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Evaluation metrics in inter- and transdisciplinary collaboration

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Conventional metrics devalue inter- and transdisciplinary research by privileging short-term, quantifiable outputs over process and integration.

Introduction

This Briefing Note (BN) delves into the challenges of assessing the quality and impact of inter- and transdisciplinary work. The literature shows that inter- and transdisciplinarity are difficult to measure using current metrics. This difficulty is related, on the one hand, to the nature of inter- and transdisciplinary research, and on the other hand, to prevailing disciplinary and STEM-based norms that disadvantage inter- and transdisciplinary research, and SSH disciplines therein. The SSH CENTRE experiments confirm this, showing the benefits and limits of creating a conducive environment for greater SSH engagement in inter- and transdisciplinary research within a research collaboration. These insights highlight that overcoming metric barriers requires action across multiple levels, and the note concludes with corresponding recommendations for researchers, projects, and broader academic systems (including funding).

What did the SSH CENTRE project do?

SSH CENTRE (Social Sciences and Humanities for Climate, Energy aNd Transport Research Excellence) is a Horizon Europe project that focused on generating best practices for incorporating both Social Sciences and Humanities (SSH) and inter- and transdisciplinary research into the European Union's climate, energy, and mobility transition policy. The SSH CENTRE project deliberately created spaces for *epistemic experimentation* – i.e. structured collaborations that bridge different epistemic (knowledge) cultures to co-produce policy-relevant knowledge:

Interdisciplinary Collaborations for EU Policy Recommendations

The SSH CENTRE project facilitated nearly 30 novel collaborations between the SSH and STEM (Science, Technology, Engineering and Mathematics) disciplines, for strengthening European climate, energy, and mobility policy. These resulted in three edited books, whereby each Interdisciplinary Collaboration produced a chapter. For more see SSH CENTRE Interdisciplinary EU Policy Book Collection.

Transdisciplinary Knowledge Brokerage Initiative

The Knowledge Brokerage Initiative for sustainability transitions gathered 30 early- and mid-career SSH researchers working on themes of climate, energy, and mobility. These researchers actively engaged in accelerating the transition process towards a carbon-free society by working with six European cities on sustainability issues and brokering SSH knowledge. The researchers organised workshops and produced a range of reports that provided knowledge to support the cities' transitions. For more see Knowledge Brokerage Reports.

This Briefing Note is one of 10 that present the findings and recommendations from the evaluation of these epistemic experiments. For more, see the Introduction to the Briefing Note collection and the Formative Accompanying Research methodology.

Problem description and literature insights

The fundamental metric barriers in inter- and transdisciplinary collaboration stem from the reliance on traditional, narrow measures of academic quality that are incompatible with the nature and goals of inter- and transdisciplinary research. Such reliance creates significant disadvantages, particularly for the SSH disciplines. The metric barriers can be grouped into three areas: the failure to capture the evolving process of inter- and transdisciplinary knowledge integration and the long-term character of outcomes; the dominance of conventional metrics and quantification bias; and the issue of standards of generalizability and quantifiability.

Rather than static, inter- and transdisciplinary research is fundamentally dynamic and **evolving processes of knowledge integration** [1–3]. Knowledge integration is not a single event but is often undertaken in phases, such as problem framing, co-production of knowledge, and the integration and application of results [4–6]. Current output measures often fail to adequately capture these dynamic processes, assessing the products of research, such as publications and citations, rather than the quality of integration processes [2,7]. Furthermore, because the impacts of inter- and transdisciplinary research are long-term and often unforeseeable, dispersed across diverse areas, and can be delayed in time, it makes them difficult to capture with a priori measures [1]. Many inter- and transdisciplinary funding programmes explicitly aim for societal transformations that involve structural changes in worldviews, power relations, social networks, or physical infrastructure [4]. Such impacts are inherently long-term and systemic, making it exceptionally difficult to attribute them, using a logic of direct linear causality, to a single research project [8].

Another of the most significant barriers is the persistent use of **conventional academic output metrics**, which typically prioritize disciplinary research [3,6]. Evaluation is primarily based on measures of academic outputs, such as the number of publications, the prestige of the publishing journal (often expressed through its impact factor), and citation counts. This metric inherently favours fields, often in STEM, where data are standardised and traditional journal publications are the primary output [2,3]. However, SSH authors often publish in book chapters and regional non-English journals, which are typically not covered by major bibliometric databases like ISI or Scopus, thus making their contributions less visible and measurable [2]. Importantly, there is a strong preference in evaluation documents and funding calls for quantified performance indicators and statistical evaluation metrics, rather than qualitative judgements of research quality [9]. The push for standardised, quantifiable, and scalable metrics often reflects a STEM-centric worldview that misunderstands and devalues the unique contributions and validation standards of SSH, thereby creating significant barriers to genuine knowledge integration and reinforcing power asymmetries [9–11].

This issue comes from a **fundamental misunderstanding of the differences between SSH and STEM disciplines**. Inter- and transdisciplinary research often involves both SSH and STEM fields, yet traditional forms of academic evaluation are largely shaped by STEM norms (such as the number of patents or citations) [1]. However, SSH and STEM disciplines study fundamentally different kinds of phenomena. STEM fields typically investigate phenomena that follow regular, law-like patterns, whereas social sciences study phenomena that are culturally and socially dependent [12,13]. For that reason, **many branches of social sciences and humanities do not look for general laws but interpret behaviours and meanings instead**. Even when social sciences employ quantitative methods to identify patterns and correlations, the interpretation of these patterns requires contextual and cultural understanding. It is impossible to understand society without understanding meaning, and meaning cannot be found in a similar way as natural laws are.

Values, ethics, and reflexivity are important in inter- and transdisciplinary research, which acknowledges that researchers themselves, and the research processes, shape the way in which phenomena are studied and understood [12,14]. A strength of SSH is its centring of the role of positionality and its acknowledgment of subjectivity. When SSH is pushed towards evaluation metrics that originate in STEM logics (i.e. a positivist paradigm), it loses its power to contribute with understandings that recognize the specificities of the (social) phenomena it studies.

Of course, science often studies phenomena that fall within the remit of *both* SSH and STEM research. This is precisely when inter- and transdisciplinary research is highly relevant. However, if the metrics used to evaluate such research are unable to recognise the value of SSH disciplines, it can have negative consequences ranging from research being rejected due to an inability to assess its SSH dimension, to internal tensions within research teams where SSH disciplines are considered subordinate (which, as BN1 shows, is common).[1]

Manifestation in the SSH CENTRE

The SSH CENTRE actively created a conducive environment for greater SSH engagement in inter- and transdisciplinary research, but of course, the project was not isolated from dominant metric regimes. Metric standards in the SSH CENTRE project were manifested both directly, through norms (especially disciplinary ones), which were an important influence that needed to be addressed, and indirectly, through previous experiences with other researchers' projects. At the level of project and broader academia norms, researchers mentioned how metric regimes create structural disincentives for inter- and transdisciplinarity – especially in contrast to the SSH CENTRE.

> *Universities are run increasingly on the basis of metrics and the basis of outputs and the basis of being able to quantify everything, which then gets in the way of taking risks, which gets in the way of talking to people from outside your disciplines because in order to maximise your own metrics, all you want to do is just gather as much as you can for yourself and then, you know, use that as a basis for evaluation.* (MEXP8, Interdisciplinary Collaborations)

1 These concerns echo ongoing reform movements. At the international level, initiatives such as DORA (Declaration on Research Assessment), the Leiden Manifesto, and the Coalition for Advancing Research Assessment (CoARA) advocate replacing simplistic metrics with broader, qualitative evaluation principles.

Multiple researchers mentioned that in academia, there is a structural embedding of metric barriers that favour predominantly quantifiable and short-term results. This leads both funders and researchers to avoid exploratory or experimental inter- and transdisciplinary work, as their outcomes are uncertain, hard to measure, and slow to emerge. Moreover, metric-driven incentives can discourage collaboration across disciplines, even when researchers may personally value it.

As mentioned in the previous section, a significant part of the discrepancy between metrics and inter- and transdisciplinary research stems from STEM-based standards, which are unable to appropriately capture the benefits of SSH disciplines. Recognising the different but equally valid approaches of SSH and STEM disciplines was a very important part of scientists' reflection within the SSH CENTRE activities, enabling the inter- and transdisciplinary collaboration itself. The SSH CENTRE fostered the position of SSH in inter- and transdisciplinary collaborations, but this did not happen by itself and negotiations between different disciplines were, of course, necessary – and these processes show the continuing influence of dominant STEM standards.

Among some STEM researchers, there was a noticeable tendency to rely on quantitative methods in the overall inter- and transdisciplinary research design. When confronted with ambiguous or value-laden goals (e.g., citizen engagement), some resorted to quantitative targets, which created friction at the start of integration and required negotiation. This illustrates the process-metric misfit mentioned in the literature above: project goals around deliberation, inclusion, or values cannot easily be reduced to metrics, yet some STEM members, drawing on their disciplinary education, tried to recast them into quantifiable form. In a debrief interview for the Knowledge Brokerage Programme, a mentor described an initial insistence of one STEM researcher on numbers and quantification, which eased later through the collaborative process and exposure to other logics. Inter- or transdisciplinary leadership and mentorship were vital in such cases (see BN7). Similarly, one participant mentioned a friction in the Knowledge Brokerage Programme related to disagreement about methodology:

> *At the beginning, for example, [Researcher20] was really strong in the fact of proposing some methods, quantitative methods and data, and was going on with this for months. So, we were literally talking different languages and with different perspectives. That doesn't mean that we were angry at each other, but that it was really hard to move on something different than quantitative.* (FECR2, Transdisciplinary Knowledge Brokerage Initiative)

The continuous negotiation of different research logics and the value of an alternative approach to the dominant STEM-based, quantification-driven approach was particularly evident in the interdisciplinary experiments, which directly targeted SSH-STEM collaborations. Throughout and after the collaboration, many STEM scientists repeatedly mentioned that they recognized the value of SSH science when they understood the methodology of measurement or differing abilities to generalize. One STEM researcher described SSH as exploring "more erratic" subject matters:

> *For the same situation, you have two different behaviour[s]. And [to] understand why these people behave like this, and those ones behave like this – for me, that's social studies. So it's something very difficult for us in [STEM] because (…) we work most of the time in the deterministic world and sometimes, like in [a field of physics] (…), it's [a] probabilistic world, but the human behaviour, that's something more erratic. So, it's very difficult to develop an exact mathematical model to explain the behaviour and people's choices.* (MEXP1, Interdisciplinary Collaborations)

The relationship between STEM and SSH disciplines is discussed in greater detail in BN1, which also mentions the experienced difference between proving and explaining as distinct approaches in STEM and SSH fields as manifested in the SSH CENTRE project.

Recommendations at individual, project, and systemic levels

Because conventional evaluation metrics misrepresent the quality of inter- and transdisciplinary work, overcoming metric barriers requires action across multiple levels: individual researchers, project design, and systemic evaluation frameworks.

Recommendations at the individual/researcher level

- Do not assume that the value of your inter- and transdisciplinary approach is self-evident. Explicitly justify your methods and demonstrate how they meet both disciplinary and inter/transdisciplinary quality standards, especially if your work violates established disciplinary tenets or reveals limitations [1].
- Clearly articulate how your outputs transcend disciplinary silos and achieve epistemic integration, including practicing active reflexivity [2].
- Embrace your inter- and transdisciplinary identity as valuable and distinct, rather than viewing it as a deviation from disciplinary norms. It can be particularly helpful to participate in supportive communities that engage in an honest exchange of vulnerabilities among colleagues for mutual empowerment [15].

Recommendations at the project level

- Adopt context-specific quality criteria. One proposed solution is a rubric-based assessment tool grounded in four core principles: relevance, credibility, legitimacy, and effectiveness [3].
- Invest in developing and using "process knowledge" – the methods and structures that help design, execute, and evaluate inter- and transdisciplinary research – and employ evaluation frameworks that align with SSH values such as fairness, inclusivity, and long-term impact [5].
- Integrate formative tools like logic models, log-frame analysis, or radar-like graphs to define and track progress toward integration and learning goals throughout the project lifecycle [1].

Recommendations at the systemic/broader academia and funding level

- Move beyond conventional "proxy" metrics (e.g., publications, citations) and develop direct measures of quality that assess the substance of the research, such as its coherence, novelty, experimental rigour, or problem-solving effectiveness [1].
- Reform peer review of research proposals to be fairer to inter- and transdisciplinary research. Key recommendations include:
  - Select review panel members for their experience in inter- and transdisciplinarity [3].
  - Use matrix panels that combine disciplinary and interdisciplinary experts [1].
  - Train staff and reviewers to distinguish genuine interdisciplinarity and provide clear instructions aligned with the inter- and transdisciplinary goals of the funding call [16].
  - Allocate time at the start of panel meetings for reviewers to develop a common understanding of the evaluation criteria [16].
  - Ensure evaluation guidelines are more open to different ways of doing and writing science and stop systematically excluding qualitative analyses.
- Identify emergent fields that do not fit into existing categories through co-citation networks and term clustering – with the goal to create flexible assessment frameworks tailored to context, scale, and stage of integration, rather than enforcing universal standards [2].
- Allow for projects to 'fail'. All project funding seems to ask for success-related evaluations (such as KPIs), with no space to say it did not work. Likewise, so-called experimental approaches are often talked about in terms of scaling-up before the project ever begins.
- Allow fixed-term researchers to lead grant applications and design reward mechanisms that value transformative societal outcomes, not just publications [1].

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