Evidence & Policy

Navigating boundaries in coproduced research: a situational analysis of researchers' experiences within integrated knowledge translation projects

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Key messages:

- Different kinds of boundaries between collaborators are inherent in research coproduction.
- This paper identifies four discursive positions that describe how coproduction researchers approach boundaries in Canadian health settings.
- Researchers' stances on boundaries in coproduction can be productively mapped along two key spectrums: the degree to which boundaries are viewed as a problem, and the degree to which researchers believe boundaries should (or could) be challenged.
- Recognizing these discursive positions can help those doing and studying research-coproduction reflect critically on their work.

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Background

Research coproduction is promoted as one approach to collaborative research, which "explicitly responds to knowledge user needs in order to produce research findings that are useful, useable, and used" (Graham et al., 2022, p.1). Proponents argue that coproduction generates more impactful evidence than traditional academic research in various ways, including by addressing more practice-relevant questions and building relationships with knowledge users (Kothari et al., 2017). Coproduction approaches have emerged from diverse fields using different terminology (Bandola-Gill et al., 2022; Nguyen et al., 2020). In the Canadian health sector, research coproduction is often called integrated knowledge translation (IKT).

A core tenet of IKT is the value of bringing together people with different knowledge, perspectives, and skills, to bridge boundaries between evidence, policy, and practice. Yet, boundaries between collaborators simultaneously create challenges in coproduced research (Gagliardi et al., 2016). Here we follow Akkerman and Bakker (2011) in defining boundaries broadly as, "sociocultural differences leading to discontinuities in action and interaction" (p. 152), which encapsulates various types of boundaries including epistemic, professional, and organizational boundaries (Evans & Scarbrough, 2014).

Researchers have increasingly and productively explored questions related to boundaries in IKT research (e.g., Nutley, 2010), with various case studies exploring how boundaries may be bridged, buffered, blurred, spanned, reinforced and maintained in different health research coproduction contexts (Kislov, 2018; Rycroft-Malone et al., 2016; Smith et al., 2015; Evans et al., 2014; Wehrens, 2014). A recent scoping review of coproduction research found that the health-focused IKT "cluster" of literature has a strong focus on "challenges to be addressed and problems to be overcome when working collaboratively across institutional boundaries" (Bandola-Gill et al., 2022, p.17). The life-or-death stakes of healthcare make it one of the more urgent settings for research to be translated quickly into action. Healthcare also provides a rich context for studying boundaries because it involves complex interactions between biomedical, clinical, social, political, and lived expertise. What has not been explored in-depth, however, is how those actively doing research coproduction think about and manage the various types of boundaries they encounter.

In IKT, boundaries have a 'dual nature' as both essential to the approach, and obstructive to collaboration (Kislov, 2018; Quick et al., 2014). In this context, key questions include: How do health researchers leverage diverse expertise and still coordinate collective action? In what ways do they handle knowledge boundaries when conducting IKT projects? What do researchers assume and think about knowledge boundaries in coproduction contexts, and how do they experience those boundaries?

For those doing coproduced research, critical reflection is repeatedly noted as vital to success, including considering the 'hidden politics' and power dynamics that inevitably occur among collaborators (Crosschild

et al., 2021; Oliver et al., 2019; Kothari et al., 2017; Flinders et al., 2016). A deeper understanding of how boundaries are conceptualized could aid critical reflection and spark productive team conversations among those considering or using IKT approaches. Scholarship from areas outside of health-focused IKT can provide alternative and useful perspectives about the nature of boundaries in collaborative research (Bandola-Gill et al., 2022; Lamont et al., 2002). For example, Bjørn and Østerlund (2014), working in science, technology and society studies argue that, "boundaries are not our enemies; instead, they are necessary for making meaning" (p. 28). For those studying coproduction, empirical evidence on how people doing IKT understand boundaries could suggest productive links to theoretical work in other areas.

Over the couple several decades, Canada has been a leader in knowledge translation. The Canadian Institutes of Health Research (CIHR) has institutionalized IKT in various funding programs and champions knowledge translation on the world stage (e.g., Nguyen et al., 2020; Smith et al., 2017; Knight et al., 2013). Focusing on Canadian healthcare provides a vibrant setting within which to study boundaries in IKT, and address our primary research question: How do researchers understand, experience, and manage boundaries in Canadian IKT health research projects?

Methods

Data collection

We conducted a multi-method qualitative study to examine how researchers make sense of and manage knowledge boundaries in IKT. Data were collected from semi-structured qualitative interviews (n=20) with researchers leading IKT projects across Canada, and an in-depth case study of a Canadian IKT project which included participant observation and analysis of project documents.

Interviews provided insight into a range of possible IKT experiences, while the case study provided an opportunity to observe how one team handled boundaries in action. During data collection, the first author was a master's student trained in qualitative interviewing. The first author was supervised by the second author, a principal investigator with extensive experience in IKT research and qualitative methodologies. We entered the project with a positive stance towards the value of collaborative research and a desire to critically interrogate ideas related to IKT. Reflexivity was maintained by recording, discussing, and challenging established assumptions in reflective memos and journaling (Barry et al., 1999). The presentation of our analysis follows Standards for Reporting Qualitative Research and the Consolidated Criteria for Reporting Qualitative Research guidelines, (O'Brien et al., 2014; Tong et al., 2007).

Interviews

Participants were recruited using a stratified random sampling strategy. We used the CIHR's online Research Information System database to identify all academic principal investigators (PIs) of projects funded by grants with an explicit IKT component between 2011-2013. This granting timeframe and the focus on PIs were chosen so participants would have substantive hands-on experience with projects that would be completed or near completion by the interviews in 2016-2017. Three funding programs included explicit IKT coproduction requirements at CIHR between 2011-2013. The Partnerships in Health Systems Improvement (PHSI) program intended to "offer Canada's health system decision-makers evidence-informed answers to their most pressing questions," and required partnership between researchers and decision-makers (CIHR, 2014b, para.1). The eHealth Innovation Partnership Program (eHIPP) required researcher partnership with industry to help researchers develop, integrate, and evaluate eHealth innovations in Canada (CIHR, 2014a). The Knowledge to Action (K2A) program was designed to accelerate knowledge translation by linking researchers and knowledge-users (Sibbald et al., 2014).

Previous research suggests grant type, gender, and geography can all be factors that meaningfully influence researchers' experiences and perspectives – including when conducting coproduction research (Squires et al., 2021; McLean et al., 2018; Tannenbaum et al., 2016; Holmes et al., 2012; Landry et al., 2010; Tetroe et al., 2008). So, we set target quotas for these three criteria (funding program, PI's presumed gender based on name, and region of PI's university), which we were able to access in CIHR's funding database. Recruitment emails were sent to randomly selected academic PIs in batches of 10 until target numbers for the three criteria were satisfied. This sampling strategy led to a diversity of grant type, geographic location, and gender among interview participants that closely matches the broader population of IKT researchers who received CIHR IKT grants between 2011-2013 (see table 1). Whereas random sampling in quantitative methods is designed to enable claims that are statistically generalizable to a population, in this qualitative study, our strategy was selected to make sampling choices transparent and to increase the chances that our recruited participants more credibly typify diverse views held in the broader community of Canadian IKT researchers.

Forty-nine potential participants were contacted by email, representing 30% of all academic PIs from the list. The email stated the goals of learning about their experiences doing IKT. Potential participants received a follow-up email two weeks after the initial invitation, and a phone call two weeks after the follow-up. Of those contacted, 29 responded. Five declined to participate for lack of time. Four responded that we should speak instead with their postdoctoral fellow who was actively leading their listed IKT project. Twenty participants proceeded to interviews (16 principal investigators and four project-leading postdoctoral fellows), representing 40.8% of potential participants contacted. Data saturation was reached at 17 interviews (i.e., no new themes were identified), but three additional interviews were completed to meet our target quotas and confirm that no further interviews were required. See table 2 for individual participant characteristics.

Table 1. here: Interview sampling criteria and number interviewed

Table 2. here: Interview participant gender and funding program affiliations

A draft interview protocol was piloted and amended using feedback from two IKT researchers. The authors were not known to participants prior to the study. The first author conducted all interviews by phone, between December 2016 and March 2017. Interview length ranged from 20 to 120 minutes, and averaged 46 minutes. Participants were asked about the history and development of their IKT projects and their understanding of and views about IKT. All interviews were audio-recorded with permission and transcribed verbatim. Participants were assigned code numbers and transcripts of their interviews were imported into NVivo version 11 (qualitative data analysis software) for analysis. Member checks were conducted by distributing a version of the abstract and results to participants. Eight out of 20 interview participants responded by the deadline, and two requested minimal changes (one found a repeated word, and another asked for one detail to be changed to avoid deductive disclosure). Three did not respond. Nine responded after the deadline, and did not request any changes. Feedback from all participants who responded was positive. Verbatim quotes (with interviewee signifier) are included to illustrate participants' views.

Case study & observation

To observe how researchers handled boundaries in action, we followed the "n of 1" case study approach of Stake (1995) supported by Tsoukas' (2009) concept of heuristic generalizability. The case study was purposely selected to complement the wider breadth and diversity of participants' recollections during interviews and triangulate how researchers understand, experience, and manage boundaries in practice and in context. The case study was selected because it had received Canadian IKT funding (both PHSI and eHIPP awards). It involved active research coproduction between patients, health practitioners, industry partners, system decision-makers, and academics who were working together to implement research findings in a clinical environment to catalyze broader health system changes.

Participant observation was the primary data collection method for the case study over a seven-month period from October 2016 to May 2017. Participant observation is a research technique, "that involves understanding the experiences of participants by observing everyday procedures, such as interacting with co-workers or performing job duties," and is particularly well suited to access data from real-world interactions in context (Guillot-Wright et al., 2022, p.6). The authors collaboratively created a note-taking framework, which focused on how knowledge was displayed, how arguments or ideas were constructed, which details received attention, who participated, and how decisions were reached. The process of participant observation included taking notes during the observation (Emerson, Fretz, & Shaw, 1995),

creating identity codes for those observed, then typing long, in-depth versions with thick descriptions (Geertz, 2003), and importing them into NVivo 11. Documents such as grant applications, conference abstracts, presentation materials and briefing notes related to the project were also analysed as part of the case, because of their salience as research-related materials coproduced by the project team. The first author spent over 500 hours in the field as a participant observer, including field observations at formal team meetings, along with other presentations and informal research processes.

Case study setting

The IKT case observed involved designing, implementing, and evaluating software to support communication of patient information about adverse drug events across locations of care and between care providers, with the goal of improving patient safety through reduction of repeat adverse drug events. The first author was a research assistant and master's student while observing the project, and the second author was a co-principal investigator with extensive experience in observational ethnographic methods. Therefore, the first and second author had a relationship with the IKT project team established prior to study commencement, and the project team knew the study was being conducted to explore how they experienced and addressed boundaries in their work.

Over the observation period (2016-2017), the project team was led by two co-principal investigators (one based in social sciences, the other a practicing physician), and included two staff research coordinators, three student research assistants, and knowledge-user collaborators (including two pharmacists and three patient partners), all of whom attended regular project meetings. This IKT project also engaged knowledge-users from throughout the health system – including representatives from the ministry of health and regional health authorities – for additional consultation and input on research questions, study designs, and dissemination strategies via ad hoc meetings, presentations, calls and emails. Ultimately, findings from the project were successfully implemented in the health system, but during the time of observation, the project was in a precarious situation, facing red tape at various levels that delayed the team's ability to test and evaluate the software. Further details on the project are provided elsewhere (Balka et al., 2018; Cragg et al., 2017; Small et al., 2017)

Data analysis

The interview and case data were analyzed using an adapted grounded theory approach developed by Adele Clarke (2005) called situational analysis. Situational analysis involves doing "cartographic exercises" – creating maps – of qualitative data in different configurations to systematically analyze potential understandings and patterns of discourse that emerge. Following Clarke (2005) and Cheek (2004), discourse is defined here as a set of statements about reality, which organize and structure the way in which a

particular topic, object, or process is talked about or represented. Situational analysis involves comparative studies of discourses, including considering various positions on key issues that emerge within those discourses - called "discursive positions" (Clarke et al., 2016, p.14). As a 'theory/methods package,' situational analysis provides a structured way to explicitly contend with the messiness and complexity of analysing qualitative data with open coding, drawing on the symbolic interactionism and pragmatist philosophy of grounded theory, while incorporating contemporary and post-structural influences such as feminist theory, postmodernist critiques, and science and technology studies (Clarke et al., 2016; Clarke, 2005).

Following the situational analysis coding procedure described by Washburn (2016), the authors collaboratively created situational and social world/arena maps based on the interviews and case study, which produced many provisional codes derived from the data. The first author then grouped these codes into categories, explored the categories in analytic memos and discussions with the second author, and conducted a second round of focused coding to iteratively create 'positional maps' to array discursive positions taken in the data and how they relate. These positions do not represent individuals' beliefs. Instead, the goal of analysis is to represent the full range of positions articulated in the discourse *in their own terms*, and "disarticulated from their sites of production, decentering them and making analytic complexities visible" (Clarke et al., 2016, p. 135).

Interview transcripts are not available due to confidentiality. Reporting checklists, recruitment materials, interview protocol, example situational analysis maps, operationalizations of key concepts, and coding schemes and summaries are available at https://osf.io/5u3k2.

Findings

We identified four key discursive positions that participants used regarding knowledge boundaries in IKT: to recognize and handle, respect and clarify, blur and integrate, or challenge and embrace. These discourses can be described using two salient spectrums: the degree to which participants viewed boundaries as a problem, and the degree to which they believed boundaries should (or could) be challenged (see figure 1).

Figure 1 here: Positional map of discourse on boundaries in IKT

In this positional map, discursive data about boundaries are plotted relatively by the degree to which discourse sees boundaries as barriers to IKT, and the degree to which discourse values the importance of challenging boundaries. Traditionally, positional maps in situational analysis are presented more like scatterplots, with an unlimited number of relative discursive positions plotted along continuums (Clarke, 2005). Thus, the axes should be understood as continua rather than binaries, and the labelled discourses

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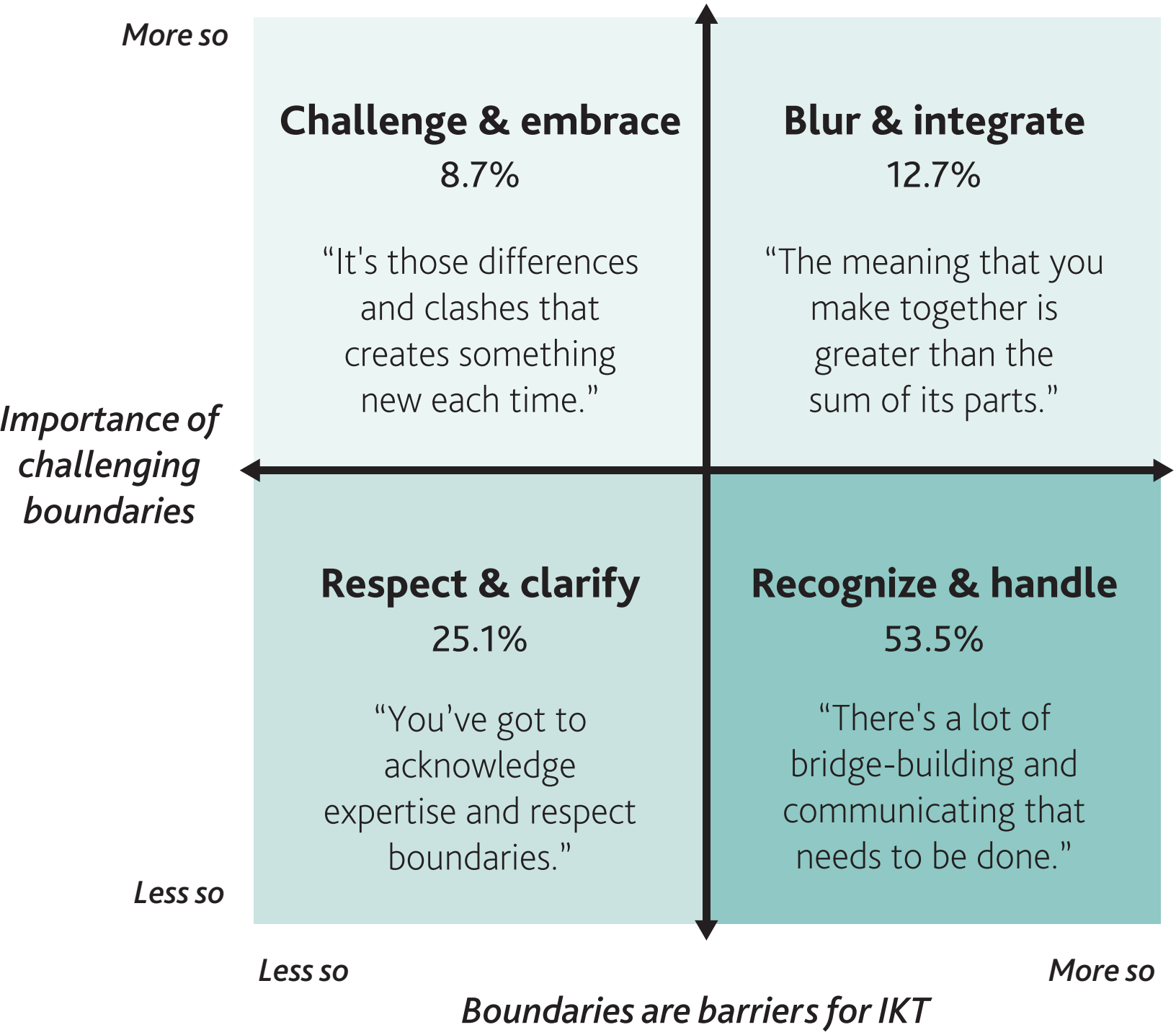

% = Of all discourse pertaining to boundaries across all data sources (interview transcripts, case study fieldnotes and case study documents)

should be seen as four empirical clusters that emerged in our data, which are not exhaustive of all possible positions on boundaries in IKT. Each position is labeled with two equally salient verbs intended to succinctly convey the discourses' normative and action-oriented stances towards boundaries. Through analysis, we considered whether and how the initial sampling criteria of grant type, geographic area, or gender might affect or account for participants' understandings and experience of boundaries, but did not ultimately observe differences in participants' discourse based on these three factors.

No single position on the map is inherently right or wrong. Additionally, any individual or organization may take multiple, even contradictory, discursive positions on an issue of concern (Glück, 2018; Clarke et al., 2016). Therefore, the positions represent a discursive menu, from which actors select strategically – and often unconsciously – to satisfy their needs in a given situation. Some discourses, however, appeared more or less frequently in our data. Thus, the 'dominance' of each discourse is reported as a percentage of all discourse pertaining to boundaries across our data sources (interview transcripts, case study fieldnotes and case study documents). Each discursive position is discussed in the following sections.

Recognize & handle

Discourse reflecting this position sees boundaries as practical problems that trap and constrain knowledge. This discursive position appreciates that boundaries are inevitable – if inconvenient – results of expert specialization. In this view, boundaries that exist should be explicitly recognized and dealt with. They are seen as an unfortunate but inevitable feature of the IKT process that must be recognized and handled, or else they will hinder success. Metaphorically, this position understands boundaries like obstacles in an obstacle course. With the right training and approach, they can be overcome, but they inevitably slow progress towards the end goal.

This position was the most frequently observed in our study. Of all discourse pertaining to boundaries across the interviews and case study data, 53.5% reflected this position. It emphasizes getting work done in a concrete, real-world context. Philosophical questions about the nature of knowledge and boundaries are seen as beside the point. Rather, the logic is that boundaries exist (regardless of their degree of "realness" versus "social constructedness"), these boundaries make it logistically hard to coordinate IKT projects, and so boundaries must be dealt with.

From this perspective, communication is an important (if not the most important) strategy for handling boundary problems. This discursive position acknowledges and understands that boundaries create communication difficulties, which cause collaboration difficulties. For example, in discussing the challenges of IKT, one interviewee said, "the drawback is that there are different cultures in community organizations and academic organization, so sometimes like there's a lot of bridge building and communicating that needs

to be done to understand each other" (IV09). Here, the different cultures are recognized as a problem, and communication is seen as a necessary strategy to bridge divides. Another participant explained:

> It's important to get to know the terminology of the different environments of the people I'm working with. And that's with the patients too, because with the patients, I have to really speak in non-academic jargon as well. And so, with each different partner group, you have to use different languages with them. (IV12)

Thus, communication is framed as both a barrier and bridge (Peters, 1999). Effective communication requires recognizing different languages are being spoken, and then use the appropriate language with each group across relatively stable divides. On a deeper level, this discourse is concerned with how boundaries can impede common understanding and cause collaboration problems:

> We all have a particular perspective that's informed by our practice experience or training, or gender identity, or the way that we interact with the world, and it makes it really hard to see other people's perspectives. I think that clashing of perspectives surround misperceptions, where you don't share a common definition of the problem. (IV19)

Identifying a common goal becomes a key strategy for overcoming misunderstandings. Extending the obstacle course metaphor, the common goal is like winning the race. While varying obstacles may prompt different approaches by different team members, the shared goal keeps everyone moving forward in the same direction. For example, one participant explained the team recognized and handled boundaries because of their shared concerns: "We are a very multidisciplinary team, it's true everybody brought strengths to the projects and specializations, but I think we were all on common ground in being concerned about [the same topic]" (IV02). Several others discussed the importance of building a "common vision" (IV15) for the IKT project or identifying research directions of "common interest" (IV04) to the research team as well as clinicians and decision-makers. Discourses from this position assume that, if existing boundaries can be overcome through better communication and continued effort, then reaching the goal of mutual understanding is possible.

Respect & clarify

Discourse reflecting this position views respecting clear boundaries as essential and beneficial to the success of any IKT project. Boundaries themselves are not seen as a problem – problems only arise from a lack of clear boundaries or respect for them. This position holds that each participant in the IKT project brings a unique expertise to the table. Setting clear boundaries around people's expertise is understood as a prerequisite for successful collaborative action, and is often discussed in parallel with setting clear expectations around power and contributions. In this position, expertise and teams can be understood metaphorically as puzzle pieces, whose boundaries must be clear to fit together cohesively. This position

was the second-most frequently reflected in the interview and case study data. Of all discourse pertaining to boundaries across the interviews and case study data, 25.1% reflected a 'respect and clarify' position.

Good communication is understood as clarifying and delineating the bounds of roles and knowledge. For example, one interviewee explained that conflict within the IKT team was mostly avoided, "because I'm pretty diligent about clarifying roles and understandings even when we're writing the grant so I think that really helps us later on" (IV06). Another said, "roles have to be defined as much as you can at the beginning, so you know the boundary where the researchers have to make the decisions and where the ministry says, 'this is our decision'" (IV02).

In contrast, disrespected or blurred boundaries can cause problems, including conflicts of interest. For example, when asked about whether or not a government partner was involved in any data collection or analysis, one participant responded:

> They weren't involved in data collection or anything like that, because I think it was important for the work that we were doing that the data collection be independent of government, because you know it's a comparative study, and so you know I think as much as possible as a research team we tried to maintain a neutral third party stance because we couldn't be gathering data in a way that was preferentially slanted. (IV08)

Boundaries are also understood from this position to enable deeper specialization and unique expertise. For example, an interviewee explained that, as the research lead on a successful IKT project, she saw her role as "making sure that I'm really respectfully honouring each different knowledge partner group's positions" (IV11). This discursive stance advocates for recognizing the boundaries of one's own knowledge, and respecting others' knowledge. For example:

> Each project I'm never doing a project just by myself and largely it's because there's a lot of things I'm not good at, so I need all those other people to do those things I don't have the expertise in. (IV10)

The respect-and-clarify position sees problems as multi-faceted, so diverse expertise is needed to create similarly multi-faceted solutions. In the words of an interviewee, "any issue or problem we tackle in society can never be done one dimensionally, they're never one dimensional" (IV02). In another interview, respect for collaborators' differences emerged as an important strategy for authentic partnership:

> It can be very, very time consuming, just to make sure that you're acknowledging other's perspectives and you're listening to them and taking the time to make sure that you're listening to the different perspectives in a meaningful way, really respecting them and their differences, and not just as tokenism. (IV01)

From this discursive position, people's differences and boundaries must be respected and upheld so that they can contribute their unique expertise. This position emerged in the case study data, during a workshop for the team on best practices for patient engagement in research. The workshop facilitators conceptualized patient involvement in terms of the unique expertise patients could contribute. For example, the workshop facilitators described patient knowledge as "complementary" to research knowledge (OB11). Facilitators emphasized that good patient engagement required respecting this different kind of expertise. Discourse reflecting this position did not see boundaries as barriers, but rather reflected the view that clear and respected boundaries enable successful IKT.

Blur & integrate

Discourse reflecting this position sees boundaries as problematic obstacles to IKT, which should be de-emphasized and ideally erased. This position holds that removing boundaries to knowledge sharing facilitates true innovation. The 'blur and integrate' position can be conveyed through the metaphor of baking, where different ingredients are combined and irreversibly integrated, prompting chemical reactions that create something new. Of all discourse pertaining to boundaries across the interviews and case study data, 12.7% reflected a 'blur and integrate' position.

In this position, perfect communication becomes a major topic of concern, where the goal is to remove any barriers to understandings and fully integrate diverse ideas. An IKT project is seen as more collaborative and therefore more successful as boundaries between participants dissolve over time. For example:

> It's much more collaborative now, and I think that just speaks to how over time you just get to know each other, you've been working together for a while, and you start working together more collaboratively because those relationships are in place now and the divides that were there kind of become less important. (IV19)

This position locates IKT itself as the process of blurring problematic boundaries and challenging the traditional power structures they create. Dissolving artificial, falsely tidy boundaries is a strategy to find better solutions to complex problems. For example:

> Most of the issues that we struggle with, as human beings in so called organized, civilized societies, I don't think you can box them, I don't think that we can distinguish mental health problems from social organization or community…I'm calling myself a trans-disciplinarian because our real focus is to produce applied research that actually provides solutions. And I think too much of the disciplinarian approach has led to almost a counter-productive response to many social problems. And so that's kind of our goal at the moment is to reduce those disciplinary boundaries. (IV13)

Relinquishing control over the research process also emerged as a theme in this discursive position. One participant said, "It isn't about owning the process, it's about letting go…I would have to say I was just more of a research co-participant than a traditional PI" (IV17). As the IKT project develops, success is realized by enabling evolution and change: "It's very much of a learning situation in terms of what skills people have or how much they want to invest in the project, so I think you do need flexibility within the boundaries of those roles" (IV01). As the project changes, so too should boundaries of the team members' roles.

By de-emphasizing boundaries, those taking a 'blur and integrate' position argue IKT projects can create something truly new. For example, one participant described the power of IKT as its ability to remove the "blinders" created by existing boundaries: "the meaning that you make together is greater than the sum of its parts…you develop a new language together, a new perspective … that's more comprehensive, kind of like taking the blinders off" (IV19). This position views boundaries themselves as the core problem that IKT seeks to address. In the case study, the team sometimes discussed how existing data sources were siloed, and that distinctions between research and clinical practices were problematic. Comments included, "It's about blurred versus boundaries between different data sources…links would really accelerate research" and that "one objective [of the project]…is to blur the lines between research and practice and make the distinction between research and practice or implementation smaller" (OB02). From this perspective, collaborative research blurs boundaries between collaborators to builds mutual understandings and help teams think outside their traditional boxes.

Challenge & embrace

Discourses reflecting this position see boundaries not as problems, but as vital to producing transformative IKT research. However, rather than accepting and respecting boundaries, this discursive position sees the benefit of boundaries emerging exactly when they are challenged, pushed, and redrawn, and the resulting conflicts are embraced and encouraged. A possible metaphor for this position is the idea of opposable thumbs, with knowledge boundaries between each digit. The opposing tension between the finger and thumb productively holds things and fosters important work. Roger Martin (2007) uses this metaphor effectively in a business context, arguing that cultivating an "opposable mind" – like an opposable thumb - can help people productively and hold contrasting views. This discourse was the rarest. Of all discourse pertaining to boundaries across the interviews and case study data, 8.7% reflected a 'challenge and embrace' discursive position.

Communication is seen as an important tool to express and enable conflicts. For example, one interviewee explained the importance of enabling disagreement within IKT projects, "It's about honouring that there are going to be dissenting perspectives, and trying to frame it in a way that allows space for those

perspectives to clash and that complexity to just be there" (IV19). This illustrates a key tenant of this position – that success in IKT involves being comfortable with inevitable conflicts resulting from knowledge boundaries, or at least allowing for discomfort and complexity without necessarily trying to resolve them.

Discourse from this position understands boundaries as enabling learning and growth. Boundaries are only problematic if they are accepted as given and fixed, and therefore should always be questioned and redrawn if needed. One interviewee recognized that, while others may see the boundaries created by diversity as challenging, he sees it as the most useful element of the IKT endeavour:

> I think other people might view that as a drawback with having all those different agendas and all those different people with different perspectives, but I kind of enjoy that part to be honest with you, because it's those differences and clashes that creates something new each time. (IV10)

Each group may never truly understand the other, but they can learn from their differences. For example, another participant discussed collaborating with a research partner from a different disciplinary background: "I think our two worlds kind of collide in this somewhat awkward way, but it's been really good, because I think we've learned a lot from each other" (IV08). Thus, this position emphasizes the strategy of co-learning, as opposed to cultivating shared interests or seeking mutual understanding.

Observing the IKT team in the case study revealed examples where 'challenge and embrace' emerged as a key discursive position taken. Challenging boundaries does not necessarily mean unhappiness or dysfunction. The project team in the case study got along well – the co-leads have a long-standing working relationship, many staff worked on the team for years, and the whole group enjoys retreats and social gatherings. In the case study project, disagreement often achieved productive results even if – or perhaps because – complete resolution was not reached. For example, one ongoing conflict from the case study related to the ethics and purpose of conducting a randomized controlled trial (RCT) to assess changes resulting from the project's intervention. Part of the motivation for an RCT in the project stemmed from a deep commitment to the scientific positivist value of objectivity, to set aside all assumptions and remain neutral about whether the intervention would improve care. Another argument for doing the RCT was the belief that a credible, 'gold-standard' research design was required to justify implementation of the intervention to health system stakeholders. On the other side, there were concerns that doing an RCT would deny those in the control group potentially life-saving care. There are also fundamental philosophical and social science challenges and critiques of RCT methodology (for a detailed discussion, see Cartwright et al., 2007). Although discussions about whether or not to do an RCT and how to conduct a meaningful, ethical RCT continued over several years, the ongoing conflict did not cripple the IKT project – if anything, it expanded it. An RCT was eventually conducted, and the team members never appeared to fundamentally

change their original views, but instead held their differences over the years in productive tension that lead to new learnings for all.

The team simultaneously embraced boundaries by actively questioning and creating new boundaries within the project. For example, researchers and patients frequently debated what it meant to be "wearing a researcher hat" versus "wearing a patient hat," since some individuals on the team could embody both roles and functions (i.e., when researchers had patient experiences, and patients had research skills) (OB07). Similarly, the team grappled with setting the right boundaries between research and advocacy. Over time, they grappled with when and how to variously "erase," "disentangle" or "clarify" the lines between research and advocate (OB02, OB04, OB10), collaboratively negotiating different approaches to suit different situations. While these kinds of challenges may feel uncomfortable, discourse from this position sees the resulting tensions and collaborative re-drawing of boundaries as among the most important strengths of an IKT approach.

Discussion & conclusions

The four discursive positions identified contribute to how we understand relationships between evidence, policy, and practice in at least three ways, by: 1) offering a critical reflection tool for IKT practitioners; 2) expanding and opening new avenues for action in IKT projects; and 3) suggesting academic links and concepts for future study of IKT processes.

Critical reflection tool for teams

This paper offers a tool that can be used by IKT practitioners to critically examine how IKT teams approach boundaries. Many experienced IKT practitioners argue that an enhanced level of reflexivity and critical reflection is necessary for collaborative action and knowledge production (Oliver et al., 2019; Smith et al., 2014). While assessing correlations between discursive positions about boundaries and project outcomes is beyond the scope of our project, considering our findings in relation to other scholarship suggests each discursive positions has drawbacks and advantages (Evans et al., 2014; Oborn et al., 2013). For example, Kislov's (2014) case study of a health research partnership showed collaboration can reproduce existing boundaries, promote their blurring, or create new boundaries – all in a single project. Comparing three coproduction projects, Melville-Richards (2016) described how teams encountered challenges and opportunities presented by multiple boundaries, based on diverse factors including organizational structures, conventions, and professional divisions. Our findings alongside other research coproduction scholarship (e.g., van der Graaf et al., 2023) reinforce the idea there is no single 'right' approach to boundaries. However, our findings also suggest that those involved in IKT efforts could benefit by not *defaulting* to dominant discursive positions without reflection.

This article offers easily understandable metaphors to describe distinct ways boundaries can be conceptualized, which can support more intentional, critical reflection among diverse collaborators. IKT teams can productively identify underlying assumptions about coproduction work by discussing how they understand their boundaries and expertise in given situations (e.g., as obstacles, puzzle pieces that fit together, ingredients to combine for baking, or opposing finger and thumbs). Collaborators can explore where various stakeholders may fit on the axes and map, in different situations and through changes over time, which can support self-reflection and learning. Our findings both prompt reflection and offer a tool for IKT collaborators to ask themselves and each other how they see boundaries within the team, and how those understandings matter in their work.

Expanding options for action in IKT practice

An awareness of the variety of possible discursive positions concerning boundaries can help collaborators surface pragmatic actions and concerns that may otherwise be overlooked. Existing IKT discussions often frame boundaries through binaries of good-bad or static-dynamic. In contrast, "positional maps assist analysts in seeing complexity, variation, and heterogeneity in situations where once only binaries and/or longstanding, oversimplified divisions may have appeared" (Clarke et al., 2016, p. 135). Alongside existing literature, our findings suggest that striving for more explicit recognition and strategic choices between a variety of discursive positions concerning boundaries may be productive for IKT practice.

For example, in both our data and the coproduction literature, the 'blur and integrate' discourse provides an appealing and often idealized rationale for why IKT seeks to bring together people with diverse knowledge. Gray et al. (2015) argue that collaborative research "seeks to dissolve, rather than bridge, the gap between the research and practice processes and communities" (p. 1958). Additionally, authors of empirical case studies have argued that blurring the lines between users and producers is a constitutive component of effective research coproduction in healthcare (Cooke et al., 2016; Douglas et al., 2014). Yet, idealizing a blur-and-integrate stance towards boundaries may be problematic and stymie effective IKT, by de-emphasizing power differentials and hidden politics.

In contrast to blurring and integrating, many of our participants who expressed the most satisfaction with their research partnerships emphasized a 'respect and clarify' discursive position. This finding is reflected in other empirical research. Based on their experiences doing collaborative research, Locock and Boaz (2004) argue that "an artificial suppression or 'blurring' of the boundaries between them can be damaging in the long term, similar to the critique of repressing conflicts as masking power" (p. 375). Comparing two IKT projects, Evans and Scarbrough (2014) found evidence that respecting boundaries helped a team in one case study create a collaboration environment where project-members could focus on developing greater depth of research expertise, because their maintenance of boundaries meant they did not

have to radically alter existing work practices. Similarly, Heaton et al. (2015) found that an academic-clinician collaborative research project was productive *because* the clinicians contributed distinct expertise and "retained their respective identities and distinct professional positions and objectives" (p. 8). This recognition suggests activities like project charters, meetings about defining roles and memorandums of understanding may be helpful actions to some research coproduction projects.

Although the 'challenge and embrace' position was least common in our data, we suggest that more intentionally recognizing and drawing from this discourse could be beneficial for those doing IKT. Greenhalgh et al.'s (2016) work addresses the value of the 'challenge and embrace' position. They argue collaborative knowledge production is "invariably power-charged and conflict-ridden; the key to its success is making power relations explicit and encouraging task-oriented conflict (which can be creative and productive)" (p. 397). Similarly, Bartunek and Rynes (2014) argue that "the correct question to ask about paradoxical tensions is how to sustain them successfully not how to resolve them" (p. 1192). They suggest that by recognizing paradoxical tensions, managers can hold dilemmas in generative ways, rather than choosing one side and delegitimizing the other. In an ethnographic study of a knowledge exchange network, Lehoux et al. (2010) found that the full potential of IKT was not realized partly because the network's "careful, conflict-adverse and centralized governance did not provide much room for members to engage in transformative discussions" (p. 745). Drawing on alternative positions, such as 'challenge and embrace,' suggest ways to better frame disagreements and create space for dissent, such as using active facilitation to surface and navigate productive conflicts. Combined with critical reflection, each of the discursive positions can be used to suggest different avenues for action before and during research coproduction, by encouraging participants to consider implications and affordances of various positions.

Broadening theoretical considerations for future research

For those studying research coproduction, the discursive map and positions offer new ways to categorize, analyze, and explore boundaries. Much of the IKT literature is based – implicitly or explicitly – on the logic of the two communities theory, which postulates that researchers and policy makers operate in two different worlds, and that the boundaries between communities are both static and problematic (Graham et al., 2022; Caplan, 1979). However, the two-communities theory has been critiqued as insufficient to fully conceptualize and explain the nuanced dynamics and complexity of coproduced research (e.g., Hurley et al., 2016; Wehrens, 2014; Nutley, 2010). By revealing a plurality of stances about boundaries present in IKT *practice*, this article offers IKT *researchers* with additional ways to conceptualize boundaries in their theoretical and empirical work, which go beyond two-communities thinking. Our findings could help coproduction scholars identify theoretical concepts that align with particular boundary discourses under study, for example by leveraging interdisciplinary literature on knowledge brokers (e.g., Waring et al., 2021; Glegg et al., 2016), using concepts from science, technology and society studies like boundary objects and boundary

work (e.g., Star, 2010; Gieryn, 1999), or exploring organizational and management studies concepts like boundary spanners (Collien, 2021; Tushman et al., 1981). By codifying and enriching our understanding of varied ways boundaries are – and could be – perceived in IKT, our findings offer productive cross-disciplinary and theoretical linkages for those studying complex research coproduction processes.

This study has several limitations. Data are limited to one case study and 20 interviews focused on academic researchers (as opposed to knowledge-user partners), who voluntarily applied for IKT grants and consented to participate in research. Hence, the views represented may be more favourable towards IKT than views held by those our sampling strategy did not reach. Because we interviewed only academic researchers who may be more supportive of IKT, and excluded knowledge user partners, contrasting opinions about IKT may be under-represented in our sample. Additionally, we focus on health research projects in a single country (Canada), so further research is needed to assess whether the findings reported here remain salient outside healthcare contexts and in other national settings where IKT may feature less prominently in research funding programs. Our analysis has focused solely on IKT processes, and did not include data on projects' ultimate impacts. This limited our ability to make claims about how different stances towards boundaries affects project outcomes, which remains a fruitful area for further inquiry. We focused on exploratively identifying researchers' discourse about boundaries in IKT, and suggest future work can investigate how researchers may shift between these discourses within projects and among different types of collaborators. A strength of this study is that it used multiple methods to collect data, including a case study and interviews. Triangulation of the case study data both reinforced interview data and yielded insights which were not apparent from the interview data alone. Ultimately, this exploratory situational analysis generated original insights about boundary discourse which we hope will be explored, tested, and extended in other research coproduction contexts.

This study has shown that researchers undertaking IKT projects understand, experience, and manage boundaries in meaningfully different ways. The four discursive positions identified can help those doing coproduced research reflect on their position(s) on boundaries and suggests a wider range of potentially productive actions. As future data become available concerning the outcomes of more IKT projects, we may be able to determine which of these stances leads to better outcomes in various situations. In the meantime, recognizing the diversity of possible discursive positions on boundaries in IKT projects can help those practising and studying IKT identify their own discursive positions in different situations, recognize others' stances, and strategically adapt as needed.

Research ethics statement

The study was reviewed and approved by the Simon Fraser University research ethics board on 4 October 2016, with the requirement to ensure the confidentiality of interview participants' identities. Risks of deductive disclosure and the ethical implications of this research were discussed in detail between the co-authors before and during fieldwork.

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Contributor statement

CA and EB designed the study collaboratively. CA had the idea for the project and collected the empirical data. CA and EB developed the analysis approach collaboratively and discussed emerging findings and interpretations. CA drafted manuscript and both authors edited subsequent drafts.

Conflict of interest

The authors declare that there is no conflict of interest.

Supplemental data

Supplementary data and research materials are archived at the Open Science Foundation (https://osf.io/5u3k2/) including reporting checklists, recruitment materials, interview protocol, example situational analysis maps, operationalizations of key concepts, and coding schemes and summaries. Interview transcripts, case study internal documents, and fieldnotes cannot be provided because of requirements for participant confidentiality, due to the identifiable nature of participants' IKT projects.

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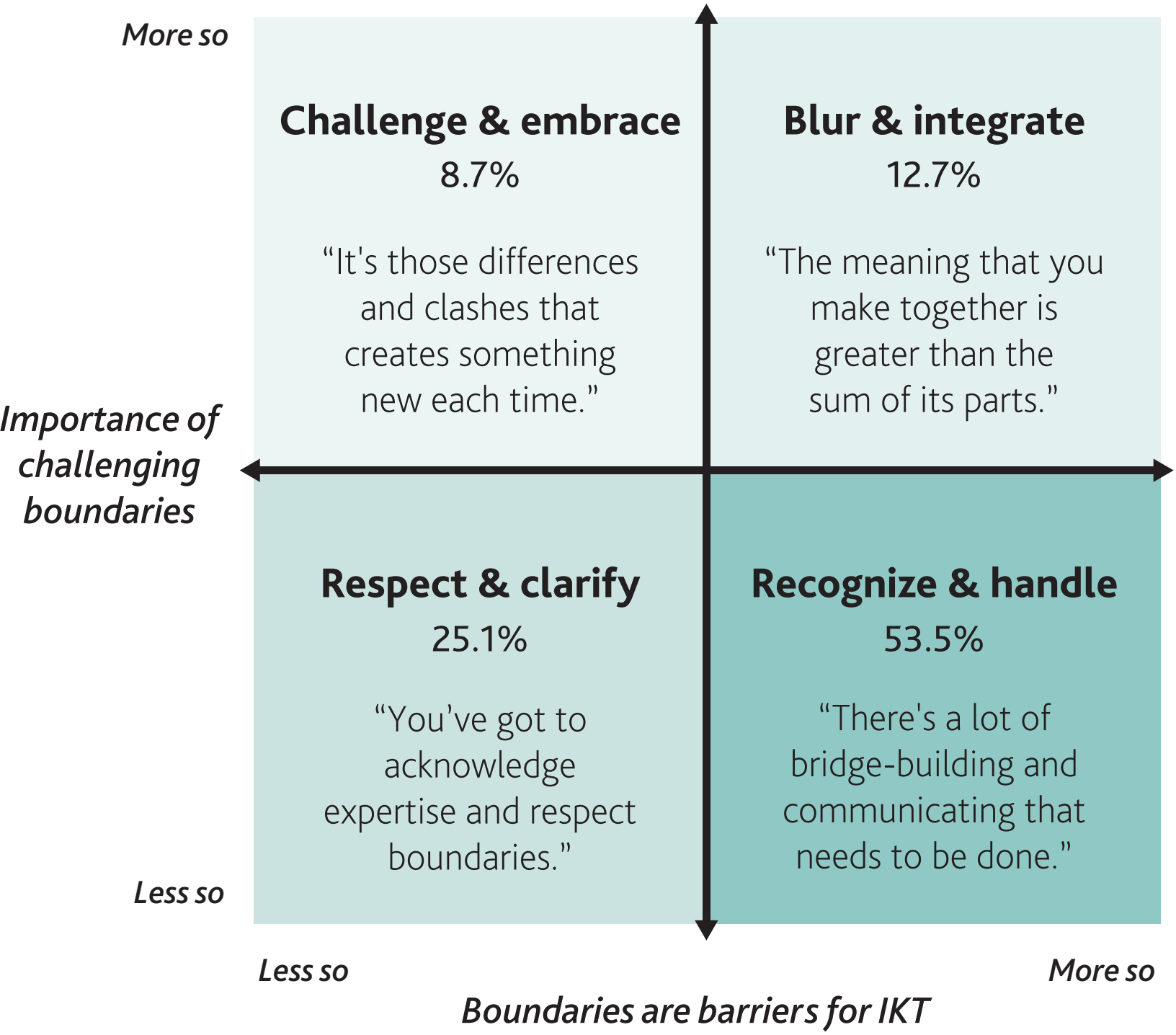
Figure 1. Positional map of discourse on boundaries in IKT



% = Of all discourse pertaining to boundaries across all data sources (interview transcripts, case study fieldnotes and case study documents)

Table 2. Interview participant gender and funding program affiliations

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Gender	Grant	ID	Primary role in project
M	PHSI	IV10	PI
M	eHIPP	IV17	PI
F	eHIPP (& K2A)	IV12	PI
M	K2A	IV07	PI
F	PHSI	IV08	Postdoctoral fellow (project lead)
F	PHSI	IV19	Postdoctoral fellow (project lead)
M	PHSI	IV13	PI
M	K2A	IV16	PI
F	PHSI	IV09	PI
F	K2A	IV05	PI
F	K2A	IV11	PI
F	K2A	IV01	PI
F	PHSI	IV06	PI
F	PHSI	IV02	PI
F	PHSI	IV03	Postdoctoral fellow (project lead)
M	PHSI	IV04	PI
M	PHSI	IV18	PI
F	PHSI	IV15	PI
F	PHSI	IV15	PI
F	PHSI	IV20	Postdoctoral fellow (project lead)

K2A: Knowledge to Action program
eHIPP: eHealth Innovation Partnership Program
PHSI: Partnerships in Health Systems Improvement program
PI: Principal Investigator

Table 1. Interview sampling criteria and number interviewed

Table 1. Interview sampling criteria and number interviewed

	Initial target % for sample based on population of grantees 2011-2013	Number interviewed (% of participants)
Canadian Region		
Alberta	9%	1 (5%)
British Columbia	19%	6 (30%)
Manitoba	3%	1 (5%)
New Brunswick	1%	0
Newfoundland and Labrador	1%	0
Nova Scotia	5%	1 (5%)
Ontario	38%	8 (40%)
Quebec	23%	3 (15%)
Saskatchewan	1%	0
Yukon, Nunavut, Northwest Territories	1%	0
Grant type		
Partnerships for Health Systems Innovation (PHSI)	57%	12 (60%)
Knowledge to Action (K2A)	35%	6 (30%)
eHealth Innovation Partnership Program (eHIPP)	9%	2 (10%)
Gender		
Female	55%	13 (65%)
Male	45%	7 (35%)