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Transdisciplinarity: an imperative for information behaviour research

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Abstract

Introduction. Information behaviour research must be methodologically and conceptually sophisticated to generate knowledge reflecting the complexities of information engagement in people's lives. Information behaviour research can be enriched by the concept of transdisciplinarity — a collaborative approach addressing complex societal problems, with actionable research outcomes.

Method. In-depth analysis traces the emergence of transdisciplinary research design. The paper then examines selected information science studies that possess strong transdisciplinary qualities, including those grounded in community-based approaches and centred on people's experiences who have been marginalised by mainstream research. The paper then discusses opportunities for, and challenges to, increased transdisciplinarity in information behaviour.

Results. Information behaviour research is well positioned to embrace transdisciplinarity, although this approach has yet to see widespread uptake. Transdisciplinary approaches present information science, generally, with a timely, multifaceted opportunity to adopt research designs that centre community, government, and/or industry stakeholders, which aligns well with the practice-oriented, interdisciplinary nature of the field.

Conclusion. This paper brings a theoretical conceptualisation of transdisciplinarity in relation to information science, focusing primarily on information behaviour research. It expands on the importance of collaboration, innovation, and cross-disciplinarity, and proposes strategies for bridging information science research into more critical investigations of information activities in contemporary society.

Introduction

In information science there are ongoing efforts to extend research contributions beyond academe. Many sub-fields, including information behaviour research, contribute meaningfully to complex, pressing societal issues, addressing widespread inequality, misinformation impacts, and the climate emergency. Yet, the field's research approaches, and some of its most widespread assumptions, are critiqued for limitations that may prevent information science research outcomes from having broader reach. For example, this research has been characterised as reductionist in much of its handling of human experience and larger social structures (Polkinghorne and Given, 2021). Mainstream assumptions about people's information interactions are criticised as insufficient for addressing systemic dynamics and power relations shaping how we understand and reform information environments (Costello and Floegel, 2021). There is also growing acknowledgement that information science research must be more methodologically and conceptually sophisticated as the field strives to generate knowledge reflecting the complexities of contemporary information engagement.

Simultaneously, across the broader research landscape, transdisciplinary research is ascendant, both as a research approach and as a buzzword. Transdisciplinary research enables the study of complex problems that cannot be fully understood by researchers alone, even in collaborative teams working across disciplines and paradigms. The key distinguishing qualities of transdisciplinary research are sustained, meaningful integration of community, industry, and/or government stakeholders from the outset; emphasis on complex issues; and a focus on applied outcomes. This paper explores each of these qualities alongside current information behaviour research, illuminating possibilities to enhance future work.

Information behaviour research often embodies transdisciplinary qualities, but rarely uses the *transdisciplinary* label, or cites literature outlining this approach. Here, we use the term *information behaviour* to refer to research across the spectrum of people's practices, experiences, and engagement, including the multiple paradigms contributing to this research. The emergence of transdisciplinary research approaches presents information science with an important, timely, and multifaceted opportunity — and one that is a comfortable fit, given the practice-oriented, interdisciplinary nature of the field. Just as information science research strives to address contemporary challenges, the emergence of transdisciplinarity presents information behaviour scholars with avenues to raise greater awareness of our research and its widespread relevance for social change. Many information behaviour researchers are adept at partnering with community groups to co-produce understandings and to apply solutions to practice contexts, using approaches that embody principles now identified as transdisciplinary. However, the connections between our approaches and the concept of *transdisciplinarity* are currently invisible. By widely and consistently designing, implementing, and framing our research as transdisciplinary, information behaviour scholars can find broader audiences, thereby pursuing new collaborations to address social challenges. Embracing both the terminology and practices of trandisciplinarity is timely to position ourselves as leaders in these approaches, to other disciplines and beyond academe.

Here, we first trace the emergence of transdisciplinary research and related terminology. Next, we discuss selected information behaviour research possessing strong transdisciplinary qualities, such as studies grounded in community-based participatory approaches and those that centre people who are often marginalised in research. We explore these studies' transdisciplinary characteristics to ground our discussion of information behaviour research design and implementation. This paper brings a theoretical conceptualisation of transdisciplinarity to our understanding of information behaviour research. It expands on the importance of collaboration, innovation, and cross-disciplinarity in our field, and it proposes strategies for aligning information behaviour

research with critical investigations of information activities in contemporary society.

Background

Transdisciplinary research: qualities and complexities

Transdisciplinarity represents an evolution of both multidisciplinarity — i.e., collaborating disciplines working within their defined paradigmatic traditions (Keith et al., 2022; Lawrence et al., 2022; Rosenfield, 1992; Stokols et al., 2008), and interdisciplinarity — i.e., collaborating disciplines working together to create new paradigmatic ways of knowing and doing (Bracken et al., 2015; Lawrence et al., 2022; Padmanabhan, 2018). However, a transdisciplinary approach does not supplant multidisciplinary or interdisciplinary research; instead, it applies to projects that fit its idiosyncratic design principles (Lawrence et al., 2022). Despite widespread references to transdisciplinary practice in research, the process is contested and does not yet have a singular definition (Grigorovich et al., 2019). Thus, we focus on the qualities that define transdisciplinary research, to guide information behaviour scholars in adopting this approach.

There is consensus in the literature on three key qualities of transdisciplinary research. Firstly, transdisciplinary research generally addresses complex, *wicked* societal problems that are difficult to tackle in unitary or multi-discipline approaches (Bracken et al., 2015; Grigorovich et al., 2019; Padmanabhan, 2018), such as ecological and sustainability studies examining the Anthropocene (Lawrence et al., 2022). Secondly, transdisciplinary research features interdisciplinary collaborations where academics engage genuinely and meaningfully with external stakeholders (i.e., experts from community, industry, and/or government) (Brandt et al., 2013; Grigorovich et al., 2019; Klein, 2008; Padmanabhan, 2018). Finally, transdisciplinary research involves the application, and adoption of research outcomes beyond academe (Bracken et al., 2015; Grigorovich et al., 2019; Lawrence et al., 2022). The presence of these three features, illustrated in Figure 1, sets transdisciplinary research apart from unitary, multidisciplinary, and interdisciplinary approaches.

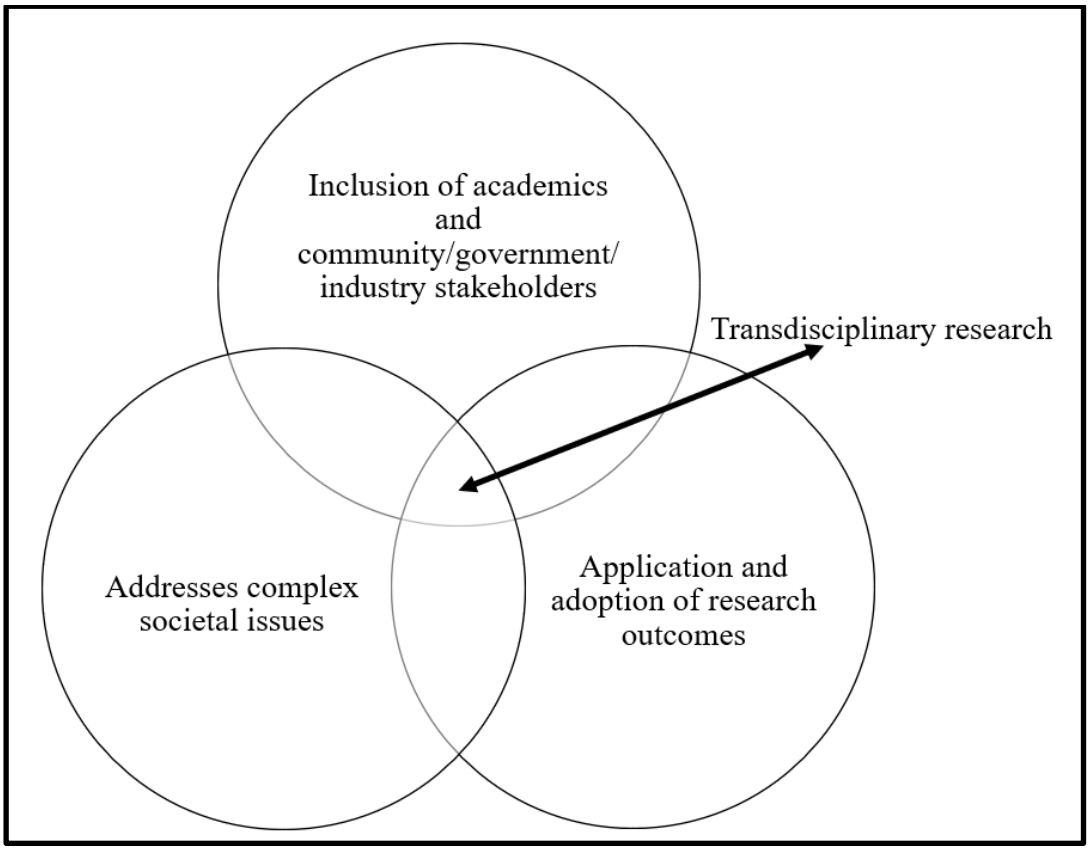

Figure 1. The requisite qualities of transdisciplinary research

The term *transdisciplinary* emerged in the 1970s, from the *Interdisciplinarity in Universities* conference (University of Nice) and subsequent publications from Piaget (1972) and Jantsch (1970, 1972) (Burgin and Hofkirchner, 2017; Lawrence et al., 2022). However, in the 1990s transdisciplinarity's popularity soared, first through the 1992 United Nations Earth Summit (Lawrence et al., 2022) and then through a *Social Science & Medicine* paper by Rosenfield (1992). Transdisciplinarity's appeal rested in its potential to address complex issues, produce actionable outcomes, and construct knowledge that transcends disciplinary boundaries (Bracken et al., 2015; Grigorovich et al., 2019; Padmanabhan, 2018). Through these strategies, transdisciplinary research stretches beyond individual disciplinary boundaries, bringing '*the silos of disciplinary work toward more unified knowledge perspectives*' (Lawrence et al., 2022, p. 46).

However, transdisciplinary research is not without its challenges, including the absence of consensus language or definitions. As a result, the term *transdisciplinary* is often used interchangeably with multidisciplinary and interdisciplinary approaches (Grigorovich et al., 2019). Similarly, transdisciplinary research has no one codified set of processes or practices (Bracken et al., 2015; Brandt et al., 2013; Padmanabhan, 2018). Further, despite claims that transdisciplinary research leads to societal impacts, evaluation of impact outcomes is extremely difficult (Grigorovich et al., 2019) given this research's tendency to address complex issues with many stakeholders. These challenges highlight tensions between the theory of transdisciplinary and the practice of enacting the approach (Padmanabhan, 2018).

Disciplinary silos further perpetuate tensions between transdisciplinary theory and practice. There are entrenched ways of knowing and doing within all (unitary) disciplines, which

make using transdisciplinary approaches challenging for many scholars (Verwoerd et al., 2023). For example, Haeffner and colleagues (2022) documented the challenges quantitative, positivist-oriented scientists faced when asked to engage with qualitative autoethnography. The scientists questioned '*... is this data? ... can this be replicated? ... The implication was that small-n, qualitative studies that did not follow the hypothesis-testing model through experimentation could not be considered valid or reliable*' (Haeffner et al. 2022, p. 159). Similarly, Keith et al. (2022) address limitations in ecology, where researchers are keen to study human behaviour, but lack the qualitative orientation needed to do so; they present a model for co-designing research that can be applied to transdisciplinary research. Further exacerbating disciplinary tensions are the structures of universities and funding bodies that tend to review, promote, and reward academics and their projects based on siloed, unitary disciplinary structures (Brandt et al., 2013; Keith et al., 2022). The peer review publication process is also bounded by traditional disciplinary expectations (Klein, 2008).

Integrating industry, community, and/or government stakeholders into research processes also brings distinctive challenges. The *meaningful* integration of people and organisations outside of academe within a research project is not the norm in all disciplines, making this one of the most complex aspects of transdisciplinary research practice. An example of *meaningful* integration is that within transdisciplinary research, all stakeholders, including people and organisations outside academe, collaboratively identify the research problem and develop ways forward to address it; this is a departure from many types of traditional academic research designs. Complications can arise through oversimplification of the concept of stakeholder engagement, leading to limited or purely consultative involvement, thereby diminishing potential impact. As Lawrence and colleagues explain, '*As the notion of transdisciplinarity becomes more popular, the risk emerges that it will be frequently misunderstood ... and that this may lead to unrealistic hopes for what can be accomplished ... [regarding] the involvement of non-academic actors*' (2022, p. 50). Additionally, it is possible to misuse, misunderstand, or misrepresent knowledge, since findings may be selectively applied depending on stakeholders' wishes (Lawrence et al., 2022). These collaborations may then be perceived as less rigorous than traditional, unitary research. However, if these challenges are acknowledged, and consistently and thoughtfully addressed, transdisciplinary research can produce knowledge leading to impact and addressing complex issues.

To overcome such challenges, a shared understanding of research goals is required, which is consistently communicated and applied (Bracken et al., 2015). Moreover, flexibility is needed for defining project success, on the part of both academics and external stakeholders. For example, industry, community, and/or government stakeholders may prioritise application of practical benefits in their contexts, while de-emphasising the value of academic publications (Bracken et al., 2015). This can create tensions for researchers, who must balance disciplinary and institutional expectations for career development, with external stakeholders' priorities for practice or policy change. These potentially divergent priorities highlight the importance of reciprocity within transdisciplinary collaborations. Researchers and stakeholders must be aware of, and mutually respect, one another's distinctive forms of expertise and the contextual factors (e.g., institutional key performance indicators) that influence priorities and practices.

Leadership is also critical within transdisciplinary projects; lead researcher(s) and lead contact(s) within the external partner organisation(s) must believe in the project and maintain its direction for success. This is critical because, invariably, within a transdisciplinary project, academics and external stakeholders alike are taken out of their comfort zones and may revert to traditional ways of thinking and operating, which undermines transdisciplinarity. Consistent and communicative leadership can

address these issues (den Boer et al., 2023; Klein, 2008; Polk, 2015).

Despite the challenges, innovative researchers have successfully implemented transdisciplinary approaches. A study from Garutsa and Mahlangu (2014), in education, highlights success of a transdisciplinary undergraduate subject administered in South Africa, where students from various disciplines became active participants in the project's journey by embracing Indigenous ways of knowing and doing. Transdisciplinary approaches are particularly valuable for Indigenous collaborations, as Koskey (2020) demonstrated with their research with Gwich'in Alaska Natives. Together they developed a community-based research program to preserve and archive Gwich'in knowledge systems. Transdisciplinary research has also been successful within policy settings, as demonstrated by Verwoerd and colleagues' study with a Dutch environment agency (2023). They demonstrated how scientists and policy administrators could collaborate to create effective policies supporting scientific rigour through planning, acting, observing, and reflecting (Verwoerd et al., 2023).

Tracing transdisciplinarity in information behaviour research

Despite the lack of terminology use around *transdisciplinarity*, information behaviour research often embodies one or more core qualities of this approach: sustained, meaningful integration of community, industry, and/or government stakeholders from the outset; emphasis on complex issues; and focus on applied outcomes. As with all fields, it remains rare for all three qualities to be enacted in one study, and transdisciplinary approaches are not always suitable for a research problem. While not all information behaviour research requires transdisciplinarity, much information behaviour research leans in this direction. This provides opportunities to learn from this research and generate a portrait of research practices that reflect transdisciplinary principles. Here, we discuss select studies that exemplify transdisciplinarity's three core qualities to highlight examples that demonstrate the presence and benefits of this approach in compelling ways.

Sustained, meaningful collaboration between researchers and stakeholders

Engaging communities in research

There is growing engagement with community-based methodologies in information behaviour research, such as community-based participatory research (commonly called CBPR). Studies adopting these approaches involve sustained, meaningful collaborations with people and organisations outside academe. Collaborative teams work together in iterative, empowering processes that lead to understanding, knowledge-sharing, and action (Israel et al., 1998). These collaborations generate the distinctive outcomes and benefits that flow from external stakeholders being involved in research from the outset (Haines, 2022; Haines et al., 2017; Senteio et al., 2023; Senteio et al., 2021).

Community-based participatory research traces its origins to the mid-20th century in sociology, education, and psychology, particularly through Kurt Lewin, Paulo Freire, and their contemporaries (Collins et al., 2018). Its influence in information science is mainly via health research, including health informatics (Unertl et al., 2016). This approach emerged to address '*social, structural, and physical environment inequities through active involvement of community members, organizational representatives, and researchers in all aspects of the research process*' (Israel et al., 1998, p. 173). Senteio et al. highlight this methodology as one that generates understandings of systemic inequities in information access, and can increase representation of Black, Indigenous, and People of Colour communities in information science (2021, 2023).

Haines and Du used community-based participatory research to collaborate with Indigenous Elders in South Australia, documenting their knowledge-sharing and storytelling practices (Du et al., 2022; Du and Haines, 2017; Haines, 2022; Haines et al., 2017). These information behaviour researchers describe the process of establishing

relationships grounded in '*trust, respect, reciprocity, time spent with the community, as well as patience and responsibility [through] conversations before the research begins*' (2017, para. 29). Responsibility requires that knowledge is shared in ways that account for community expectations, while reciprocity ensures researchers give back to the community appropriately and acknowledge community members' contributions.

Community-based participatory research is enacted through various methods. Haines used visual ethnography in working with Indigenous Elders '*capture unobserved information that is problematic to contextualize in written text alone*' (2022, p. 427). Haines and the community also co-created a new method, Weave and Talk (*Lakun Wanyali Thungari* in Ngarrindjeri). This is a video technique developed to preserve and better understand '*the complexity of Storytellers' knowledge in both cultural stories and communal activities*' (2022, p. 428), thereby contributing to Indigenous knowledge preservation efforts. Community-based participatory research provides a principled, responsive approach to grounding research in equitable collaborations with stakeholders.

Mixing bodies of information science expertise

Researchers come to information science with diverse paradigmatic backgrounds, with qualifications in the sciences, social sciences, humanities, and arts. Thus, different intellectual and methodological traditions are represented in our field (Madsen, 2016). Across information science, we therefore use multi-paradigmatic approaches to investigate research problems, bringing ideas from different subfields into conversation. Here, we discuss an example that incorporates information behaviour research into a critical, empirical cataloguing study on the '*extent to which current subject cataloguing of items on marginalized topics differ from the expectations of the items' creators, specifically works on Indigenous Peoples of North America*' (Watson and Bullard, 2022, p. 335). This study exemplifies transdisciplinarity by combining different expertise to illuminate complex issues.

Bullard and colleagues (Bullard, 2022; Bullard et al., 2022; Watson and Bullard, 2022) document 38 authors' perceptions of how their work was catalogued in libraries. All participating authors' books relate to Indigenous peoples of North America, which are commonly assigned the Library of Congress Subject Heading *Indians of North America*. '*This research contributes to "analyzing systems by starting from the margins—those pieces that are not meant to fit, those for whom the system is always in breakdown, and those whose principles, values, and needs are most relevant to the reparative work attempted by reformers*' (Bullard et al., 2022, p. 61). By giving voice to authors, something rarely done in cataloguing research, this study confirms problems with dated terminology and articulates the implications of inadequate classification, including mischaracterisation and suppressed discoverability.

The 38 authors interviewed were scholars, themselves, which enabled Bullard et al. to draw on information behaviour research insights to understand information seeking. This included, for example, incorporating previous findings on historians' information practices and needs involving serendipity and browsing (Watson and Bullard, 2022). This study makes an important applied contribution to longstanding cataloguing issues, foremost the problematic subject heading *Indians of North America*. However, the researchers' transdisciplinary strategy of combining cataloguing and classification with information behaviour research also enables identification of new findings within their data. They rightly observe that historians and other scholars have mostly been studied as *users* of libraries, with little attention paid to them as experts on their own work, able to assess its representations within information systems. This study stands as an example of the rich insights that can result from bringing information behaviour research into conversation with other information science subfields.

Addressing complex issues

Information behaviour researchers often centre people's own accounts of their experiences to understand complexity, even

when the study does not involve co-design. By effectively centring people's narratives, such research sheds light on complex issues, including interactions with systems such as schools, businesses, and hospitals. Here, we highlight studies where complex issues are well-grounded in participants' voices, with personal narratives centred within data analysis and writing.

Wagner and Kitzie (2023) worked with community leaders to identify how queer visibility affects people's health information practices. They highlight the common belief that '*HIV-related health disparities exist among Black, queer communities, and informational and advocacy-based interventions can combat these disparities*', and argue that centring community members' experiences '*reframes these assumptions*' (p. 1045), leading to sophisticated insights. This approach underpins successful transdisciplinary research.

The researchers interviewed 30 queer community leaders in the United States, who were recruited because they '*possess a snapshot of their communities' more significant problems, practices and experiences*' (p. 1048). The authors describe their study design and implementation in detail, including recruitment strategies for participants with intersecting experiences of social difference, and to suit a broad definition of *leader*, '*from those one might traditionally think of, such as the head of a nationally recognised non-profit, to less traditional ones, such as a teen trying to establish the first gay–straight alliance* (GSA) *in his high school*' (p. 1048).

Through a multi-stage analytical process, Wagner and Kitzie identify three constructs of queer visibility (i.e., visibility, invisibility, hypervisibility) and discuss how each shapes community considerations around information access. They richly portray each construct and give space to introducing and quoting participants to depict how queer visibility is negotiated and held alongside other forms of marginality, resource disparities, and broader normative forces. Their findings emphasise that there is no singular queer experience, but that '*each version of one's queerness and its visibility relative to other lived identities produced unique embodied information practices*' (p. 1057). Wagner and Kitzie's work exemplifies the sustained commitment required to centre participants' experiences throughout an information behaviour study, providing a model for examining complexity to productively disrupt conventional assumptions.

There are numerous other recent examples of information behaviour studies that model a commitment to exploring complex issues and to research design that illuminates complexity, in accordance with transdisciplinary goals. For example, there is an emerging body of research addressing transitional life experiences, which benefit from documenting participants' experiences over time. Examples include Willson's work on the experiences of early-career academics transitioning into their first full-time academic positions (Willson, 2019; Willson and Given, 2020), and Huttunen's (2022, 2021, 2020) explorations of the information experiences of transgender people. These authors frame their research, intentionally, as generating understanding of complex experiences that are not only understudied, but also subject to rarely-questioned normalising assumptions within larger systems (i.e., academia, medicine).

Focus on applied outcomes

Information behaviour researchers often consider potential application of research outcomes. In transdisciplinary designs, the application and adoption of outcomes flow from sustained collaboration with community, industry, and/or government stakeholders. A recent example is Paris and Costley White's (2023) study investigating the use of community town halls to allay misinformation around COVID-19. Discussing online health information behaviour, misinformation, and trust, the researchers acknowledge some information science research on '*hyperlocal community information sessions as a site to increase local engagement with public health issues*', but explain such approaches are '*far from normalized within the field*' (p. 316).

The *town hall* information sessions were for community members in the United States but held online due to the pandemic; each featured

an expert panel. These sessions were the first step in the research process and served as an applied outcome that benefited local communities. Paris and Costley White argue that information science researchers can undertake '*community-engaged methods to enact or simulate a public-forum experience to generate dialogue and recommendations [...] as an end in itself*' (p. 316). Town hall attendees were also given a questionnaire, where respondents could then volunteer to be interviewed. Paris and Costley White found these events were

> more unanimously trustworthy than any other sources of information [suggesting that a] town hall event, where residents can interact with local officials and talk about local problems [...] can be very useful for residents, as it connects them with trusted community members and officials, helps them access and address localized problems [...] and honors them as stakeholders in community issues (p. 323).

By hosting town halls and documenting their positive impacts for community members, Paris and Costley White effectively embed two applied outcomes within one project.

Information behaviour research and transdisciplinary opportunities

As these studies demonstrate, many information behaviour studies embody the core qualities of transdisciplinarity (see Figure 1). These studies signal an ongoing shift within information behaviour research (and information science, generally) toward more sophisticated approaches, often grounded in a qualitative paradigm, that prioritise deep integration of the needs and perspectives of the people and communities being studied. It may be that most information behaviour researchers agree with the principles underpinning transdisciplinarity, as evidenced by their engagement with external stakeholders, their focus on application of research outcomes, and their adoption of interdisciplinary approaches. The adoption of theories and methodologies from other disciplines (Fisher et al., 2005; Given et al., 2023; Julien et al., 2011; Willson et al., 2022), for example, is one of the most compelling articulations of information behaviour scholars' openness to interdisciplinary ways of thinking and doing.

Information behaviour research has also coalesced around a *user-centred* paradigm for several decades. Rhetoric about centring *users* in our research is commonplace (Julien et al, 2018). At the same time, published research reflects the challenges some researchers face in working in *user-centred* ways, such as constructing participants as agentic and capable rather than deficient (Julien et al., 2018). Transdisciplinarity can help information behaviour researchers with these challenges, as it offers ways to think about building inclusive and responsive studies that are designed to contribute to social change, while generating rich, authentic insights into pressing issues. Transdisciplinarity helps by presenting considerations for study design and implementation that can align information behaviour research practices with longstanding *user-centred* aspirations. Transdisciplinarity also provides researchers an opportunity to imagine new aspirations where the predominant organising concept of people's *user*-ness (e.g., in relation to information systems) is superseded by a holistic understanding of people and communities as continuously engaging with information (Polkinghorne and Given, 2021). One implication of this shift over time may be a reduction of our reliance on the term *users*, as discussed later in this paper.

The other significant opportunity represented by transdisciplinarity is one of strategic awareness-raising around the relevance of information behaviour research to inform other disciplines' research investigations. The term *transdisciplinary* is beginning to appear in high-level university research strategy documents and be used by government funding agencies; yet, in practice, many disciplines continue to embrace unitary, multi- or interdisciplinary ways of working. Information behaviour researchers are uniquely positioned to lead collaborative, transdisciplinary studies, given our historic focus on practice-based outcomes of research and the interdisciplinary nature of

researchers' profiles and qualifications. As information behaviour researchers already build elements of transdisciplinarity into their studies, highlighting this fact in research publications and other outputs creates a point of potential connection and discovery with researchers beyond information science, who often are unaware of information behaviour's contributions.

Designing transdisciplinary information behaviour research

For information behaviour research to be *fully transdisciplinary*, research programs and projects will: 1) incorporate sustained, power-sharing partnerships with community, government, and/or industry from the point of inception; 2) focus on complex societal issue(s); and 3) emphasise the application and adoption of research outcomes for practice-based change. Such research is certainly possible within all areas of information behaviour research. It requires investments of time and resources not only into creating and maintaining relationships with stakeholders beyond academe, but also into negotiating the precise research problems to be explored, the methodologies and methods to be used, the types of potential applications and adoption practices to be undertaken, and the roles to be played by all team members at all stages of research and societal impact-related work. Researchers' perspectives are not unimportant, but they must be decentred so that stakeholders' perspectives may be voiced and understood, informing co-production of project design and implementation.

Flexibility and humility are required of researchers in this process, as they may carry more structural power with respect to research activities, and as they are asking stakeholders to trust that there will be useful outcomes that can be enacted in practice. Transdisciplinary researchers need to consider stakeholders' contexts holistically if they are going to design and implement research that addresses authentic pressing issues (Polkinghorne and Given, 2021). For example, information behaviour scholars may need to extend their investigations beyond traditional sites of exploration (such as information seeking and use) to ensure that stakeholders' research goals are addressed; information behaviour scholars who already embrace investigations of social contexts, situational needs, and other meta-level concerns to inform studies of people's information practices will be well-placed to adapt to the inclusion of relevant, additional areas of investigation beyond those that are purely *informational*. Similarly, external stakeholders will need to adapt to research requirements that may be new to them (such as ethics approval requirements) and which may require adaptation of timelines, outcomes, and ways of working to meet regulatory guidelines. Universities may also need to adapt their practices and expectations (e.g., for academic promotion and reward structures), to ensure that researchers receive the appropriate time and recognition required for successful transdisciplinary research (Kelly and Given, 2023).

The other shared qualities of transdisciplinary research are a focus on complex societal issues, and an emphasis on application and adoption of research outcomes for social change. For information behaviour researchers, the complexities presented by these elements align with our central concerns with how people engage with *information*, as well as explorations of the information environment, broadly defined. While all complex societal issues contain informational challenges, changes to information environments or to individual people's information practices are unlikely to address these challenges on their own. One characteristic of transdisciplinary information behaviour research, then, must be an active appreciation of the interplay between information-centred experiences, systems, and priorities, and other experiences, systems, and priorities. For example, understanding how people engage with information in healthcare systems should not only focus on patients or healthcare workers' information behaviours. Examining these behaviours alongside explorations of government healthcare policies, hospital systems and spaces, community-based allied health services, or other contextual elements identified by industry, community and/or government stakeholders would be a

key feature of transdisciplinary information behaviour research.

In transdisciplinary research approaches, stakeholders' lived experiences of the sites and phenomena researchers investigate are paramount in shaping the research design and implementation, as well as the identification of potential application and adoption of research outcomes, and impacts on stakeholders over time. Stakeholders must decide (for example) whether an outcome is relevant to their practice, how potential practice changes could be adopted, and whether the timing for adoption of research outcomes is appropriate, among other factors. Transdisciplinary research designs and outcomes may not resemble the typical studies that have shaped information behaviour to date, which often conclude with recommendations for *informational* interventions or services for *users* in information institutions. Rather, applications of transdisciplinary information behaviour research may resemble community organising, awareness-raising with the wider public, advocacy efforts within larger relevant systems, and policy interventions. Such options may emerge from the work or be targeted from the outset, and need to be considered in setting project timelines, budgets, and in co-designing research practices with potential beneficiaries of these activities.

There are also two significant conceptual challenges that all researchers must consider in planning to adopt transdisciplinary research practices. First, researchers are employed by universities — and part of international research disciplines — that require academics to pursue particular outcomes. Typically, researchers are expected to seek funding for their work and to produce publications (e.g., journal articles, books, exhibitions), alongside working with external stakeholders in pursuit of societal impact. Yet, there is often a disconnect between individual, institutional and disciplinary expectations to engage with the community beyond academe and the support and reward structures in place to facilitate this work (Kelly and Given, 2023). For transdisciplinary research practices to thrive, institutions and disciplines will need to adapt expectations and rewards to suit the time and skills required for this type of research. Information behaviour scholars need to be mindful of the disconnect between the rhetoric of community-engaged, impactful scholarship, and the traditional ways that universities are structured (i.e., in disciplinary silos) and what they reward (e.g., publications and grants). Researchers will need to advocate for the work they do, seek the support they need from university administrators and colleagues, and balance career development needs.

The second conceptual challenge for information scientists, in particular, revolves around the concept of *users*, and the positioning of people within information science research. The concept of the *user* has been extensively discussed and critiqued (Bawden, 2006; Booth, 2008; Julien, 1999; Julien, et al. 2018; Miksa, 2009; Olsson, 2009; Wilson, 2008). This literature points to the limitations of the user construct, as it often positions people in isolation from their social contexts, or other aspects that shape their experiences; studies of information *users* thus often end with recommendations as to how best to *fix* these users' interactions with information sources and systems. Transdisciplinary information behaviour researchers must set aside this construct of the atomistic *user* in favour of a more holistic view of people, information, and the institutional, social, and systemic aspects that shape their experiences. Defining people as *users* gives primacy to their relationship to the *thing* they *use*, such as a library, an information system, or a technology tool, and to easily categorisable forms of *use*, such as finding a journal article in a database. The term *user* also implies the existence of *non-users*, such as people who do not use libraries. As a field, our concern with *users*, historically, has far outweighed our interest in studying *non-users*. Further, conceptualising external stakeholders as *users* is also inadvisable for successfully forming and sustaining meaningful and equitable relationships within a transdisciplinary design. Rather, these stakeholders may best be conceptualised as *co-investigators* or *co-researchers*, with members of the broader communities or organisations positioned as *potential beneficiaries* of research

outcomes. Information behaviour scholars should look to participatory co-design practices for inspiration and guidance in this regard.

Writing up transdisciplinary information behaviour research

In writing up transdisciplinary information behaviour research, researchers can set their work apart by speaking directly about elements that are often omitted in conventional academic outputs, particularly in reports of empirical work that focus on findings. First, there is a need to describe procedural and processual matters, such as how engagement with industry, community and/or government stakeholders was initiated and maintained in the research, and how experts from different disciplines integrated paradigmatic approaches. The relational intentionality required in transdisciplinary research is a critical aspect of its effectiveness, making it an indicator of rich rigour, which is communicated through procedural detail (Tracy, 2010). Such transparency is not intended to encourage positivist expectations of *replicability* (as that is neither appropriate nor possible in transdisciplinary designs), but rather to enable ongoing evolution and adoption of transdisciplinary research strategies.

Another necessity in writing up transdisciplinary research is concrete mention of the application and adoption of potential research outcomes and benefits to industry, community, and/or government stakeholders, even if they have not yet fully materialised. When discussion of outcomes is precise, the writing can avoid potential overstatement of planned impact work and contribute to the study's overall integrity to external stakeholders. Transdisciplinary researchers must also remain open to creating non-scholarly outputs, as well as presenting at professional conferences or facilitating outcomes-focused workshops, as appropriate to external stakeholders engaged in the research. As co-investigators, stakeholders can also serve as co-authors on both scholarly and professional outputs. These practices also contribute to the study being enacted in a coherent and fully transdisciplinary fashion, long after the research project tasks have been completed.

Reflexive observations are also important in communicating transdisciplinary research. Reflection in the context of transdisciplinary research involves considering what difference it made that the research was conducted in this way. Having documented procedural details and outcomes, it becomes possible to identify insights that may not have been achieved without a transdisciplinary approach. Differing perspectives among researchers, across disciplines, and with industry, community, and/or government stakeholders are often the source of such insights, as people collaborating in productive ways continually check assumptions and make decisions that weigh differing needs.

Conclusion

As both a concept and an array of research practices, transdisciplinarity continues to emerge and evolve. We have discussed selected compelling examples from the numerous information behaviour studies that possess transdisciplinary qualities. Drawing on these studies as examples, and on the wider literature, we have discussed opportunities, challenges, characteristics, and practices in transdisciplinary information behaviour research. A transdisciplinary approach represents an opportunity for information behaviour (as one subfield of information science) to grow in rich and relevant ways by orienting future research toward explorations of more complex human experiences and broader issues. This, in turn, brings potential for greater integration and development of information behaviour concepts within information science and other disciplines, and for wider applied contributions to society.

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