost halfway through the Collaborative initiative. Our practices have conducted over 150 test cycles of improvement in staff education, leadership, information and patient involvement. In this time, the number of people whose CKD was previously undetected has been increased (792 patients have been added to CKD disease registers, increasing the average practice prevalence from 4.1% to 4.9%) (p16)	Disease registers	Repository	It allows standardised information to be shared across different groups involved in impl. Bridges what is known and what is not known enabling a valid baseline to evaluate impl and identify future impl needs.

6	<p>Next steps</p> <p>We will support practices in developing a pathway to HF care, working with GPs who have special interests in this area. General practice HF disease registers will be validated; tools to detect HF will be developed and rolled out. We will also implement tailored interactive training and education sessions in general practices to support this. (p17)</p> <p>A total of 1,324 new patients have been added to CKD Registers and 74% of those patients on the registers are now being treated to NICE blood pressure targets, which represents a tremendous improvement in a period of just one year. (p2)</p> <p>An impressive 1,324 additional patients have been added to the CKD registers by the 19 Collaborative practices. (p7)</p> <p>Validating the register</p> <p>Having an accurate register at the start of the project was important to make sure that the baseline was a true measure of the number of patients with CKD in the practice. The practices checked all the patients on their existing CKD registers to be sure that everyone was diagnosed correctly, following appropriate tests. Patients with incorrect diagnoses were removed from the records and a note was made to follow them up with further tests as necessary. A valuable spin-off from this exercise was that it helped to identify areas where staff knowledge was weak or lacking, for example by highlighting where test results</p>			<p>Acting to ensure the quality of baseline data and identify knowledge gap. This work is part of impl work by highlighting knowledge gaps and defining areas of impl need.</p>
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	had been misinterpreted or patients were not receiving the best available care. (p11)			
2	<p>2</p> <p>This acknowledges that successful implementation depends on...</p> <ul style="list-style-type: none"> • The way in which the implementation process is facilitated (each initiative is facilitated by a Knowledge Transfer Associate (KTA) who supports the exchange of Knowledge between the University and the NHS) (p13) <p>6</p> <p>The Knowledge Transfer Associates, working with the practices, have analysed data and turned it into information. (p2)</p> <p>6</p> <p>The practices were supported during the action periods through regular visits from Knowledge Transfer Associates (KTAs). The KTAs also helped practices to understand and improve their practice context. (6)</p>	KTA	<p>Insufficient data to specify what type of BO people in boundary spanning roles can best be described as. Appear to have elements of repository in that K is possessed; involved in translatory tasks (transfer and translate K), have boundary spanning properties (move across impl contexts),</p>	<p>The KTAs act like BOs by transferring and translating knowledge form context to context. In terms of impl making knowledge relevant and accessible to a practice context is important in encouraging uptake of evidence into practice, supporting the exchange of knowledge across different impl contexts/parties</p> <p>KTAs also possess context changing qualities.</p> <p>Key: relationship, support</p>
6				

			and are flexible and adaptable to context.	
3	3 We are expanding our investment in „knowledge brokers” – NHS staff with a specific role to promote the dissemination and use of evidence. (p2)	Knowledge broker	? as above	Knowledge brokers have been referred to as human BOs
3	With the support of the CLAHRC, the study team have trained a total of 36 educators to deliver the intervention to patients at high risk of diabetes. (p5)	Educator	? as above	This may be about boundary crossing during impl but insufficient data to confirm but education and training is a key element of impl
2	2 We have worked with NHS XXXX to design a lifestyle intervention for people with Impaired Glucose Tolerance (IGT), delivered by health trainers and incorporating face-to-face and telephone-based support services (p.15). In NHS XXXXX, a project team was set up to design the telephone-based support for people with IGT, which is now being delivered through the PCT's existing Care-Call service to patients from four practices. (p15) In NHS XXXXX we are working on the set up and evaluation of a telephone-based service, provided by health trainers, to offer lifestyle support to people who have two or more risk factors for vascular conditions, as part of the national programme of Integrated Care Pilots, sponsored by the Department of Health. (p15)	Health trainer	? as above	Supports dialogue during which meaning is negotiated with the aim of establishing a shared understanding between people with IGT and health trainer. K boundary between service and service-user. Health trainer possesses K of EB lifestyle intervention, translating it into language of service-user with the intention of generating a behaviour change at the S/U level. S/U = focus of impl effort; end

				<p>user of evidence</p> <p>An individual S/U impl focus is relevant to impl work as recognises that S/U is ultimate end-user of EBK i.e. impl falters is this final stage of KT is unsuccessful/incomplete.</p> <p>Relevant to KT (CIHR)/Impl (Eccles & Mittman, 2006) as concerned with improving health outcomes of S/Us, strengthening effectiveness of health services</p>
3	<p>3</p> <p>The appointment of „boundary spanning“ CLAHRC Co-ordinators in trusts has supported this principle. Their networking role has proved invaluable in topic prioritisation, project scoping and partnership development. (p2)</p>	CLAHRC co-ordinator	? as above	<p>Boundary spanning is a defining feature of BOs.</p> <p>Maybe the CLAHRC-co-ordinator represents a store of embedded K whose role is to share and translate EBK across different impl contexts?</p> <p>Key: relationships</p>
9	<p>9</p> <p>The findings will be used by those commissioning, planning or delivering care, and when necessary, formal methods of implementation will be used (the approach to implementation is described later). An example, taken from the prevention theme, concerns the identification of people at risk of depressive illness. [here, implementation is</p>	BO - Formal implementation methods	SMF	<p>Formal impl methods can be described as a standardised methods and forms type of BO in that they represent a single shared format/method/app to impl using established,</p>

<p>referred to in terms of prevention theme] (p3)</p> <p>In our CLAHRC, implementation refers to the more established approaches to get evidence into practice that generally rest on the linear model in which research is produced by researchers, and practitioners and managers are encouraged to make use of it. (p4)</p> <p>The theme will also seek to advance the methods of implementation by building on the idea of tailoring implementation methods to the barriers and enablers of change (p4)</p> <p>Our providers need efficient and practical methods that can be used routinely. Initial projects to develop aspects of this practical tailored implementation intervention are planned or underway, the first addressing the issue of implementation of guidelines on obesity in primary care. (p4)</p> <p>Implementation using methods such as these, however, can be regarded as one component of translation, as set out in our simple model. (p4)</p> <p>While implementation is regarded as the use of more established interventions within a more linear framework for understanding the process of getting research into practice (p5)</p>			<p>consistent (if linear?) approach to impl achieved by following a set of standardised steps or procedures. This standardisation means that impl efforts can be regulated and evaluated by providing a comparable approach to the complex and inconsistent process of impl.</p> <p>The stated assumption is that these standardised methods can then be taken and tailored to specific impl contexts, keying the approach to recognise and respond to barriers and enablers in a flexible and context-sensitive way. Doc 9 states an awareness of the need to tailor impl approaches to specific impl contexts, building an expanding the established toolkit of formal imp methods to encompass a wider view of KT.</p> <p>Is there tension between being a generic and tailored BO? How/is this mediated during impl work?</p>
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3	<p>3</p> <p>Now that the applied research programme is well established, we have started to develop an implementation plan. We envisage that implementation activities will increase during the second half of the CLAHRC funding period. Specific objectives of the implementation programme include:</p> <p>Implementation of the SPACE manual in four GP practices within the GP Commissioning Consortia in XXXXX.</p> <p>Implementation of “Activate your Heart” in XXXXX General Hospitals.</p> <p>Programme to assist partner Trusts in meeting CQUIN standards relating to unscheduled hospitalisation for patients with COPD. Development of a database tool to gather information on COPD management in primary care in collaboration with the prevention theme (IMPACT). (p11, rehab theme)</p> <p>Improving Early Presentation of TIA/Stroke Patients to Specialist Services</p> <p>This cluster-randomised study in primary care is focusing on the recommended interventions arising from another local research study (Barriers to the Early Assessment of TIA and Stroke, BEATS). These educational interventions are applied to patients, the public and health care professionals to support local protocols for assessment,</p>	BO –protocols /plans	SMF OMM	<p>Impl plan Abbreviated /condensed representations of the impl process that are used in the planning, coordination and orchestration of impl around which impl work can be organised and coordinated</p> <p>Data base tool is a standardised method and form type of BO as it allows the collection of standardised information to identify and inform impl efforts i.e. identifying impl shortfall where pts are slipping through the net and failing to receive appropriate EB care, as well as providing a record of how and where impl is succeeding. Manual also provides an OMM around which collaboration in impl work can be focused in terms of bringing different groups involved in COPD together across primary care and CLAHRC prevention and</p>

<p>investigation and management of TIA/stroke. The study will report in March 2012 (p7, Early Detection Theme)</p> <p>6</p> <p>Protocols are one way of providing more standardised care for all patients. Practices created protocols that staff could follow to identify and treat patients with CKD, using existing guidelines such as those from NICE or the Map of Medicine, and localising them to suit their individual needs.</p> <p>The new systems and changes had to be adopted by all staff in the practice to be successful. Improvement teams typically used practice meetings to introduce new ideas about identifying and managing CKD, including the development of protocols and making sure that staff knew how to follow them. (p11)</p> <p>Ensuring all patients have had a recent ACR test Proteinuria indicates a significantly increased risk of cardiovascular illness and CKD progression, so it is important to make sure all patients on the CKD register are tested regularly. Many practices ran clinics specifically for this purpose or took advantage of opportunities such as flu vaccine clinics to get everybody tested whilst they were in the surgery. Practices realised that many patients were tested but the result had not been coded on their records. This was where having a practice protocol could help to make sure that</p> <p>all staff were recording results appropriately (p13)</p> <p>Sustaining improvement is not easy. Once the initial flurry of excitement and activity</p>			<p>rehab themes.</p> <p>The purpose of protocols in impl is to overcome health inequalities and enable more standardised EB care to be delivered to all pts. In this way protocols are intended to provide a roadmap which can be followed to ensure all pts receive EBC. Protocols are used to embed EBK in practice but the success of this in terms of impl depends on how inds/orgs respond to the protocol. The idea of a protocol is take EBK and condense it into practical guidance which can be tailored to specific impl contexts.</p> <p>The focus of change remains at the ind practitioner level but the convenience of a protocol is that it can be rolled out across an org with the intention of triggering collective change. However, like guidelines and other written accounts (or inscribed representations) each ind may interpret and respond to a</p>
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	<p>relating to a new project has passed, it is easy for it to be forgotten as new priorities come onto the agenda or the day-to-day pressure of work takes over. Planning for longer-term sustainability is essential. Key steps that have been undertaken within the Collaborative to address the issue of sustainability include spreading learning and involvement to the wider practice team, developing systems for regular patient review and introducing measures to enhance the use of the CKD protocol. (p14)</p> <p>Involving and educating other staff Although the improvement teams were responsible for leading the changes in each practice, it was important to make sure that the CKD project was not just confined to the immediate improvement team. The new systems and changes had to be adopted by all staff in the practice to be successful. Improvement teams typically used practice meetings to introduce new ideas about identifying and managing CKD, including the development of protocols and making sure that staff knew how to follow them. (p14)</p> <p>Ensuring CKD protocols are used in practice Improvement teams quickly became aware that simply telling all staff about the protocol was not sufficient to make sure they used it. In addition to discussions about the protocol at staff meetings, some teams have set up reminder systems to routinely check for missed diagnoses or poorly managed patients. This regular audit and review of their data helps them to assess how well the protocol is working and identify where there are still problems to be resolved. (p14)</p>		<p>protocol in line with their own practice beliefs and values – if the protocol fails to reflect these or is insufficiently flexible to accommodate tailoring at a micro level then there may be a greater risk the protocol fails to support imp, work.</p> <p>As a standardised method and form type of BO protocols may act to coordinate diverse groups health care professional involved in impl work to work towards a shared goal – improved pt outcome. As a BO it may also act as the focus around which CoPs involved in impl can form around to focus on imp efforts.</p> <p>A protocol may mean different thing to different groups involved in impl but may act to align different groups with diff understandings, views and approaches to impl within CLAHRCs.</p> <p>As a BO it acts to manage local uncertainties and coordinate heterogeneous impl activities</p>
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				<p>across different contexts.</p> <p>Impl aim – to strengthen/improve quality and effectiveness of HC services.</p>
2 3	<p>3 Assessment of Response Rates and Yields for Two Tools for Early Detection of Non-diabetic</p> <p>Hyperglycaemia and Diabetes (ATTEND) The ATTEND study assesses the feasibility and utility of two screening strategies (based on risk factor assessment) for identifying people in an ethnically diverse UK population at high risk of type 2 diabetes mellitus. It will determine the specificity and predictive power of these strategies and, to support future implementation, will also assess patient and practitioner acceptability. The study will report in March 2012 (p6, early detection theme)</p> <p>This pragmatic trial is assessing pharmacy-based screening methods for impaired glucose tolerance (IGT) and type 2 diabetes mellitus (T2DM) in line with the recently implemented NHS „health check“ programme. The hypothesis is that screening using a self assessed risk score followed by near patient HbA1c testing in pharmacies and general practices increases uptake of a second stage blood test conducted at the GP surgery compared to screening with a risk score alone. To support possible widespread implementation, the study also assesses the patient, pharmacist and general practitioner acceptability of the screening methods. The study will report in March 2012. (p7, early detection theme)</p>	BO - Tools	SMF OMM	<p>Tools of all kinds qualify as both a SMF and OMM as they provide a proforma which can be shared across individuals and groups to collect and assess standardised information across different practice contexts.</p> <p>This example illustrates that some BOs used in impl like these can undergo a selection process during which the BO is evaluated according to its boundary crossing capacity i.e. how readily it is received and perceived across boundaries defining pts, pharmacists and GPs. Successful uptake of the tool as BO could depend on how flexible it is to interpretation across these different groups and contexts, and how successful it is as maintaining a sufficient level of shared understanding by all so that K can be translated form one</p>

				group or context into the lang of another.
3 6	<p>The [prevention]Theme has made considerable progress in conducting applied research relevant to the local NIHR Collaborations for Leadership in Applied Health Research & Care – Progress Report 2010 5population of XXXXX. Theme studies bridge the primary-secondary care boundary and bring high-quality evidence to NHS efforts to prevent long term conditions. Intervention activities within the Theme are highly relevant to local and national service frameworks for chronic kidney disease (CKD) and diabetes management. Considerable local and national need has driven early implementation of the CKD audit tool and the Walking Away structured education programme. 9(p4-5)`</p> <p>6</p> <p>the project team will use a MIQUEST driven extraction/audit tool to help general practices with low CKD recording to identify at risk patients and to populate their CKD registers.(p5)</p>	BO - CKD audit tool (see BO tool)	SMF OMM	<p>Links audit tool to EBK embodied in NSFs</p> <p>Allows collection and collation of standardised information across practice contexts highlighting gaps in care delivery and populating disease registers (repository BOs) with validated, baseline impl data. Used in conjunction with registers the audit tool is used to generate the information held within the disease register so that accurate and relevant information can be stored, shared and accessed.</p> <p>Here the impl aim is focused on developing and maintaining an associated BO in order to accelerate the rate at which EBK is translated into EBC to improve pt outcomes and strengthen the effectiveness of HC services.</p> <p>The information gathered by the audit tool is relevant to impl as it</p>

				can be used to shape and influence decisions made at an ind and org level re where impl efforts are best directed as well as providing an evaluative measure for earlier impl interventions (has it worked, where and by how much). Decision aid/involved in impl decisions-making
2 3 10	<p>2 The Health Information Systems theme is developing new information systems to facilitate the planning and monitoring of care pathways for people with vascular conditions. (p5)</p> <p>[healthcare practitioners re theme] We will design a treatment guideline, based on NICE guidance, to direct the clinical care of depression in adults with chronic physical health problems. The guidance will be used by practitioners and patients as a focus to discuss the diagnosis of depression, negotiate treatment options and follow-up, and provide patients with a record of planned treatment (care plan). (p9)</p> <p>[health info systems res theme] Four PhD studentships will be based around the design, implementation and analysis of care pathways in each of the CLAHRC's implementation themes (p.11)</p> <p>[HD theme] A comprehensive care pathway map of HF transitions of care between hospital</p>	BO - care pathway/plan	SMF OMM	Care pathway is both a standardised method and form and an object model and map type of BO as it allows a standardised set of information to be followed across different contexts to encourage and enable a more consistent approach to translating EBK into EBC during which the different groups involved can be coordinated despite having different interpretations of the pathway itself. This can result in each ind/group responding in a different yet coordinated manner, being driven by differing motivations and concerns related to their role and identity within the impl/KT process The pathway is a standardised

<p>and community services across NHS [Hazeldean] has been developed, utilising discovery interviews with clinicians, audit of patient records and data to document the perceptions and realities of the patient's journey along the pathway (p17)</p> <p>Our engagement with local NHS stakeholders has led to support for implementing the HF Standard of Care through projects planned for the coming year. We have embedded our team within the XXXXX and started planning a joint</p> <p>improvement programme for the atrial fibrillation (AF) pathway, working with the Stroke theme (p.17)</p> <p>The Health Care Practitioners research theme has engaged patients and carers in developing a care pathway for people with vascular conditions who also have depression.(p18)The focus group discussed experience of care for people with both depression and a long term physical health problem and what barriers exist to delivering effective care, particularly for people of South Asian origin. Building on these preliminary discussions, the focus group then considered the advantages and potential disadvantages of a new approach to care. The results fed into the development of a prototype care pathway that will be piloted in Spring 2010. (p19)</p> <p>3[prevention theme] Implementation and Evaluation of Care Pathways in Adults with Intellectual Disability This project will implement and evaluate eight stakeholder-identified care pathways for adults with learning disabilities in order to (a) reduce barriers to access, (b) reduce waiting times, (c) improve patient experience and outcome, and (d) improve the cost efficiency of service delivery. The project team plan to establish an initial structured assessment process to decide the most appropriate care pathway; (p6)</p>			<p>method and form as it represents a number of steps that can be taken to promote EBC of the pt. As an object model or map it provides an atlas of EBC, signposting each ind involved. EBC is completed through the coordinated actions and behaviour of the multiple HC pros – if a pathway is present but ignored, underutilised and rejected then it fails in its role as a BO.</p> <p>In terms of impl, it is important to ensure that a care pathway is flexible to the needs of all users inc the pt as it has been created as a tool to ensure care is pt focused, EB, and coordinated across the MDT.</p> <p>This data highlight how choosing and impl the incorrect or inappropriate BO (care pathway) can hinder EBC resulting in failed impl outcomes. By exploring from a stakeholder perspective issues of waiting times, barriers to access,</p>
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	<p>3The CLAHRC XXXXX theme, Improving Quality and Effectiveness of Service Therapies and</p> <p>Self-management of Longer-term Depression (XXXXX), aims to increase both user engagement with services and self-management by employing user knowledge and experience in the development of those services. We are trying to find out and test the best ways to improve the care pathway for people with this distressing and disabling condition (p34)</p> <p>10 This 'second gap' in translating new ideas into clinical practice and new products into the care pathway needed to be addressed within the research and implementation themes of the new CLAHRCs, demonstrating how evidence can be translated within a knowledge translation cycle into changed behaviour within the NHS. (p170) Within our application to become a CLAHRC, we developed a number of research themes that were all specifically designed to establish where the gaps in the patient pathway are and how new innovations in technology could be used to enable self management and self care by people with long-term conditions (p 171)</p>		<p>improved pt experience and outcome and improved cost efficiency the data highlights weaknesses in the impl chain which may not be apparent from a single user perspective.</p> <p>Embodies different forms of evidence from different perspectives – in PARIHS terms adds high quality, robust, credible K. Pathways are designed to translate research evidence into practice by guiding the decisions and actions of the different pathway users with EBK – by involving stakeholders evidence is broadened</p> <p>As an OMM it is algorithmic in its format – an idealised and condensed representation of a complex impl processes in a heterogeneous practice reality</p> <p>Creates a focus for shared understanding, clarifying roles and activities during the final</p>
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				stage of impl when EBK is translated into EBP (knowledge into behaviour), provides a middle ground where different members of the MDT can communicate with each other regarding the task in hand. Provides a lang which is understandable across the boundaries of the MDT.
4	<p>4</p> <p>The performance of each Centre is monitored and reviewed by annual reports and meetings with the NIHR Central Commissioning Facility.</p> <p>OVERALL COMMENTS (p2)</p> <p>7</p> <p>All nine of the NIHR Collaborations for Leadership in Applied Health Research and Care (CLAHRCs) devoted considerable care and attention to preparing their Annual Reports and have made significant progress in implementing the strategy outlined in their funding applications. (P1)</p> <p>Nevertheless, there was clear evidence that strong foundations had been laid in the first year, and we expect to see increases in the level of activity and outputs over the initial five year period of CLAHRC funding; the data provided in the Annual Reports for the first award</p>	BO - Annual & other reports	OMM	<p>Acts as a BO by bridging boundary b/w CLAHRC (as CoP) and public/other CoPs.</p> <p>Enables CLAHRC to share information about impl work, creates an opportunity to open up impl dialogue</p> <p>Acts to raise the profile of CLAHRC, presenting impl work as desirable and achievable.</p> <p>Raises profile and awareness of impl, with the intention to draw support from across a number of external boundaries</p> <p>Inscription chronicling successful boundary crossing endeavours – highly rhetorical and aspirational</p>

	year will provide a valuable baseline (p1)			<p>– maybe elements of symbolic, visionary BO?</p> <p>Captures these ‘successes’ in a format that is transportable and immutable across contexts but interpretation relies on how report is read by reader.</p> <p>A rhetorical account, a documentary BO, an inscription inviting approval, alliance, support and ultimately engagement in CLAHRC.</p> <p>Acts as a cohesive</p>
3	CLAHRC is developing and evaluating a secure, interactive web-based cardiac rehabilitation programme. Through this, patients can receive a tailored programme of cardiac rehabilitation with access to healthcare specialists through discussion forums, blogs and “Ask the Expert” sections.(p11)	BO - Blog	OMM	Blog is an online interactive journal inviting others to join impl dialogue and enabling access to expert EBK
2	A website for patients, carers and health care professionals will support the programme, holding up-to-date clinical guidelines, patient stories and advice, service information and, in the case of professionals, facilitating information exchange. (p17)	BO - website	OMM	Website is a BO involved in impl by proving a consensual platform for communication. This is not necessarily two-way as it also serves as a projected

				representation of impl through CLAHRC intended to open up a dialogue around impl and encourage engagement in collaborative impl activities.
3	Please also describe how you keep patients and the public informed of the work being undertaken by your CLAHRC. The local population are kept informed of activities and outputs of the CLAHRC by a (i) a regularly updated website, (ii) a quarterly newsletter – the SPARK, (iii) regular email bulletins, and (iv) events and presentations from CLAHRC themes. CLAHRC also makes good use of newsletters, websites, events and other communication channels hosted by local organisations. For example, the Prevention Theme uses the Nene Commissioning newsletter to update patients and the public on progress with its research activities and outputs. Members of the CLAHRC regularly attend patient group meetings organised by local trusts or branches of national charities, such as Diabetes UK, to discuss and update the community on our research activity. Work is also underway to liaise with local NHS Trusts to contact their members to inform them of CLAHRC activities and seek to recruit them into CLAHRC studies and, where appropriate, project steering groups (p15)	BO - Newsletter	OMM	Here an array of BOs – the full bureaucratic range of communication devices and strategies are drafted in to improve the power of communication. CLAHRC is keen to open up an impl dialogue with the intention of engaging and recruiting the local population in its activities. Here the local population is the focus of behaviour change interventions and an alliance is sought. BOs are used to align this population with the impl aims of CLAHRC.
3	[rehab theme]Implementation of the SPACE manual in four GP practices within the GP Commissioning Consortia in XXXXXXXX.(p11)	BO – Manual	OMM SMF	The SPACE manual is a BO as it an object that is transported across boundaries separating GP practices and their pts from researchers. The manual acts as a vehicle designed to deliver EBK re COPD across this boundary but the meanings

				assigned to the manual by its producers, receiver/users may be different and variously interpreted according to the role and identity within impl process
2 3 6 7 11	<p>(HC Practitioners res theme) Next steps. We will design a treatment guideline, based on NICE guidance, to direct the clinical care of depression in adults with chronic physical health problems. The guidance will be used by practitioners and patients as a focus to discuss the diagnosis of depression, negotiate treatment options and follow-up, and provide patients with a record of planned treatment (care plan).Also, we will design a training intervention to assist practitioners in the detection, assessment and treatment of depression in people with vascular conditions. The treatment guideline and training will be piloted and then evaluated in a clinical trial that will start at the end of year two (p2)</p> <p>2 (Health info systems)We will focus on finding new ways to compare the care expected from clinical guidelines with the actual patient journeys, as far as this can be extracted from electronic health records. This will produce new tools for clinical audit and service redesign. Four PhD studentships will be based around the design, implementation and analysis of care pathways in each of the CLAHRC's implementation themes (p11)</p> <p>2 improve their systems for detecting, recording and managing CKD in line with National Institute for Health and Clinical Excellence (NICE) guidelines. (p16)</p> <p>3 During the course of the year, elements of this strategy were delivered, for example, our review of tailoring was completed and published in the Cochrane Library (XXXXXet al, 20XX) and a project to implement the NICE guidelines on obesity in primary care</p>	BO - Guideline	OMM SMF	<p>Guidelines literally provide a standardised form for communicating EBK across multiple practice sites.</p> <p>Can provide a focus around which CoPs can form to collaborate in impl work</p> <p>Provides as standardised set of recommendations around which impl work can be coordinated and directed</p> <p>Major focus of impl efforts across all CLAHRCs</p> <p>Applied as a BO to join up boundaries separating vascular and MH conditions to impl EBC more widely and appropriately</p> <p>Provides a benchmarking function from which other BOs can be designed and tailored according to current EBK.</p>

	<p>completed recruitment and initial data collection (p3)</p> <p>3 Ongoing and completed Implementation Theme projects are:</p> <ul style="list-style-type: none"> - Implementation of NICE guidelines on Teenage pregnancy - Implementation of NICE guidelines on Obesity (p3) <p>3 - Implementing NICE guidelines on Falls in the Elderly in the emergency department (new project) (p3)</p> <p>3 Our obesity guideline implementation project showed that patients and practitioners experienced lack of access to weight management services (p4)</p> <p>3</p> <p>Rehabilitation Theme The Rehabilitation Theme continues to conduct its novel and ambitious programme of applied research in the field of rehabilitation for patients with chronic cardiopulmonary diseases. The benefits of pulmonary and cardiac rehabilitation are well established and enshrined in national and international guidelines and service strategies. (p10)</p> <p>3</p> <p>Implementation Theme support for the implementation of NICE guidelines on obesity has</p>		<p>Are recognisable, credible and robust but impl of guidelines can be challenging –tailoring is a way of addressing inflexibility.</p> <p>Boundary crossing events are used as a way of introducing new guidelines and proving a shared information space in which impl can be discussed.</p> <p>Barriers to impl have been highlighted i.e. lack of access to weight management services, that highlight the divide between having EBK (weight management services are helpful) and responding to EBK. This know-do gap is out of the locus of control for these pts. This data highlights a mismatch between who impl interventions are being targeted at (inds: drs, pts) and a lack of facilitatory resources i.e. in terms of PARIHs evidence is high but facilitation is low.</p> <p><u>Do these ppl act as K brokers?</u> <u>Are they operating in boundary</u></p>
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<p>Improved the management of overweight and obese adults in local general practices by providing practices with information about referral opportunities for overweight patients. An educational package (an e-learning tool) for healthcare professionals has also been made available. <u>Professor Baker</u> is a member of NICE's Implementation Strategy group, and therefore has been able to keep NICE informed of lessons emerging from the CLAHRC's experience. This has included participation in a workshop hosted by the Implementation Strategy Group, interaction with <u>NICE's regional implementation consultant</u>, and with <u>local NICE scholars</u>.</p> <p>2. The Walking Away for Diabetes programme is being implemented in seven regions in the UK and Ireland as part of usual care. The initiative has had a major impact on patient care and usual health care practice in these regions. Furthermore, several investigators from the project are currently involved in drafting NICE guidance around the prevention of diabetes in high risk population. (p12)</p> <p>6 In the majority of cases, CKD can be managed easily in primary care. There is a lot of advice available to clinicians about treating patients with CKD (e.g. NICE guidelines1 or www.ckdonline.org), with the key points being to identify patients early and make sure that their blood pressure is well managed. However, we know that thousands of people are not receiving the best possible care as recommended in the NICE guidelines. (p4)</p> <p>6 Developing a practice protocol</p> <p>Protocols are one way of providing more standardised care for all patients. Practices created protocols that staff could follow to identify and treat patients with CKD, using</p>			<p><u>spanning roles?</u></p> <p>A guideline is a way of capturing and presenting EBK in a standardised format. Uptake however is influenced by personal practice values and style. Impl a guideline can be challenging is facilitatory interventions are insufficient. The rigid structure of a guideline mean that it requires tinkering and tailoring before it can be embedded into a local impl context.</p> <p>Strength of a guideline as a BO maybe that is designed to overcome local impl uncertainties and can be rolled out across multiple sites. However see above re need to be tailored.</p> <p>Date recognises difficulties in impl guidelines</p>
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<p>existing guidelines such as those from NICE or the Map of Medicine, and localising them to suit their individual needs (p11)</p> <p>6 Following NICE recommendations, the practices ensured that anyone at high risk of CKD, particularly those with hypertension, diabetes or cardiovascular disease, had had an eGFR test in the last 12 months.(p12)</p> <p>6</p> <p>The second part of the aim involved managing patients' blood pressure to the targets recommended by NICE. This involved testing for proteinuria and then using appropriate interventions to reduce and maintain blood pressure (p13)</p> <p>7 IMPACT ON HEALTHCARE PROVISION</p> <p>We are pleased to note that a number of impressive healthcare impacts were described by the CLAHRCs, ranging from national impacts (e.g. inclusion of research evidence in NICE guidelines) to local impacts on healthcare practice within the local CLAHRC collaboration. As anticipated (given that it will take time for work funded via the CLAHRC award to translate into healthcare impacts), (p2)</p> <p>9 Many of the approaches used in the past have focused directly on the performance of individuals and teams, and have included educational interventions about the recommendations of guidelines (e.g., workshops and seminars), quality improvement interventions (e.g., audit and feedback), and marketing interventions (e.g., academic</p>			<p>Guidelines used to bridge boundary between research, clinicians and vascular pts</p> <p>Boundary between early intervention and late treatment</p> <p>NICE recs/Guideline as BO used to organise and coordinate impl work re vascular conditions amongst divergent GP practices</p> <p>Guideline impl requires multiple BOs and boundary crossing interventions.</p> <p>Boundary described between untested and tested pts (boundary between known and unknown, classified/identified and unclassified/unidentified pt)</p> <p>One way that a piece of EBK or</p>
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	<p>detailing). Within the CLAHRC, we refer to these approaches as implementation, an activity focused on getting research into practice (p2)</p> <p>9 Initial projects to develop aspects of this <u>practical tailored implementation intervention</u> are planned or underway, the first addressing the issue of implementation of guidelines on obesity in primary care. (p4-5)</p> <p>11 The literature reviewed included clinical guidelines such as those produced by the National Institute for Health and Clinical Excellence (NICE) and the Royal College of Physicians (RCP). (p7)</p>			<p>information artefact can become more flexible without losing K content is through multiple representation of the same information adapting to a format that reflects the EBK needs of different users.</p> <p>Data describes3 approaches to impl guidelines described:</p> <p>Learning, QA, marketing</p> <p>Introducing a new BO (i.e. guideline) requires</p> <p>To each user the guideline as BO has different meanings and uses</p>
<p>2</p> <p>3</p> <p>11</p>	<p>2 The Heart Disease theme is developing and implementing an evidence-based best practice Standard of Care for Heart Failure (HF) and a programme for patients and clinicians to support its implementation. (p17)</p> <p>3Work is already underway to implement structured education programmes locally and nationally as part of the national service framework for diabetes. With the support of the CLAHRC, the study team have trained a total of 36 educators to deliver the intervention to</p>	<p>BO - Standard of care/NSF</p>	<p>SMF</p> <p>OMM</p>	<p>Again a standard of care is a standardised method of managing communication and defending against local uncertainties to ensure that the same K is impl across diff practice contexts. The aim is to address inequalities by applying a baseline for impl. These</p>

	<p>patients at high risk of diabetes. The project team were delighted to secure a Regional Innovation Funding Award to extend the evaluation of this early implementation work in Northamptonshire. (p5)</p>			<p>outcomes can then be measured against the NSF to provide an evaluation of impl success. (an impl. Heuristic?)</p> <p>Focus is on changing the behaviour at an ind and org level by providing a universally recognisable quality standard</p>
2	<p>2 Each health care improvement initiative follows five steps (see figure 3), based on the Model for Improvement 2 and the Promoting Action on Research Implementation in Health Services (PARIHS) 3 framework.</p> <p>This acknowledges that successful implementation depends on:</p> <ul style="list-style-type: none"> • The evidence that is being implemented and its acceptability to patients and practitioners • The context in which implementation takes place (improvement initiatives are adapted to suit local circumstances) • The way in which the implementation process is facilitated (each initiative is facilitated by a Knowledge Transfer Associate (KTA) who supports the exchange of knowledge between the University and the NHS (p13) 	<p>BO – Model, improvement</p> <p>BO - PARIHS</p> <p>BO - KTA</p>	OMM	<p>Blending two BOs to generate a tailored approach to impl</p> <p>Models provide a framework around which impl work can be coordinated.</p> <p>Provides a step-by-step standardised method to approach impl challenge</p> <p>Acknowledges contexts sensitivity and flexibility required by BO</p> <p>KTAs have boundary spanning role related to facilitation and support of impl across boundaries separating university from NHS</p>
1	<p>XXXX Primary Care Trust is leading the work of the Stroke theme. As well as coordinating developments, the PCT is developing a model of intelligent commissioning that will</p>	<p>BO – Model, intelligent</p>	OMM	<p>Developing a BO (OMM) around which impl work (research</p>

	facilitate the integration and application of research in South Yorkshire but that will also be applicable generally (p.32)	commissioning		integration and application) can be organised and coordinated – creates a pathway towards impl which can then be applied across multiple impl contexts.
9	<p>Our translation model has been strongly influenced by the organisational excellence model of Nutley and colleagues [6]. (p3)</p> <p>As the number of staff in the trusts become involved in undertaking research studies or in applying the findings, we will be investigating the extent to which this changes the way the trusts use research in their decision making, and whether it increases their capacity to absorb and apply new research evidence, that is, whether they are developing the research minded culture of the organizational excellence model [6 (p4)</p>	BO - Model, org excellence	OMM	<p>Endorsing a QI approach to impl, focusing on generating change at an organisational level. OMM acts to bring different inds/groups involved in CLAHRCs to work together towards the shared goal of impl.</p> <p>Local-global boundary</p>
2	<p>Each health care improvement initiative follows five steps (see figure 3), based on the Model for Improvement 2 and the Promoting Action on Research Implementation in Health Services (PARIHS) 3 framework. This acknowledges that successful implementation depends on:</p> <ul style="list-style-type: none"> • The evidence that is being implemented and its acceptability to patients and practitioners • The context in which implementation takes place (improvement initiatives are adapted to suit local circumstances) • The way in which the implementation process is facilitated (each initiative is facilitated by 	BO – PARIHS	OMM	<p>Provides an atlas of successful impl which can be used to translate the concept of impl across different practice and research contexts. Embodies an inclusive approach to impl within which different stakeholder perspectives are embedded (e.g. pts and practitioners) Can provide a conceptual tool which can be interpreted and utilised differently dependent on identity of user. Provides an imp heuristic against which varying factors relating to successful</p>

	a Knowledge Transfer Associate (KTA) who supports the exchange of knowledge between the University and the NHS) (p13)			impl can be measured. Aspects can be tailored to specific contexts and has multilevel applicability. CLAHRC using to guide and inform targeting of impl interventions.
3 9	3The primary aim of this initial work was to develop readily applicable methods for identifying barriers and enablers to evidence use, and for selecting implementation interventions to address them (tailored implementation). This approach is a key component of knowledge translation models, including the Canadian Health Research Institute's (CIHR's) knowledge-to-action (KTA) cycle that is a key component of our approach to knowledge translation (XXXX et al, 2009). In keeping with our new strategy, we now focus less on research into implementation methods and more on direct implementation activities. (p3) 9 Our model is also influenced by the knowledge to action process [5] in which identification of the need for knowledge and the adaptation or tailoring of knowledge have important roles. (p3)	BO – K2A	OMM	Impl work involves preliminary/preparatory work around the development of tailored BOs which are keyed to specific aspects of the impl context (e.g. barriers and enablers) K2A is used as a SMF to establish a shared understanding of the processes of impl between different inds/groups involved in impl, as well as providing a coordinating mechanism around which impl work can be organised
6	6 The Collaborative methodology The CKD Collaborative uses a method called the Breakthrough Series from the Institute of Healthcare Improvement in the USA. This method draws on two main principles: rapid	BO – PDSA	SMF OMM	The PDSA cycle provides a SMF that is related to impl by enable and evaluate change and collaboration between CKD

	<p>cycle change using Plan-Do-Study-Act (PDSA) cycles and collaboration between participants for shared learning (p5)</p> <p>(p6) PDSA cycles: Plan, Do, Study, Act . One of the key elements of the Breakthrough Series is the use of PDSA cycles. This is a simple tool that helps teams test a change on a small scale and assess whether it has been a worthwhile change.</p> <p>(6)The use of PDSA cycles has been really useful as it has given us the chance to reflect on how successful any changes have been for the practice and what we have learned. (testimonial, p6)</p> <p>However, initial PDSAs often involve just one member of staff testing a change on a small group of their patients for a short time, so the adopt stage – rolling out the improvement to all staff and all patients – can be a challenge in itself (p6)</p>			<p>collaborative members.</p> <p>Assumes a QI app to impl</p> <p>As an OMM it provides focus around which practices and practice members can be aligned to work together to get research into practice</p>
2	<p>What we have done</p> <p>We used routinely collected performance data from general practices (Quality and Outcomes Framework) to highlight the shortfall in the number of people identified with CKD. Having established the Collaborative, we developed individualised resources for each practice and worked with them to improve their systems for detecting, recording and managing CKD in line with National Institute for Health and Clinical Excellence (NICE) guidelines. Practices collect CKD prevalence and blood pressure management data each month and we have developed a reporting structure that translates the data into quality improvement information (p16)</p>	BO - QOF	OMM	<p>Impl involves using multi-BO systems for the detection, recording and management of CKD</p> <p>Use of a reporting structure (SMF) to translate data into impl (QI app) info</p> <p>Intention is to align GP practices to be impl EBK at a standardised level as measured against NICE guideline</p>

				Developing individualised resources may be about developing tailored information artefacts that can be used to translate NICE guidance into lang and tools relevant to each practice context. Systems/clusters/bundles of BOs
2	<p>2 The Collaboration for Leadership in Applied Health Research and Care (CLAHRC) for XXXXXXXX is one of nine CLAHRCs in England that were established in 2008 by the National Institute for Health Research (NIHR) to improve population health and health care through partnership working between a leading university and its surrounding NHS trusts. Each CLAHRC is funded jointly by the NIHR and partner organisations to carry out a programme of high quality research and ensure that the knowledge gained from this work is translated into improved care for patients. (p2)</p> <p>2 All nine CLAHRCs meet regularly together to share their knowledge and experience, ensuring that learning from any one CLAHRC is available to all. To help facilitate this,</p> <p>the NIHR Service Delivery and Organisation Network (SDO Net) organises 'learning and sharing' events at which CLAHRCs exchange knowledge about, for example, effective strategies for engaging patients in research. (p2)</p> <p>2 "The CLAHRC has helped keep us motivated and not lose momentum. The methods of knowledge sharing between practices has been fantastic and very beneficial."</p>	BO - CLAHRC	Symbolic BO	<p>CLAHRC can be described as a symbolic type BO as it is projected as a universally positive and persuasive concept. It embodies an idealised abstract notion of implementation, drawing on overwhelmingly positive notions of partnerships, joint working, collaboration and knowledge sharing to reinforce a profile that encourages support and promotes alliance with its values and aims.</p> <p>It is described as motivational, 'fantastic' and 'very beneficial'</p> <p>In terms of boundary spanning CLAHRC has been developed</p>

<p>Dr XXXXXXX, GP, XXXXXXX Medical Practice (p4)</p> <p>2 “The CLAHRC has helped clinicians with the understanding and clarification of CKD and removal of fear for patients who can better comprehend the condition.”</p> <p>Dr XXXXXXX, GP, Dr XXXXX Surgery (p19)</p> <p>6 Other benefits of taking part in the Collaborative</p> <p>Clearly, involvement in the CKD Collaborative has led to direct benefits for patients within the practices involved. However, wider benefits have also been observed within the participating practices. Staff have become more confident in managing CKD in primary care, resulting in a reduced number of referrals to secondary care. The skills gained in managing CKD also have wider applicability to other long term conditions. For example, practices have improved skills in auditing data, validating registers and patient review systems – all of which are transferable to the wider management of disease registers for long term conditions. More generally still, practice staff have developed skills and knowledge in change management, teamwork and improvement methods that are applicable to all aspects of their work (9)</p> <p>The CLAHRCs have all demonstrated a strong commitment to patient and public involvement and a number of interesting initiatives in this area were described, including the appointment of lay representatives to committees and management groups and specific PPI appointments within the CLAHRC. Some CLAHRCs describe the process of user involvement at an individual project level, most describe links with NHS patient, carer and other user groups.</p>			<p>and designed specifically to bring researchers, practitioners, managers and service-users together to work collaboratively to translate knowledge into practice.</p> <p>Potentially could also be described in terms of the shared/common knowledge space it providers, enabling these different groups to share and exchange knowledge by enabling communication and cooperation.</p> <p>Its primary purpose is to translate knowledge from the language of one social work into another (from EBK to EBC)</p> <p>Involved in negotiating meaning and establishing a shared understanding between clinicians and service-users i.e. 'by helping clinicians with the understanding and clarification of CKD and removal of fear for pt'</p>
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	<p>The information on PPI included in the Annual Reports has already been collated into a mapping report by INVOLVE and a CLAHRC PPI Forum has been established by representatives of the nine NIHR CLAHRCs working in collaboration with the INVOLVE Coordinating Centre. This group provides a structured mechanism to facilitate joint working for those involved in developing and supporting public involvement in the research and implementation activities of the CLAHRCs and focuses on shared themes, approaches, learning and resources for public involvement, which is a welcome development.</p> <p>7 The CLAHRCs have also been successful in developing a joined up approach to PPI in other ways, including holding Learning Events with a clear PPI focus and by actively seeking to collaborate locally on PPI with their nearest Research Design Services, NHS Trusts, Biomedical Research Centres and Units, etc. It is also pleasing to note that two of the seven shortlisted proposals for the recent NIHR Health Service Research Programme/INVOLVE research call originated from CLAHRCs.</p> <p>We are also pleased to note that the majority of the CLAHRCs are developing engagement mechanisms in order to increase public understanding and awareness of their activities. (p2)</p> <p>10 The NIHR collaborations have been designed to be innovative communities of health professionals, academic researchers, technologists, voluntary agencies, industry and the public, with the aim of improving patient outcomes by conducting applied research and knowledge translation. (p.170)</p>			<p>It hosts an array of BOs involved in impl</p> <p>It aspires to generating a superCoP within which the boundaries between research, practice, management, and PPI are joined up.</p> <p>Data illustrates CLAHRC's intention into enable generate boundary crossing and knowledge exchange between health professionals, academic researchers, technologists, voluntary agencies, industry and the public</p>
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	<p>11 The CLAHRC has four teams of researchers and four teams working to implement research, each working in different PCTs across the conurbation and each looking to improve care for those affected by cardiovascular conditions (diabetes, heart disease, kidney disease and stroke). (p6)</p>			
2	2			
11	<p>Implementation The Stroke implementation theme worked extensively with patients and carers to design the six-month post-stroke review, which is a requirement of the National Stroke Strategy. In collaboration with a public health consultant and the stroke coordinator from NHS XXXXX, as well as members from the local Stroke Association, two half day focus groups for stroke patients and carers were arranged. The focus groups identified what patients and carers wanted from their stroke service, especially those needs that remain unmet in the longer term.</p> <p>This input has helped CLAHRC partners to understand where improvements to existing services can be made and to identify the features of the six-month review that are most important to patients. The findings were used to design the six-month post-stroke assessment which is now being implemented and evaluated through Plan-Do-Study-Act cycles by four PCTs. (p19)</p>	BO –GM-SAT	SMF OMM	<p>This is a BO that has been developed from K generated via boundary crossing endeavour. It represents a shared perspective and understanding of post stroke need, broadening assessment to encompass the perspectives of clinicians, pts, and carers and provide a tool which can be used to open up dialogue and overcome boundaries between these distinct groups. This is important in terms of impl as having a BO that embodies EBK and is flexible enough to reflect different user's interpretations could mean it is more likely to be uptaken.</p> <p>A tool like this could be described as representing both a vessel carrying EBK and a vector of impl.</p>

				In terms of the stroke impl theme impl requires collaboration across a number of boundaries between pts, carers and clinicians focusing on meeting post stroke needs of an ind, but their activities, understandings and motivations may differ.
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Key:App: approach

EB: evidence-based

Pt: patient

Impl: implementation

EBC: evidence-based care

Prac: practitioner/practice

Lang: language

EBK: evidence-based knowledge

Res: research/researcher

K: knowledge

Appendix 5: Phase 2, Table of participants

Phase 2: Table of participants

Participant number	Participant name	Site	Boundary spanner level	Date	Type	File name
1	Jean	Oakdown	Senior	11-10-12	telephone	DM450028
2	Rose	Oakdown	High level	04-12-12	telephone	DM450031
3	Jaime	Hazeldean	Senior level	06-12-12	telephone	DM450032
4	Christy	Oakdown	Senior level	06-12-12	1-2-1	DM450033
5	Bernie	Oakdown	Senior level	06-12-12	1-2-1	DM450034
6	Charlotte	Oakdown	Frontline	06-12-12	1-2-1	DM450035
7	Maureen	Oakdown	Frontline	24-01-13	telephone	DM450037
8	Susan	Hazeldean	Senior level	25-01-13	telephone	DM450038
9	Jon	Hazeldean	Frontline	25-01-13	telephone	DM450039 DM450040
10	Dafydd	Hazeldean	Frontline	28-01-13	telephone	DM450041 DM450042
11	Blythe	Hazeldean	Senior	08-02-13	telephone	DM450043
12	Sion	Hazeldean	Frontline	08-02-13	telephone	DM450044 DM450045
13	Pat	Ashgrove	Frontline	11-02-13	telephone	DM450046
14	Shirley	Hazeldean	Senior level	12-02-13	telephone	DM450047
15	Julie	Ashgrove	Frontline	13-02-13	telephone	DM450048
16	Gerard	Ashgrove	Senior level	15-02-13	telephone	DM450049 DM450050
17	Tanya	Ashgrove	Senior level	18-02-13	telephone	DM450052
18	Chantelle	Hazeldean	Senior level	20-02-13	telephone	DM450053
19	Judy	Ashgrove	Senior	11-03-13	telephone	DM450055
20	Stefan	Ashgrove	Frontline	26-03-13	telephone	DM450057
21	Ffion	Ashgrove	Frontline	26-03-13	telephone	DM450058

Appendix 6: Phase 2, examples of framework analysis (case by case and cross case analysis)

Case 1 Oakdown

Table of boundary objects identified during phase 2

Boundary object	Data	Boundaries	Findings/commentary
Implementation project proposal	<i>“And collectively we developed a project proposal of what we were taking forward using the knowledge to action cycle and framework”</i>	Implementation projects proposal provides shared object with which to negotiate organisational boundaries between HEI and NHS partners	Produced through discussion to reach a collective consensus around the nature and topics of implementation to be pursued y CLAHRC
VTE assessment form	<i>things like the MUST screening tool or the department of health VTE assessment form and the idea that those are then adapted to the local context so MUST was developed to what we called MUST plus because it had an extra question that we felt was appropriate. The VTE assessment tool went through about eight iterations both in terms of the questions being asked and where it was located which ended up on the drug cardex.” (S1P2)</i>	VTE assessment tool relocated to span the boundary between knowing and doing more effectively, increasing its potential as a BO-in-use.	Scope and scale of validated tool amended to encourage uptake and improve transition from BO-in-theory to BO-in-use
MUST+ and nursing guidelines	<i>“So ... so ... and that was, again, [name] that ... that added that in. So we’ve got the validated tool, we haven’t touched the tool ...it’s still the tool as is, but alongside that, on admission there are four or five other questions in addition to MUST, because they didn’t feel ... the dieticians didn’t feel MUST was enough on its own. So they added ... they added that in. And they used</i>	MUST+ tool amended to bridge the boundary between knowledge and action more effectively	Validated tool amended to embed practitioner (dietician) knowledge in order to improve relevancy and prompt action.

their ... professional expertise and knowledge that ... that kind of evidence, to create those questions.”(S1P3)

And it was just little things like, you know, when we introduced MUST, at first the graphs for MUST were actually put on a notice board well away from the scales and all of the wards, you know, and I came along, because of my practical knowledge, and because I still work on the frontline, I said ‘Hang on a minute, we need to probably hang these graphs on the weighing scales’ ...you know, so as you weigh the patient you can relate to the graphs, work out the MUST score, blah-blah-blah. So my ... [name] my Manager, let me laminate all the graphs really for all seventeen wards, and that was done initially, right at the beginning of the project when we realised it was a problem, because the ... the nursing staff were like to-ing and fro-ing from the weighing scales to the graph and then back again, and ... and it was a problem, they were wasting a lot of time doing it. And obviously that, you know, they would sort of think oh my gosh, this is a ... a tedious task really. I think that did

MUST+ graphs and nursing guidelines relocated to encourage uptake and span the boundary between knowledge and action more effectively.

Recognising that the scope and scale of the BO-in theory requiring changing from ‘all nursing staff’ to ‘those staff completing weighing of patients’ and from clinical notes and guidelines to next to weighing scales.

	<i>help and, again, you know, my frontline clinical experience came in handy”</i>		
evidence-based practice	<i>“yes but what I’ve really talked about is evidence-based practice as I have used the terms that you’ve used as I think these are much more known...For example from practice I spoke with a couple of general practitioners in training or who were responsible for training and asked them what their what language and they talked about service improvement” (S1P1)</i>	EBP a concept that is shared across professional boundaries amongst healthcare practitioners	
service improvement		Service improvement is shared language amongst GPs	Recognising that a shared language is being used that relates to concept of implementation and applying this language to open up implementation dialogue with GPs.
Patient safety	<i>“I’m tending to use a slogan that I suppose is about patient safety...Everybody’s business. So those are sort of catch phrases that capture people’s interest” (S1P1)</i>	Catchphrase spans stakeholder boundaries	Coining a catch-phrase as an easy to share, highly resonant symbolic BO-in-theory and practice.
Nutrition action plan	<i>“The action plan was a way ... of giving them back some ... it was their action plan, they decided on it...So although it had some top down elements in that, you know, they had to get better at using MUST, they decided that ... and they decided how that would be done. And they decided what other little objectives they would have around supporting people with oral nutrition. So the action plan I suppose was a ... was a</i>	Action plan helps to address to open communication between ward staff and CLAHRC implementation facilitators in order to develop a BO that is meaningful at an individual ward scale, and within the scope of the ward team.	Rendering the generic and inflexible MUST+ more context specific (changing is scale and scope) by embedding it in an individualised action plan that is meaningful to users increases potential uptake of tool and adherence to nutrition guidelines.

boundary object... in ... you know, to cross that ... top down issue... problem...Yeah so ... so yeah, yeah so you could unify those things ...together.” (S1P3)

I mean to an extent MUST and the nursing care guidelines were very prescriptive ...but anything else that we wanted them to do ... we developed some action points, where they chose their own goals really; ...they chose three goals related to their own ward area, that they wanted to achieve within their area. ...And in the end they sort of like ... I call it ‘Pick and Mix’, they ... they’d picked and mixed what they wanted to do in their area, and ... and I think that was a good way really, rather than us telling them what to do. They were more aware of what was happening in their area than we were, and I think that gave them some empowerment.”

Making the prescriptive and standardised context specific and meaningful.

Nutrition education package

We’ve got a variety of lesson plans and learning resources, workbook ... there’s just quite a lot that’s come out. And then what we do is we say we’ve got all this, what ... what would work for you ...and then they take what they think will work for them...You can adapt it or use it as

The nutrition education pack contains a numbers of items that represent BOs-in-theory that can be used together or individually to open up dialogue around nutrition across different implementation contexts for instance both within the NHs and in external sites of implementation

The nutrition implementation work pack contains a number of templates which can be adapted to implementation context and user needs to generate a tailored pack of BOs-in-theory.

<p>Nutrition workbook</p>	<p>is.” <i>“And certainly with the workbook, that has gone out to ... to community settings ...that are more institutional community settings...Basically we send them the PDF one ...which they can't play with ...and then say if you want to play with us just e-mail me back ...and I'll send you one that can. And then we have a record of who's ... used it and ...and all we ask is that they acknowledge [xxxx place name] as ...as the people that developed it.”</i> (S1P3)</p>	<p>such as nursing homes. See above. The work book is a BO that has been shared with external agencies and can be adapted for use in different contexts, permission notwithstanding.</p>	<p>Workbooks flexibility is unlocked through agreement with authors, enabling a BO-in-theory to be adapted to a new implementation context and thus increasing its potential to succeed as a BO-in-use.</p>
<p>Nutrition</p>	<p><i>“I think the thing with nutrition is it's not a hard sell... I really don't think anybody thinks it's not important ...everybody thinks it is important, I'll get all the negatives out of that sentence. And most people, and I can't think ... as I say, most people believe nutrition is important...So it's not a hard sell. What's the hard sell is how to do it.”</i></p>	<p>Shared clinical topic such as nutrition and dysphagia are boundary spanning concepts that are meaningful to a range of stakeholders including practitioners, patients and nursing staff. However, the relative value of these concepts can vary between stakeholders which can influence their uptake and limit their scope of potential action.</p>	<p>Nutrition is a powerful and symbolic BO which resonates across almost every context. It is something that is universally important and understood across all stakeholders.</p>

Case 2 Hazeldean

Table of boundary objects identified during phase 2

Boundary object	Data	Boundary	Findings/commentary
<p>Statistics such as national data and local QOF data</p>	<p>I'd say in terms of the work that we did, our kidney disease work, probably one of the things that opened up the dialogue initially and on an on-going basis was data that we had. We had QOF data and we had national data which which showed very clearly that the local delivery of care was not as good as one would have expected it to be. (S2P1)</p>	<p>Communication opened up at a commissioner and PCT level. Identification of shortfall, potential to improve service delivery, assists in reaching targets.</p>	<p>QoF data represents a clear and compelling case for participating in implementation work. Provides a powerful and persuasive message which is difficult/impossible to discount. However maybe not a true BO as lacks intrinsic plasticity, although it does have a boundary function.</p>
	<p>And I think ... I think sort of that ... that sort of more ... more senior level, you know ...coming in and really setting the scene by ... by really looking at ... at evidence, and showing them the evidence to what's out there and why you're proposing what you're proposing in terms of a change to ... to service delivery, or a change to the way their practices are managing a specific disease, was ... was really that I suppose ... the research evidence that was available around that and the ... whether it was NICE guidance or whatever ... whatever other evidence; well it could be local sort of opinion leader evidence, was</p>		

really ... there's sort of the ... sort of those headline messages that you had to go in with ...to really open that dialogue. (S2P8).

Well yeah, with the QOF targets ...which is kind of how you ... you know, if you're going into like a practice or ... meeting commissioners ...you know, to open up a dialogue

Disease registers

we sort of, we knew what some of the sticking points in that had been, and one of them had actually just been the logistics of interrogating registers in a practice, was much more complicated than we thought cos they all use different systems, they weren't that that, some of them weren't that competent really at doing the registers so in the first project we probably spent about three quarters of the time just trying to get an accurate picture of what the register looked like and who actually had CKD...So so actually doing the improvement work around blood pressure was really squashed at the end of the twelve month (S2P1)

Generates a repository of standardised information which can be accessed by different parties across different contexts.

CKD registers initially do not function as BOs or catalysts as there is a lack of standardisation within systems, a high level of inaccuracy, and failure to use or maintain them with any sort of sufficiency.

Later they become the focus of implementation work, highlighting how implementation work is coordinated around their upkeep and use.

Disease registers are designed to provide a repository of standardised information accessible across different domains by different users. However their disrepair and high level of embedded inaccuracy means that implementation work is coordinated around their interrogation and validation, as well as the necessary skilling up of users.

<p>CKD improvement guide</p>	<p>but after after twelve months what we did was like compile what we'd learnt into a CKD improvement guide which we sort of put onto the CLAHRC website and sent to the practices that had taken part.</p> <p>put in all three of those together what we saw was firstly the practices achieved the targets but they achieved them much more quickly...A more complex implementation intervention, a quicker rate of improvement. (S2P1)</p>	<p>An objects to be shared across primary, spanning the boundaries between GP practices as individual businesses</p>	<p>This improvement resource combined with the electronic audit tool, a secondee facilitator and lessons learned from first stage gave better implementation outcomes. Using a BO as part of a complex implementation intervention can enhance improvement rates. However a certain level of BO competency is required to use BOs effectively.</p>
<p>CLAHRC</p>	<p>[re. CLAHRC] No they wouldn't understand; they don't what ... they don't know what it stands for. And people can't even spell it (laughs).(S2p2)</p> <p>It's quite a difficult concept really to first ... I suppose portray, because I think immediately people assume that you ... you're doing a research study and ... and they don't quite understand. And I suppose if you just talk about it in the context of sort of service reorganisation or ... or delivery, you know, or service improvement, then they get ... a bit more of a ... you know, a helpful steer on what you ... what you're</p>	<p>CLAHRC resonates at a senior organisational level as it frequently (but not always) reflects priorities at this level, enabling collaboration between healthcare providers and HEIs.</p>	<p>CLAHRC is not widely understood at different levels. CLAHRC acts as both catalyst and inhibitor depending on organisational level.</p>

actually meaning, but just to kind of keep away from the fact that you're really talking ... we're not talking about, you know, going in and doing a ... a research study.(S2P8)

HF Alert Card

So it did ... did kind of ... it did start to improve communication. And what came out from the patient interviews was the patients felt more empowered, you know, having this card. And one of the things that was interesting that came out was they felt it legitimised the fact that they'd got heart failure because they had a card, a plastic card with their name on that said 'I've got heart failure', so ... they were quite ... you know, it ... they were quite successful. And they've been spread now, you know, to quite a lot of ... quite a few other heart failure services.
(S2P2)

Communication boundary between primary and secondary care.

Communication is successfully opened up across boundaries, all stakeholders report impact and benefit – patients feel empowered, medics and nurses across both practice settings are engaged in dialogue, patient care is seamless and optimised.

Does not transform knowledge but does convey it across boundaries. Likelihood of uptake.BO tailored to specific boundaries. Semantic boundaries.

Stakeholder feedback provides measure of impact of BO-in-use. Boundaries may be semantic in nature, and require semantic BO. Boundary to be addressed stems from a failure to communicate across primary and secondary care division.

Idea/template for HF card adapted from external source to fit needs of users in new context.

Simple format designed to improve communication.

Came about via serendipity rather

than intention, recognition initial assumptions re what should be focus of implementation were based on conjecture rather than consultation. Real sense of learning from this although also an unexpected consequence of having little direction or brief at beginning of project.
 Effective BO driven and developed by user need.
The problem came from them and then we just tried to find a solution for it.

Stroke assessment tool

So I worked with a lot with Stroke professionals, out in the community, in the hospitals, and patients and carers, to look at exactly what post Stroke reviews, and six month reviews particularly, should consist of. And, using that information, developed an assessment tool (S2P3)

Negotiating the boundaries between stroke patients' and professionals' expectations regarding post stroke recovery.

BO-in-theory developed in partnership with stoke professional and patients.

Implementation models and frameworks

So my main input has been around the implementation project in managing chronic kidney disease in primary care and really sort of using what we know from the research and from some of the theoretical models of knowledge mobilisation to help design and run the projects at an NHS level.
 (S2P1)

Models and frameworks provide useful guidance around which projects can be coordinated at an organisational level. Implementation models and frameworks may at as BOs-in-use (Catalysts) at higher organisational level (scope and scale).

No I never use [PARIHS]...I never, no because I think it's, I think it's something which initially switches people off if I'm honest.(S2P4)

I think having that as, in the back of your mind whilst you approach people it is quite, it is really useful to be honest... I think I indirectly work in the Paris Framework all the time to be honest, but not directly if that makes sense. (S2P4)

Physical health assessment tool

it was set as a target, the team managers probably knew about it but again in three out of four groups there was no understanding on the ground what it actually was, how to access it, what I need to do and there's a massive skill set problem because they, most people weren't trained, especially like social workers. (s2P4)

Linking physical and mental health

BOs-in-theory that insufficiently reflecting stakeholders' views and values, and which are enforced/imposed will be met with resistance.

the other one is making sure service users are receiving physical health assessment in the community which is part of the Trust [inaudible 19:47] so it's aligned to that. You would think it would work like that actually, it doesn't... (S2P5)

Approval and agreement at as senior level does not influence success of BO-in practice at frontline level.

I think it was, I think it is not that

that they don't see the added value of doing it, it's about something else they need to do and I think they, they feel they are quite stretched capacity wise anyway, care coordinators in that team. And they feel that it is, something the Trust was putting on without giving any support, without giving any adequate training... And we try to put on training for them but I think because it's seen as, 'oh the CLAHRC's doing that, it's not the Trust'. There's quite an issue to that as well because we always, I mean we try to be as much endorsed by the Trust or embedded but at the same time we're seen as a different organisation.

<p>CKD audit tool/change package</p>	<p>and since we've started using this audit tool we've been sharing the resources with this other CLAHRC and we're now in a formal collaboration where basically the audit tool that they developed and the change package that we developed all come under the same brand of impact.</p>	<p>Collaboration formed around shared objects between Hazeldean and Ashgrove CLAHRCs</p>	<p>Contingent on whether or not BOs-in-theory are meaningful in another setting. Here there is an exchange of BOs-in-theory and in-use around which collaboration is coordinated</p>
<p>Change package/audit tool/ shared protocol</p>	<p>I think it's one of the most crucial things to be honest and this kind of information that we developed, the</p>		<p>Protocol is similar in development and function to nutrition action plans at Oakdown.</p>

change package on the back of, and you know part of that learning and development would be say development of protocol within the practice by the practice team which we would then ask that practice to share with us, we'd say, look we're likely to put this into our change package but we'd also like to share it with other practices, so as long as you're happy for us to do that but you know, can I take a copy of it. Because all team we've met at learning sessions and been involved in [inaudible 23:16] etc., etc., they're generally all like really quite engaged with each other on the back of that and I know there's sort of communities of practice, it produced a kind of temporary kind of community of practice this project where people were happy to share ideas with each other. So we were kind of, these protocols were developed that people would have to share with one another.

Developing BOs represents "one of the most crucial things" in terms of implementation work outputs, for example the change package, audit tool, HF card. Protocol developed by practice team reflects practice needs and values. If this is then embedded into change package then change package will become meaningful and reflect local contextual condition and priorities. Aim of then sharing this with other GP practices, representing a BO around which a CoP is formed.

Case 3 Ashgrove

Table of boundary objects identified during phase 2

Boundary object	Data	Boundaries	Findings/commentary
CKD audit tool	<p>And out of that there was this, there was an Excel based tool that they were using as the data extraction and realised, sort of in a nutshell that that was, that could be turned into something of a standalone sort of, standalone use, usage. So it was sort of branded as Impact improving patient access to kidney, I forget what the acronym stands for. But it was Impact with a K. (S3P1)</p> <p>Another person involved who actually developed the tool is a GP...And so that you've got sort of academic, Secondary Care, Primary Care (S3P1)</p> <p>So that's gonna, we've all been able to sort of see that as not only a benefit to the, benefit to the general, the general practice or the GPs surgery, they'll benefit because their registers will be up to date so QOF points and stuff like that. The patients will be able to sort of benefit because they'll hopefully they're obviously gonna reap the</p>	<p>Clarifies boundary between what is known and what is done. Both opens and reinforces CLAHRC-to-CLAHRC at different levels.</p>	<p>Establishes baseline implementation data, provides a tool around which implementation can be focused and coordinated. May lack intrinsic flexibility but is this embedded in a more user friendly format of change package?</p> <p>Diversity of stakeholders from different domains grouping around, development, and implementation of CKD audit tool. Audit tool embodies shared goal 'which is ultimately to help to identify patients who've got chronic kidney disease and get people to start being treated early'.</p> <p>Implications across a range of concerns which are more or less important to each stakeholder group. As a BO-in-theory it embodies multiple objectives ranging from inc register accuracy, inc pt outcome, and inc financial rewards, whilst retaining focus on single goal (improve early detection and treatment).</p>

benefits of better sort of care being targeted earlier. And then the financial implications for the NHS is being able to save money on sort of. (S3P1)

Yeah I suppose some challenges from one of the projects I'm involved with deal quite a lot with GP's and practice managers so going out and implementing an audit tool for Chronic Kidney Disease and have had mixed reception from GP's generally or really positive and really appreciative of the work that we're doing for them and they can, you know, clearly see the benefits that are very useful for them. But have had one or two GP's who are slightly sceptical of my role and I guess unsure about me and have questioned my qualifications and knowledge and purpose which is sometimes, you know, a challenge. But I'm not from a clinical background, I don't have a medical degree so I'm always kind of honest about that but I tell them I'm here to implement the tool in their practice and, you know, look through their data and it's up to them what they want to do with it and I'm not going to give them any clinical advice and there's other information available

CKD audit tool maybe represent a BO-in-use at an organisational level, but implementation has not been without challenges. Also provide the focus of some domain issues around ownership and use, provoking territorialism and rivalry between CLAHRCs, reinforcing boundaries despite a public portrayal of formal collaboration (can collaboration ever be classed as a 'formal' process of engagement?)

	and, you know, sort of try and back it up with that kind of information. So that's probably the most challenging side of that. (S3P2)		
CKD Audit data	they'd say 'yeah that's great, come on in' so one of us or, yeah normally it's been one or two of us have sort of gone out and visited the Practice, explained the situation and then they'd sort of log us onto the system and we'd sort of run it all there and then... And get the results immediately... If they've been sort of stand-offish and they've seen the results and been swayed. (S3P2)	Clarifies boundary between what is known and what is done.	Being an effective tool may both hinder and enable implementation. For example the Impakt tool is likely to rapidly and unequivocally reveal failings in register and subsequent missed treatment opportunities re CKD. This can be both convincing and generate support for tool, or provoke discomfort and resistance. CKD audit tool provokes a mixed reception from GPs. GPs can respond negatively if associate audit tool (BO-in-theory) with a boundary spanner who lacks credibility (the BO is automatically associated with the boundary spanner who introduces it, and thus embodies that person's identity – if they are credible then by association the BO will also be deemed as more credible).
Evaluation and implementation toolkits	We sort of found there weren't that many kind of local resources that could be used that you could give the people to work through or a kind of reference guide so it's the producing those sorts of toolkits and bits and pieces like that to help people either evaluate, you know, what they're doing or use, use the	Know and do boundary Toolkit provides a reference point prompting and guiding implementation dialogue. Between different groups of stakeholders Example of designated object designed with boundary crossing in mind. It's simple but engaging and	Two toolkits are produced for the purpose of implementation: an evaluation and an implementation specific toolkit. These consist of a set of resources including templates that can be modified according to need, with learning facilitated via e-learning using the Moodle platform to enable collective discussion and

evidence better, that kind of work.
(S3P2)

One of the ones I was involved with was to produce an evaluation toolkit so that kind of went through all the different stages to do an evaluation basically and it had different templates and things that people could use to kind of build evaluation. To start with I worked with the coordinators mainly with ****?... So when I started **** had already started on the toolkit and then when I came I kind of helped her with that. And then we had to write an implementation toolkit, [inaudible 03:19] toolkit obviously, and so it was similar so it had templates and it had information on how to actually take everything and get it into practice and then from the toolkit we also, we're building an e-learning course on Moodle so it kind of took the principles of implementation and then you could work through the course. But because it was on Moodle, it was a, what do you call it? Lots of people did it online and you'd have discussions [wiki]. (S2P4)

So I can't remember exactly now but there were lots of different ways and

intuitive format enables users to communicate and share information across cognitive, cultural and professional boundaries.

learning via a wiki.

Toolkit facilitates the negotiation of implementation goals by opening and guiding discussion. By using it stakeholders are able to negotiate and agree on a shared implementation goal.

Strong sense that implementation is interpreted as evaluation, and ambiguity regarding differences.

things people wanted because I suppose there were lots of different stakeholders. There were service users, there were members of staff, there were like lots of different people, a lot of different people want different things I guess, trying to get them all to decide exactly what they wanted and what we'd do first and then what, I suppose what would be most useful for them to do. But we used the toolkit actually. (S3P4)

I think because it was quite intuitive really. So like the toolkit, let's say the evaluation one, you could, you could take bits out, you didn't have to do the whole thing (S3P4)

Research opportunity tool

And actually when I went in I did a ... I developed a tool, the 14 different opportunities, as I saw it in the research process, that you could have meaningful involvement. (S3P6)

I'm not saying that every project needs ... you know, all fourteen levels ... you know, all fourteen points of involvement, but just to act as a prompt for researchers to say oh, I didn't think about that, that I

The PPI opportunities tool has been developed to bridge the gap between researchers and service-users by enabling researchers to identify specific opportunities for engagement and collaboration within the research process.

There is scant data about the process in which this tool came about. It is implied that service-users views and values are embedded within it but it is unclear exactly how these have been captured (i.e. "as I saw it")

can actually get them to be involved at this point. (S3P6)

Yeah. I have ... I have been burned a couple of time when people, you know, they'll take stuff that I ... you know, and take it off, and I find that very difficult. But, you know, its [unclear - 0:53:44] stops me being quite so open with my ... you know, if I design something ... like the Opportunities Tool ...I didn't want that ... you know, CLAHRCs very much about, you know, sharing information, you know, I ... anyone who wants to use it, use it that's fine, and I ... you know, make it freely available, but then when other people then front it up as their own work ...you're like, well ... no that's not on

Highlights issue of ownership of BOs and consequences of sharing without consensus

Lesser diabetes risk score

I can give you an example from our CLAHRC, when they developed the lesser diabetes risk score. It's an online tool, seven questions, very simple; age, your BMI, family history of high blood pressure, whether you're on any medication for high blood pressure, all these sorts of things, seemingly very simple. Anyway, they decided, because ... South Asian communities have a

Between practitioners and BME service-users

Despite its apparent simplicity in terms of content and questions, developing the lesser diabetes tool in isolation of the target community resulted in the assumption that it could readily be translated. However by overlooking the importance of involving the BME community in tailoring tool to context a literal translation was produced and piloted, provoking an

higher incidence of diabetes at a lower BMI ...this was a real ... it was important, and obviously Ashgrove has a very high [BME] population; it was really important that this tool worked for that group. (S3P6)

So those discussions, if they hadn't have taken place that tool would have gone out, I mean it is out, Diabetes UK host it, it is a really valuable tool...But it would not have worked for that group if they hadn't had that conversation.
(S3P6)

So it ... yeah, if they hadn't had that conversation it wouldn't it wouldn't have worked, it wouldn't have helped. But likewise, it can now be adapted further for different communities (S3P6)

outcry amongst due to its inappropriate, confusing and offensive content.

For example the decision to translate the tool literally without considering contextual differences immediately embed these false assumptions within the BO-in-theory thus alienating potential users. The transition to BO-in-use cannot then be made.

BOs-in-theory developed without the input of stakeholders are most likely to exert an inhibitory rather than a catalytic effect on implementation. Engaging stakeholders in the design and development of a new BO-in-theory increases the likelihood uptake and consumption:

Despite early issues, the diabetes tool now represents an object that has made a successful transition from BO-in-theory to BO-in-use. This is a result of being attentive to the needs and nuances of specific target communities, embedding these social meanings into the tool as it is tailored to new community, rather than inadvertently embedding the assumptions of the designers in the final product.

Cardiac e-rehab programme

I can think of another one that ... it was an intervention that wasn't working ... Basically it was an online ... self-help tool for people that have had a heart attack ...

Anyway, it didn't work, the research just wasn't working. And they spoke to a couple of patients and got them involved with it, and one of them happened to be ... an IT consultant by his background ...you know, prior to his heart attack, and so he was able to be very instrumental in redesigning the website. So the tool had been out there and ... just wasn't doing anything ...so they sort of took it back to grass roots and ... with them as patients, with their own lived to say 'Well I wouldn't do that, why would I bother sitting and plugging in to a computer to ...', you know, they were able to give very frank and very honest reasons why it probably wasn't being used, why it wasn't working. And recently, they've been working on it for about eighteen months, and it's just been re-launched and actually it's working phenomenally well, and the uptake from other health authorities is

Between PR actioners and service-users

Reactivate your Heart was initially unappealing to patients as it reflected a clinical agenda rather than the patient experience, conveying the message that practitioner and academic knowledge is privileged above patient knowledge.

This provides an illustration of why embedding stakeholder perspectives, values and knowledge within a BO-in-theory is of utmost importance. Without doing so a BO-in-theory may exert an inhibitory effect by conveying meanings that are privileged and partisan rather than inclusive and shared.

The response to the redesigned Activate Your Heart has been positive across all stakeholder domains:

Rehabs programmes such as Reactivate Your Herat can represent effective BOs if they adequately represent stakeholder needs and priorities. If this is over looked the likelihood is that one or all stakeholders will find the BO-in-theory burdensome and irrelevant. Relevancy is key to the success of BOs-in-theory making the transition

really positive.

And it's now being used for ... they're developing a ... a COPD version. So ... there's then that translation to other disease states and other conditions

And for the patients, they wanted something that was going ... they could see the benefit of ... you need that buy in. And for the staff, I mean there is ... sort of, you know ... a question bit where the individuals can ask questions specifically of a clinical team member, and that ... and that would be answered within 24 hours, and obviously ... so they've got a bit of back up that the clinicians are monitoring this, and they have that opportunity. From a clinical point of view, actually that's easier to manage than, you know, people coming back in day in and out, or phoning, you know, it's easier to be able to quick check my e-mails, oh right I've got six from ... from the website that I need to quickly ... respond to, or ... you know, put onto an appropriate member of staff to respond to.

to BOs-in-use.

Needs to be relevant and responsive to user needs and context.

PPI plays an important role in the development of BOs-in theory which have the potential to be tailored and modified for use across a range of implementation settings.

Again highlights the importance of the tacit and subjective in terms of engaging with BOs-in theory which if used could have a catalytic impact on process of implementation. BOs-in-theory that make the transition to BOs-in use are often the one's in which tacit elements of stakeholder knowledge and experience is embedded,

CLAHRC as concept

we really sort of got our heads together about what CLAHRC was, and actually what we should be doing. And in fact I ... I kind of ... you know, when the new co-ordinator started, because I sort of gave them a briefing of what I'd found out about CLAHRC and how I interpreted it, and ... yeah, we kind of just worked something out ourselves and just created a job and created work for ourselves, based on our interpretations of ... of what it is. (S3P5)

Yeah it is ... its ... it's a programme of work to promote collaborative ... collaborative work between academia and healthcare to ...ensure research evidence is used quickly, and it is ... is ... worthwhile, it's wanted, and it's used. And its high quality obviously.(S3P5)

Research and practice

CLAHRC as a catalytic artefact is variably interpreted. In this case what it is and does is initially ambiguous and lacks clarity. However through a process of collective sense-making facilitated through the formation of a CoP a definition is determined and a meaning is agreed upon. CLAHRC as collaborative entities struggle with CLAHRC-to-CLAHRC collaboration due to competition and territorialism. Single BO-in-theory or use can either unify or provoke conflict at different levels and under different conditions. Territorialism undermines collaborative effort (successful implementation is underpinned by meaningful collaboration to overcome territorial tendencies and historical border conflicts). CLAHRC as inhibitor has inadvertently generated, sustained and reinforced boundaries. Evidence that a lot of effort has been put into attempting to bridge boundaries that have arisen due to CLAHRC's perceived external organisational identity Claiming ownership of BO and

reinforcing borders.

Bowel screening card

the findings that came out of that were ... were used to inform social marketing initiatives, so some of the stuff they were doing ... we ... we developed like little ... they looked like little business cards they have information on, sort of ... you know, symptoms and ... and sort of information on the screening pro ... you know, they're just like a little information card, and numbers if you're worried, that you can call, or numbers you can call for [unclear - 0:37:56] ...regarding the screening programme....They went out to all pharmacies, and I think doctors across the County.

Research and service-users
Know/do

Unclear data regarding the impact and outcome of the card, or discussion around whether or not it was produced in collectively.

Phase 2 Across Case theme table

Themes	Case 1 Oakdown	Case 2 Hazeldean	Case 3 Ashgrove
Theme 1 CLAHRC as concept	CLAHRC concept is linked to research rather than practice at frontline. Growing recognition of concept at senior levels. Disparity regarding what implementation through CLAHRC is and means.	Lack of consensus amongst academic core team regarding the conceptual basis of CLAHRC has led to mixed approaches to implementation work. Difficult concept to explain. Uncertainty regarding what CLAHRC can offer.	Initial uncertainty regarding what CLAHRC is and how to do implementation drove boundary spanners to develop own definition.
CLAHRC as external entity	Remains unfamiliar and unrecognised at frontline. CLAHRC received with suspicion and wariness by NHS staff.	Seen as different organisation. Evidence of occluding CLAHRC brand to encourage buy-in to implementation activities including project recruitment and delivery of training.	Perceived as an inbetweener entity, neither a part of academia or NHS. Issue related to lack of prestige.
Theme 2: Emergence of boundary objects in CLAHRCs	BOs have emerged at a strategic level through discussion amongst senior stakeholders, resulting in the establishment of a shared understanding around implementation, framed in the language of NHS priorities. This shared understanding is embedded in collectively generated objects and cascaded through all levels of CLAHRC. At the frontline objects are embedded in contextualised formats to improve uptake by counteracting rigidity.	BOs are often the focus of implementation work, however some objects to be implemented lack sufficient meaning amongst stakeholders which is compounded by their association with an imposed implementation agenda and a sense of burden. Objects that have most successfully been implemented are those that have been generated through collective endeavour.	Examples of failed BOs such a cardiac e-rehab programme and diabetes tool which failed to represent user needs and views. Such objects have been withdrawn and reviewed in collaboration with users to develop objects embedded with user knowledge and meaningful to all stakeholders.
Collectively created objects	Implementation project proposal	Heart failure alert card	Cardiac e-rehab programme

	Implementation action plans	HF action plans	
Collectively tailored objects	MUST+ Nutrition workbook		Wiki to encourage collective learning.
Standardised object	VTE assessment form	Disease repositories Physical health assessment tool	Audit tool Implements ion tool kit
Theme 3: Symbolic objects	Local NHS priorities, clinical topics and the concepts of implementation and CLAHRC itself are variably symbolically resonant. However evidence points to improved patient care as universally powerful symbolic objects across all stakeholders and levels.	Failing to identify power ideas as symbolic objects can reduce a boundary spanners capacity to engage stakeholders in implementation. Improving patient care remains powerful, trumping financial incentives and targets at the frontline.	Less evidence of shared concepts operating as symbolic objects. Instead the division between the 'two cultures' of research and practice remains largely unbridged evidenced by a failure to establish a shared language or common ground. Recognition that what resonates to members of each domain is very different.
Speaking the same language – issues in identifying a shared language around the concept of implementation.	KT EBP Service improvement	Service improvement	Quality improvement
Clinical topics as symbolic boundary objects in theory and use	Nutrition dysphagia	CKD Diabetes Heart failure Stroke	Unclear
Targets and incentives as symbolic boundary objects in theory and use	Appealing at senior levels as linked to reaching quality improvement targets.	Attempts to encouraged by linking to financial incentive and reaching targets helpful at organisational level but not at frontline, where improving patient care is most powerful shared concept.	Unclear
Becoming meaningful at	Alignment to NHS priorities around	Associated with a top-down agenda.	Counter evidence: diabetes tool and

different levels	improving patient outcomes targeting specific clinical areas. Improving patient care meaningful across all levels.	Linked to burden at pct practice level and practitioner level. Improving patient care meaningful across all levels.	cardiac e-rehab programme initially only meaningful at senior level but not at user level.
Theme 4: Transition from BO-in-theory to BO-in-use through collectively driven evolution	Embedding MUST+ in Nutrition action plans overcomes its genericism and encourages uptake	Heart failure alert card Post stroke assessment tool	Cardiac rehabilitation programme
Imposition of BO-in-theory hinders transition to BO-in-use	Re nutrition tool – evidence that it is seen as a burden rather than a priority in some settings.	Physical health assessment tool Audit tool Diabetes Disease registers	N/A
Credibility and authenticity - Boundary objects reflect the identity of stakeholders/ownership	Nutrition action plans Implementation projects proposals	Heart failure alert card	Cardiac rehabilitation programme Opps lesser diabetes score
Territorialism	Inter-disciplinary territorialism between healthcare professionals.	Primary care GP surgeries i.e. Single manned GP surgery Overlap with areas where implementation is already underway (NHS rivalry) CLAHRC-to-CLAHRC rivalry	HEI rivalry CLAHRC-to-CLAHRC rivalry