Supporting knowledge translation through collaborative translational research initiatives: 'Bridging' versus 'blurring' boundary-spanning approaches in the UK CLAHRC initiative

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Abstract

Recent policy initiatives in the UK and internationally have sought to promote knowledge translation between the 'producers' and 'users' of research. Within this paper we explore how boundary-spanning interventions used within such initiatives can support knowledge translation between diverse groups. Using qualitative data from a research study of two case sites drawn from the CLAHRC initiative in the UK, we distinguish two different approaches to supporting knowledge translation; a 'bridging' approach that involves designated roles, discrete events and activities to span the boundaries between communities, and a 'blurring' approach that de-emphasises the boundaries between groups, enabling a more continuous process of knowledge translation as part of day-to-day work-practices. In this paper, we identify and differentiate these boundary-spanning approaches and describe how they emerged from the environing context of the wider CLAHRC networks. This highlights the need to develop a more contextualized analysis of the boundary-spanning that underpins knowledge translation processes, relating this to the distinctive features of a particular case.

Keywords: knowledge translation; boundary-spanning; professional boundaries; collaboration; translational research initiatives; healthcare management, CLAHRCs

Background & Context

In recent years, greater recognition of the importance of knowledge translation for healthcare improvement has prompted the development of explicit initiatives aimed at

translating research evidence into policy and practice (Lang, Wyer et al. 2007). One approach taken by health research funding agencies has been to commission collaborative entities in which researchers work closely with other stakeholder groups (such as practitioner groups and policy representatives). Examples include academic health centres and practice-based networks in the USA (Agency for Healthcare Research & Quality, 2012), a variety of knowledge translation initiatives and institutes set up by Canadian policy (Canadian Institute of Health Research, 2012), and various centres and networks commissioned by the UK's National Institute of Health Research (NIHR) (National Institute for Health Research, 2012). These act as system-level interventions, which seek to create an environment in which research and evidence can be more readily applied in practice (Boyko 2012). Each programme is characterised by a particular strategic approach to assembling the mechanisms and processes needed to support knowledge translation across the boundaries of stakeholder groups.

In this paper, we contribute to literature on the role of these translational initiatives by presenting findings from an empirical study of the CLAHRC (Collaborations for Leadership in Applied Health Research and Care) initiative in the UK. Nine CLAHRCs, each encompassing a university in partnership with local NHS bodies were funded by the NIHR over the period Through our case-study analysis of two different CLAHRC collaborations, we propose a characterisation of two boundary-spanning approaches based on how they achieve knowledge translation. These we term 'bridging' and 'blurring' approaches. Further, through analysis of the interplay between the contextual attributes of each case and the enactment

of these boundary-spanning approaches, we explore the importance of such features in influencing emergent patterns of knowledge translation.

The role of policy-driven strategies encouraging collaborative practices to support knowledge translation in healthcare is widely debated (Denis and Lomas 2003)(Rynes, Bartunek et al. 2001). Central to this emerging literature is an understanding that knowledge cannot easily be transferred between different 'communities of practice' (Carlile 2004; Oborn, Barrett et al. 2010) because dissimilar communities produce, share and apply knowledge according to the practices and tenets of 'different worlds' (Caplan 1979). For example, academic-researchers may prioritise the production of explicit forms of knowledge such as academic papers, whereas clinical-professionals use tacit 'know-how' to inform their practice (Bartunek, Trullen et al. 2003).

Building on studies in the healthcare-management field that have established the difficulties of mobilising knowledge across the different settings of research and practice, the existing literature has particularly focused on; a) synthesising the types of strategies used (e.g. Mitton, Adair et al. 2007; Sudsawad 2007; Tetroe, Graham et al. 2008); b) developing frameworks and tools for the evaluative development of knowledge translation (e.g. Contandriopoulos, Lemire et al. 2010; Boyko 2012); and c) the use of particular interventional mechanisms, encompassing individual-, organisational- or institutional-levels of activity, with examples ranging from knowledge-broker roles for individuals (Lomas 2007; Dobbins, Robeson et al. 2009; Ward, House et al. 2009); organisational-level activities such as exchange forums (Lavis 2006; Baumbusch, Kirkham et al. 2008); and institutional-level activities such as the CIHR integrated knowledge translation processes (e.g. Davison 2009;

CIHR; 2010; CIHR, 2008). It is the 'externally-directed' boundary between the different communities of the 'producers' and 'users' of healthcare research (Bartunek, Trullen et al. 2003) that is most recognised as the focus of these interventions, but they can also be directed 'internally' toward the more subtle boundaries within a profession (Martin, Currie et al. 2009; Powell 2012) or between members of the same organisational entity (Bate 2000). Despite the attention given to boundary-spanning mechanisms and processes within the existing literature, there has been relatively limited empirical investigation of knowledge translation within the healthcare setting. Existing models tend to be based on conceptual developments (Crilly, Jashapara et al. 2010), rather than on 'real world applications' (Mitton, Adair et al. 2007; Ward 2012). Within those studies, however, much work has sought to focus on the gap between researchers and policy-makers caused by different epistemic positions or ways of conceptualizing knowledge (Knorr-Cetina 1999) . This focus is reflected in a concern with boundary-spanning activities, roles such as knowledge brokers, and artefacts such as boundary objects (Crilly, Jashapara et al. 2010)(Wenger 1998).

One consequence of this concern with the gap between communities is that existing work often relies on the metaphor of a 'bridge' to depict the boundary-spanning activities involved in knowledge translation (Lavis 2006; Hartling, Scott Findlay et al. 2007; Straus, Tetroe et al. 2009) (Lomas 2007; Ward, House et al. 2009). One important limitation of this narrow focus on bridging interventions, however, is that it neglects the influence of context on knowledge translation. Since CLAHRCs were established to provide a supportive context for such translation, this is a serious limitation. Thus, in a recent study of that initiative, Oborn et al. (2013) note, the need to 'position' brokers and boundary objects 'within the broader networks of research and practice' to 'enable insight into current translational

processes' (2013 p. 422). More generally, Boyko (2012) calls for studies of how knowledge translation models are 'applied for different issues or in different contexts… to understand how specific features might be tailored to achieve certain outcomes'. This need to address context is also emphasised in other work (e.g. Ward 2012). Thus, context is a key component in accounting for the knowledge translation activity enabled by tools such as the PARIHS framework (Kitson, Rycroft-Malone et al. 2008), the Alberta context tool (Estabrooks, Squires et al. 2009), and the context-based evidence-based decision making framework (Dobrow, Goel et al. 2004). In short, knowledge translation is deeply embedded in a complex array of organisational, policy and institutional contexts (Contandriopoulos, Lemire et al. 2010).

In our study of the CLAHRC initiative we therefore adopted as our overarching research problem the influence of the CLAHRC as an organizational context – that is, the structure, leadership and management of the CLAHRC - upon the process of knowledge translation between research and practice. Within that process, and reflecting the previous work highlighted above, our concern was with the way in which boundaries between relevant communities were spanned to enable knowledge translation.

In seeking to position knowledge translation within its context, however, we also sought to recognize theoretical issues highlighted in recent studies which have questioned certain of the assumptions of established conceptual models, particularly as they relate to flows of knowledge between different groups (Oborn et al. 2013). These recent studies emphasize

the role of epistemic differences and political imbalances between groups in defining what becomes accepted as knowledge (Asimakou, 2009). (Martin, Currie et al. 2009). They also highlight an over-emphasis on explicit forms of knowledge in established models, neglecting the importance of socialization and tacit forms of knowledge (Wenger 1998, Oborn et al. 2013).

Moreover, where existing models tend to view context as an objective force operating upon knowledge translation, work within the domain of organization theory rather emphasises the actions of individuals and groups in interpreting and constructing that context. It was important, therefore, to incorporate within our study an awareness of the agency of leadership in promoting an interpretation of context that 'legitimises a particular form of action' (Grint 2005). Likewise, we viewed the boundaries observed within a particular context, as between communities within a CLAHRC, and between the CLAHRC and its wider environment, not as a fixed and static phenomenon, but rather as dynamic, with some boundaries becoming more salient and others decaying over time (Barrett et al. 2012). While this view of context precludes a simple contingency model of knowledge translation processes, it does highlight the salience over time of particular contextual features, and these provided an important focus for our empirical work.

Empirical field and methods

The findings presented within this paper derive from two UK initiatives which were commissioned under the NIHR CLAHRC programme. They were given a remit to develop an organisational model that could support translational work for the purpose of conducting applied-health research and implementation in issues around service delivery for chronic and mental health conditions. They were designed as environments for trans-disciplinary

collaborative work, bringing together academic researchers with experts from the fields of healthcare management and practice. They involved partnerships between organisations within the same locality, including universities, local healthcare organisations (e.g. acute hospitals, mental health trusts and primary care trusts), and other relevant groups (e.g. local authority, third-sector organisations and charities). In effect, each CLAHRC was designed not to pursue discrete implementation activities, but instead sought to develop new organisational models that could result in changes to working-practices (Rowley, Morriss et al. 2012). The CLAHRCs' contribution to overcoming the 'second translational gap' should therefore be viewed in terms of organisation-level intervention and change.

However, each CLAHRC enjoyed great flexibility in interpreting their broad remit, and this was reflected in the development of different operational and management structures, and distinctive visions and environments for their translational work-programme. Our study's focus here centres on case-study analyses of two of the nine CLAHRCs. These cases highlight different strategic approaches to organisational-level translational interventions. This case selection for the purpose of illuminating complementary features and relationships (Eisenhardt and Graebner 2007) thus supported our overarching concern with the relationship between the organizational context and the process of knowledge translation.

Both case-study CLAHRCs were structured in broadly similar organisational terms, with a central management team, and sets of project-teams conducting clinical-research and implementation work-programmes. In addition, each initiative comprised shared support services where members provided expertise such as healtheconomics, statistics, implementation, healthcare-commissioning, healthcare-management, clinical-practice and social-sciences insight. The work programmes of the CLAHRCs also encompassed a range of

of outputs, including sharing new research evidence to inform decisions made by local commissioners, incorporating findings into local and national clinical-guidelines, contributing to local healthcare services re-design, empirically-testing and implementing new interventions to be used by a particular Trust, and becoming a source of information for local clinical-networks to support service development.

Differences between the CLAHRCs emerged, however, in terms of the range of professional groups involved. CLAHRC A was centred upon a leadership team of social- and clinical-scientists, with project teams being dominated by clinical-academics. The majority of members were co-located within a university setting. The core management team for CLAHRC B included several members who held dual academic and practitioner positions, and who povided links between different disciplines within research and practice. Project-team members were from varied academic and healthcare-practice and management backgrounds, and were dispersed across partner organisation locations. This variation in professional affiliations was also reflected in differences in their organizational structure,. In CLAHRC A, 'shared support' members were grouped separately from project-teams, while in CLAHRC B these support services were integrated within the practice either of senior management or clinical project-work.

Our analysis focused on exploring how boundary-spanning within work-practices interacted with the contextual features developed by each CLAHRC (Baxter 2008). Hence, we found it was not necessary to differentiate between types of outputs to illuminate organisational characteristics. As outlined in Table 1, and reflecting the literature discussed above, we viewed the CLAHRCs as defining multiple, co-existent boundaries for knowledge translation.

[Table 1 to be placed here]

Our three-year study, for which we were granted full ethical approval (10/H1208/30), commenced in January 2010, around a year after funding for the initiatives had started. We adopted a multi-method, longitudinal approach to consider their development over time. Our data included 67 semi-structured interviews with individuals who represented the variety of roles and positions within the initiatives, including members of core management, shared support services and clinical project-teams. We also collected observational data (e.g. core management, project-team and advisory board meetings, and knowledge-exchange, dissemination and engagement events) and key documents (e.g. original bid documents, project outlines, and publications). All interviews were audio-recorded and transcribed for analysis, and we used the qualitative data package NVIVO for data coding. Within this paper, we draw on data from the earlier stages of the initiative, which explored set-up, focusing on features such as how structure, organisation, management, and leadership influenced how the work-programmes were being achieved in practice. The interviews were designed to explore accounts of how work-programmes were being undertaken in relation to the evolving context of each initiative. Topics discussed included the management and organisation of the initiative, the types of activities that had been developed to support knowledge translation, and the processes that were being used to facilitate collaborative working. Within the interviews, we discussed for what purposes, and in what ways boundary spanning to other members of the initiative and external groups was being achieved in practice by members of the project teams. This supported our analysis of how knowledge translation was being achieved within the initiatives, and allowed us to

relate how emergent features of each CLAHRC supported its own distinctive 'way of working'.

Our analysis broadly followed Fereday and Muir-Cochrane's (2008) staged approach to data coding and identification of themes, combining both inductive and deductive thematic analysis to develop codes from interview data. Although this followed a linear 'step-by-step' procedure, it also facilitated an iterative and reflexive process, where our analysis built upon our pre-existing conceptual insight that boundary-spanning between different communities was important in relation to further exploration of how knowledge translation was being achieved in different contexts. Our coding process combined both hierarchical coding which facilitates the capturing of fine-grain detail, and axial coding to reflect on relationships between themes (Espinosa, Slaughter et al. 2007). In our analysis of this data, boundary-spanning was identified as a top-level theme, and we continued developing our coding to explore the types of mechanisms and processes used to facilitate this, and to identify the emergent features that were associated with each case. The summary results of this analysis are outlined in Table Two. They highlight, with illustrations from our data, the following boundary-spanning mechanisms; organizational processes; activities and events; and roles.

Findings

As outlined in Table 2, we identified six types of boundary-spanning activity used in both cases as follows: (1) arrangements used to connect clinical project-teams with core management, and (2) the process through which clinical project-teams access expertise

provided by specialist support services; (3) events or activities for acquiring information and insight; (4) events or activities for sharing evidence and dissemination; (5) inward-focused brokering within the initiative and (6) outward-focused roles to external groups.

[Table Two to be placed here]

In the next stage of our analysis, outlined in Table 3, we then related the different mechanisms outlined above to the different boundaries that emerged as salient within each CLAHRC, analysing how members of project-teams interacted and shared knowledge across such boundaries. We were thus able to identify how the different contextual features of each initiative were important in shaping a process of knowledge translation as enabled by the relevant boundary-spanning mechanisms and processes.

[Table Three to be placed here]

What emerges from this analysis are two distinct patterns in the salience of boundaries experienced by different groups and the means by which they were overcome. In CLAHRC A, organizational and epistemic boundaries are strongly defined by professional and disciplinary structures. There is a relatively homogeneous core group within each project team, and teams are organized in a hub and spoke arrangement around the senior leadership team of clinical academics. The practices of research and implementation are explicitly divided by these boundaries, and the boundary-spanning mechanisms of processes, events and support roles are oriented towards bridging this divide. In contrast, in CLAHRC A professional and disciplinary boundaries are much less salient. The senior leadership team enact dual roles which are situated in the domains of both research and

practice. Project teams are heterogeneous, encompassing multiple disciplines and not centred on a homogeneous disciplinary core.

We characterise these related features of both boundary salience and boundary-spanning found in our cases as reflecting two different approaches to knowledge translation, termed 'bridging' and 'blurring'. In the following sections, we unpack these approaches further and relate them to the wider CLAHRC context through our qualitative analysis of each CLAHRC's development.

Boundary-spanning using a 'bridging' approach

In CLAHRC A, leadership of the initiative was comprised of academics from clinical- and social-science disciplines. Clinical-academics in leadership positions (i.e. typically professors from medical school clinical sub-disciplines) informed clinical-research project design. Each project-team was established around the team leader, with the majority of team members being from similar clinical-academic areas who took up designated roles for research and management of work-programmes. Those in leadership positions from social-science disciplines were influential in incorporating initiative-wide structural features to support the organisation of translational activities. As the initiative was formed around a large proportion of clinical-scientists, it was considered that they would not easily be able to interact to translate knowledge with communities that had different working-practice cultures. Therefore, features such as shared support services were created where initiative members employed with the explicit remit of connecting the work conducted by academic-researchers with relevant external healthcare communities.

"For the clinical-scientists this is a complete new way for them to do any work…Our model is for the clinical teams, so it's thinking outside their box… it's quite a divide that we [shared support services] will do the implementation work and we will do the overall knowledge-broker support." [Shared support services lead]

Included within this was the creation of positions within project-teams designed to explicitly link core clinical-academic members with others who could contribute different forms of expertise.

"The idea of knowledge-brokering is using these people to work in [to our project-teams], and then we work out with them [to their communities], because they'll be key in building the networks." [Core management lead]

Thus the practices and epistemic commitments of project-teams depended on a relatively homogeneous 'core' of members drawn from similar professional backgrounds. These 'core' group adopted a clinical-sciences approach to their programmes of work. Meanwhile, the roles of individuals outside of this core group evolved so that they became the link connecting the project-team with relevant practitioner and user-groups. For example, one such translator guided how best to frame the potential benefit of the project's findings in the context of the pressures and priorities of managers for a particular local clinical specialty. As core team members were co-located, this further emphasised the informal demarcation with these 'knowledge-broker' members, who often had bases in other organisations. As a result, this group were seen as being positioned towards the periphery

of the project team, acting as a link between the team and external communities. One example of this is provided by a team member from a nursing background who was allocated a defined boundary-spanning role within a project. Here she describes how she drew on her practitioner experience to discuss the impact of the study with practitioner groups and then guided the team to develop a more sustainable approach.

> *"What practitioners said to me I'll bring back to the team meeting… it's two-way, facilitating what their ideas are or problems are, obviously so we can sort them out." [Project-team member in designated knowledge-broker role]*

We observed in the team meeting how the knowledge-broker's insight was debated alongside its implications for academic rigour, with high-quality journal publications emerging as a central preoccupation. In these discussions, the project-lead enacted her role, in terms of applying technical insight that maintained the dominant clinical-science focus of the team's working-practices. Knowledge translation activity thus depended heavily on the agency of those in peripheral boundary-spanning roles, and their ability to adjust their own working-practices to accommodate the norms and practices of the project team.

Structures and processes were designed by the initiative for the specific purpose of linking project-teams with expertise from other communities. These included holding advisory boards, stakeholder meetings and events, clinical-academics who took up 'honorary' positions at partner healthcare organisations, and team members who, specifically for the

purpose of project-work, sought to become part of other stakeholder groups and decision-making forums.

> *"Without the initiative we would have had links with the networks within our clinical area potentially, we would have known about it, but I think through the umbrella of the initiative we've kind of formalised that working arrangement and looked at ways of doing things much more collaboratively." [Project-team-lead]*

These arrangements created a 'separate space' where project-team members could engage for a strictly delimited time with the knowledge and insights offered by other communities. Specialist support services within the CLAHRC assisted with 'translating' project findings into a style more appropriate for external communities, including hosting dissemination events and defining the form of written outputs. Whilst project-teams were exposed to different types of insight at these events, the effect on their practices was episodic rather than continuous.

Boundary-spanning using a 'blurring' approach

In CLAHRC B, project-teams were composed of a mix of academics (e.g. nursing, allied-health, clinical-sciences, health-studies) and practitioners and managers from healthcare-practice. As project-team leads often came from a different discipline to most other team members, their role did not centre on providing technical support (e.g. scientific and methodological direction). Instead it focused on guiding members to engage with the vision of the translational initiative.

"On the face of it, I don't fully connect with all of the different parts of the project…I knew that the initiative was obviously about the second gap in translation and building networks, but once I started working in my role that became the primary focus." [Project-team-lead]

CLAHRC members, both at senior management and project levels, often played 'dual' or 'hyrbid roles' being involved in both research and in a practitioner role within the NHS. This duality supported the integration of the practices of research, dissemination and implementation within the work-programmes. In one example, a team-member describes how she drew on both her academic expertise and practitioner experience to support fluid integration of the different project-work phases. As well as leading the conduct of research, she actively supported the implementation process.

"For implementation, there will be some early phases to it where I'm not actually seeing patients and I'll be breaking down barriers, things like working with IT departments within the hospitals, and also working with the clinical teams to see where this will fit and how we actually tie it in to what's happening already… and then after that start our work clinically delivering that service." [Project-team member (with research and practitioner expertise)]

By combining an in-depth understanding of research issues with a practitioner appreciation of the challenges of implementing service changes, she was able to tailoring the intervention to problems identified by the team. Outputs produced from projects were also readily disseminated into external communities by individuals holding these 'hybrid' positions.

The overlap of roles and responsibilities within and between a large senior management group and those in positions of leadership within project-teams itself acted as a boundary-spanning mechanism to coordinate different types of knowledge. Those members with 'specialist' forms of expertise were also fully socialized members of project-teams, allowing their different insights to routinely inform work-programmes. Whilst each member obviously brought their own skill set, no one professional community dominated and, there was flexibility in how roles were enacted. Members continually drew on insights from a combination of practices as enacted both by colleagues within the initiative and from external communities. In this sense, boundary-spanning activity occurred through the integration of multiple forms of knowledge within day-to-day project-work. Our data demonstrates how even discrete boundary-spanning mechanisms, such as project meetings and advisory groups, aligned with this, as they supported the synthesis of different perspectives. As one project-lead describes it:

> *"You see everyone has got a different perspective… we deliberately wanted to incorporate a collaborative project between all those different groups. That was the aim really…to make sure that we were using different methodologies so it's methodologically diverse." [Project-team-lead]*

Project-team members also freely interacted with the other types of knowledge made available within these heterogeneous project teams.

> *"You're working with different paradigms really. So we're all coming from different perspectives in terms of our base disciplines, but hopefully we've got enough shared understanding and shared agreement about what the key issues are, and how to help people, that we can work in a complementary way to each other." [Specialist support services lead]*

Even where members were given designated knowledge-broker roles within CLAHRC B, they were not positioned on the periphery of the project-teams but supported connections between the creation and utilisation of evidence, as is described by one knowledge-broker.

> *"I work between a number of different organisations. It was useful that I am actually from an academic background myself… because I work for the NHS and ensure that the [initiative's] work is embedded within this NHS organisation. So it's very much that boundary-spanning role, I have two identities." [Project-team member in designated knowledge-broker role]*

In CLAHRC B, professional and disciplinary boundaries were less salient, and team members' experience of project work emphasized a readiness to draw on and combine insights from

different perspectives and other communities. This was facilitated by a more emergent, less prescriptiove approach to developing study designs and plans, in which work-programmes were not specified in detail at the outset.

Discussion and considerations for policy and practice

As many studies of knowledge translation models are not based on empirical study (Mitton, Adair et al. 2007; Crilly, Jashapara et al. 2010), our findings are important in as much as they depict primary research into 'real-world' utilisation of boundary-spanning mechanisms and processes, and thus contribute to an understanding of "what works in what contexts" (Mitton, Adair et al. 2007, p.,756). In this section, we consider characteristic features of how the two boundary-spanning approaches achieve knowledge translation. We then reflect on how these different emergent patterns of knowledge translation were influenced by key features of the pre-existing institutional environment, organisational structure and operational management of each CLAHRC as a system-level translational intervention.

In CLAHRC A, boundary-spanning mechanisms acted as 'bridges' to facilitate the translation of knowledge. This sustained an environment where communities on either sides of the gap were not required to radically alter their work-practices. An advantage of this approach is that researchers have less pressure to develop new skill-sets for knowledge translation, instead relying on additional mechanisms (e.g. a knowledge-broker or translational activity) to enact translational processes (Lavis, Robertson et al. 2003). This approach allowed project-members to focus on developing depth of expertise. As described, this was important in CLAHRC A, where there was strong institutional pressure from the university-

partner to produce high quality academic publications. The way in which mechanisms were used in CLAHRC A was similar to other examples described in the empirical literature. These include the creation of spaces for 'producer-' and 'user-groups' to engage in end-of-grant knowledge translation activities where knowledge is adapted for different audiences (CIHR, 2010(Davison 2009)), and the use of safe harbours (Lavis 2006), or regular face-to-face meetings (Baumbusch, Kirkham et al. 2008), to create a forum for the exchange of ideas between academics and practitioners to support the translation of knowledge from a research-programme.

However, from CLAHRC B our study also found that knowledge translation can occur through a different type of process, which we call 'blurring', and which has not been depicted in previous health-studies literature. This may reflect in part an oversimplification within existing accounts of how knowledge is exchanged between homogenous 'producer' and 'user' groups, with little regard to the complexity of human motivations and relationships (Contandriopoulos, Lemire et al. 2010). The distinction between approaches can shed light on differences in the enactment of knowledge-broker roles. Thus, although both our cases employed project-team members as designated knowledge-brokers, these roles were performed differently in the 'blurring' case to accounts provided in the existing literature, which depict these individuals acting as the key link between groups (Lomas 2007; Dobbins, Robeson et al. 2009; Ward, House et al. 2009). In contrast, with the 'blurring' approach, knowledge translation occurs as a continual process of small translations of knowledge, within routine day-to-day work. As our account of project work demonstates, members from different communities with distinct (but often overlapping) expertise implicitly pursued the mutual adaptation of practices to pursue CLAHRC goals. When each

small-scale translational moment is considered discretely, the translation of knowledge is less observable, but when the sum of these processes is considered, there is the potential for large scale 'transformation' of knowledge, and ultimately impact on practice, across complex boundaries (Carlile 2004).

Although the notion of 'blurring' has not been identified in previous literature in the healthcare field, a relevant framework drawn from the wider literature is Latour's (Latour 2005) distinction between intermediaries who only *transport* knowledge, and mediators who may *transform* its meaning. This seems a useful concept for understanding differences between the 'bridging' and 'blurring' cases. Knowledge translation though 'bridging' was achieved through 'transportation' into and from project teams to span the wide gaps between communities with very dissimilar forms of knowledge. In contrast, the knowledge created through 'blurring' approaches involves the integration of existing knowledges (Alin, Taylor et al. 2011). In this sense, 'blurring' forms of boundary-spanning have the potential to transform established professional expertise into more synthetic forms of knowledge that transcend established specialist domains, but which can be more readily utilised due to the closer, overlapping relations between the communities involved (Powell, Koput et al. 1996; Amin and Roberts 2008).

Our distinction between 'bridging' and 'blurring' approaches for knowledge translation does not correspond to existing knowledge translation models. Rather, our study contributes to an understanding of how different boundary-spanning approaches help achieve knowledge

translation within a particular context, and further how they emerge from, and help to shape that context. It follows that both of these approaches may be relevant to implementing a particular knowledge translation model in practice. For example, both 'bridging' and 'blurring' approaches might be used to support the translational activity within the CIHR's six opportunities within the research cycle (Sudsawad 2007). What determines the appropriateness of these approaches is not the model per se, but rather the interplay between an initiative's specific context and unfolding role-enactment and work-practices.

In CLAHRC A, given the socio-historical attributes of the local environment, many contextual features were explicitly supportive of a particular form of knowledge translation activity . For example, due to pressures from the academic-host organisation, the involvement of high profile clinical-academics could only be secured by allowing them to determine a particular disciplinary emphasis in their project-work. This in turn shaped project-team composition and role-enactment, and the wider framing and formation of work-programmes moulded members' work-practices. As project team work was centred on a dominant disciplinary area, the role of project-leads adapted to this context by focussing on the provision of technical advice on scientific and methodological issues. This helped these teams to achieve greater depth in the work that they produced within this disciplinary field.

In contrast, the socio-historical attributes of CLAHRC B model helped to produce a context in which professional boundaries and divisions in practice were much less emphasized, thus supporting the 'blurring' of boundaries . As their project-teams drew from a wide range of expertise including professional-science academics (e.g. allied health & nursing),

communities became more closely aligned, and knowledge boundaries between both disciplinary-science academic groups (e.g. economics and sociology) and practitioner groups (e.g. doctors and nurses) were reduced (Landry, Amara et al. 2001). The senior management of the initiative actively legitimised more innovative working practices which were less closely tied to professional norms. The role of project-leaders was also focused on encouraging these new work practices, rather than providing technical expertise . Although this approach had implications for the depth of research which could be conducted within a particular disciplinary field, overall these features helped to integrate team members who were not spatially co-located, and helped support the development of new working practices within the CLAHRC. The presence of joint-appointment academic-practitioners in the senior management team also helped to support this approach by validating more 'hybrid' and less professionally embedded forms of role enactment.

In conclusion, in our two CLAHRC cases we observed boundaries to knowledge translation being constructed and overcome in strikingly different ways. Where professional boundaries were experienced as strong and highly salient, organizational processes, activities and roles were explicitly designed to 'bridge' the divisions in practice. In contrast, where such boundaries were de-emphasized, these mechanisms operated through the implicit blurring of distinctions between professional roles and knowledges. This relationship between the organizational context and boundary-spanning mechanisms has important implications for both research and practice in the area of knowledge translation. For one, it suggests that even when collaborative-networks use ostensibly similar activities, such as knowledge-broker roles, they may achieve knowledge translation in different ways. At a practical level,

and in response to Mitton's (2007) comment that no one strategy fits all circumstances, and Dwayne VanEerd's (2011) call for non-context-/ activity-specific instruments to assess knowledge translation tools, our findings are useful for considering at the inception of a new initiative how boundary-spanning mechanisms may operate within a particular context.

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Table 1: Multiple co-existing boundaries in KT initiatives

TYPE OF BOUNDARY		Boundary manifested in:
EPISTEMIC BOUNDARIES		Linked to different conceptualizations of knowledge
PROFESSIONAL BOUNDARIES		Determined by the quality of relationships between professional groups.
ORGANIZATIONAL BOUNDARIES	**Within project teams**	Between 'co-team' members from different disciplines or areas of professional-practice
	Between project teams and senior management	Between members in different parts of the initiative: e.g. different clinical project-teams, the core and shared support services
	Between initiative and external stakeholders	Between members of the initiative and those 'outside' whom they hoped to influence e.g. local healthcare commissioners, national policy-makers, Trust Chief Executives, healthcare managers of clinical-services, clinicalstaff in specific clinical disciplines, local clinical-networks of keyinfluent ial stakeholders, national academic community

Table 2: Types of boundary-spanning activities used by the CLAHRCs

Boundary-spanning activity type	CLAHRC A	Illustrative examples from our data	CLAHRC B	Illustrative examples from our data
Organisational processes	Hub and spoke links, with central management representatives attending project team meetings.	A member from central management describes her role within the project meetings as *"to remind the project team of central management's priorities and viewpoints for the vision of the initiative."*	Multiple overlapping CLAHRC roles within both central management and project teams	A member describes how senior management influenced the focus of their project leadership role - "*I knew that the initiative was obviously about second gap translation and networks and so on but once I started working [in my project role] that became the primary focus"*
	Homogenous project teams and structural features to connect these to other members who have different expertise	As project team members are from similar backgrounds, the CLAHRC model is designed to connect project teams to those with skills to do implementation work *"Our model is for the clinical teams, so it's thinking outside their box… it's quite a divide that we [shared support services] will do the implementation work and we will do the overall knowledge-broker support."*	Heterogeneous project teams	Project team work draws from the styles and approaches of different communities - *"You see everyone has got a different perspective… we deliberately wanted to incorporate a collaborative project between all those different groups. That was the aim really…to make sure that we were using different methodologies so it's methodologically diverse."* [Project-team-lead]
Activities & events	Designated activities to facilitate access to advice about how CLAHRC work is conducted	A project team made contact with a local network and invited them to an interim workshop specifically for the purpose of discussing the future plans for their programme of work - *"Without the initiative we would have had links with the networks within our clinical area potentially, we would have known about it, but I think*	Informal advisory sources about how to conduct CLAHRC work based on pre-existing social networks	A project team drew primarily upon the pre-existing social connections of its team members to obtain advice and feedback about its programme of work - *"The overall structure of the research design didn't change but it was such an organic process really, what we set out to do is what we're doing, but their support and interest*

		through the umbrella of the initiative we've kind of formalised that working arrangement and looked at ways of doing things much more collaboratively." [Project-team-lead]		*and feedback was important… It was inherently flexible in how it's targeted sort of what exactly you do with the focus."*
	CLAHRC-wide strategy for dissemination and implementation of the products produced through CLAHRC work.	The CLAHRC developed a common template and approach to writing-up findings for all project teams to connect with local external communities.	Implementation integrated within routine work of team members	A project team draws upon the pre-existing position of a member as a health care practitioner to conduct the implementation stage of the project - *"For implementation, there will be some early phases to it where I'm not actually seeing patients and I'll be breaking down barriers, things like working with IT departments within the hospitals, and also working with the clinical teams to see where this will fit and how we actually tie it in to what's happening already. So I think those sorts of things will have to happen first. And then after that start our work clinically delivering that service."*
Roles within CLAHRC	Formal knowledge broker roles providing specialist expertise	The CLAHRC structure deliberately created boundary spanning positions to provide project teams with different types of expertise. One participant describes how their role is as a guide to link the clinical teams with the decision makers with whom the outputs of the project are designed to impact. - *"I am a, a guide, a support. I will introduce people to people, commissioners to researchers"*	Informal boundary spanning roles providing specialist expertise	Members with 'specialist' types of expertise are fully integrated members of project teams, allowing many members enact informal boundary spanning roles - *"In [this translational initiative] you're going into situations all the time where everyone in the room has got lots of different roles. That can be a bit of a challenge at times with people having to approach things from lots of different perspectives. It's very much going in and out of roles sometimes."*
	Formal knowledge-broker positions for representatives of external communities	Explicit knowledge broker roles created to link clinical project teams to external communities were incorporated into the structural design of the overall initiative.	Hybrid CLAHRC and non-CLAHRC roles	Boundary spanning roles emerged as CLAHRC members also drew upon their on-going non-CLAHRC positions - *"I work between a number of different*

		"The idea of knowledge-brokering is using these people to work in [to our project-teams], and then we work out with them [to their communities], because they'll be key in building the networks." [Core management lead] *"What practitioners said to me I'll bring back to the team meeting… it's two-way, facilitating what their ideas are or problems are, obviously so we can sort them out." [Project-team member in designated knowledge-broker role]*		*organisations, so principally the NHS and academia… I work for the NHS and ensure that the CLAHRC work is embedded within this NHS organisation. So it's very much that boundary spanning role, I have two identities."*

Table 3: Comparison of boundary-spanning mechanisms vs. boundaries in the CLAHRCs

BOUNDARIES \ BOUNDARY-SPANNING MECHANISMS	**CLAHRC A**	*Description of use*		**CLAHRC B**	*Description of use*
Organizational					
Within teams	Co-located 'core' of project teams	Knowledge broker roles located on the 'edge' of the project team. These individuals naturally belong in another environment, but for their CLAHRC roles they compromise their own approach to work to fit in with the project team. They enact a role to connect the project team to their 'home' context, and act as facilitators for knowledge flow between these settings.		Members of project-teams remain based in their original work-places	Team members are able to innately connect insight from external communities to inform and influence the form of the CLAHRC programme of work.
Between teams and core management	Distinct CLAHRC positions	CLAHRC organisation creates distinct CLAHRC positions - members move to the space of other parts of the CLAHRC to interact (e.g. central management to a project meeting), and then go back to their 'home' environment and main CLAHRC role		Multiple overlapping roles	Those in leadership position concurrently hold multiple positions across CLAHRC – Naturally facilitates that the vision of core management is an integrated part of the work of clinical teams
	Designated	With the detail of work-programme		Activities drawn from	Teams draw upon pre-existing connections

Between initiative and external stakeholders	activities	plans (focus & design) largely set at the beginning, activities such as stakeholder workshops are developed specifically for the purpose of CLAHRC work. They principally are formed from new connections, and create a time and space where CLAHRC members can meet with new external communities.		routine practice	from its members with external communities, meaning that the CLAHRC work is not seen as separate activities. This facilitates work-programme plans to evolve over time as project work progresses.
Professional	Designated knowledge broker positions	Knowledge broker positions were created to second individuals from external communities to spend a proportion of their working week working with CLAHRC project teams.		Hybrid roles	Many members of CLAHRC also continued to hold pre-existing roles with external organisations, with insight from these organisation naturally influencing CLAHRC project work.
Epistemic	Homogenous 'core' team composition & formal boundary spanning positions	Project work follows the style of one community's approach, with team leaders re-enforcing depth of expertise through providing technical (scientific & methodological advice), meaning that most team members can naturally work within the dominant (clinical-academic) approach. It is through explicit boundary spanning mechanisms (e.g. through broker roles and designated events) where different types of knowledges are considered and translated.		Heterogeneous team composition	Although there is no dominant approach to project work, (which is informed by the culture of different communities), team members' expertise is closely related (e.g. academic and practitioner allied health) meaning that there are only small epistemic differences within teams. The role of team leaders helps to coordinate the varied expertise to produce one coherent work-programme.