## Key messages

An embedded two-way collective team makes brokering easier.

It provides a safe space for brokers to be vulnerable, share learning and navigate problems.

Team-brokering models collaborative behaviour and creates a critical mass.

But many brokering challenges still exist.

## Introduction

Knowledge brokers work in many contexts including health, social care, education and international development in diverse countries such as Australia (Armstrong et al., 2013), Holland (Langeveld et al., 2016) and Burkina Faso (Dagenais et al., 2015). Usually, they act as linkage agents, knowledge managers and capacity-builders (Bornbaum et al., 2015), although sometimes they might be facilitators, evaluators (Glegg and Hoens, 2016) or 'critical friends' (Wye et al., 2017).

Personal contact between researchers and decision-makers is consistently found to be the key factor in influencing decision-making (Oliver et al., 2014). Brokers create opportunities for interactions by bringing together service users, policy-makers, managers, practitioners and academics. The underlying premise is that knowledge will be shared, usually between those from different communities, which will lead to behavioural change. These changes may come through "productive relationships" (Dwan and McInnes, 2013); or employing tangible 'boundary objects' (Kimble et al., 2010), such as evidence briefs to feed in research knowledge (Campbell et al., 2011).[1] These notions underpin the development and work of the collective brokering team reported here.

To date we know little about how collective brokering works. This paper addresses this gap in our understanding by focusing on a multi-professional, two-way, embedded collective brokering team to answer the following questions:

1. What elements of this team model worked well?
2. What contextual factors helped/hindered this approach?
3. How did team members work together to influence decision-making?
4. What were the advantages and challenges of team-based brokering?
5. What difference did team-based brokering make?

But first, we briefly present what is known about brokering.

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[1] As all brokers facilitate interactions and build relationships to some degree, the term 'relationship broker', as coined by Bowen et al (Bowen et all, 2017), might be more apt than 'knowledge broker'. In this paper, we use the neutral term 'broker'.

# Knowledge brokering – some theoretical perspectives

## Knowledge brokering models

The literature largely describes three main brokering models: 1) single brokers (Robeson et al., 2008, Ward et al., 2012, Urquhart et al., 2011); 2) a cohort of brokers from the same profession deployed across similar organisations (Moore et al., 2017, Rivard et al., 2010, Bruce and O'Callaghan, 2016) or 3) a quasi-/fully independent agency with either an explicit or added remit for brokering (Frost et al., 2012, Olejniczak et al., 2016, van Kammen et al., 2006). However, a fourth, newly-emerging model is of brokers from different disciplines entering into two-way secondments, with each working in isolation, rather than together (Uneke et al., 2017, O'Donoughue-Jenkins and Anstley, 2017).

Within this emerging typology, although most brokers work across different organisations, some work intra-organisationally (Waring et al., 2013). Brokers may have a different professional affiliation from those they hope to influence (Morris et al., 2013, Davies et al., 2017) or the same (Gerrish et al., 2011, Rowley et al., 2012), be situated externally (Traynor et al., 2014) or embedded within (Chew et al., 2013). Importantly, two independent reviews concluded that broker positioning and affiliation is important to success (Bornbaum et al., 2015, Elueze, 2015). Kislov and colleagues (2016) have also proposed team-based brokering as an approach that might mitigate the challenges of other models (Kislov, 2016) and, as such is central to the work described here.

## Brokering activities and skills

Although brokering activities differ according to circumstances, a systematic review identified 10 common domains such as 'facilitating collaboration', 'facilitating development of analytical and interpretive skills' and 'creating tailored knowledge products' (Bornbaum et al., 2015); for example by fostering relationships between different knowledge users (Jansson et al., 2010), running research-skills workshops

(Stevens et al., 2005), finding the 'right' people (Conklin et al., 2013), promoting reflective practice (Robeson et al., 2008), evaluating changes (Donnelly et al., 2014), and creating tailor-made outputs (Campbell et al., 2011). Brokers not only help pass knowledge between communities; they also create new "brokered" knowledge that draws on explicit and tacit knowledge from multiple sources (Meyer, 2010).

To cover such a diverse remit, brokers require a broad range of skills, ranging from the interpersonal to the technical.  More specifically, these include communication and motivational (Dobbins et al., 2009b), mediation and team building (Lomas, 2007), and the ability to interpret and translate knowledge from, and to, different communities (Clark and Kelly, 2005). Brokers need to be accessible, organised role models with a positive attitude (McCormack et al., 2013) and have good networks (Traynor et al., 2014).  Additionally, effective brokers exhibit many of the following qualities - flexibility, enthusiasm, creativity, courage, tact and commitment alongside being a good listener (Phipps and Morton, 2013).  Together with these skills and attributes, brokers need to be credible to gain people's trust and respect (Lomas, 2007, Kislov et al., 2011) which in turn enhances understanding and action in the people with whom brokers interact.

## Some thoughts on how and why brokering works

To deepen understanding of how and why brokering works, a recent paper examined five 'implementation' theoretical frameworks, which conceptualise brokering slightly differently (Glegg and Hoens, 2016). For example, the Knowledge-to-Action and PARIHS frameworks emphasise context and focus on brokers' specific roles (Graham et al., 2006, Rycroft-Malone, 2004), while the Diffusion of Innovations approach posits brokers as an 'intervention' to spread innovation (Rogers, 1995). K* Spectrum sees brokers functionally, engaging in diverse activities from one-way information dissemination to co-creation of new knowledge (United Nations University et al., 2012) while the Fernandez-Gould framework suggests that 'insider' brokers can utilise peer influence while those external may be less effective, unless viewed as 'objective outsiders' (Fernandez and Gould, 1994). But despite their

differences all of these frameworks assumed that interaction catalyses behavioural change and as such is central to effective brokering.

How and why 'interaction' works is poorly explained in the literature (Langer et al., 2016) but perhaps focusing on critical elements of that process – who is brought together and how plus the nature of those interactions - might help to explain brokers' success or failure. These elements can be viewed as part of brokers' repertoire for constructing the necessary discourse(s) (Marshak and Heracleous, 2005) for knowledge sharing to occur.

As brokers usually work across diverse communities; successful brokering is partly about finding the best people to put together to make things happen. Brokers want to find those who have common areas of interest, a willingness to work with and curiosity about those from the other community and enough influence to foster change. There are many ways to bring people together so knowledge can be shared e.g. through workshops, meetings, networks and 'communities of practice' (CoP); all are used for linking people so they can exchange ideas and knowledge with or without formal brokering. Communities of practice (face-to-face and/or virtual) have become particularly popular as a means to share ideas, increase knowledge and solve problems (Wenger et al., 2002). Brokers may work within and between such communities either as coordinators who bring together people from one or more community, encourage social interaction, and link individuals with useful resources, or as bridges between CoPs bringing 'boundary objects' (e.g. evidence briefs) from elsewhere into the community or taking them from one CoP to another. The interactions that occur within or between CoPs can change the way people think, understand each other and consequently how they behave either individually or collectively (Gabbay et al., 2003, Gabbay and le May, 2004, Gabbay and le May A, 2011). Over time, these interactions may develop people's 'knowledge-in-practice-in-context' by enabling them to apply expanded, sophisticated, broader-based knowledge to particular decisions within a specific set of circumstances (Gabbay and le May A, 2011). Interaction engenders change because it increases the likelihood

that views from diverse groups are heard and understood so that common interests are more likely to be found and shared plans happen.

Having brought people together, brokers need to optimise the nature of the interactions. Here there are two important factors - the content and the quality of the interaction. Much has been written about the effectiveness and relevance of the content, but only recently have we begun to explore the quality of interactions i.e. the detail of what lies behind the often used catch-all term 'excellent interpersonal skills'. Trying to tease out the essence of these interactions is central to appreciating the success of brokering and to developing effective brokers. One area to attend to in the quality of the discourse between people in brokering interactions is ensuring it is respectful and skilfully critical (Littleton and Mercer, 2013, Gabbay and le May, 2016). Power differences between individuals from different communities and within same communities need to be mediated and levelled out. Respectful, skilfully critical dialogue allows all voices to be heard and divergent points to be understood, prioritised and incorporated into shared decisions. The ability to construct favourable discourses within brokering encounters will determine the impact of any brokering exchanges.

## Impact of brokering

Despite the obvious potential of brokering, the literature is inconclusive about its impact. A well-known trial found that an external broker working with 30 Canadian public health departments over 12 months made no difference to the outcome of research use in a decision (Dobbins et al., 2009a). Nonetheless, the lead trial investigator described brokering as "promising" (Traynor et al., 2014). In another trial, two medically-trained brokers visited their cardiac colleagues six times over a year to discuss prescribing behaviour literature (Amsallem et al., 2007). Although a small effect on knowledge and intentions was noted, no behavioural change was detected. Another effectiveness study with a before and after design of 25 embedded clinical brokers found that use of a research-based tool increased at study completion and 12 months later amongst their colleagues (Russell et al., 2015).

The obvious differences in these studies are the models i.e. single or paired external brokers versus 25 embedded brokers with same/ different professional affiliations; intervention exposure i.e. weak and episodic (external) or continual (embedded); and outcomes i.e. use of research evidence in a decision; intention, knowledge and prescribing behaviour; use of a research-based tool. Brokering models and interventions are highly heterogeneous with multiple possible outcomes, which further complicate our understanding of effectiveness. We really do not know if brokering (of any description) 'works'.

However, the literature suggests brokering does make a difference, although the effects are more likely to be "subtle" than direct (Bornbaum et al., 2015), such as changes in knowledge e.g. broadening an understanding of 'evidence' to include research (Ward et al., 2012), skills e.g. where to find research evidence (Waqa et al., 2013); and (unspecified) decision-making (Gerrish et al., 2011).

## The Bristol Knowledge Mobilisation Team

The brokering model described in this paper was a two-way, multi-professional, embedded approach. Based in southwest England, the aim of the Bristol Knowledge Mobilisation Team (KM team) was to foster interactions across the communities of academic primary care research and local healthcare policy-making (known as commissioning) to influence the decision-making of both. Intended outcomes were 'commissioning-informed research' (e.g. research of relevance to commissioners) and 'research-informed commissioning'.

The culture, priorities, environment, goals, levers, norms and context of the academic and commissioning communities were radically different. In terms of commissioning, local English healthcare policy-makers manage 80% of the National Health Service budget (estimated at £140 billion). Commissioners operate in "fast-paced, reactive work environments in which individuals have limited autonomy" with externally imposed objectives that are subject to constant change (Beckett et al.,

2016). They respond to national, regional and local priorities; set up, modify and de-commission services; develop new care pathways; monitor contracts; develop region-wide strategies and assess the quality of healthcare providers (Wye et al., 2015). In contrast, researchers develop and conduct studies over years with autonomy to pursue their own interests and objectives (Beckett et al., 2016). Commissioners usually take no more than two days to draft a business case worth half million pounds, while researchers could require more than six months to write a grant proposal for a similar amount (Beckett et al., 2016). But despite these differences, the KM team needed to find ways to bridge the two.

The KM team was a joint venture of the Centre for Academic Primary Care at the University of Bristol and the local National Health Service (NHS) Research and Development office. Its key features were:

1. a focus on local healthcare commissioning rather than clinical care

2. simultaneous two-way placements of researchers and commissioners into each other's organisations creating a boundary-spanning team

3. embedded KM team members spent one to three days a week in their host organisation for two years

4. evaluation, both internal and independent, was continuous.

Over two recruitment rounds from September 2013-December 2016, four commissioners, or 'management fellows', and two researchers-in-residence were seconded to the KM team. They were embedded into an academic primary care unit (management fellows) or a local commissioning organisation (researchers-in-residence). The researchers-in-residence had desks co-located within the commissioning transformation team, which included two management fellows, so a geographical hub was created. Within the university, KM team members were placed in different offices to extend their reach. A qualitative researcher (LW), with twenty years' experience in policy and change management, led the team. All posts (except LW's) received 'research capability funding' managed by the local R&D office. The

total cost of the KM team, including the manager's salary, was £150,000 per annum. For further information, see Table 1 and www.bristol.ac.uk/primaryhealthcare/km.

## Methods

As a hybrid research-practice initiative, the KM team engaged in the practice of brokering, while research methods were applied to understand, inform, adapt and assess its impact. This paper draws on multiple sources including brokers' logs, reflective essays and exit interviews; whole team workshops; and independent evaluations of the KM team.

Broker activities, reflections and learning were tracked through KM team members' personal logs. These logs varied; two brokers updated Excel spreadsheets weekly and four added to Word documents as events arose. These logs also fed into reflective essays and exit interviews. Four KM team members wrote reflective essays, which were 8-20 pages, and two took part in exit interviews with LW, when their secondments finished. The essays and interviews covered initial objectives, primary activities, key learning and suggestions for improvement. The interviews were recorded with consent and transcribed externally. To explore group learning, a team workshop was held in September 2016 of two hours' duration, facilitated by LW, taped with permission and transcribed.

All data were managed using Nvivo 10. Coding inductively (Thomas, 2006), LW developed and applied a coding framework to all data sources (i.e. logs, reflective essays and interviews, team workshops). In addition, LW drafted a summary document for every team member, drawing across all sources; this was fed back to the relevant broker for comments and clarifications. To explore patterns and relationships and identify disconfirmatory data, these summaries were compared and contrasted (Patton, 2002). To check for face validity, preliminary findings were discussed in KM team meetings, where divergent views were also explored to broaden understanding.

To gain critical distance, an annual evaluation cycle was embedded with three formative evaluations carried out in total. The two latter evaluations were completely independent and the first was quasi-independent; a freelance researcher collected data and LW conducted the analysis, with the consent and knowledge of evaluation participants. The evaluation aims changed with each cycle from refining KM team activities to identifying levers and barriers to collaborations to assessing initial outcomes. All three evaluations drew on interview data with commissioning and academic colleagues; one included documentation and another observations. Analysis approaches varied from deductive framework to inductive thematic. Measures to ensure the validity of findings included double-coding, discussions with an independent 'critical friend', and regular meetings of the evaluation team. All evaluations received ethical permission from the Faculty of Medicine at the University of Bristol (references 9163, 51561 and 28263) and complied with data protection regulations. Table 2 provides more details (Table 2).

## Results

This results section is structured according to the five research questions set out in the introduction, starting with key team elements.

### What elements of this team model worked well?

All brokers had excellent interpersonal and communication skills, wide networks within their own communities, and in-depth knowledge of their discipline. The KM team manager was well-established with experience of policy-making and academia, familiarity with the literature, dedicated time to support the team and an "empowering", collaborative approach (Farr, July 2015). The KM team manager met KM team members individually and facilitated whole KM team meetings every two weeks to discuss learning and challenges, organise activities (e.g. building a website) and plan events such as workshops. The team ethos was one of sharing, experiential learning and experimentation. KM team members were inclusive, encouraging contributions and respecting differing viewpoints, as noted by their academic and commissioning colleagues.

> *They made me feel like an equal.*

*I have never felt like an idiot when I have said stuff that probably is idiotic.* Second evaluation (Farr, July 2015)

Brokers were seconded part-time for two years, which helped them to keep up-to-date with changes and responsibilities within their substantive communities while maximising the benefits for their host organisation. Two years was sufficient to move from feeling "lost without a map or compass" (Management fellow, personal log) to becoming productive. Being part of the KM team made these transitions easier.

> *I've learned more quickly through being part of the team. I think I would have perhaps found my way, but I think it would have been a rockier road in my journey. (Management fellow, team workshop)*

KM team members were part of other teams, too. Every broker was attached to a research group (management fellows) or commissioning sub-committee (researchers-in-residence). Management fellows learnt research skills, ways that research studies were designed and delivered and the challenges in conducting research. Researchers-in-residence discovered how the wider healthcare system operated, ways that policy was drafted, gaps in commissioners' knowledge and how research could (or couldn't) make a difference. Attachment team activities varied. Management fellows developed innovative dissemination materials or conducted data collection and analysis while researchers-in-residence focused on designing co-produced research studies or carrying out mini-ethnographic studies to improve commissioning performance. These attachments provided rich learning in how host communities talked, thought and behaved that could then be re-examined safely with other KM team members.

> *I had a few hot moments where I felt I could have really dropped a clanger ….So I really emotionally needed a team, and in a diplomatic way needed help to pitch, I felt I had to say something but how to say something that didn't massively rock the role….And just a constant stream of little moments where you're not quite sure how to put something or get it across, and checking with*

*other people to try and achieve what you're trying to achieve. (Researcher-in-residence, team workshop)*

From embedding, or co-location within the host organisation, KM team members gained tacit 'insider' knowledge such as who was influential, how the organisation worked, what levers to pull and how to persuade the right people.

*I think you do have to be embedded. The benefits are…seeing how they [commissioners] work in a big shared, open plan office, the amount of distractions, the way they catch each other all the time, so that you can see the connections and how they work on little verbal connections and drop-ins…. and hearing some of the stories about how things do or don't happen and how you can get pushed out unless you have these [senior] people in the glass boxes on your side…So understanding how the organisation worked and how you have influence. (Researcher-in-residence, exit interview)*

Embedded KM team members met those unreachable otherwise and took advantage of unusual opportunities. For example, a researcher-in-residence had serendipitous conversations in the lift and kitchen at the commissioning headquarters that led to funded research projects. Indeed, co-location was so important, that when this researcher-in-residence was absent for several weeks, she noticed commissioners stopped returning her e-mails. An added benefit of embedding was impact on other colleagues. For example, the presence of management fellows at the university furnished a regular reminder to academics.

*Even just their presence, passing them in the corridor, and reminding you "I must just think about commissioners going forward, I must build that into my proposal". It's kind of a prompt to really keep including it in the process.* First evaluation (Wye and Baxter, 2014)

As previous experience suggested a single broker could struggle, the principle of 'buddying' was incorporated throughout the model, for example every KM team

member had a corresponding 'buddy' from his/ her own background with whom to share their experiences.

> *I really benefited having [Management fellow] from just a sense checking, feel lost, don't know the hell I'm doing, but yeah, [s/he] feels the same. That makes me feel better to start with. (Management fellow, team workshop)*

Buddying could be demotivating, however, if one was doing better than the other.

> *I've got to live up to all your [achievements]… I felt more comfortable over time, but there have been moments where I've felt like, "Oh my God, I'm the poor relation." (Researcher-in-residence, team workshop)*

Buddying also occurred inter-organisationally, for example all co-produced service evaluations had at least one researcher-in-residence and a management fellow. This cross-community buddying helped create engagement from both organisations, facilitated smoother progress and modelled the collaborative behaviour the KM team hoped to engender more widely.

> *When I've been trying to set up evaluations, I've been trying to model it on what we've actually done here [in the KM team]. Because that proves to me it can be done….If I hadn't had that, there's a bit of me that would have thought, "Is this actually even possible?  Can you actually do this?" (Researcher-in-residence, team workshop)*

### What contextual factors helped/hindered this approach?

Local academic and commissioning environments were highly favourable, as both communities were settled, solvent and stable. In addition, the initiative had relatively secure, long-term, ring-fenced funding.

Influential academic leaders with some knowledge of commissioning and senior commissioning leaders interested in research had well-established relationships from prior inter-organisational initiatives seeded by the KM team funders, the local R&D office. Thus, senior staff from both communities supported the scheme, encouraged junior staff to apply and accommodated altered work plans (with varying degrees of

enthusiasm). In addition, embedded brokers benefited from allies, champions and 'chaperones' located throughout the host organisations, who explained the new terrain, introduced the broker to useful contacts, lent their own credibility to help establish trust, developed the brokers' skills and knowledge in research (management fellows) or commissioning (researchers-in-residence) and kept close watch over the brokers to monitor objectives (chaperones). Initially, other KM team members took these roles, but as the secondments developed, an intricate, wider web of commissioners and academics stepped in. Individuals could enact more than one role, but every broker needed at least two separate people within the host organisation to function optimally.

For example, one researcher-in-residence had developed an excellent working relationship with a lead commissioner who moved to another project about six months later. The researcher-in-residence never built a comparable partnership, as four different commissioners successively occupied the lead role. Without a consistent chaperone/ champion, the researcher-in-residence struggled to identify, much less meet, objectives for the commissioners.

> *[Lead commissioner] being got rid of was very stressful. That was quite upsetting…It was like having your best informant get kicked out, my ally….Losing people along with way, you just start up a relationship and then they've gone again….[I was] trying to do too many things. This was sort of quite stressful, trying to deliver things that you didn't really know. (Researcher-in-residence, exit interview)*

## How did team members work together to influence decision-making?

The aim of the KM team was to increase interactions between commissioners and researchers to influence decision-making. These interactions fluidly morphed into and out of contact, collaboration and co-production in a non-linear way (see Box 1 for definitions). The following stories were selected because they illustrate team-working, contact, collaboration and co-production and the outcome is known.

The KM team made dozens of attempts to set up encounters between researchers and commissioners; most resulting in one-off exchanges. A rare example of an on-going relationship happened when two senior academics wanted help with a mental health funding application. In a meeting, a researcher-in-residence explained the value of commissioning input while a management fellow 'translated' commissioning jargon, provided knowledge of the healthcare landscape and contact details for local mental health commissioners. Subsequently, the management fellow primed the mental health commissioners by introducing the academic proposal and gauging interest. The senior academics then met with the mental health commissioners, and the resulting application was successful, systematically addressing key commissioning priorities. Three commissioners joined the project team. In her exit essay, the management fellow wondered if this brokering success was due to her efforts, the senior academics' proactivity, the openness and "research-mindedness" of the commissioners, the fit between the interests of the academic and commissioners or some combination of the above.

Another successful example emerged from a common interest in 'virtual wards', which occur when patients are discharged home from hospital and managed electronically. A researcher-in-residence and a management fellow organised a 'viritual ward' discussion group made up of over 20 researchers, healthcare providers, clinicians and commissioners, drawing on the management fellow's knowledge of "who to invite, how to invite, when to invite" and a researcher-in-residence's influence in persuading a well-known, respected academic to chair (KM team workshop). This discussion contributed to commissioners' decision to discard virtual wards as an option, partly because the research evidence was not promising. This multi-professional, multi-organisational collaboration was ongoing with new members coming and leaving, as priorities, interests and posts changed, perhaps partly because the researcher-in-residence received external funding to continue its co-ordination.

Occasionally, co-produced outputs were developed, most commonly research grants or service evaluations. For example, while attending commissioning meetings, a

researcher-in-residence identified how the lack of a reliable measure of 'avoided hospital admission' frustrated decision-making. In designing a study to develop a suitable tool, the researcher-in-residence iteratively discussed and shaped the rationale and methods with academic contacts, two management fellows, and various clinicians and commissioners within the host commissioning organisation. But she also needed the engagement of commissioners from elsewhere, whom she did not know. Accordingly, one management fellow, who worked part-time with these other commissioners, made sure that his senior colleagues read and understood the relevant study documents and consequently secured support. A £25,000 grant was awarded. Success came from finding and continually re-crafting the common ground of a high-priority commissioning topic that was also of interest to researchers, and the researcher-in-residence and management fellows working together to ensure continued momentum.

But not all KM team efforts were successful. For example, a commissioning organisation wanted to evaluate a £1.4 million community-based telehealth service to help decide whether to re-commission. To design and conduct the evaluation, a 'community of practice' was created with researchers, commissioners, healthcare managers, practitioners, analysts, and KM team members. The lead management fellow navigated changing commissioning priorities, ensured senior support, found ways to access routine data, liaised with relevant healthcare staff to embed new data collection processes and used project management skills to progress the evaluation. Two researchers-in-residence provided qualitative expertise, facilitated staff focus groups, carried out staff interviews and trained the management fellows in data collection and analysis (the management fellows collected all service user data, as the researchers-in-residence were not allowed patient contact). All met regularly to analyse findings and a management fellow and a researcher-in-residence drafted a report with a bespoke, hybrid structure. Despite this effective team-working, little difference was made to commissioning decisions, largely because the report, which took two years to produce, was needed 18 months earlier. It had missed its moment. However, there were other benefits such as commissioners understanding research better, a non-KM team researcher meeting with local commissioners to discuss

commissioning priorities in his academic area, and the management fellows using their evaluation skills to for other commissioning initiatives.

## What were the advantages and challenges of team-based brokering?
### Advantages
As these examples show, KM team members worked together to draw on each other's 'insider' knowledge, skills, experience and networks to progress their own activities and those of their colleagues by:

- preparing the ground with professionals from within their substantive community
- using their own reputation to guarantee the credibility of others
- brokering promising relationships
- 'translating' jargon, priorities, norms and interests
- increasing other KM team members' knowledge of host communities
- constantly look for common ground to carry out joint activities or projects
- helping each other to circumvent obstacles, smooth progress and secure ongoing organisational support
- navigating access to data or key staff
- sharing their learning with each other and their wider colleagues

Being part of a team made brokering easier. KM team members could be vulnerable with each other while building their confidence. Moreover, challenges could be resolved more quickly.

> *Management fellow: I felt quite quickly part of something where we were all in quite a tricky place, trying to help each other through and enabling each other to make the most of the opportunities….This has been a fantastic way of sharing the learning, learning from each other….And how would you have done that learning without having safe people to be honest and open and vulnerable with? I think I would have really struggled.*

> *Researcher-in-residence: And I think there's confidence-building as well.  It's very reassuring, isn't it?  You say, "Well, I think this," and then you can run it*

> *past [Management fellow] or you can run it past [Management fellow] and say, "Is that acceptable behaviour?" "Yes, that is fine." "OK, I'll go ahead." ….You've got that confidence then of somebody really is steering you. (team workshop)*

Moreover, a team approach meant that both commissioning and academic organisations benefited. KM team evaluations consistently showed that the host organisation (where the embedded broker was seconded) profited most. For example, academic colleagues appreciated management fellows' "insider" contributions (Wye and Baxter, 2014), but rarely mentioned researchers-in-residence, while commissioners talked enthusiastically about researchers-in-residence (Beckett et al., 2016), but did not comment on the management fellows. Of course, those outside the team were much less aware of the brokers' inter-dependency that was essential to achieve objectives, however by constructing a two-way boundary-spanning team, both communities saw benefits.

## Challenges

Nonetheless despite the multiple advantages of this collective model, the KM team faced many of the usual brokering difficulties such as too many task masters, unrealistic expectations and workload, commissioning staff turnover, an inability of substantive organisations to capitalise on brokers' new skills and knowledge, limited post-secondment options and institutional obstacles such as mismatches in time constraints, constantly changing commissioning agendas, and limited academic levers to incentivise researchers (Beckett et al., 2016). KM team members and their commissioning and academic colleagues regularly expressed frustration at the difficulties in capturing the 'value added' (Beckett et al., 2016).

## What difference did team-based brokering make?

The impact of the KM team was greatest on the brokers themselves and those among their attached teams, with weaker effects on more distant colleagues. Although the intensity varied, the type of differences reported in attitude, knowledge, networks and skills across these groups were similar. These included improved awareness of the other community; greater knowledge about commissioning and

research; better access to and skills in networking within the other community; and more interest and confidence in working with each other. (Farr, July 2015, Beckett et al., 2016) (see Figure 1)

In considering the aim of 'research-informed commissioning', three co-produced evaluations were generated; one did not get to the reporting stage, one made little impact (i.e. see telehealth above) and another appeared to influence commissioners' decisions about a major service transformation. Although unable to articulate exactly how, commissioners stated that the KM team efforts had made a difference.

> *It's informed some of our commissioning questions and decisions or given us the opportunity to get someone to go and research it.*
>
> *The cardiovascular review has definitely informed our commissioning plan around what's the best thing we should spend money on.* Third evaluation (*Beckett et al., 2016*)

The difference in 'commissioning-informed research' was more measurable, as researchers noted an impact on grant-writing.

> *All that contact with the [commissioners] makes you write better, more applied research projects.* Third evaluation (Beckett et al., 2016)

Tangible outputs were five funded co-produced research grants. In addition, large grants from national funders were more likely to include commissioners as co-applicants or collaborators. Moreover, the right commissioner co-applicants with appropriate expertise were involved, rather than any willing commissioner to hand.

In considering the overall effect of the KM team, colleagues identified another important, but nebulous and potentially fleeting, consequence - cultural change within and between the communities.

*[The KM team] have helped bring about or catalyse a cultural shift, which is still early.*

*The Knowledge Mobilisation Team has been key perhaps to catalysing that sea change of understanding.* Third evaluation (Beckett et al., 2016)

## Discussion

### Summary of findings

Returning to the literature, it is clear that the brokers' positioning and affiliation (Bornbaum et al., 2015, Elueze, 2015) was critical to the success of the KM team, as both 'insiders' and 'outsiders' were deployed (Fernandez and Gould, 1994), often simultaneously and in pairs. With these two-way secondments, 'buddying up', shared values and a team identity, the brokers capitalised on each other's knowledge, networks, reputations and skills to prepare the ground, translate jargon, look for common interests and so on, thereby creating a complex web of over-lapping contacts, complementary expertise, mutual understanding and shared projects: all of which helped the KM team to deepen their 'knowledge-in-practice-in-context' (Gabbay and le May A, 2011) and construct the necessary environment(s) for constructive discourses (Marshak and Heracleous, 2005) to emerge and flourish. This, in turn, aided their wider colleagues.

Like other embedded initiatives (Morris et al., 2013, Bruce and O'Callaghan, 2016), co-location and attachments to research/ commissioning teams provided rich learning opportunities for brokers to gain tacit, experiential knowledge of host organisations. Other secondment schemes have found dedicated time important (Gerrish and Piercy, 2014); part-time contracts of two years' duration were sufficient to become acclimatised, improve performance and achieve objectives. This collective brokering model would have been hampered in less affluent or more turbulent climates, without the time afforded by ring-fenced funding from solvent, stable organisations. Previous senior inter-organisational relationships created mutually receptive environments, which other studies have also found important

(Uneke et al., 2017, Cheetham et al., 2018). Allies, champions and chaperones formed a multi-level network at all levels within host organisations, without which KM team members struggled to find direction or make progress. Additional support came from a team manager with a collaborative leadership style who had sufficient time for the team. This helped the "socially intelligent" (Goleman, 2007) brokers with the right qualities, skills and backgrounds (Traynor et al., 2014, Phipps and Morton, 2013) to facilitate respectful, critical dialogue (Littleton and Mercer, 2013) in their day-to-day interactions. Figure 2 illustrates the findings summarised in the discussion section so far, with the KM team represented as co-constructing a 'shared ownership' edifice in the centre and other important contextual, organisational factors elsewhere. (Figure 2)

Collective brokering helped both the brokers and their organisations. Brokers adapted and became productive relatively quickly within the safe team environment, as they exposed vulnerabilities, built their confidence, navigated obstacles and found ways forward together. As host organisations tended to reap the rewards of an embedded broker, two-way placements benefited both communities, thereby securing their ongoing engagement. Moreover by working as a team, the brokers modelled respectful, collaborative behaviour and created a critical mass to raise awareness, increase negotiating power and change organisational culture (Wye et al., 2017). This team approach perhaps particularly resonated within commissioning as healthcare professionals are used to team working and sharing knowledge collectively (Currie and White, 2012).

Team-based brokering has recently been conceived as a way of dispelling the "tensions" (or the "dark side") of other brokering models (Kislov, 2016). Sole brokers may prioritise one function over others (e.g. information management may be easier than capacity-building), but in team-based brokering, because there were so many brokers, each with varying interests and dispositions, all functions were covered. Moreover, unlike other initiatives (Urquhart et al., 2011), no particular knowledge type dominated (e.g. academic versus policy-related), given that success could not be obtained unless multiple types of knowledge were accessed and applied. The

challenges of 'in-betweenness' still existed. However rather than feeling isolated like individual  brokers (Chew et al., 2013), the boundary-spanning nature of the team meant that academic and commissioning colleagues saw the brokers as having privileged access to special knowledge and networks. Being in-between was a unique selling point.

Brokers and their colleagues identified many changes in attitudes, knowledge, and skills. But as previous reviews of brokers have found (Bornbaum et al., 2015, Elueze, 2015), capturing the more quantifiable 'added value' of the KM team was challenging. Differences in 'commissioning-informed research' appeared more common than changes in 'research-informed commissioning', although this could be because co-produced grant proposals are more easily measurable. Nonetheless, collective brokering still encountered many of the usual difficulties including:

- institutional levers that at best dis-incentivise and at worst impede researcher-commissioner collaborations (Marshall et al., 2014)
- mismatches between commissioners need for rapid information and researchers requiring years to produce that information (Bruce and O'Callaghan, 2016, Cheetham et al., 2018)
- role strain with competing, unrealistic expectations and obligations from too many taskmasters (Vindrola-Padros et al., 2016)
- lack of career progression (Lightowler and Knight, 2013, Bruce and O'Callaghan, 2016, Marshall et al., 2014, Bullock et al., 2012).

## Strengths and limitations

The strengths of this study are the systematic recording of activities, outcomes and reflections, along with regular independent evaluations; this provided an unusual degree of rigour. However because knowledge is dynamic and constantly transforming (Gabbay and le May A, 2011), many potential consequences generated from collective brokering remain undetected. Moreover, those participating in evaluations may have over-estimated the benefits, including the brokers who had a vested interest in the initiative. To some extent, this was balanced by the critical

gaze of independent evaluators. Combining the 'practice' of knowledge brokering with 'research' to advance the field is rare.

## Implications

An implication of this study is that brokering models need to be selected with the intended aims and brokers' affiliations and positioning in mind. If the purpose is to increase the impact of existing research knowledge, say through the production of evidence reviews, then a single, externally-positioned broker with credibility within both communities who is able to 'translate' policy-makers' needs to researchers and researchers' outputs to policy-makers could suffice (Moore et al., 2017, Armstrong et al., 2013), although this lone individual may struggle to tackle the structural, contextual and system-level barriers that prevent managers from drawing on research (Bowen et al., 2009).

If the aim is fostering interactions through collaborations, then these are more likely to emerge through the co-production of 'new' knowledge, drawing on the expertise of those from both communities. In this instance, a two-way, embedded multi-professional team may be appropriate, as both the research and policy-making communities need to change. Complexity and network theories propose that success depends on "agents" working across and between highly complex, multi-level multiple systems and clusters in an "interdependent, contingent, relationship-centric way" (Kitson et al., 2018). Both communities need credible brokers with the requisite skills to create discourse between them, and embedded brokers are more likely to be able to do this and to bring about cultural change, as they gain the necessary tacit and experiential knowledge to influence their colleagues (Wye et al., 2017).

## Conclusion

Although existing institutional, structural and contextual obstacles still frustrate success, collective brokering in a two-way, embedded multi-professional team makes brokering easier. In such a model, brokers modelled collaborative behaviour to emulate and create a conspicuous critical mass. This team model may be

especially appropriate when the aim is to generate new knowledge through fostering collaborations, leading to cultural changes in communities.

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## Conflicts of interest

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