

## Transdisciplinary research partnerships for complex problem solving – meeting the challenges

Global environment and development challenges are complex and cross-cutting. Finding effective solutions requires a shift from disciplinary approaches to interdisciplinary and transdisciplinary partnerships with user engagement. How can researchers and research teams foster and support these partnerships?

### Introduction

Calls for science and research to address complex ‘societal challenges’ have been increasing,<sup>1,2</sup> together with the argument that understanding and addressing them require transdisciplinary modes of research.<sup>3</sup> More effective, implementable solutions are needed that are timely, salient to stakeholders, foster ownership and grounded in thorough contextual understanding.<sup>4</sup>

This requires a shift from disciplinary approaches and science for society, to interdisciplinary approaches and science with society.<sup>5</sup> Solutions are defined and their uptake promoted through user engagement, involving the interplay of different disciplines and stakeholders, such as policymakers, local government, civil society and private sector actors, often across geographies and sectors.<sup>3,6</sup> A broad array of skills and knowledge is needed for this.<sup>7</sup>

#### Box 1 Background on the Sentinel Project

The Sentinel project (2017–2022), Social and Environmental Trade-Offs in African Agriculture, brought together research partners from universities and research institutes in the UK, Zambia, Ethiopia and Ghana in interdisciplinary collaboration. Working at the nexus of food production, land use and biodiversity, Sentinel carried out interdisciplinary research on the impacts, risks and trade-offs relating to agricultural expansion, including the drivers and livelihood impacts of agricultural expansion,<sup>8</sup> raising awareness amongst policy makers in the focal countries on land-use trade-offs and conflicting policy objectives.<sup>9</sup>

### Summary

This guidance brief draws on the Sentinel project’s collective insights on collaborative working in transdisciplinary partnerships, to support research user engagement and the co-production of knowledge for sustainable development. The experience of the project team was explored and analysed. Challenges and successes were identified to frame guidance for individual researchers and research partnerships on fostering transdisciplinary research, focusing on project design and structure, governance, and monitoring, evaluation and learning.

### Summary

Sentinel brings together academic and development organisations across the UK, Zambia, Ethiopia, Ghana, and Sub-Saharan Africa generally to produce research on impacts, risks and trade-offs relating to agricultural expansion, to inform policy in Ghana, Zambia, and Ethiopia.

Partners:



Funded by:



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Stakeholder engagement is a crucial part of transdisciplinarity,<sup>10,11</sup> as designing research and deriving 'solutions' require bridging different 'ways of knowing', including knowledge held by local communities, practitioners, or policy makers, and because stakeholders are often crucial to enact the change itself.<sup>12,13</sup> To achieve this, researchers, community members and policy makers work together with a shared vision and language that draws together scientific, experiential and contextual knowledge to innovatively address a common complex problem.<sup>14</sup>

Reflexivity in knowledge production is often at the core of transdisciplinary working.<sup>4</sup> It involves individual and group reflection on knowledge, decisions, practices and outcomes in the research process. It has been argued that reflexivity is crucial in fostering transformative change because visions underpinning transformation are deeply normative and political and should therefore be debated.<sup>15</sup>

## Box 2 Definitions of interdisciplinarity and transdisciplinarity

Interdisciplinarity can be defined as 'research involving unrelated academic disciplines in a way that requires them to cross disciplinary boundaries to create new knowledge and theory in pursuit of a common research goal'.<sup>16</sup> The UK's Global Challenges Research Fund (GCRF) situates interdisciplinarity as a process to '...effectively tackle development challenges'.<sup>17</sup>

Transdisciplinarity, in contrast, '...is characterised by interdisciplinary integration and the involvement of non-academic stakeholders in the research process, in part to foster knowledge co-production and address the 'applicability gap...'.<sup>6,18</sup> To achieve this, researchers, community members and policy makers work together with a shared vision and language that draws together scientific, experiential and contextual knowledge to innovatively address a common complex problem.<sup>14</sup>

Universities, research institutes and research funders increasingly value and call for cross-cutting research that addresses complex societal challenges, to deliver impact across policy and practice realms (Box 1). However, in practice, this often does not translate into the desired shift towards inter- and trans-disciplinary working, because research partnerships face various constraints and challenges. Among these are the following:

- **Transdisciplinary modes of research digress from conventional modes of research production.**

Inter- and trans-disciplinary research is complex, challenging, and slow to deliver.<sup>19</sup> It is often characterised by high heterogeneity of data, particularly between the social, and natural sciences,<sup>20</sup> epistemological differences,<sup>21</sup> and significant

time investments.<sup>20,22</sup> Defining research aims around the needs and priorities of research users shifts knowledge production away from researchers alone, towards co-creation of research with research-users.<sup>15</sup> Knowledge brokers, such as communication experts, may be engaged to ensure effective and sustained knowledge-exchange. This makes project conceptualisation, prioritisation and decision-making more complex and slows the pace of research.

- **Academic incentive structures largely remain geared towards rewarding individual disciplinary research.**

Researchers face competitive, demanding research environments, which incentivise peer-reviewed outputs in established, high-impact journals.<sup>23</sup> The prioritisation of such journals, with an emphasis on generalisable quantitative analyses, can sometimes clash with the need to produce research which is practical, situated, and place-based.<sup>4,24</sup> Stakeholder engagement and research outputs which do not easily translate into journal publications are often seen as lower priority by researchers, even though these are crucial to deliver impact.

Further, individual researchers may be incentivised to create their own individual identity, leading to multiple competing units rather than collaboration. Differences in incentive structures between disciplines can also make collaboration challenging.<sup>25</sup>

Many universities lack mechanisms and support, not only for facilitating interdisciplinarity, but for dynamic stakeholder engagement and knowledge-brokering, and effective monitoring, evaluation and learning systems.<sup>26</sup> In this environment, transdisciplinary research can impose significant transaction costs on researchers, particularly on early career researchers.<sup>27</sup> There remains a lack of reward and incentives to overcome these transaction costs and establish such collaborations.<sup>27,28</sup>

Policy makers, private sector and civil society stakeholders also have incentives and constraints, notably time and divergent priorities, which can challenge engagement with researchers.

- **Unequal power dynamics can challenge transdisciplinary working.**

These can emerge in relation to power differentials between disciplines,<sup>4,29</sup> or in the context of north-south partnerships, where research is funded and led or designed by northern partners.<sup>30</sup> Power asymmetries in turn challenge collaboration, knowledge integration, and equitable partnerships,<sup>31</sup> requiring attention to the politics of knowledge production and utilisation in such partnerships.<sup>4</sup> Despite these known challenges, there is a lack of reporting on how to overcome them, and in-turn a lack of institutional memory building on delivering effective transdisciplinary research partnerships.

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## Scope

In this guidance note, we bring together collective learning from the Sentinel partnership to frame guidance for research partnerships on how to support transdisciplinary research.

We explore the challenges and enabling factors which emerged over the course of the project, relating to 1) research collaboration across disciplines to support co-production of interdisciplinary knowledge addressing sustainable development challenges 2) collaboration between researchers and communication (Comms), monitoring, evaluation and learning (MEL) partners in delivering demand based research and tracking impact 3) collaboration between partners situated in the north and the south (Zambia, Ghana and Ethiopia, Sub-Saharan Africa overall, and UK). We also share experiences on harnessing MEL processes to support collaboration, capacity strengthening, and capture lesson learning.

While Sentinel incorporated communication partners engaged with research users, the research user engagement process is beyond the scope of this brief.

Given the history of power imbalances in North-South research partnerships, and a desire to foster more equitable knowledge co-production,<sup>30</sup> we focus on 'North-South' relations to offer guidance on how to promote equitable partnerships across these geographies.

Fostering these three dimensions of collaboration is vital to build and strengthen relationships, and sustained capacity strengthening at the individual, organisational, and institutional levels. Our guidance aligns with the priorities of the funder (UKRI) of fostering interdisciplinarity, partnership building, capacity strengthening, and delivering policy impact.

## Methodology

To explore experience of interdisciplinary working and partnership in the Sentinel project, we used a mixed-methods approach involving informal discussions, annual semi-structured interviews, participatory workshops, and structured questionnaires. We conducted four rounds of in-depth semi-structured interviews<sup>i</sup> with Sentinel team members, over the duration of the project. Interviews focused on interdisciplinary working, equitable partnerships and collaborative working. Interview results, focusing on constraints and enablers were presented in a workshop with 25 attendees from the project team. Group discussions and reflection allowed the partners to 'co-create' lessons learned. The guidance presented here **draws from these lessons, as well as interview findings**. We first explore the challenges encountered and the lessons learned, and then present enabling factors for strengthening capacity at the individual researcher and research

team levels.

## Challenges and barriers to transdisciplinarity in Sentinel

Interdisciplinary working, partnership building, capacity-strengthening and engaging with research users posed challenges for researchers, conflicting with traditional academic ways of working. Initially Sentinel faced slow progress in refining research scope and formulating research questions due to difficulties in operationalising interdisciplinarity within a wide thematic, geographical and scalar scope, and involving partners with diverse perspectives, disciplines and research priorities. COVID-19 limited in-person interaction, affecting field work planning and research-user engagement. Uncertainty over funding for a project extension further challenged planning and resource allocation.

The misalignment of incentive structures, along with these challenges, raised the costs of inter- and trans-disciplinary work. This decreased appetite and ability to promote research integration and collaborate with communication partners to align research activities and outputs with research user needs.

## Achieving interdisciplinarity

There were challenges of project governance which affected interdisciplinary working. These were related to different ways of working and different priorities among partner organisations, leading to differences in allocating time to planning and process, or to research activities. For example, the lead organisation (IIED, an environment and development thinktank) prioritised research user engagement processes, requiring additional elements of planning, whereas some academic partners focused primarily on the production of peer-reviewed journal publications.

We also found that decision-making was often challenged by 'participatory paralysis' (i.e. where consultation becomes demanding and time consuming), exacerbated by a lack of clarity around decision-making structures and roles. Although attempts were made to specify roles in writing,<sup>ii</sup> there were different interpretations of roles, such as what it means to lead a research question, or how co-leadership is operationalised. These challenges slowed co-design and delineation of research questions.

Research integration was hampered by disciplinary silos, difficulties in visualising linkages between research topics, and mismatches in data collected at different spatial and temporal scales. There was some lack of understanding of others' research objectives, competencies, ways of working and interests, and limited proactivity in reaching out to others,

<sup>i</sup> AC completed a total of 90 interviews, involving 35 people from 6 organisations, in research, management and coordination, communication, and monitoring, evaluation and learning (MEL) roles.

<sup>ii</sup> For example, Sentinel created a 'who's who' document outlining roles and responsibilities across the project.

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all key for collaboration and communication processes crucial to interdisciplinary working (e.g. communicating emerging opportunities for research integration or communicating one's expertise or exploring that of others). For example, the necessary bridging between the qualitative and quantitative components of scenario building was challenged by lack of understanding of how these methods and their outputs would complement each other. Internal communication (South-South, and North-South) was further constrained by poor internet connectivity across partners in Africa, as well as lack of adoption of the internal file and information sharing platform (Sharepoint), which partners found to be insufficiently user friendly.

In terms of project design and structure, interdisciplinary collaboration was limited by partners' time constraints, divergent research interests and priorities, and departmental silos. Most researchers, notably senior leads, had limited time<sup>iii</sup> on the project, limiting South-South and North-South cross-disciplinary exchanges. Some partners pursued research priorities moulded around personal interests and ambition, or organisational incentive structures (such as the need to publish in disciplinary journals for career progression).

Departmental isolation in some partner organisations in Africa was a challenge to recruiting researchers across departments to bring in varied expertise. Ultimately, interdisciplinary working requires compromise to progress towards common objectives, which may misalign with individual researcher ambitions or organisational structures.

## Challenges in delivering demand-driven research and tracking the impact of research partnerships

We found there was weak interaction between researchers and the MEL and Comms partners throughout the project, particularly in the early stages. This challenged the communication of research progress and findings to practitioners and policy makers, research user engagement and MEL, on top of the compounding effect of COVID travel restrictions. Internal communications were not sufficiently focused on creating an early awareness of team composition, roles, and expectations around interaction and linkages among research, Comms, and MEL processes.

The lack of a recognised and endorsed mandate for Comms and MEL partners challenged their work in focal research countries. They were largely perceived as secondary and subordinate to research, which limited the leadership and influence of their roles. The perception of Comms as an end-process limited knowledge-

brokering and dynamic connection between the core research and research users. Partners overseeing Comms and MEL in the focal research countries were also in charge of administrative tasks, limiting their capacity to pursue their mandate.

Research outputs were slow to materialise due to the extended process of refining research objectives and delineating research questions in an interdisciplinary manner. This significantly delayed research user engagement processes and policy brief production. This was compounded by a lack of reward and incentive for academic partners to engage research users, particularly to identify research-user needs at the start. Sharing of results in workshops and publication of policy briefs happened at the end of the project. These constraints reinforced each other, limiting transdisciplinary engagement.

## Challenges to equitable, North-South research partnerships

Challenges to establishing equitable partnerships<sup>iv</sup> between partner institutions in the UK and Africa were rooted for the most part in project governance, structure and design, and internal communication.

In addition to challenges of internal communication, the COVID-19 pandemic prevented international travel and planned partner exchanges intended to encourage North-South interaction. Second, despite significant efforts to foster co-leadership and co-creation, overall, partners perceived the project as UK-led, although the extent of co-leadership varied between research processes, with some activities reported as being highly collaborative and equitable.<sup>v</sup> Most partners in Africa saw their role primarily as supporting the work of UK researchers. In turn, several UK researchers reported a lack of input and participation in discussions, decision-making, research processes and overall ownership by partners in SSA.

In terms of project structure and design, the short proposal turnaround time (from call announcement to submission deadline), challenged development of shared understanding and buy-in across partners, and made it difficult to structure the team to ensure compatibility in expertise and research interests. At the start of the project, there were delays in hiring researchers in focal research countries, leading to disparities in the pace of team build-up between UK and Africa, in part due to uncertainties around which expertise to incorporate as research was still being conceptualised.

There was an imbalance in engagement between partners in UK and Africa. Across the three focal countries in Africa,

<sup>iii</sup> Most partners in SSA had limited time on the project (also see section on equitable partnerships). Although many researchers, particularly senior researchers, across UK partners also had limited time, the effect was mitigated by the presence of several full-time PDRAs in the UK.

<sup>iv</sup> The definition of equitable partnership given in annual reporting guidance for the GCRF Growing Research Capability programme, March 2018, says it is characterised by transparency, joint ownership, mutual responsibility and benefits for all partners, and co-design and joint decision making at project management level.

<sup>v</sup> An example was the MEL/Comms workshop March 2018 in Ethiopia, and creation of the project theory of change.

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organisational constraints made it difficult to hire fixed-term, full-time staff (e.g. post-doctoral researchers).<sup>vi</sup> The predominance of researchers with limited time budgeted on the project, often recruited for specific research needs, not only challenged research co-design, but also the development of ownership, team building and capacity strengthening. The project was UK-heavy in structure and composition: it was overseen by a UK organisation with sole accountability to the funder and there were more partner organisations in the UK than across the three focal countries in Africa. Together, these issues compounded each other, challenging equitable participation and ownership in the project.

Issues of trust also emerged, challenging equitable relations; for example, some partners in SSA perceived a lack of trust in their research capacity by some UK partners. In turn, some UK partners lacked confidence in certain data collection activities led by SSA partners, in part due to different perspectives on how data should be collected, or because work was outsourced to third parties which they felt challenged ownership. Processes to foster co-creation and collaboration promoted by the UK lead organisation (e.g. internal peer-review), may have been perceived by some partners as demonstrating lack of trust. Differentials in research capacity, real or perceived, may challenge the emergence of trust, and collaboration.

## Enablers

Many of the enablers are cross-cutting, responding to the need to deliver equitable collaborative partnerships supporting interdisciplinarity, partnership building, impact, and monitoring, learning, and evaluation. When managed carefully, synergies occur between these aims. Interdisciplinary working contributes to capacity strengthening, as researchers learn concepts or methods from each other. Equity in the partnership fosters the collaboration which underpins interdisciplinarity and research user engagement processes. Additionally, the expectations of certain research users can provide impetus to generate research perceived as robust and more likely to be taken-up. Below we present guidance for individual and research team capacity strengthening<sup>vii</sup> separately.

## Guidance for individuals

Effective interdisciplinary working requires establishing productive collaborative working relationships.

- We recommend that researchers **take time to explore and appreciate diversity** in norms, values, epistemologies, interests, ‘languages’, competencies, ways of working, and incentive structures of partners, and how these may affect collaboration.
- **Understanding partner perspectives around research aims and the research process** to deliver these is crucial to foster buy-in. The more diverse the team, the longer it takes to promote shared understanding and trust, equity, and long-term project sustainability. It is important for partners to develop an understanding and appreciation of the demands and opportunities transdisciplinarity presents. A balance is needed i) between the production of disciplinary and interdisciplinary research outputs, and ii) between processes and outputs for research user engagement, and the production of academic publications.
- Adequately planning for research and research user engagement processes requires **appreciating how partners may operate at different paces**, due to differing responsibilities, capacities, or organisational constraints. Interaction among partners in Sentinel planning workshops was important for exploring this.
- It is crucial to **understand the various roles in the research-team, beyond research**, including communications, MEL, and coordination and management roles, and how these collectively sustain the research process and deliver and track impact. Clear leadership is needed from designated leads, but individual partners may be required to step up and show leadership at times depending on evolving needs.
- **Developing strong working relationships over time and proactive engagement** enables researchers to explore opportunities for cross-disciplinary linkages, as does harnessing systems thinking to explore how the various disciplinary methods, outputs or work may link-up, or visualising how research objectives address stakeholder needs.

<sup>vi</sup> The hiring of post-docs can be challenging, as individuals with PhDs have permanent professional opportunities in African Universities. Additionally bringing on university researchers/staff for fixed term, full time appointments on a project isn't possible, as their prime responsibility revolves around other departmental or university duties, such as teaching.

<sup>vii</sup> Three levels of capacity strengthening were identified by the GCRF Growing Research Capability programme – individual, organisational and institutional, in DAC list countries and the UK. The individual level concerns the capacity of researchers and teams to design, implement, analyse, write up and publish research findings and influence policy makers and UK researchers' involvement in international development research, partnerships and collaborations. Organisational level concerns the capacity of university research departments and think tanks to fund, manage and sustain themselves and for UK partners to manage and support international development research projects. The Institutional level refers to changes in the 'rules of the game' and incentive structures, the political and regulatory context and the resource base in which research is undertaken and used by policy makers.

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- We found that **fostering and practising reflexivity** is crucial to strengthen capacities and promote adaptive management. Interviewees emphasised how group workshops and annual interviews created insights and reflection on challenges, opportunities and lessons learned, such as how diverse ways of working can challenge collaboration.

## Guidance for research teams

Lessons from Sentinel point to the need to build strong, effective collaborations to help overcome challenges to projects imposed by their complex thematic, geographical, and multi-scale scope.

### Supportive project design and structure

- We recommend **incorporating ample time and mechanisms in project design to foster co-creation** and engage all partners from the start. This helps ensure that research aims reflect needs and priorities of stakeholders, rather than those defined and set by actors elsewhere, which can jeopardise equity and ownership.<sup>30</sup> Sentinel tackled this challenge through co-development of an interdisciplinary conceptual framework, serving as a basis for contextual studies, which in turn framed participatory scenario workshops with stakeholders, and subsequently research objectives.
- **Research team participation in the development of a theory of change** was a further step to create a common understanding of the project vision and how to deliver it. It encouraged thinking how research outputs would lead to higher-level outcomes through research user engagement processes. The co-development of the theory of change in a workshop also promoted shared understanding of different partners' contributions.
- **It is important to match partner competencies, knowledge, and interests, with project needs**, to develop strong buy-in and collaboration. We found that fostering research integration requires partners who not only buy into interdisciplinary working, but also individuals with breadth of understanding who can bridge and ensure linkages between research processes.
- **Fostering equity between partners requires balancing the number of researchers and their time and expertise.** Promoting balance is crucial, particularly when the research partnership-funder relationship is mediated by a northern partner as this may impede co-ownership and balanced leadership.<sup>30</sup> It is also crucial to minimise turn-over in team composition to the extent possible, as this challenges project ownership, relationship building and capacity strengthening.
- We found that it is **crucial to clearly delineate roles and responsibilities and decision-making structures**, to promote an effective participatory environment. Potentially overlapping role structures require careful attention, as this may lead to ambiguity around who decides.

- Our experience shows the importance of **ensuring key roles are adequately resourced in funding and time.** In Sentinel, inadequate resources hindered the capacity of Comms partners. Experienced Comms and MEL partners are integral to project success and to sustaining transdisciplinarity, including stakeholder engagement and tracking outcomes and impact. These roles require a strong mandate to ensure they have the time, space, and capacity to pursue their crucial functions, as equal partners.
- We also emphasise the **need to structure contingency in workplans as part of adaptive management** processes, responding to emerging challenges or tensions, and harnessing opportunities. In Sentinel, slower than expected progress towards research outputs, compounded by COVID-19, significantly reduced opportunities for stakeholder engagement. However, with careful planning, final workshops in hybrid format were held in all three countries for presentation and discussion of research findings and policy implications. These were well-attended by a range of stakeholders.

### Governance and internal communication

We found that effective governance relied on leadership, a shared partnership framework, and interaction and dialogue. Other supporting factors were expert facilitation, clear timetabling of deliverables and workplans, and negotiating the extent of cross-disciplinary interaction and the balance between planning and research.

- **Effective leadership** drives efficient decision-making, energises project partners, and consolidates work around overarching aims. This requires visible leadership in decision-making and research processes (such as supervising field work), as well as accommodating different areas of expertise or leadership styles at different stages of the transdisciplinary research process.<sup>14</sup> For example, ensuring strong bridges between researchers and research users is crucial at the beginning of the project (as research is conceptualised), and in the latter phases (in formulating and sharing messages). Project coordinators and managers also play key roles in tackling the increased transaction costs in managing research partnerships, planning and internal knowledge-exchange.
- Our experience indicates the value of a **framework to set partners' expectations and formulate a shared agreement** around the delivery of transdisciplinary research, equitable partnerships and capacity strengthening. As inter- and transdisciplinary research processes are fundamentally collaborative, a shift from an individual to a team mindset through team building is necessary. This requires negotiating working relationships and partnership aims beyond research objectives, including around capacity strengthening, partners' visions of success, how information is handled, and how authorship is credited. A partnership agreement can help to

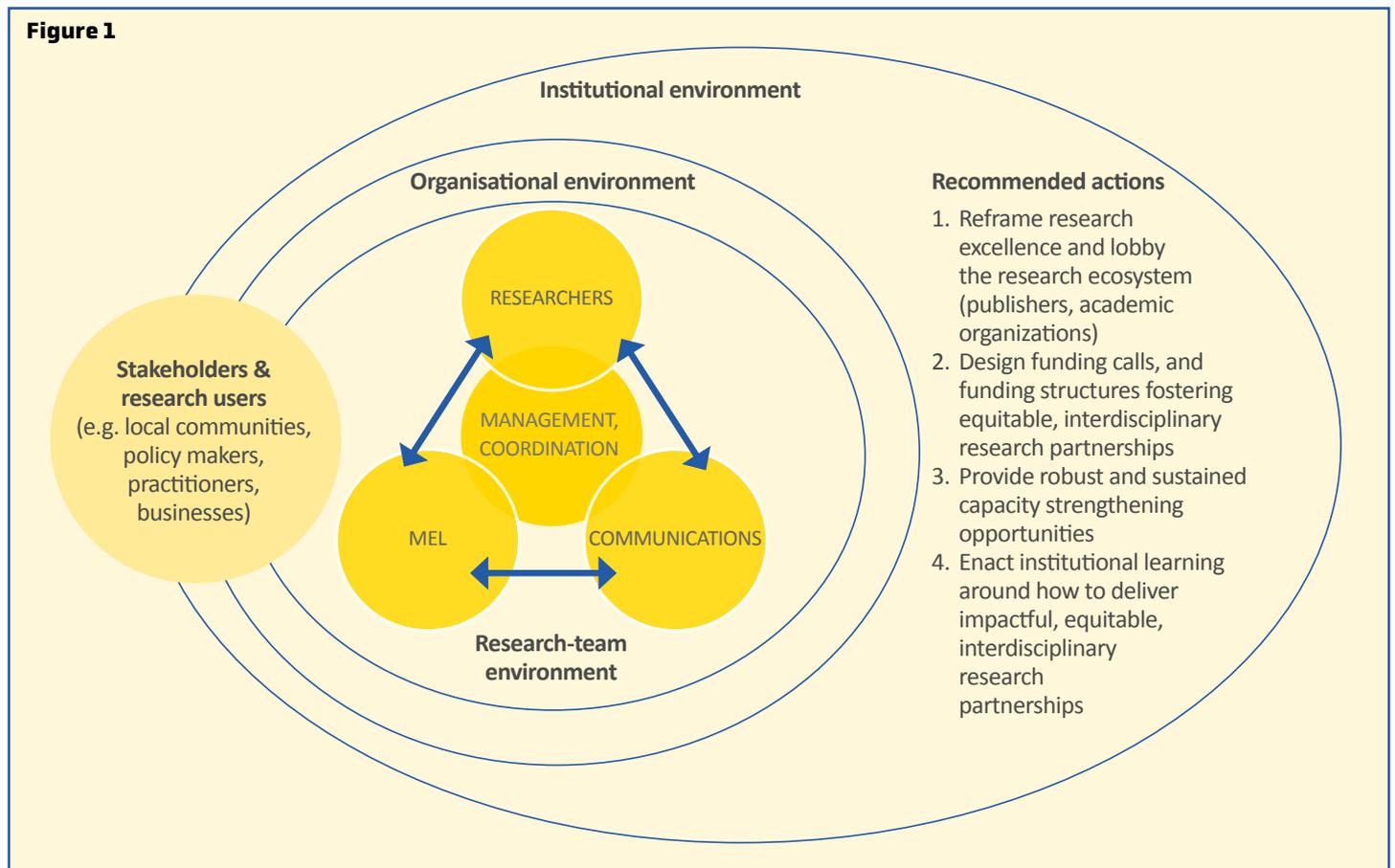
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minimise risks<sup>viii</sup> associated with different ways of working in participatory, multi-stakeholder partnerships.

- We found that **actively driving interaction between partners**, and establishing time for this, is essential to foster and sustain dialogue and support adaptive management. It helps build shared understanding and gives impetus to research planning and research integration, as well as relationship building. Sentinel strengthened interactions through frequent meetings, webinars, field research and annual partner workshops. Small working groups or meetings were important to build shared understanding, promote interdisciplinary working and foster more equitable engagement between northern and southern partners. They also supported the emergence of safe spaces to voice potential needs and concerns. Online interaction can help sustain relationships and information flow, but we found it does not replace the face-to-face in person interactions needed to energise collaboration. An online platform, easy to use and accessible to all partners, is needed to facilitate information sharing, particularly across geographies.

- It is important to **incorporate time for interaction and learning, exploration and relationship building**, and not to push co-creation and research integration prematurely. Sentinel was unable to implement the planned secondments for collaboration and capacity strengthening, given COVID-19 restrictions, but we recommend projects do so.
- **Interactions between researchers, MEL, Comms, and research management or coordination roles (fig. 1) are crucial** to ensure research is 'demand-driven' (i.e. designed to address identified research needs), to track the impact of transdisciplinary research partnerships, and to maximise research uptake. Our collective learning experience suggests the need to focus on these interactions from the start and embed Comms and MEL partners early on, to promote understanding of how their respective competencies and needs complement each other. This can be operationalised through regular meetings, annual partner workshops, collaborative 'write-shops' or by directly embedding MEL and Comms partners in the research process. Researchers can also engage directly with Comms partners, in the research user engagement process.

**Figure 1**



<sup>viii</sup> To support accountability, Sentinel established a partnership agreement, clarifying expectations around the delivery of demand-driven interdisciplinarity, equitable partnerships and capacity strengthening. This agreement included shared aims, definitions, ways of working, finance administration, internal peer-review processes and dispute resolution, and intellectual property rights. Sentinel also promoted accountability by regularly monitoring progress towards project objectives, through an internal progress tracking tool.

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- **Incorporating the right voices and expertise at the right time in the right discussions** is important to ensure effective decision-making that genuinely supports co-creation. When deciding who to involve, both the required research expertise and those whose ‘buy-in’ or support will become essential should be considered.
- **Dedicated facilitators and coordinators are key to fostering this process** – helping to manage social dynamics, the bridging of different perspectives and ‘languages’, ensuring participation and promoting dialogue and effective decision making.
- **It is important to negotiate the balance between discipline-based and collaborative, interactive working, as well as between procedural planning and research exploration.** Research teams should explore when in the research process is interdisciplinary working warranted. It is also helpful to consider a differentiated approach among project partners, particularly when they have different experience of interdisciplinary working. Fostering active engagement of all partners in the process is crucial to support capacity building and equitable partnerships.

## Monitoring, evaluation, and learning

Although the emphasis on MEL is often on tracking delivery of outputs and the intended impacts, we found it essential to harness MEL to support collaboration and capacity strengthening in the partnership and to capture lessons from this process.

Partner feedback highlighted the importance of the interviews and participatory workshops to fostering reflection and learning. The initial interviews allowed us to establish baseline capacities, which in turn guided capacity strengthening strategy development. They also supported lesson learning, to adaptively manage the project, and strengthen partners’ capacities for fostering successful transdisciplinary partnerships.

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